Salt Lake County deputy sheriff Craig Meyer also responded as part of the sheriff's SWAT team. Id at 941. He also arrived around 6:00 that evening. Id at 942. The area around the house was being contained by police officers when the garage was set on fire. Id at 944. At that point the members of the swat team were ordered to enter the residence. Id. Upon entering the building the deputy saw Mr. Vanisi down a hall way to his right. Id at 948. Mr. Vanisi was holding a gun. Deputy Meyer raised his weapon and shot Mr. Vanisi in the arm. Id at 949-950.[18] While firing at Mr. Vanisi the deputy proceeded to back out of the residence. Id at 950-951. About ten minutes later Mr. Vanisi stepped outside and, failing to respond to the officers' commands, was shot with a "bean-bag" round to subdue him. Then he was taken into custody. Id at 951-952.

The State rested its case-in-chief at this point. Id at 994. Mr. Vanisi elected not to testify. Id at 971. Without calling any defense witnesses, the defense also rested. Id at 995.

The jury found Mr. Vanisi guilty of one (1) count first degree murder with the use of a deadly weapon; three (3) counts of robbery with the use of a deadly weapon; and one (1) count of grand larceny. Id at 1043-1045; and see ROA Vol. 6 at 1722-1727 (Verdicts).

Penalty Phase

The State's first penalty witness was Michael Wiley, a correctional officer with the Nevada State Prison. ROA Vol. 28 at 1133-1134. He testified that on May 24, 1998, he was on watch in the Unit 12 yards of the Nevada State Prison. Id at 1135-1136. Mr. Vanisi was in the "walk-alone yard" and refused to respond to a command to come to the gate to be locked

[18] Mr. Vanisi did not fire any rounds at the deputy. ROA Vol. 25 at 953.

up. Id at 1135-1137.[19] According to the officer Mr. Vanisi had begun to dig a hole under one of the fences. Id at 1138. Mr. Vanisi would not stop and eventually the officer shot at him with real hard rubber pellets. Id at 1139-1141. Another correctional officer also took shots at Mr. Vanisi. Id at 1141. Ultimately Mr. Vanisi was removed from the yard. Id at 1142.

Next, Nevada State Prison correctional officer David Molnar testified concerning an incident that occurred three days later on May 27, 1998. Officer Molnar testified about Mr. Vanisi's barricading himself in his cell and the efforts taken to successfully remove him from that cell. Id at 1154-1160.

The State's next witness was Deborah Mann, a Correctional Case Work Specialist 3 at the Nevada State Prison. Id at 1168. As part of her duties she completed an assessment of Mr. Vanisi concerning levels of dangerousness or threat to staff and/or other inmates. Id at 1169-1172. She opined that Mr. Vanisi was "very volatile and very conniving" and was considered by her to be a significant risk to staff and inmates. Id at 1172.

The State also called a couple of Washoe County deputies to testify about discipline problems Mr. Vanisi had at the Washoe County Jail -- chiefly failure to timely return to his cell when ordered to. See Id at 1178-1195 (James Ellis); Id at 1214-1224 (Geoffrey Wise).

Vainga Kinikini, who had testified in the State's case-in-chief was called back to relate to the jury that on January 14, 1998, when he was talking to Mr. Vanisi in Utah, Mr. Vanisi told him that he [Mr. Vanisi] was insane and that he didn't care about anything anymore and that he was free and that he had to kill some more to keep his high. Id at 1209. On cross-examination Mr. Kinikini made clear that he thought Mr. Vanisi had gone crazy. Id at 1210.

[19] For what it's worth Mr. Vanisi was not in the prison under any sentence. Rather he was being held as a courtesy to the Washoe County Jail. ROA Vol. 28 at 1150, 1172-1173.

He noted that the Vanisi he was talking to in Utah wasn't the Vanisi he had known previously. Id at 1211.

The State's final witnesses were Sergeant Sullivan's sister, a UNR police colleague, Sergeant Sullivan's wife and daughter who each gave emotionally moving victim impact statements in this case. Id at 1237-1248 (Sue Millard); Id at 1248-1267 (Stephen Sauter); Id at 1267-1308 (Carolyn Sullivan); and Id at 1308-1310 (Meghan Sullivan). With that the State rested. Id at 1310.

In mitigation the defense called twenty-one (21) friends and family members who recounted stories concerning Mr. Vanisi's birth, early family life in Tonga, his eventual move to the United States, his early schooling and church activities in the Mormon church. The testimony given by these witnesses painted a picture of a loving family and a loving child; a picture of Mr. Vanisi's kindness and support to his friends and family members (including his wife). But finally, a picture of a man who, for unknown reasons began to act oddly and in a fashion his family could not explain and which hurt them. ROA Vol. 28 at1311-1335; ROA Vol. 29; ROA Vol. 30. Deanne Vanacey, Mr. Vanisi's wife and the mother of his two children also testified concerning Mr. Vanisi's drug use and odd behavior. She said that about six months after they were married Mr. Vanisi would want to dress like a superhero. ROA Vol. 29 at 1490-1491. She noted that it didn't happen over night but rather happened over a period of time. Id at 1491. Mr. Vanisi would also pretend to be different people and would pose in front of a mirror pretending to be different people and giving himself different names. Id at 1492. She testified that Mr. Vanisi began to use Phen Fen. Id at 1493. And that he would act "very

strange, very weird. He would ramble." Id at 1495. Ms. Vanacey testified that Mr. Vanisi's behavior became progressively worse and bizarre. Id at 1495-1496.

The defense also presented the testimony of Dr. Ole Thienhaus, a psychiatrist presently employed at the Washoe County Jail. ROA Vol. 29 at 1439-1440. Dr. Thienhaus, in the course of his duties at the jail saw and treated Mr. Vanisi. Id at 1442. His impression of Mr. Vanisi was that he was possibly bipolar or cyclothymia and he recommended a drug -- Depakote -- for Mr. Vanisi. Id at 1443. Depakote is a mood stabilizer. Id at 1453. Later, Dr. Thienhaus put Mr. Vanisi on the antipsychotic drug Risperdal as well as a sleeping medication. Id at 1454. Mr. Vanisi was also on lithium. Id at 1455. Dr. Thienhaus opined that Mr. Vanisi suffered from a bipolar disorder. Id at 1457.

After the defenses rested [ROA Vol. 30 at 1691-192], the State called Reno Police Detective David Jenkins as its sole rebuttal witness. Id at 1697. Detective Jenkins testified that Mr. Vanisi's wife -- Deanne Vanacey -- "adamantly declined" to speak with him in any kind of official setting. Id at 1700. Concerning Mr. Vanisi, the detective testified that he was part of the detail that returned Mr. Vanisi back to Reno from Salt Lake City. Id at 1700-1701. According to the detective, while in the Salt Lake City airport Mr. Vanisi complained about his mother ever bringing him to the United States and that he would have been happier in Tonga. Id at 1702.

Mr. Vanisi elected not to testify but did make a statement in allocution:

> I want to say that I'm sorry the Sullivan family has gone through this. I'm sorry that my family has gone through this. If I had known that I was ill, I would have gone to the doctor. I used speed and marijuana before coming to Reno, and used it for the week that I was here. I didn't sleep much.

> This is not an excuse, but a reason. I fell away from my church and my values. If given the opportunity, I hope to try and help others avoid the nightmare of drugs and despair. Maybe this will help the Sullivan family and my family with their grief. Thank you.

Id at 1720.

The jury sentenced Mr. Vanisi to death for the first degree murder of George Sullivan. ROA Vol. 32 at 1854-1855; and see ROA Vol. 6 at 1768-1769 (Verdict). This automatic appeal followed.[20]

ARGUMENT

Guilt Phase

JUDGE STEINHEIMER COMMITTED REVERSIBLE ERRROR WHEN SHE DENIED APPELLANT'S PRETRIAL *FARETTA* MOTION FOR SELF-REPRESENTATION WHERE, AS HERE, THE RECORD DOES NOT SUPPORT, AND DOES NOT PROVIDE, A BASIS FOR THAT DENIAL.[21]

A criminal defendant is entitled to waive his Sixth Amendment right to counsel. See *Faretta v. California*, 422 U.S. 806, 807 (1975). A waiver of the right to counsel must be knowing, intelligent and unequivocal. Id at 835; *Harris v. State*, 113 Nev. 799, 801, 942 P.2d 151 (1997). The Supreme Court has for many years recognized the right to self-representation. Indeed, the Court has extended the *Faretta* right to all defendants, even those who are mentally impaired, so long as they are "competent to stand trial." *Godinez v. Moran*, 509 U.S. 389, 399-400 (1993). "The test of a valid waiver is not whether specific warnings or advertisements were given but whether the record *as a whole* demonstrates that the defendant understood the disadvantages of self-representation, including the risks and complexities of a particular case."

[20] Other facts necessary to this appeal are set forth in the Argument portion of this Opening Brief.

Harris, supra, 113 Nev. at 801 (italics added, citations and internal quotation marks omitted). "The relevant assessment examines the accused's competence to choose self-representation, *not his ability to adequately defend himself*." Id at 802 (italics added, citation omitted). A defendant "has the constitutional right to refuse the service of counsel, so long as he does so knowingly and intelligently." Id at 803 (citing *Lyons v. State*, 106 Nev. 438, 443, 796 P.2d 210 (1990). Denial of that right is per se harmful." Id.

In this case, prior to the second trial, Mr. Vanisi filed a motion with the district court seeking to exercise his Sixth Amendment right to conduct his own defense himself; that is, he sought his *Faretta* right for self-representation. On August 10, 1999, Judge Steinheimer held a hearing to conduct a canvass of Mr. Vanisi concerning his *Faretta* request. ROA Vol. 5 at 1333-1418.[22] At the conclusion of Judge Steinheimer's canvass defense counsel remarked that he thought Mr. Vanisi had "passed that canvass with flying colors. I think this Court has no alternative but to grant this man his penultimate constitutional right to represent himself, and any other decision by this Court creates reversible error." Id at 1412. The prosecution too thought that Mr. Vanisi had demonstrated that his request for self-representation was made knowingly and intelligently. "[MR. STANTON]: " I would agree with Mr. Gregory that Mr. Vanisi passed most, if not all of the Court's inquiry this morning." Id at 1412-1413. On the question whether Mr. Vanisi's request would delay the trial, the prosecutor acknowledged that it would not:

> ... Mr. Vanisi, I think, two times this morning, and confirmed by Mr. Gregory, indicated that indeed he would be prepared to go to

[21] Although the following argument concerning the right to self-representation is being made in the "guilt phase" portion of this brief the error complained of obviously infects the entire proceedings including the "penalty phase." Thus by this reference this argument is made applicable to the "penalty phase" as well.
[22] This canvass was conducted in conformity with Supreme Court Rule 253.

> trial as his own counsel on September 7 this year. So to the extent now the State has what appears to be a confirmation of its concerns or lack of concerns that the timeliness of the motion and the delay *is not an issue*, that we are looking at a September 7 trial date with no delay.

Id at 1413 (italics added). The prosecution then addressed the question of whether Mr. Vanisi's intent by seeking self-representation was one of disrupting the judicial process. Again, the prosecution found no problem:

> ... I would indicate to the Court that at least the times in court that the State has been present -- we obviously were not present during another motion hearing. But certainly this morning Mr. Vanisi has been anything but disruptive. I think he responded very literally to the Court's inquiry, was cognizant of the questions and the proceedings surrounding them, oriented to time and place, *and satisfies that criteria across the board.*

Id at 1414 (italics added). Mr. Stanton noted that "[t]his would be my fourth pro per felony matter and Mr. Vanisi's distinctly and cognitively more adept at defending himself than any defendant I have ever been involved with." Id at 1414-1415. Mr. Stanton noted that Mr. Vanisi's "ability to read and process information [was] significant." Id at 1415. Mr. Stanton also acknowledged that "the law does not recognize as a significant consideration the extent of someone's legal knowledge." Id. Summing up, Mr. Stanton said:

> But the State is certainly aware of the unequivocal and fundamental constitutional right that has been endorsed time and again by the United States Supreme Court and the Nevada Supreme Court. This is the powerful right of one to represent themselves [sic]. *The State has seen nothing in the canvass this morning that would render Mr. Vanisi incapable pursuant to our guidelines of representing himself*, although we collectively do it, make that assessment with a severe degree of caution.

Id at 1415-1416 (italics added). Notwithstanding that "degree of caution" Mr. Stanton told the court: "I think that he's satisfied all the requirements" and "...if the record is looked at closely

and the rule of law is followed, I believe Mr. Vanisi's right prevails. And that is the State's position on this motion." Id at 1416.

Judge Steinheimer took the matter under submission but appeared to be prepared to grant Mr. Vanisi's motion: "THE COURT: Counsel, we have a ten a.m. hearing tomorrow morning. I am going to issue my decision right before that hearing. *However, I encourage Mr. Vanisi to be prepared for that hearing tomorrow.*" Id at 1417 (italics added).

The next morning Judge Steinheimer entered her order. ROA Vol. 5 at 1287-1296. In a stunning about face Judge Steinheimer denied Mr. Vanisi's motion for self-representation chiefly on the basis that it was untimely and made for the purpose of disputing the judicial process. This ruling finds no support in the record as a whole and constituted an unconstitutional infringement on Mr. Vanisi's rights under the Sixth Amendment. As such, it is reversible error *per se*. *Lyons v. State*, 106 Nev. at 443; *Harris v. State*, 113 Nev. at 803.

Judge Steinheimer first found that the motion was made for "the purpose of delay." Id at 1290. However, the record belies that finding. ROA Vol. 5 at 1375 ([MR. VANISI]: "So yeah, if you're not so, you are incorrect when you say I'm doing this to delay. I'll be ready on September 7. I will be ready September 7."); Id at 1375-1376 ("... but I wanted to put on the record that I'm not, I'm not -- I'm not delaying time. I will be ready on September 7.").

Judge Steinheimer's next basis for denying the motion was that she perceived it was made for the purpose of disrupting the judicial process. ROA Vol. 5 at 1290. Again the record does not support this finding:

> I don't intend to do anything that would violate the constitutional or the court law or any law. My pure intention of a tactical decision, it's just as I said first was, it was in my best interest. And that is why I want to represent myself, because it's

> in my best interest to pose as myself as a person who litigates for himself.

ROA Vol. 5 at 1376. In response to a follow up question concerning previously litigated motions -- Judge Steinheimer asked Mr. Vanisi if he was going to try and raise motions that had previously been raised [Id] -- Mr. Vanisi said he was not going to play games [Id] and that:

> [t]he point of representing myself is to behave and to comport with the justice system and to comport with your, with the court rules and comport with this rule, and just obey the commandments that are expected of me and to represent myself along those guidelines; not to meander off course or to wander aimlessly in a muddle. I don't, I don't plan on raising any of those arguments that I have already argued in this court. I am moving on.

Id at 1377.

Judge Steinheimer next suggested that perhaps Mr. Vanisi sought to represent himself so that he would be "released from the restraints that [he was] placed in." Id at 1378. Mr. Vanisi appropriately responded: "No, that's frivolous. . . . . That's not my intention." Id. Later, Mr. Vanisi's counsel observed (with no disagreement voiced on the record by either Judge Steinheimer or the prosecution): "[t]his man's behavior has been impeccable over a year in this courtroom." Id at 1386; and see Id at 1388 ("This man's behavior, I reiterate, has been impeccable since this case first came into this courtroom. He had five days when he was in trial. He minded his manners. He's observed decorum. He's paid respect and courtesy to this Court."); and Id at 1389 ("He's answered all your questions. He's going to behave himself. He's not going to delay anything. He wants to go to trial September 7.").

A fair reading of Judge Steinheimer's order demonstrates that the expressed concern about the serious disruption of judicial proceedings was in actuality a concern about the inherent inconvenience of a *pro per* defendant:

> [d]uring the Rule 253 inquiry by the Court, the Defendant exhibited difficulty in processing information. He took an extremely lengthy period of time to respond to many of the Court's questions, the courtroom proceedings stopping for *two or three minutes* at times while he pondered his answer. The Court was asked to repeat the same question many times before answering. In addition, the Defendant refused to answer the Court's question because he believed it to be an "incomplete sentence." He frequently asked the Court questions rather than answering the Court's questions directly. Further, he spoke out loud to myself in such a manner that it was at times difficult to determine if he was speaking for his own benefit or to the courtroom audience or to the Court. Further, Mr. Vanisi has previously been observed making statements under his breath while others were speaking in court. Moreover, at past hearings, Mr. Vanisi has been observed standing up and engaging in unsettling rocking motions, as well as repeating himself over and over again. Based on this combination of words and gestures during prior proceedings, this Court has concern about *future* disruptions during trial.

ROA Vol. 5 at 1290-1291 (italics added). This Court's first question should be "what disruption?" Is it the fact that Mr. Vanisi "ponders" or thinks about the answer he is about to give? Is it the fact that Mr. Vanisi sought clarification concerning the questions asked of him before he was about to answer? Is it that fact that Mr. Vanisi chose not to answer a question he perceived to be incomplete? Is it that Mr. Vanisi would speak an answer to himself on occasion before answering the court on the record? Can Judge Steinheimer really say that a

rocking motion is disruptive -- and if so, where in any of the transcripts of any hearing and/or the first trial has this fact been brought to anyone's attention?

As Justice Rose noted in his dissenting opinion in *Tanksley v. State*, 113 Nev. 997, 946 P.2d 148 (1997):

> *Illinois v. Allen*, 397 U.S. 337, 346, 90 S.Ct. 1057, 1062, 25 L.Ed. 2d 353 (1970), clearly explains that behavior will be considered "disruptive" only if it is of an "extreme and aggravated nature." In *Allen*, the defendant, during trial, threatened to kill the judge, argued with the judge in an abusive and disrespectful manner, threatened to disrupt the proceedings by constantly talking, and answered the judge's questions with abusive and vile language. The judge repeatedly warned the defendant about his behavior and then expelled the defendant from the proceedings. *Id.* at 339-41, 90 S.Ct. at 1058-60. The United States Supreme Court concluded that Allen's actions were of such an "extreme and aggravated nature" as to justify the judge's remedial actions. *Id.* at 346, 90 S.Ct. at 1062.

113 Nev. at 1006. In his dissent, Justice Rose distinguished between actions of an "extreme and aggravated nature" -- "as to be considered 'serious and obstructionist conduct' pursuant to *Faretta* and *Allen*" -- and that of the mere "'inherent inconvenience' caused by a pro se defendant." 113 Nev. at 1006-1007 (citing *Lyons*, 106 Nev. at 444 n. 1). The lesson, of course, is that where serious and obstructionist behavior may form the basis for a denial of self-representation, the "inherent inconvenience" caused by a *pro se* defendant will not.

Judge Steinheimer had three fallback positions, neither of which supports her order. First, that this was a complex case. In *Godinez*, the United States Supreme Court observed (quoting *Faretta*), "... we made it clear that a defendant's 'technical legal knowledge' is 'not relevant' to the determination whether he competent to waive his right to counsel, and we emphasized that although the defendant "may conduct his own defense ultimately to his own

detriment, his choice must be honored. Thus, while '[i]t is undeniable that in most criminal prosecutions defendants could better defend with counsel's guidance than by there own unskilled efforts' a criminal defendant's ability to represent himself has no bearing upon his competence to *choose* self representation." 509 U.S. at 400. Judge Steinheimer's "complex case" rational is really the "inconvenience of a *pro se* litigant" rational turned on its head.

Second, Judge Steinheimer found that Mr. Vanisi did not understand the potential penalties that could be imposed in this case. ROA Vol. 5 at 1293. Wrong. Mr. Vanisi clearly articulated that first degree murder carried a possible death penalty and/or a sentence of life in the Nevada State Prison with or without the possibility of parole. ROA Vol. 5 at 1367.[23] Mr. Vanisi also correctly informed the court of the possible sentences for robbery and grand larceny as well as noting that each sentence could be doubled due to a weapon enhancement and that the district court could order consecutive or current sentences. Id at 1367-1368. Mr. Vanisi even knew what would occur in terms of an appeal, that is, the automatic nature of an appeal from a sentence of death, as well as, the thirty (30) day jurisdictional time frame to file a notice of appeal in all other criminal cases. Id at 1372.

Finally, Judge Steinheimer denied Mr. Vanisi's motion because of the medications he was taking. Id at 1294 (expressing concern about whether drowsiness "could" affect defendant's ability). However, the doctor treating Mr. Vanisi, under questioning by the prosecution, testified that the medications that Mr. Vanisi was taking would not affect his mental abilities to address issues as his own lawyer. ROA Vol. 5 at 1406; and see Id at 1407 ("[MR. STANTON]: So there's nothing about -- you use the term psychotropic medication.

There's nothing about either of these, either the dosage amounts or combination with one another, that would cause Mr. Vanisi to be mentally incapable of handling the issues that are confronting him in this context; is that correct? A. That is correct. If you again permit me to say, thinking of Mr. Vanisi as an average adult male of sound body frame and so forth, there is nothing, that's correct.").

It is respectfully submitted that Judge Steinheimer improperly denied Mr. Vanisi's *Faretta* motion for self-representation. This Court's full and complete review of the transcript of the canvass conducted by Judge Steinheimer will convince this Court -- as it convinced both defense counsel and the prosecution at its conclusion -- that Mr. Vanisi sought to represent himself and wished to waive court appointed counsel and that he was exercising his Sixth Amendment right in that regard in a knowing, intelligent and unequivocal manner. Further, the record demonstrates that Mr. Vanisi knew and understood the nature of the charges against him; the possible penalties; and the dangers and disadvantages of self-representation. That is to say Mr. Vanisi knew what he was doing and made his choice with eyes wide open. *United States v. Farhad*, 190 F.3d 1097, 1099 (9th Cir.1999). Accordingly, it was reversible error to denied Mr. Vanisi's motion particularly here, where the motion was denied merely to save the district court the inconvenience of a *pro se* defendant.

Because the State of Nevada "may not 'compel a defendant to accept a lawyer he does not want'" [*Arajakis v. State*, 108 Nev. 976, 980, 843 P.2d 800 (1992)(citation omitted)], this case must be reversed and remanded for a new trial in order for Mr. Vanisi to be able to defend himself in his own voice.

[23] That Mr. Vanisi did not mention the possible term of years as a penalty should be of little relevance.

THE REASONABLE DOUBT INSTRUCTION GIVEN IN THIS CASE IMPERMISSIBLY REDUCED THE STATE'S BURDEN OF PROVING FIRST DEGREE MURDER BEYOND A REASONABLE DOUBT IN VIOLATION OF DUE PROCESS OF LAW.

The "standard of proof beyond a reasonable doubt," said the United States Supreme Court, "plays a vital role in the American scheme of criminal procedure because it operates to give 'concrete substance' to the presumption of innocence, to ensure against unjust convictions, and to reduce the risk of factual error in a criminal proceeding." *Jackson v. Virginia*, 443 U.S. 307, 315 (1979)(citation omitted). But, as Justice Blackman observed:

> [d]espite the inherent appeal of the reasonable doubt standard, it provides protection to the innocent only to the extent that the standard, in reality is an enforceable rule of law. To be a meaningful safeguard, the reasonable doubt standard must have a tangible meaning that is capable of being understood by those who are required to apply it.

Victor v. Nebraska, 511 U.S. 1, 29 (1994) (Blackman, J., concurring in part and dissenting in part). A "misstatement of the reasonable-doubt standard is prejudicial to [a] defendant, as it 'vitiates all the jury's findings,' and removes the only constitutionally appropriate predicate for the jury's verdict." Id (citation omitted).

In this case the district court instructed the jury on the concept of "reasonable doubt" based upon the provisions of NRS 175.211. ROA Vol. 6 at 1696 (Instruction No 18 [guilt phase]).[24] Contrary to Justice Blackman's admonition that to be meaningful a reasonable doubt instruction must "have a tangible meaning that is cable of being understood by those who are required to apply it," Nevada's instruction requires a jury to conceptualize reasonable doubt as

[24] And ROA Vol. 6 at 1748 (Instruction number 5 [penalty phase]). In each case the instruction was objected to by defense counsel and an alternative instruction offered. ROA Vol. 24 at 872 (guilt phase); ROA Vol. 29 at 1543 (penalty phase). Although this argument is advanced in the guilt phase portion of this brief it is equally applicable to the penalty phase and by this reference is incorporated therein.

that kind of doubt that would "govern or control a person in the more weighty affairs of life." As will be shown below, this standard is neither tangible nor meaningful.

The difficulty in this formulation of "reasonable doubt" is that it involves a risk-taking analysis that is wholly unlike the decisions a jury must make.[25] In 1989, the Supreme Court of the state of Utah directed trial courts in that state "to discontinue use of [the more weighty affairs of life language] in their instructions on the definition of reasonable doubt." *State v. Ireland*, 773 P.2d 1375, 1380 (Utah 1989). The dissent in *Ireland*, which later became the law in Utah,[26] collected cases critical of the "more weighty affairs of life" formulation of reasonable doubt. The dissent's eloquent analysis (which was later adopted by the court) is instructive to the issue at hand:

> ... it is not proper to instruct a jury that a reasonable doubt is one which "would govern or control a person in the more weighty affairs of life." Nothing that one ordinarily does in the course of a normal life span is comparable to the decision to deprive another of either his life or liberty by voting to convict for a crime. See *Scurry v. United States*, 347 F.2d 468 (D.C.Cir. 1965), cert. denied, 389 U.S. 883, 88 S.Ct. 139, 19 L.Ed.2d 179 (1967). Profound differences exist between decisions to enter into marriage, buy a home, invest money, have a child, or have a medical operation -- or whatever else might be deemed a weighty affair of life,

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[25] Justice Ginsburg made this point when analyzing similar "hesitate to act" language:

> [a] committee of distinguished federal judges ... has criticized this "hesitate to act" formulation "because the analogy it uses seems misplaced. In the decisions people make in the most important of their affairs, resolution of conflicts about past events does not usually play a major role. Indeed, decisions we make in the most important affairs of our lives -- choosing a spouse, a job, a place to live, and the like -- generally involve a very heavy element of uncertainty and risk-taking. They are wholly unlike decisions jurors ought to make in criminal cases."

Victor v. Nebraska, 511 U.S. at 24 (Ginsburg, J., concurring in part and concurring in judgment [citation omitted]). The same, noted in the text above, can be -- and has been in other states -- said about the "more weighty affairs of life" language offered to Nevada juries.

[26] See *State v. Johnson*, 774 P.2d 1141 (Utah 1989).

The mental process employed in deciding that someone has committed a crime beyond a reasonable doubt is different from the mental process employed in making decisions in the "more weighty affairs of life." In making the latter type of decisions, a person looks forward and makes a decision about future conduct. A degree of risk is always inherent in such a decision, and usually the degree of risk based on doubt about future events is significant. The process employed in making such decisions is only partly a matter of assessment of past facts; instead, the decision often rests on a degree of hope, determination, and frequently, personal resolve. In most cases, the decision is revocable, but whether or not revocable, it is at least salvageable.

A decision to convict always looks backward; it is concerned only about resolving conflicting versions of factual propositions about a past event. It is always irrevocable as to the jurors. The process does not involve the decision maker's hope, determination or willingness to undertake personal risk. Rather, such a decision demands reason, impartiality, and common sense. A jury must have a greater assurance of the correctness of its decision, if it is to comply with the constitutional mandate, than the jurors are likely to have in making the "weighty" decisions they confront in their own lives.

A number of courts have criticized the definition of reasonable doubt standard expressed in terms of making important or "weighty" decisions in juror's own lives. An instruction that does that *tends to diminish and trivialize the constitutionally required burden-of-proof standard.* See *Dunn v. Perrin*, 570 F.2d 21 (1st Cir.), cert. denied, 437 U.S. 910, 98 S.Ct. 3102, 57 L.Ed2d 1141 (1978). In *Scurry*, Judge Skelly Wright stated:

> A person called upon to act in an important business or family matter would certainly gravely weigh the often neatly balanced considerations and risks tending in both directions. But, in making and acting on a judgment after so doing, such person would not necessarily be convinced beyond a reasonable doubt that he made the right judgment. Human experience, unfortunately, is to the contrary.

The Supreme Judicial Court of Massachusetts in *Commonwealth v. Ferreira*, 373 Mass. 116, 130, 364 N.E.2d 1264, 1273 (1977), stated:

> The degree of certainty required to convict is unique to criminal law. We do not think that people customarily make private decisions according to this standard nor may it even be possible to do so. Indeed, we suspect that were this standard mandatory in private affairs the result would be massive inertia. Individuals may often have the luxury of undoing private mistakes; a verdict of guilty is frequently irrevocable. (footnotes omitted).

773 P.2d at 1381-1382 (Stewart, J., dissenting [italics added, footnote omitted]).[27]

Recently in the case of *Quillen v. State*, 112 Nev. 1369, 929 P.2d 893 (1996), this Court recognized that the Ninth Circuit:

> no longer analogizes reasonable doubt to the most important decisions in one's life, because decisions like "choosing a spouse, buying a house, borrowing money, and the like ... may involve a heavy element of uncertainty and risk-taking and are wholly unlike the decisions jurors ought to make in a criminal trial.

112 Nev. at 1382 (citation omitted). This Court in *Quillen* found the reasoning "persuasive" but found the prosecutor's remarks in that case -- analogizing reasonable doubt to "buying a house, changing jobs, major life decisions" -- to be harmless error since the jury was given a written instruction containing the statutory definition of reasonable doubt. 112 Nev. at 1382-1383. Yet, as this Court must recognize, it is this very "definition" that provides the basis for such an argument.[28] Even more recently, in the case of *Holmes v. State*, 114 Nev. ____, 972

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[27] As noted above, Justice Stewart's dissenting analysis in *Ireland* was later adopted by the Utah's Supreme Court. See e.g., *State v. Robertson*, 932 P.2d 1219, 1232 (Utah 1997)(the analysis "requires a three-part test. First, 'the instruction should specifically state that the State's proof must obviate all reasonable doubt.' Second, the instruction should not state that a reasonable doubt is one which 'would govern or control a person in the more weighty affairs of life,' as such an instruction tends to trivialize the decision of whether to convict. Third, 'it is inappropriate to instruct that a reasonable doubt is not merely a possibility,' although it is permissible to instruct that a 'fanciful or wholly speculative possibility ought not to defeat proof beyond a reasonable doubt." [citations omitted]).

[28] Consider, how does one -- whether the State's attorney or defense counsel -- address the more "weighty affairs of life" language of the instruction when making closing argument to the jury in light of *Quillen*? Is counsel to

P.2d 337 (1998), this Court reversed a conviction because the district court gave an improper written instruction on reasonable doubt (it contained the word "substantial") and because the prosecutor's argument improperly analogized reasonable doubt with major life decisions such as buying a house or purchasing a car. Query, if it is an improper argument to analogize reasonable doubt to major life decisions ("the more weighty affairs of life"), why is it not equally improper to instruct a jury that that is the standard it must use to determine reasonable doubt? The answer of course is that it is wrong to so instruct. In short, as the case law set forth above demonstrates, the instruction required by NRS 175.211 tends to trivialize the decision whether to convict and fails to provide "a tangible meaning that is cable of being understood by those who are required to apply it." *Victor v. Nebraska*, 511 U.S. at 29 (Blackman, J., concurring in part).

This Court, in principle, has already accepted the argument advanced above. See e.g., *Bollinger v. State*, 111 Nev. 1110, 1115, n. 2, 901 P.2d 671 (1995). But unfortunately, this Court has taken the position that "the task of discontinuing the use of this language in Nevada is best initiated by the legislature." Id.; and see *Middleton v. State*, 114 Nev. ____, 968 P.2d 296, 311 (998)(same).[29] But, because a constitutionally deficient reasonable doubt instruction

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ignore it and hope the jury does too? If so, what kind of guidance does the language provide a juror trying to come to terms with the tricky concept of proof "beyond a reasonable doubt"? See *Humphrey v. Cain*, 120 F.3d 526, 530 (5th Cir. 1997)(noting that "reasonable doubt is the quintessential black box decision."). Or, is counsel to draw the types of analogies rejected by a number of courts (as set forth in the text above) because of the imprecision of the analogy? If so, how does that help the jury?

[29] Mr. Vanisi is aware that this Court reads the case of *Ramirez v. Hatcher*, 136 F.3d 1209 (9th Cir.), *cert. denied*, ____ U.S. ____, 119 S.Ct. 415 (1998), as upholding the constitutionality of NRS 175.211. See e.g. *Noonan v. State*, 115 Nev. ____, 980 P.2d 637, 640 (1999). However, in that case the two-judge majority made clear that they did "not endorse the Nevada instruction's 'govern or control' language" but rather concluded that in considering the instructions in their entirety "... we hold that the 'govern or control' language did not render the charge unconstitutional." 136 F.3d at 1214. Moreover, Judge Reinhardt's dissenting opinion serves to under score the points made in the text above. In particular, the fact that the instruction as given impermissibly lessens the prosecution's burden of proof. See 136 F.3d at 1216-1219.

can never be harmless, [*Sullivan v. Louisiana*, 508 U.S. 275, 280-281 (1993)], this Court should, in its capacity to oversee the lower district courts, instruct those courts to discontinue use of the "more weighty affairs of life" language in their instructions on the definition of reasonable doubt. Accord, *Ireland v. State*, 773 P.2d 1375 (Utah 1989).[30]

Penalty Phase

THE IMPOSITION OF THE DEATH PENALTY IN THIS CASE WAS EXCESSIVE AND MUST BE SET ASIDE AS IT WAS INFLUENCED BY CONSIDERATION OF ONE IMPROPER AGGRAVATOR; AND WAS THE PRODUCT OF PASSION AND PREJUDICED AS EVIDENCE BY THE FAILURE OF THE JURY TO FIND ANY MITIGATING CIRCUMSTANCES – EVEN THOUGH THE RECORD CLEARLY CONTAINS MITIGATION EVIDENCE.

In this case the State sought the death penalty and alleged four (4) aggravating factors. The State first alleged that the murder in this case occurred during a robbery with the use of a deathly weapon. NRS 200.033(4)(a). Next, the State alleged that the murder occurred upon a police officer who was engaged in the performance of official duty. NRS 200.033(7). Next, the State alleged that the murder involved torture or the mutilation of the victim. NRS 200.033(8).[31] Finally, the State alleged that the murder was committed on the victim because of the actual or perceived race, color or national origin of that person. ROA Vol. 4 at 920-927 (Amended Notice of Intent to Seek Death Penalty).

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[30] It should be noted that in the last legislative session Senate Bill 400, if passed, would have changed the reasonable doubt instruction to one consistent with this Court's suggestion in *Bollinger*. Unfortunately, the Bill was never given the opportunity to be considered by the legislature. This Court then should not defer to that body any longer. A court's deference to a legislative body is appropriate where the question presented is political in nature and plausible arguments for or against the question can be marshaled. But how to define "reasonable doubt" is *not* a "political question." It is a concept intrinsic to due process; any "misstatement of the reasonable-doubt standard ... 'vitiates all the jury's findings' and removes the only constitutionally appropriate predicate for the jury's verdict." *Victor v. Nebraska*, 511 U.S. at 29 (Blackmun, J. concurring [citing *Sullivan v. Louisiana*, 508 U.S. 275, 281 (1993).

[31] In the course of the trial the State elected to remove the theory of torture as an aggravator and proceeded solely on mutilation as an aggravator. ROA Vol. 29 at 1547.

During closing arguments in the penalty phase of this trial defense counsel conceded the first two alleged aggravators; namely, that the murder was committed in the course of a robbery and that the murder had been committed against a police (or peace) officer. ROA, Vol. 32 at 1791. When the jury returned its verdict -- a sentence of death -- it based that sentence upon finding beyond a reasonable doubt each of the alleged aggravators except for the last one; namely, that the murder had been committed for racial reasons. ROA Vol. 32 at 1853-1855; and see ROA Vol. 6 at 1768-1769 (Verdict). The jury apparently did not find any mitigating circumstances in this case. Id.[32]

Improper Aggravator:

In this case the State alleged that the murder of George Sullivan involved mutilation of the victim. Recently, this Court held that mutilation, whether it occurs before or after a victim's death is an aggravating circumstance under NRS 200.033(8). See *Byford v. State*, 116 Nev. ___, ____ P.2d ____ (116 Nev.Adv.Op. # 23, filed on February 28, 2000). In *Byford* the victim's body was set on fire after the victim's death. Premortem mutilation can be illustrated by the case of *Calambro v. State*, 114 Nev. ____, 952 P.2d 946, 949 (1998)(victim hog-tied and gagged, hands behind his back, duct tape around his face, head smashed repeatedly by hammer, pry bar used to stab at victim's skull and used in an attempt to pry skull apart).

Each of these cases confirms that, concerning the imposition of the death penalty, the act of mutilation in murder is something "beyond the act killing itself."[33] That is, there must be an

[32] The jury was instructed on four (4) mitigating circumstances: (1) no significant history of prior criminal behavior; (2) influence of extreme mental or emotional disturbance; (3) defendant's youth at the time of the crime; and (4) any other mitigating evidence. ROA Vol. 6 at 1754 (Instruction number 11).

[33] *Cf Robbins v. State*, 106 Nev. 611, 798 P.2d 558 (1990)(qualifying requirement to an aggravating circumstance based upon torture).

intent to mutilate on the part of the murder *in addition to* an intent to kill. Former Justice Springer made this point in his concurring opinion in *Calambro*:

> ... in many of the cases decided by this court, murder involving "mutilation of the victims" has incorrectly become "murder accompanied by great damage to the victim's body." Thus where two stab wounds may not be mutilation, ten wounds probably would be, because of the damage done to the body by so many wounds. A pistol shot to the head probably would not be seen as mutilation, whereas, a shotgun blast to the head probably would. [However] ... the essence of the mutilation aggravator is not disfigurement alone resulting from the killing act itself, but rather, the murder's *intent* to mutilate (maim) in addition to intending to kill his victim.

952 P.2d at 951 (citation omitted).

In the instant case Dr. Clark testified that Sergeant Sullivan died from "multiple injuries of the skull and brain due to blunt impact trauma." She found 20 "separate and discrete impacts to the face and head." She also found that each of the wounds were "all acute and of the same age." That is, they occurred at roughly the same time and were of such a nature that the "survival interval would have been relatively short." These findings are consistent with that statements attributed to Mr. Vanisi by Mr. Vainga Kinikini. The Court will recall that according to Mr. Kinikini Mr. Vanisi told him he knocked on the window of the police car and started swinging after Sergeant Sullivan rolled down the window and asked if he could help.

There is no question that Sergeant Sullivan suffered disfigurement in this attack. But that disfigurement was the inevitable result of the deadly weapon used in the murder and was not product of a specific intent to mutilate or maim. In this case mutilation was an improperly charged aggravator factor in this case because, in the former Justice's words: the "essence" of

the mutilation aggravator was not met here where, the disfigurement resulted from the killing act itself and not because of Mr. Vanisi's intent to mutilate.

Accordingly, this aggravator should be set aside as improperly charged by the State and considered by the jury.

No Mitigator:

Admittedly, the jury's finding of just the first two aggravators proven by the State and conceded by the defense makes Mr. Vanisi death eligible under Nevada's statutory death penalty scheme. But having said that, the question is: although Mr. Vanisi was death eligible, was the death penalty the most appropriate penalty to be imposed in this case? In *Haynes v. State* 103 Nev. 309, 739 P.2d 497 (1987), this Court said:

> [t]he United States Supreme Court has observed "that under contemporary standards of decency death is viewed as an inappropriate punishment for a substantial portion of convicted first degree murders."

103 Nev. at 319-329 (citation omitted).

NRS 177.055(2) requires this Court to review the imposition of the death penalty in this case to determine if, given the facts concerning both the crime and the defendant, the penalty imposed was excessive and must be set aside. Indeed, the Court's mandatory review required by the statute is not limited to a mere perfunctory weighing of the aggravating circumstances and mitigating factors. Instead, this Court must examine the record in it entirety to determine whether the death penalty imposed herein was, in fact, *the* appropriate penalty given the facts of this case and the character of the defendant. Additionally this Court must determine if the penalty imposed was the product of passion and prejudice. *Parker v. State*, 109 Nev. 383, 392, 849 P.2d 1062 (1993).

In this case the jury's penalty verdict was improperly influence by an improperly charged aggravator; namely, mutilation. Further, the jury's apparent rejection of any mitigating factor demonstrates not only that the sentence is unreliable under the Eighth Amendment, but also indicates that the sentence was imposed -- in this high profile and emotionally charged case -- "under the influence of passion and prejudice" and must be reversed. NRS 177.055(2)(c); *Mills v. Maryland*, 486 U.S. 367 (1988).[34]

CONCLUSION

For the reasons and authorities set forth above it is restfully submitted that Mr. Vanisi's convictions and sentences must be reversed and this matter remanded to the district court so that Mr. Vanisi can conduct his own defense as mandated by the Sixth Amendment to the United States Constitution.

DATED this 17 day of April 2000.

MICHAEL R. SPECCHIO
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[34] This is so because the fact that the jury made no findings with respect to mitigating factors suggests that the jury violated *Mills*, by confining its consideration (if any) of mitigation to factors which the jury could only agree upon unanimously. Prejudice and passion is also suggested as factors in the jury's verdict by the jury's failure to find any mitigating factor after hearing the testimony of twenty-two defense witnesses who spoke approvingly of Mr. Vanisi's childhood and early young adult years, as well as, other testimony concerning his lack of a criminal history, and his suffering severe mental health problems in his later years. That is to say, in this "cop-killer" case the emotions ran high.

CERTIFICATE OF COMPLIANCE

I hereby certify that I have read this appellate brief, and to the best of my knowledge, information, and belief, it is not frivolous or interposed for any improper purpose. I further certify that this brief complies with all applicable Nevada Rules of Appellate Procedure, in particular NRAP 28(e), which requires every assertion in the brief regarding matters in the record to be supported by a reference to the page of the transcript or appendix where the matter relied upon is to be found. I understand that I may be subject to sanctions in the event that the accompanying brief is not in conformity with the requirements of the Nevada Rules of Appellate Procedure.

DATED this 17 day of April, 2000.

JOHN REESE PETTY
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CERTIFICATE OF SERVICE

I hereby certify that I am an employee of the Washoe County Public Defender's Office, Reno, Washoe County, Nevada, and that on this date I forwarded a true copy of the foregoing document addressed to:

GARY HATLESTAD
Chief Appellate Deputy
Washoe County District Attorney
195 South Sierra Street
Reno, Nevada

DATED this 17 day of April, 2000.

Amy Peterson

Exhibit 9

Exhibit 9

ORIGINAL

IN THE SUPREME COURT OF THE STATE OF NEVADA

SIAOSI VANISI,

Appellant,

vs.

THE STATE OF NEVADA,

Respondent.

No. 35249

Appeal from A Judgment of Conviction
Second Judicial District Court of the State of Nevada
The Honorable Connie Steinheimer, District Judge

APPELLANT'S REPLY BRIEF

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AT ITS HEART, THE RULE EXPOUNDED BY THE SUPREME COURT IN *FARETTA* IS A RULE PROTECTING INDIVIDUAL AUTONOMY AND WHERE, AS HERE, THE RECORD DOES NOT FACTUALLY SUPPORT A DENIAL OF THE RIGHT TO SELF-REPRESENTATION, THIS COURT MUST REVERSE THE CONVICTIONS BELOW AND REMAND FOR A NEW TRIAL.

"At its heart, the rule expounded by the Supreme Court in *Faretta* is a rule protecting individual autonomy." *Bribiesca v. Galaza*, 215 F.3d 1015, 1020 (9th Cir. 2000). In *Faretta* the United States Supreme Court observed:

> [i]t is undeniable that in most criminal prosecutions defendants could better defend with counsel's guidance than by their own unskilled efforts. But where the defendant will not voluntarily accept representation by counsel, the potential advantage of a lawyer's training and experience can be realized, if at all, only imperfectly. To force a lawyer on a defendant can only lead him to believe that the law contrives against him. Moreover, it is not inconceivable that in some rare instances, the defendant might in fact present his case more effectively by conducting his own defense. *Personal liberties are not rooted in the law of averages. The right to defend is personal. The defendant, and not his lawyer or the State, will bear the personal consequences of a conviction. It is the defendant, therefore, who must be free personally to decide whether in his particular case counsel is to his advantage. And although he may conduct his own defense ultimately to his own detriment, his choice must be honored out of "that respect for the individual which is the lifeblood of the law."*

Faretta v. California, 422 U.S. 806, 834 (1975) (emphasis added, citation omitted). Thus, in deciding "whether a defendant has knowingly and intelligently decided to represent himself, the trial court is to look not to the quality of his representation, but rather to the quality of his decision." *Bribiesca v. Galaza, supra*, 215 F.3d at 1020.

In *Tanksley v. State*, 113 Nev. 997, 946 P.2d 148 (1997), this Court noted that a defendant "has an 'unqualified right' to represent himself so long as the his waiver of counsel is intelligent and voluntary." 113 Nev. at 1000 (citations omitted). In assessing a waiver the question before the district court is not

> whether the defendant can competently represent himself, but whether he can knowingly and voluntarily waive his right to counsel. "[T]he defendant's technical knowledge is not the relevant inquiry. In order for a defendant's waiver of counsel to withstand constitutional scrutiny, the judge need only be convinced that the defendant made his decision with a clear comprehension of the attendant risks." Furthermore, "a request for self-representation may *not* be denied solely because the court considers the defendant to lack reasonable *legal* skills or because of the inherent inconvenience often caused by *pro se* litigants."

113 Nev. at 1001 (emphasis in the original, citations omitted); and see *Furbay v. State*, 116 Nev. ____, 998 P.2d 553, 556 (2000).

This Court, in *Tanksley*, did note five situations where the right of self representation *may* be denied: (1) where the request is untimely; (2) where the request is equivocal; (3) where the request is made solely for the purpose of delay; (4) where the defendant abuses his right by [presently] disputing the judicial process; and (5) where the defendant is incompetent to waive his right to counsel. 113 Nev. at 1001. As noted in the Opening Brief -- and for the reasons stated therein -- none of these five situations exist in the instant case. Thus, when Judge Steinheimer denied Mr. Vanisi's motion for self-representation it was "*per se* harmful." *Harris v. State*, 113 Nev. 799, 803, 942 P.2d 151 (1997).[1]

[1] Compare the recent case of *Furbay v. State*, 116 Nev. ____, 998 P.2d 553 (2000). In *Furbay*, this Court found that the district court's denial of the motion for self-representation in that case was based on the district court's determination that Furbay "was not aware that he might face the death penalty if convicted." 998 P.2d at 556. However, this Court determined that it need not consider whether Furbay was unconstitutionally denied the right

Nonetheless, notwithstanding the prosecution's assessment at the trial level that Mr. Vanisi successfully passed the district court's Rule 253 canvass, the prosecution now, on appeal, contends that Judge Steinheimer's ruling should be affirmed[2] -- largely by trying to fit this case into one or more of the five situations noted above. The State's efforts must fail, and here's why.[3]

The State first acknowledges that a defendant enjoys an "unqualified" right to self-representation. Respondent's Answering Brief at 7 (hereinafter "RAB at ____"). But then notes that a judge may "*terminate* self-representation by a defendant who deliberately engages in serious and obstructionist conduct." RAB at 7-8 (citation omitted). Clearly, in such an instance the unqualified right would first have to be granted before it could be taken away due to subsequent "serious and obstructionist conduct." Similarly, the State writes that the right of self-representation "is not a right to abuse the dignity of the courtroom [nor] is it a license not to comply with relevant rules of procedure and substantive law." RAB at 8 (citation omitted). Again, the unqualified right would first have to be honored before such conduct would justify a

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to represent himself because Furbay later "waived his right to self representation." Id. In the present case, the record reveals that Mr. Vanisi not only clearly understood that he faced the death penalty if convicted, [ROA, Vol. 5 at 1637], but also, the fact that Mr. Vanisi never waived his right to self representation. See ROA, Vol. 25 at 969-970.

[2] The position taken by the State's appellant counsel is at odds with the position expressed by the State's trial counsel at, and following, the Rule 253 canvass. Thus, to the extent that the State's appeal argument is this Court can only review a "cold transcript" this Court should remember that the State's trial counsel was surely in a place to raise questions and/or objections when the hearing was taking place. He didn't. Moreover, the State's trial counsel said that the timeliness of the motion "is not an issue" that Mr. Vanisi has "been anything but disruptive" and that he hadn't seen anything "that would render Mr. Vanisi incapable pursuant to our guidelines of representing himself." Indeed, it was the State's trial counsel that pointed out that "if the record is looked at closely and the rule of law is followed, I believe Mr. Vanisi's right prevails. *And that is the State's position on the motion.*" (all quotes are from pages 16-17 of the Appellant's Opening Brief. In short, the State's new position should be taken with a grain of salt.

[3] As a preliminary matter the State's "invitation" to this Court to adopt the reasoning of Judge Reinhardt's specially concurring opinion in *United States v. Farhad*, 190 F.3d 1097 (9th Cir. 1999), and do away with the right of self-representation must be rejected since this Court is "compelled by the overwhelming weight of [precedent] to apply the law as it currently exists" and not as the State may have it. 190 F.3d at 1101 and at 1100

court's terminating the right of self-representation. Or, as in *Tanksley*, the district court judge would have to have a basis on the record to deny the request flat out. In *Tanksley*, the record showed that in a pretrial status hearing Tanksley "talked back to the judge and behaved so disrespectfully and contemptuously that the judge found him in contempt and was forced to tape Tanksley mouth shut for the remainder of the hearing." 113 Nev. at 1001-1002. Additionally, the district judge in *Tanksley* had previously presided over a different trial where Tanksley had represented himself. Id at 1002. The trial judge found that Tanksley's self-representation in that case was "disruptive." Id.

In the instant case, Judge Steinheimer did not grant or honor Mr. Vanisi's unqualified right of self-representation. But, unlike in *Tanksley*, there is no basis in the record relating to this case for a finding that Mr. Vanisi had been, is or would be disruptive if allowed to represent himself.[4] In sum, whereas in *Tanksley* the record provided factual support for the trial court's ruling, the instant record does not. And, as noted elsewhere, to the State's trial attorney Mr. Vanisi had been "anything but disruptive" in his many prior appearances before the district judge. As pointed out in Appellant's Opening Brief, the things Judge Steinheimer identified as indicators of future disruption -- taking time to answer questions, rocking motions, making statements under his breath, etc. -- were nothing of the kind; but rather, if relevant, were only indicative of the "inherent inconvenience often caused by *pro se* litigants" -

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(noting that both the Supreme Court and the Ninth Circuit have for many years recognized the right to self-representation [citations omitted]). The State's invitation is found at RAB at 7, n. 3.

[4] The State cites *Stewart v. Corbin*, 850 F.2d 492 (9th Cir. 1998), for the proposition that in custody pretrial behavior can be utilized to predict future disruptive behavior. RAB at 8. But in that case the defendant ***was*** allowed to represent himself. The issue in that case relating to self-representation was whether the defendant's right to self-representation was violated when he was required to be gagged due to his disruptive behavior *in* court. The appellate court found that the right was not violated because the defendant had stand by counsel. 850 P.2d at 506. It should also be noted that the defendant was allowed to represent himself even though, as the

- an "inconvenience" not enough to justify an unqualified right to self-representation. See *Tanksley*, 113 Nev. at 1001 (pretrial activity is relevant "*if* it affords a *strong indication* that the [defendant] will disrupt the proceedings in the courtroom." [emphasis added, citation omitted]); and 113 Nev. at 1006 (Rose, J. dissenting, [noting that behavior will be considered "disruptive" only if it is of an "extreme and aggravated nature."]). "Predictions" by a district judge (who apparently did not want to deal with the inconvenient *pro se* litigant) should not be sufficient to deny a defendant a fundamental and unqualified constitutional right.

The State, on appeal, next argues that Mr. Vanisi's motion for self-representation could have been made for the purpose of delay. RAB at 10-12. But as noted elsewhere, the State's trial attorney was satisfied that delay was "not in issue." Moreover, as noted in Appellant's Opening Brief, Mr. Vanisi repeatedly stated he did not want to delay the trial and would be ready on the date previously set by the court for the trial to begin. On appeal the State now writes: "no rule of law requires the court to take the defendant's protestations that he will be ready on the designated date at face value." RAB at 10. But it is equally true that there is no rule (of law, or culture or psychology) that says a criminal defendant's word is not as good as another's. When Mr. Vanisi filed his motion for self-representation he did not accompany that motion with a written request for a continuance. Nor did he request a continuance while before Judge Steinheimer at the 253 hearing. Furthermore, although Judge Steinheimer was not obligated to appoint standby or advisory counsel [*Harris*, 113 Nev. at 804], such an appointment would have been a less restrictive means of addressing her concerns than the flat out denial of a fundamental and unqualified constitutional right.

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appellate court noted, he "was a violent, disruptive, dangerous and contumacious individual who was a very high escape risk and who also presented a distinct risk of physical assault to courtroom personnel." 850 F.2d at 494.

Finally, the State argues that the district court finding that this case was too complex was in and of itself sufficient to deny Mr. Vanisi's request. RAB at 12-15.[5] One could repeatedly proclaim the sky to be green, but that would not make it true. This Court need only review the facts and record of this case to quickly appreciate the straightforward manner in which the State presented its case. That is to say, despite Judge Steinheimer characterization of this case as being "complex" it was anything but. To be sure, a death penalty case requires careful scrutiny, but a death penalty case is not immune to Sixth Amendment considerations. See *Godinez v. Moran*, 509 U.S. 389, 399-400 (1993)(death penalty case where Court extended *Faretta* to those who are mentally impaired so long as they are found to be competent).[6]

The record in this case does not provide any factual support for Judge Steinheimer's ruling as a whole or for any of the "reasons" she cited. As such, her ruling violated Mr. Vanisi's unqualified and fundamental constitution right of self-representation. To quote from *United States v. Farhad*, 190 F.3d 1097, Mr. Vanisi:

> was clearly appraised of the nature of the charges against him, the possible penalties he faced if convicted, and the dangers and disadvantages of undertaking his own *representation*. Nevertheless, he repeatedly expressed his wish to represent himself, and reiterated his sincere, if misguided and unrealistic, belief that he would offer a "more effective" defense than appointed counsel.

190 F.3d at 1100. Under the applicable precedents, his waiver was constitutionally sound. By denying his request, the district court violated a fundamental constitutional right that was

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[5] In making this finding Judge Steinheimer relied on the case of *Meegan v. State*, 114 Nev. 1150, 968 P.2d 292 (1998). See ROA, Vol. 5 at 1293. But, as this Court noted, any discussion of the trial court's order in that case denying the right to self-representation was made moot by the defendant's subsequent abandonment of his request for self-representation. 114 Nev. at 1154.

personal to Mr. Vanisi; namely, the individual autonomy that the rule announced in *Faretta* protects. Accordingly, this case must be reversed and remanded for a new trial. The error requiring reversal rests squarely on the shoulders of the district court judge. This Court can reverse confident that it has fulfilled its constitutional duty.

CONCLUSION

For the reasons and authorities set forth above and as set forth in the Opening Brief it is restfully submitted that Mr. Vanisi's convictions and sentences must be reversed and this matter remanded to the district court so that Mr. Vanisi can conduct his own defense as mandated by the Sixth Amendment to the United States Constitution; that is, the trial court's ruling denying Mt. Vanisi's request for self-representation is not supported by the factual record in this case and, furthermore, was contrary to established federal law as set forth in *Faretta* and its progeny.

DATED this 21st day of October 2000.

MICHAEL R. SPECCHIO
WASHOE COUNTY PUBLIC DEFENDER

By: _____
JOHN REESE PETTY
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Nevada Bar No. 00010
Washoe County Public Defender
P.O. Box 30083
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[6] Presumably, in *Furbay v. State*, *supra*, note 1, the defendant would have been allowed to represent himself in that death penalty case if he had renewed his request and if he had satisfied the district court that he knew he faced the death penalty (and what that meant) if convicted.

CERTIFICATE OF COMPLIANCE

I hereby certify that I have read this appellate brief, and to the best of my knowledge, information, and belief, it is not frivolous or interposed for any improper purpose. I further certify that this brief complies with all applicable Nevada Rules of Appellate Procedure, in particular NRAP 28(e), which requires every assertion in the brief regarding matters in the record to be supported by a reference to the page of the transcript or appendix where the matter relied upon is to be found. I understand that I may be subject to sanctions in the event that the accompanying brief is not in conformity with the requirements of the Nevada Rules of Appellate Procedure.

DATED this 31st day of October, 2000.

JOHN REESE PETTY
Chief Deputy
Nevada Bar No. 00010
Washoe County Public Defender
Post Office Box 11130
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CERTIFICATE OF SERVICE

I hereby certify that I am an employee of the Washoe County Public Defender's Office, Reno, Washoe County, Nevada, and that on this date I forwarded a true copy of the foregoing document addressed to:

GARY HATLESTAD
Chief Appellate Deputy
Washoe County District Attorney
195 South Sierra Street
Reno, Nevada

DATED this 31st day of October, 2000.

Amy Peterson

Exhibit 10

Exhibit 10

DA #159523

RPD 019114-98

IN THE JUSTICE COURT OF RENO TOWNSHIP

IN AND FOR THE COUNTY OF WASHOE, STATE OF NEVADA

FILED *

98 FEB 3 P1:37

THE STATE OF NEVADA,

Plaintiff,

RJC: 89,820

v.

DEPT: ED 2

L. Jenkins

SIAOSI VANISI,
also known as
"PE",
also known as
"GEORGE",

Defendant.

AMENDED
CRIMINAL COMPLAINT

/

DAVID L. STANTON of the County of Washoe, State of Nevada, verifies and declares upon information and belief and under penalty of perjury, that SIAOSI VANISI, also known as "PE", also known as "GEORGE", the defendant above-named, has committed the crimes of:

COUNT I. MURDER IN THE FIRST DEGREE, a violation of NRS 200.010 and NRS 200.030 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully, unlawfully, and with malice aforethought, deliberation, and premeditation, kill and murder SERGEANT GEORGE SULLIVAN, a human being, by means of repeated blows to the head and face with a hatchet, and/or other implement(s), and/or other blunt force trauma inflicted to the

head and upper torso thereby inflicting mortal injuries upon the said SERGEANT GEORGE SULLIVAN from which he died on January 13, 1998; or

That the said defendant during the course of, and in furtherance of an armed robbery, did willfully and unlawfully murder SERGEANT GEORGE SULLIVAN in that the said defendant on or about January 12, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, in the perpetration and/or the furtherance of an armed robbery at the University of Nevada, Reno, at or near the information kiosk, with the use of a deadly weapon, to wit, a hatchet, and/or other implement(s); or

That the said defendant on or about January 13, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, by lying in wait, in that the said defendant did watch, wait and conceal himself from SERGEANT GEORGE SULLIVAN, with the intention of killing SERGEANT GEORGE SULLIVAN, in that he hid and waited until SERGEANT GEORGE SULLIVAN completed a traffic stop, then observed and followed SERGEANT GEORGE SULLIVAN to a location where he was alone and then ambushed SERGEANT GEORGE SULLIVAN inflicting mortal injuries to his person from which he died on January 12, 1998.

COUNT II. ROBBERY WITH THE USE OF A DEADLY WEAPON, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe,

State of Nevada, did willfully and unlawfully take personal property, to wit: a Glock .45 caliber handgun; Glock "magazines"; a flashlight; and handcuffs from the person of SERGEANT GEORGE SULLIVAN, at or near the information kiosk located at the University of Nevada, Reno campus, Washoe County, Nevada, against his will, and by means of force or violence to his person and with the use of a hatchet, and/or other implement(s), which the said defendant used to strike SERGEANT GEORGE SULLIVAN repeatedly in the head and face, and/or other blunt force trauma inflicted to the head and upper torso.

COUNT III. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from the person of PATRICIA MISITO, the clerk at the 7-11 Store located at 710 Baring Boulevard, Washoe County, Nevada, against her will, and by means of force or violence or fear of immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

COUNT IV. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

///

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from DIANA LYNN SHOUSE, the clerk at said establishment, at the Jackson Food Mart located at 2595 Clearacre Lane, Washoe County, Nevada, against her will, and by means of force or violence or fear of immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

COUNT V. GRAND LARCENY, a violation of NRS 205.220, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully steal, take and drive away the personal property of LOUIS D. HILL, to wit: a certain black four door 1993 Toyota Camry bearing Nevada license plate 029 HPY, with the intent then and there to permanently deprive the owner thereof.

DATED this 3rd day of FEBRUARY, 1998.

Restitution:
Custody:
Bailed:
Warrant:
01145000

District Court Dept: 4
District Att: GAMMICK/STANTON
Defense Att:
Bail No Bail

Exhibit 11

Exhibit 11

ORIGINAL

FILED

SEP 27 1999

AMY HARVEY
By: M. Stone
DEPUTY CLERK

Case No. CR98-0516

Dept. No. 4

IN THE SECOND JUDICIAL DISTRICT COURT OF THE STATE OF NEVADA,

IN AND FOR THE COUNTY OF WASHOE

* * *

THE STATE OF NEVADA,

Plaintiff,

v.

SIAOSI VANISI,
also known as
"PE",
also known as
"GEORGE",

Defendant.

_____/

LADIES AND GENTLEMEN OF THE JURY:

It is my duty as judge to instruct you in the law that applies to this case, and it is your duty as jurors to follow the law as I shall state it to you, regardless of what you may think the law is or ought to be. On the other hand, it is your exclusive province to determine the facts in the case, and to consider and weigh the evidence for that purpose. The authority thus vested in you is not an arbitrary power, but must be

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exercised with sincere judgment, sound discretion, and in accordance with the rules of law stated to you.

Instruction No. 1

The defendant in this matter, SIAOSI VANISI also known as "PE" also known as "GEORGE", is being tried upon an Information which was filed on the 26th day of February, 1998, in the Second Judicial District Court, charging the said defendant, SIAOSI VANISI also known as "PE" also known as "GEORGE", with:

COUNT I. MURDER IN THE FIRST DEGREE, a violation of NRS 200.010 and NRS 200.030 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of the Information, at and within the County of Washoe, State of Nevada, did willfully, unlawfully, and with malice aforethought, deliberation, and premeditation, kill and murder SERGEANT GEORGE SULLIVAN, a human being, by means of repeated blows to the head and face with a hatchet, and/or other implement(s), and/or other blunt force trauma inflicted to the head and upper torso thereby inflicting mortal injuries upon the said SERGEANT GEORGE SULLIVAN from which he died on January 13, 1998; or

That the said defendant during the course of, and in furtherance of an armed robbery, did willfully and unlawfully murder SERGEANT GEORGE SULLIVAN in that the said defendant on or about January 13, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, in the perpetration and/or the furtherance of an armed robbery at the University of Nevada, Reno, at or near the information kiosk, with the use of a deadly weapon, to wit, a hatchet, and/or other implement(s); or

That the said defendant on or about January 13, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, by lying in wait, in that the said defendant did watch, wait and conceal himself from SERGEANT GEORGE SULLIVAN, with the intention of killing SERGEANT GEORGE SULLIVAN, in that he hid and waited until SERGEANT GEORGE SULLIVAN completed a traffic stop, then observed and followed SERGEANT GEORGE SULLIVAN to a location where he was alone and then ambushed SERGEANT GEORGE SULLIVAN inflicting mortal injuries to his person from which he died on January 13, 1998.

COUNT II. ROBBERY WITH THE USE OF A DEADLY WEAPON, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of the Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: a Glock .45 caliber handgun; Glock "magazines"; a flashlight; and handcuffs from the person of SERGEANT GEORGE SULLIVAN, at or near the information kiosk located at the University of Nevada, Reno campus, Washoe County, Nevada, against his will, and by means of force or violence to his person and with the use of a hatchet, and/or other implement(s), which the said defendant used to strike SERGEANT GEORGE SULLIVAN repeatedly in the head and face, and/or other blunt force trauma inflicted to the head and upper torso.

COUNT III. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of the Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from the person of PATRICIA MISITO, the clerk at the 7-11 Store located at 710 Baring Boulevard, Washoe County, Nevada, against her will, and by means of force or violence or fear of immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

COUNT IV. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of the Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from DIANA LYNN SHOUSE, the clerk at said establishment, at the Jackson Food Mart located at 2595 Clearacre Lane, Washoe County, Nevada, against her will, and by means of force or violence or fear of immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

COUNT V. GRAND LARCENY, a violation of NRS 205.220, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of the Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully steal, take and drive away the personal property of LOUIS D. HILL, to wit: a certain black four door 1993 Toyota Camry bearing Nevada license plate 029 HPY, with the intent then and there to permanently deprive the owner thereof.

To the charges stated in the Information, the defendant, SIAOSI VANISI also known as "PE" also known as "GEORGE", pled "NOT GUILTY."

Instruction No. 2

An Information is a formal method of accusing a defendant of a crime. It is not evidence of any kind against the accused, and does not create any presumption or permit any inference of guilt.

Instruction No. 3

If in these instructions, any rule, direction or idea is stated in varying ways, no emphasis thereon is intended by me and none must be inferred by you. For that reason, you are not to single out any certain sentence, or any individual point or instruction, and ignore the others, but you are to consider all the instructions as a whole and to regard each in the light of all the others.

Instruction No. 4

If, during this trial, I have said or done anything which has suggested to you that I am inclined to favor the position of either party, you will not be influenced by any such suggestion.

I have not expressed, nor intended to express any opinion as to which witnesses are or are not worthy of belief, what facts are or are not established, or what inference should be drawn from the evidence. If any expression of mine has seemed to indicate an opinion relating to any of these matters, I instruct you to disregard it.

Instruction No. 5

Although you are to consider only the evidence in the case in reaching a verdict, you must bring to the consideration of the evidence your everyday common sense and judgment as reasonable men and women. Thus, you are not limited solely to what you see and hear as the witnesses testify. You may draw reasonable inferences which you feel are justified by the evidence, keeping in mind that such inferences should not be based on speculation or guess.

A verdict may never be influenced by sympathy, passion, prejudice, or public opinion. Your decision should be the product of sincere judgment and sound discretion in accordance with these rules of law.

Instruction No. 6

It is the duty of attorneys on each side of a case to object when the other side offers testimony or other evidence which counsel believes is not admissible.

When the court has sustained an objection to a question, the jury is to disregard the question and may draw no inference from the wording of it or speculate as to what the witness would have said if permitted to answer.

Instruction No. 7

Nothing that counsel say during the trial is evidence in the case.

The evidence in a case consists of the testimony of the witnesses and all physical or documentary evidence which has been admitted.

Instruction No. 8

The penalty provided by law for the offense charged is not to be considered by the jury in arriving at a verdict.

Instruction No. 9

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Neither the prosecution nor the defense is required to call as witnesses all persons who may appear to have some knowledge of the matters in question in this trial.

Instruction No. 10

There are two types of evidence from which a jury may properly arrive at a verdict. One is direct evidence, such as the testimony of an eyewitness. The other is circumstantial evidence, the proof of a chain of circumstances pointing to the existence or nonexistence of a fact in issue.

The law makes no distinction between direct and circumstantial evidence, but requires that before convicting a defendant, the jury be satisfied of the defendant's guilt beyond a reasonable doubt from all the evidence in the case.

Instruction No. 11

To the jury alone belongs the duty of weighing the evidence and determining the credibility of the witnesses. The degree of credit due a witness should be determined by his or her character, conduct, manner upon the stand, fears, bias, impartiality, reasonableness or unreasonableness of the statements he or she makes, and the strength or weakness of his or her recollections, viewed in the light of all the other facts in evidence.

If the jury believes that any witness has willfully sworn falsely, they may disregard the whole of the evidence of any such witness.

Instruction No. 12

A person is qualified to testify as an expert if he or she has special knowledge, skill, experience, training, or education sufficient to qualify him or her as an expert on the subject to which his or her testimony relates.

Duly qualified experts may give their opinions on questions in controversy at a trial. To assist you in deciding such questions, you may consider the opinion with the reasons given for it, if any, by the expert who gives the opinion. You may also consider the qualifications and credibility of the expert.

You are not bound to accept an expert opinion as conclusive, but should give to it the weight to which you find it to be entitled. You may disregard any such opinion if you find it to be unreasonable.

Instruction No. 13

In every crime there must exist a union or joint operation of act and intent.

The burden is always upon the prosecution to prove both act and intent beyond a reasonable doubt.

Instruction No. 14

Intent may be proved by circumstantial evidence. It rarely can be established by any other means. While witnesses may see and hear and thus be able to give direct evidence of what a defendant does or fails to do, there can be no eyewitness account of a state of mind with which the acts were done or omitted, but what a defendant does or fails to do may indicate intent or lack of intent to commit the offense charged.

Instruction No. 15

IN THE SUPREME COURT OF THE STATE OF NEVADA

* * * * * * * * * *

SIAOSI VANISI, Appellant, vs. RENEE BAKER, WARDEN, and CATHERINE CORTEZ MASTO, ATTORNEY GENERAL FOR THE STATE OF NEVADA, Respondents.	No. 65774 Volume 2 of 26

APPELLANT'S APPENDIX

Appeal from Order Denying Petition
for Writ of Habeas Corpus (Post-Conviction)

Second Judicial District Court, Washoe County

RENE L. VALLADARES
Federal Public Defender

TIFFANI D. HURST
Assistant Federal Public Defender
Nevada State Bar No. 11027C
411 E. Bonneville, Suite 250
Las Vegas, Nevada 89101
(702) 388-6577
danielle_hurst@fd.org

Attorneys for Appellant

INDEX

CERTIFICATE OF SERVICE

I hereby certify that this document was filed electronically with the Nevada Supreme Court on the 7th day of January, 2015. Electronic Service of the foregoing Appellant's Appendix shall be made in accordance with the Master Service List as follows:

Terrence P. McCarthy
Washoe County District Attorney
tmccarth@da.washoecounty.us

Felicia Darensbourg
An employee of the Federal Public Defender's Office

Exhibit 1

Exhibit 1

DA #159523

RPD 019114-98

IN THE JUSTICE COURT OF RENO TOWNSHIP

IN AND FOR THE COUNTY OF WASHOE, STATE OF NEVADA

* * *

FILED

'98 JAN 14 P12:22

DONA C. JEPPSON, CLERK
RENO JUSTICE COURT
BY: [signature]
DEPUTY

THE STATE OF NEVADA,

Plaintiff,

v.

SIAOSI VANISI, also known as "PE", also known as "GEORGE",

Defendant.

RJC: 89,820

DEPT: 2

CRIMINAL COMPLAINT

/

DAVID P. JENKINS of the County of Washoe, State of Nevada, verifies and declares upon information and belief and under penalty of perjury, that SIAOSI VANISI, also known as "PE", also known as "GEORGE", the defendant above-named, has committed the crimes of:

COUNT I. MURDER IN THE FIRST DEGREE, a violation of NRS 200.010 and NRS 200.030 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully, unlawfully, and with malice aforethought, deliberation, and premeditation, kill and murder SERGEANT GEORGE SULLIVAN, a human being, by means of repeated blows to the head with a hatchet, thereby inflicting mortal

///

injuries upon the said SERGEANT GEORGE SULLIVAN from which he died on January 13, 1998; or

That the said defendant during the course of, and in furtherance of an armed robbery, did willfully and unlawfully murder SERGEANT GEORGE SULLIVAN in that the said defendant on or about January 12, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, in the perpetration and/or the furtherance of an armed robbery at the University of Nevada, Reno, at or near the information kiosk, with the use of a deadly weapon, to wit, a hatchet; or

That the said defendant on or about January 13, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, by lying in wait, in that the said defendant did watch, wait and conceal himself from SERGEANT GEORGE SULLIVAN, with the intention of killing SERGEANT GEORGE SULLIVAN, in that he hid and waited until SERGEANT GEORGE SULLIVAN completed a traffic stop, then observed and followed SERGEANT GEORGE SULLIVAN to a location where he was alone and then ambushed SERGEANT GEORGE SULLIVAN inflicting mortal injuries to his person from which he died on January 12, 1998.

COUNT II. ROBBERY WITH THE USE OF A DEADLY WEAPON, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully take personal

property, to wit: a Glock .45 caliber handgun; Motorola cellular phone; Glock "magazines"; a flashlight; and handcuffs from the person of SERGEANT GEORGE SULLIVAN, at or near the information kiosk located at the University of Nevada, Reno campus, Washoe County, Nevada, against his will, and by means of force or violence to his person and with the use of a hatchet which the said defendant used to strike SERGEANT GEORGE SULLIVAN repeatedly in the head and face.

COUNT III. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from the person of the clerk at said establishment, at the 7-11 located at 710 Baring Boulevard, Washoe County, Nevada, against his will, and by means of force or violence or fear of immediate or future injury to his person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

COUNT IV. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully take personal

property, to wit: U.S. currency from the person of the clerk at said establishment, at the Jackson Food Mart located at 2595 Clearacre Lane, Washoe County, Nevada, against his will, and by means of force or violence or fear of immediate or future injury to his person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

DATED this 14th day of JANUARY, 1998.

Restitution:
Custody:
Bailed:
Warrant: X
01145000

District Court Dept:
District Attorney:
Defense Attorney:
Bail NO BAIL

Exhibit 2

Exhibit 2

DA #159523

RPD 019114-98

IN THE JUSTICE COURT OF RENO TOWNSHIP

IN AND FOR THE COUNTY OF WASHOE, STATE OF NEVADA

* * *

THE STATE OF NEVADA, FILED

Plaintiff,

'98 FEB -3 P1:58

v.

RJC: 89,820

DEPT: ED

SIAOSI VANISI,
also known as
"PE",
also known as
"GEORGE",

Defendant.

AMENDED
CRIMINAL COMPLAINT

/

DAVID L. STANTON of the County of Washoe, State of Nevada, verifies and declares upon information and belief and under penalty of perjury, that SIAOSI VANISI, also known as "PE", also known as "GEORGE", the defendant above-named, has committed the crimes of:

COUNT I. MURDER IN THE FIRST DEGREE, a violation of NRS 200.010 and NRS 200.030 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully, unlawfully, and with malice aforethought, deliberation, and premeditation, kill and murder SERGEANT GEORGE SULLIVAN, a human being, by means of repeated blows to the head and face with a hatchet, and/or other implement(s), and/or other blunt force trauma inflicted to the

head and upper torso thereby inflicting mortal injuries upon the said SERGEANT GEORGE SULLIVAN from which he died on January 13, 1998; or

That the said defendant during the course of, and in furtherance of an armed robbery, did willfully and unlawfully murder SERGEANT GEORGE SULLIVAN in that the said defendant on or about January 12, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, in the perpetration and/or the furtherance of an armed robbery at the University of Nevada, Reno, at or near the information kiosk, with the use of a deadly weapon, to wit, a hatchet, and/or other implement(s); or

That the said defendant on or about January 13, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, by lying in wait, in that the said defendant did watch, wait and conceal himself from SERGEANT GEORGE SULLIVAN, with the intention of killing SERGEANT GEORGE SULLIVAN, in that he hid and waited until SERGEANT GEORGE SULLIVAN completed a traffic stop, then observed and followed SERGEANT GEORGE SULLIVAN to a location where he was alone and then ambushed SERGEANT GEORGE SULLIVAN inflicting mortal injuries to his person from which he died on January 12, 1998.

COUNT II. ROBBERY WITH THE USE OF A DEADLY WEAPON, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe,

State of Nevada, did willfully and unlawfully take personal property, to wit: a Glock .45 caliber handgun; Glock "magazines"; a flashlight; and handcuffs from the person of SERGEANT GEORGE SULLIVAN, at or near the information kiosk located at the University of Nevada, Reno campus, Washoe County, Nevada, against his will, and by means of force or violence to his person and with the use of a hatchet, and/or other implement(s), which the said defendant used to strike SERGEANT GEORGE SULLIVAN repeatedly in the head and face, and/or other blunt force trauma inflicted to the head and upper torso.

COUNT III. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from the person of PATRICIA MISITO, the clerk at the 7-11 Store located at 710 Baring Boulevard, Washoe County, Nevada, against her will, and by means of force or violence or fear of immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

COUNT IV. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following, to wit:

///

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from DIANA LYNN SHOUSE, the clerk at said establishment, at the Jackson Food Mart located at 2595 Clearacre Lane, Washoe County, Nevada, against her will, and by means of force or violence or fear of immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

COUNT V. GRAND LARCENY, a violation of NRS 205.220, a felony, in the manner following, to wit:

That the said defendant on or about the 13th day of January, 1998, at Reno Township, within the County of Washoe, State of Nevada, did willfully and unlawfully steal, take and drive away the personal property of LOUIS D. HILL, to wit: a certain black four door 1993 Toyota Camry bearing Nevada license plate 029 HPY, with the intent then and there to permanently deprive the owner thereof.

DATED this 3rd day of FEBRUARY, 1998.

Restitution:
Custody:
Bailed:
Warrant:
01145000

District Court Dept: 4
District Att: GAMMICK/STANTON
Defense Att:
Bail No Bail

Exhibit 3

Exhibit 3

FILED

'98 FEB 26 A9:01

JUDI BAILEY, CLERK

BY _____ DEPUTY

DA #159523

RPD 019114-98

Case No. CR98-0516

Dept. No. 4

IN THE SECOND JUDICIAL DISTRICT COURT OF THE STATE OF NEVADA,

IN AND FOR THE COUNTY OF WASHOE

* * *

THE STATE OF NEVADA,

Plaintiff,

v.

INFORMATION

SIAOSI VANISI,
also known as
"PE",
also known as
"GEORGE",

Defendant.

_____/

RICHARD A. GAMMICK, District Attorney within and for the County of Washoe, State of Nevada, in the name and by the authority of the State of Nevada, informs the above entitled Court that SIAOSI VANISI, also known as "PE", also known as "GEORGE", the defendant above named, has committed the crimes of:

F720 COUNT I. MURDER IN THE FIRST DEGREE, a violation of NRS 200.010 and NRS 200.030 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of this Information,

at and within the County of Washoe, State of Nevada, did willfully, unlawfully, and with malice aforethought, deliberation, and premeditation, kill and murder SERGEANT GEORGE SULLIVAN, a human being, by means of repeated blows to the head and face with a hatchet, and/or other implement(s), and/or other blunt force trauma inflicted to the head and upper torso thereby inflicting mortal injuries upon the said SERGEANT GEORGE SULLIVAN from which he died on January 13, 1998; or

That the said defendant during the course of, and in furtherance of an armed robbery, did willfully and unlawfully murder SERGEANT GEORGE SULLIVAN in that the said defendant on or about January 13, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, in the perpetration and/or the furtherance of an armed robbery at the University of Nevada, Reno, at or near the information kiosk, with the use of a deadly weapon, to wit, a hatchet, and/or other implement(s); or

That the said defendant on or about January 13, 1998, did kill and murder SERGEANT GEORGE SULLIVAN, a human being, by lying in wait, in that the said defendant did watch, wait and conceal himself from SERGEANT GEORGE SULLIVAN, with the intention of killing SERGEANT GEORGE SULLIVAN, in that he hid and waited until SERGEANT GEORGE SULLIVAN completed a traffic stop, then observed and followed SERGEANT GEORGE SULLIVAN to a location where he was alone and then ambushed SERGEANT GEORGE SULLIVAN inflicting mortal injuries to his person from which he died on January 13, 1998.

F-960

COUNT II. ROBBERY WITH THE USE OF A DEADLY WEAPON, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of this Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: a Glock .45 caliber handgun; Glock "magazines"; a flashlight; and handcuffs from the person of SERGEANT GEORGE SULLIVAN, at or near the information kiosk located at the University of Nevada, Reno campus, Washoe County, Nevada, against his will, and by means of force or violence to his person and with the use of a hatchet, and/or other implement(s), which the said defendant used to strike SERGEANT GEORGE SULLIVAN repeatedly in the head and face, and/or other blunt force trauma inflicted to the head and upper torso.

F-960

COUNT III. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of this Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from the person of PATRICIA MISITO, the clerk at the 7-11 Store located at 710 Baring Boulevard, Washoe County, Nevada, against her will, and by means of force or violence or fear of

immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

F 960 COUNT IV. ROBBERY WITH THE USE OF A FIREARM, a violation of NRS 200.380 and NRS 193.165, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of this Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully take personal property, to wit: U.S. currency from DIANA LYNN SHOUSE, the clerk at said establishment, at the Jackson Food Mart located at 2595 Clearacre Lane, Washoe County, Nevada, against her will, and by means of force or violence or fear of immediate or future injury to her person and with the use of a large caliber handgun which the said defendant displayed to the victim and demanded money.

F 520 COUNT V. GRAND LARCENY, a violation of NRS 205.220, a felony, in the manner following:

That the said defendant on the 13th day of January A.D. 1998, or thereabout, and before the filing of this Information, at and within the County of Washoe, State of Nevada, did willfully and unlawfully steal, take and drive away the personal property of LOUIS D. HILL, to wit: a certain black four door 1993 Toyota Camry bearing Nevada license plate 029 HPY, with the intent then and there to permanently deprive the owner thereof.

///

All of which is contrary to the form of the Statute in such case made and provided, and against the peace and dignity of the State of Nevada.

RICHARD A. GAMMICK
District Attorney
Washoe County, Nevada

DAVID L. STANTON
Chief Deputy District Attorney

The following are the names and addresses of such witnesses as are known to me at the time of the filing of the within Information:

SALT LAKE COUNTY SHERIFF'S DEPARTMENT

DETECTIVE BRENT ADAMSON
INVESTIGATOR JEFF ITAMI
GARY LUCIER
JERRY TOWNSEND

RENO POLICE DEPARTMENT

DETECTIVE GREG BALLEW
DETECTIVE JOE DEPCZYNSKI
DETECTIVE RON DREHER
DETECTIVE JOHN DOUGLAS
DETECTIVE JIM DUNCAN
DETECTIVE DAVE JENKINS
DETECTIVE MOHAMAD RAFAQAT

UNIVERSITY OF NEVADA POLICE DEPARTMENT

SERGEANT LOUIS LEPERA
OFFICER CARL SMITH

WASHOE COUNTY SHERIFF'S OFFICE CRIME LAB

TONI LEAL
WILLIE STEVENSON

SCOTT ALBIN, 1555 Sky Valley Drive, Apartment C-104, Reno, Nevada

CAROL DIANA ARROYO, 5785 Conti Circle, Sun Valley, Nevada

MATHEW DONALD BANTA, Nye Hall, Room #863, Reno, Nevada

KALEB LEE BARTLEHEIM, 5034 Pleasant View Drive, Sparks, Nevada

LEMONT BONNER, University Inn, Room #729, Reno, Nevada

GUSTAVO MARTIN CERON, 943 Bell Street, Apartment #2, Reno, Nevada

ANDREW GUY "DREW" CIOCCA, 1316 Buena Vista Avenue, Apartment B, Reno, Nevada

ELLEN G.I. CLARK, MD, Forensic Pathologist

PRISCILLA LUPE ENDEMANN, 930 Manhattan, Apartment #3, Reno, Nevada

JESSIE JAMES GARLAND, JR., 805 Kuenzli, Apartment #225, Reno, Nevada

CHAITRA MICHELLE HANKE, 2860 Brittania Curt, Reno, Nevada

LOUIS D. HILL, 6075 Bankside Drive, Reno, Nevada

NATHAN DOUGLAS HUNT, 345 Ralston, Apartment G, Reno, Nevada

MAKALETA KAVAPALU

DAVID KINIKINI, 1665 South Riverside Drive, Salt Lake City, Utah

VAINGA IMONA KINIKINI, 1665 South Riverside Drive, Salt Lake City, Utah

NIA KOFUTUA

GABRIEL PHILLIP KNOX, 835 Evans Avenue (S.A.E. Fraternity House, Reno, Nevada

CORINA SALOTE LOUIS, 1098 North Rock Boulevard, Apartment A, Sparks, Nevada

MARIA LOSA LOUIS, 1098 North Rock Boulevard, Apartment A, Sparks, Nevada

DANIELLE MALLEY

BRENDA MARTINEZ, 720 Robinhood Drive, #218, Reno, Nevada

MELE MAVENI

PATRICIA MARY MISITO, 472 Emerson Way, Sparks, Nevada

MANAMOUI PEAUA, 1645 Sterling Way, Reno, Nevada

RENEE NANCY PEAUA, 1645 Sterling Way, Reno, Nevada

SHOMARI KAMU ROBERTS, 1966 Bishop Street, Reno, Nevada

DIANA LYNN SHOUSE, 7900 North Virginia Street, #121, Reno, Nevada

GAR SOWLE

SATEKI TAUKIEUVEA, 230 Booth Street, Apartment A, Reno, Nevada

///

METUISELA TAUVELI, 1098 Rock Boulevard, Apartment A, Sparks, Nevada or 280 East Eighth Avenue, Sun Valley, Nevada

NAMOA STEPHANOTIS TUPOU, 2712 Star Meadows Loop, Reno, Nevada

SIVAKUMAR UTHIRAM, 830 North Center Street, #11, Reno, Nevada

RONALD THOMAS VIETTI

DARLENE GAY WILSON, 850 North Virginia Street, #106, Reno, Nevada

JACK GRANT WOOD, 810 'H' Street, Sparks, Nevada

JULIE MICHELLE WOOD, 810 'H' Street, Sparks, Nevada

JAMES BYONG YIM, 1647 Wedekind Road, #23C, Reno, Nevada

RICHARD A. GAMMICK
District Attorney

DAVID L. STANTON
Chief Deputy District Attorney

PCN 88877081

02251114

EXHIBIT 4

EXHIBIT 4

AS APPROVED BY THE ABA HOUSE OF DELEGATES FEBRUARY 3, 1997:

AMERICAN BAR ASSOCIATION
SECTION OF INDIVIDUAL RIGHTS AND RESPONSIBILITIES
SECTION OF LITIGATION
SECTION OF TORT AND INSURANCE PRACTICE
COMMISSION ON MENTAL AND PHYSICAL DISABILITY LAW
MASSACHUSETTS BAR ASSOCIATION
THE ASSOCIATION OF THE BAR OF THE CITY OF NEW YORK
NEW YORK STATE BAR ASSOCIATION

RECOMMENDATION

RESOLVED, That the American Bar Association calls upon each jurisdiction that imposes capital punishment not to carry out the death penalty until the jurisdiction implements policies and procedures that are consistent with the following longstanding American Bar Association policies intended to (1) ensure that death penalty cases are administered fairly and impartially, in accordance with due process, and (2) minimize the risk that innocent persons may be executed:

(i) Implementing ABA "Guidelines for the Appointment and Performance of Counsel in Death Penalty Cases" (adopted Feb. 1989) and Association policies intended to encourage competency of counsel in capital cases (adopted Feb. 1979, Feb. 1988, Feb. 1990, Aug. 1996);

(ii) Preserving, enhancing, and streamlining state and federal courts' authority and responsibility to exercise independent judgment on the merits of constitutional claims in state post-conviction and federal *habeas corpus* proceedings (adopted Aug. 1982, Feb. 1990);

(iii) Striving to eliminate discrimination in capital sentencing on the basis of the race of either the victim or the defendant (adopted Aug. 1988, Aug. 1991); and

(iv) Preventing execution of mentally retarded persons (adopted Feb. 1989) and persons who were under the age of 18 at the time of their offenses (adopted Aug. 1983).

FURTHER RESOLVED, That in adopting this recommendation, apart from existing Association policies relating to offenders who are mentally retarded or under the age of 18 at the time of the commission of the offenses, the Association takes no position on the death penalty.

The following report was submitted with Recommendation No. 107. Reports accompanying recommendations are not official ABA policy, but are provided to support the recommendation.

REPORT

INTRODUCTION

The American Bar Association has adopted numerous policies bearing on the manner in which the death penalty should be applied in jurisdictions where it exists. These policies were adopted in view of the ABA's extensive experience with the administration of the death penalty and in light of several ABA-sponsored studies. The policies concern: (1) competent counsel in capital cases; (2) proper processes for adjudicating claims in capital cases (including the availability of federal *habeas corpus*); (3) racial discrimination in the administration of capital punishment; and (4) the execution of juveniles and mentally retarded persons.

The time has now come for the ABA to take additional decisive action with regard to capital punishment. Not only have the ABA's existing policies generally not been implemented, but also, and more critically, the federal and state governments have been moving in a direction contrary to these policies. The most recent and most dramatic moves, both strongly opposed by the ABA, have come in the form of laws enacted by Congress in 1996. Federal courts already are construing one law to significantly curtail the availability of federal *habeas corpus* to death row inmates, even when they have been convicted or sentenced to death as a result of serious, prejudicial constitutional violations. Another law completely withdraws federal funding from the Post-Conviction Defender Organizations that have handled many post-conviction cases and that have mentored many other lawyers who have represented death row inmates in such proceedings.

These two recently enacted laws, together with other federal and state actions taken since the ABA adopted its policies on capital punishment, have resulted in a situation in which fundamental due process is now systematically lacking in capital cases. Accordingly, in order to effectuate its existing policies, the ABA should now call upon jurisdictions with capital punishment not to carry out the death penalty until these policies are implemented. Of course, individual lawyers differ in their views on the death penalty in principle and on its constitutionality. However, it should now be apparent to all of us in the profession that the administration of the death penalty has become so seriously flawed that capital punishment should not be implemented without adherence to the various applicable ABA policies.

BACKGROUND

The backdrop for this Recommendation is the two decades of jurisprudence and legislation since the United States Supreme Court upheld new death penalty statutes in Gregg v.

Georgia,[1] after having invalidated earlier death penalty statutes in 1972 in Furman v. Georgia.[2] In Furman, the Court believed that then-existing state statutes failed to properly balance the need to ensure overall consistency in capital sentencing with the need to ensure fairness in individual cases. Four years later, in Gregg, the Court concluded that new state statutes' special procedural requirements for capital prosecutions provided a means by which the states would achieve that balance.

However, two decades after Gregg, it is apparent that the efforts to forge a fair capital punishment jurisprudence have failed.[3] Today, administration of the death penalty, far from being fair and consistent, is instead a haphazard maze of unfair practices with no internal consistency. To a substantial extent, this situation has developed because death penalty jurisdictions generally have failed to implement the types of policies called for by existing ABA policies. The pervasive unfairness of the capital punishment system that has evolved since Gregg has led two of the Supreme Court Justices who were part of the majority in Gregg to regret having upheld the death penalty's constitutionality. Retired Justice Lewis Powell, in a 1991 interview, expressed his doubt whether the death penalty could be administered in a way

[1] 428 U.S. 153 (1976).

[2] 408 U.S. 238 (1972).

[3] *See* Carol S. Steiker & Jordan M. Steiker, Sober Second Thoughts: Reflections on Two Decades of Constitutional Regulation of Capital Punishment, 109 Harv. L. Rev. 355, 357 (1995)(reporting that "[v]irtually no one thinks that the constitutional regulation of capital punishment has been a success"). *See* also James S. Liebman & Jonathan M. Moses, Fatal Distortion: The Chronic Making and Unmaking of Death Penalty Law (publication forthcoming).

that was truly fair and stated that, in retrospect, his greatest regret was that he had voted to uphold the constitutionality of capital punishment in McCleskey v. Kemp, 481 U.S. 279 (1987), and other cases.[4] Justice Harry Blackmun expressed similar concerns in his 1994 dissent in McFarland v. Scott:

> When we execute a capital defendant in this country, we rely on the belief that the individual was guilty, and was convicted and sentenced after a fair trial, to justify the imposition of state-sponsored killing. . . . My 24 years of overseeing the imposition of the death penalty from this court have left me in grave doubt whether this reliance is justified and whether the constitutional requirement of competent legal counsel for capital defendants is being fulfilled.[5]

The already deplorable state of affairs noted by Justices Powell and Blackmun is exacerbated by three other, very recent developments. First, although certain states have begun to implement some ABA policies, more states are moving in the opposite direction--undermining or eliminating important procedural safeguards that the ABA has found to be essential.

Second, Congress recently enacted legislation that makes it significantly more difficult for the federal courts to adjudicate meritorious federal constitutional claims in capital cases. Title I of the Anti-Terrorism and Effective Death Penalty Act of 1996 establishes deadlines for filing federal *habeas* petitions, places limits on federal evidentiary hearings into the facts underlying federal constitutional claims, sets timetables for federal court action, limits the availability of appellate review, establishes even more demanding restrictions on second or successive applications for federal relief, and, in some instances, apparently bars the federal courts from awarding relief on the basis of federal constitutional violations where state courts have erred in concluding that no such violation occurred.

While the ABA has consistently supported meaningful *habeas corpus* reforms, this new federal legislation instead dramatically undermines the federal courts' capacity to adjudicate federal constitutional claims in a fair and efficient manner. Indeed, that may itself be unconstitutional, as the ABA already has asserted in an *amicus* brief. Congress' adoption of the 1996 Act only underscores the extent of this country's failure to fashion a workable and just system for administering capital punishment.

Third, and also contrary to longstanding ABA policies, Congress has ended funding for Post-Conviction Defender Organizations (PCDO's), which have handled many capital post-

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[4] *See* JOHN C. JEFFRIES, JR., JUSTICE LEWIS F. POWELL, JR. 451-52 (1994) (quoting Justice Powell).

[5] 114 S. Ct. 2785, 2790 (1994).

conviction cases and have recruited and supported volunteer lawyers in these cases for many indigent death row prisoners. The ABA had a major role in supporting the creation of the PCDO's.

Together, these three developments have brought the adjudication of capital cases to the point of crisis. Unless existing ABA policies are now implemented, many more prisoners will be executed under circumstances that are inconsistent with the Supreme Court's mandate, articulated in Furman and Gregg, that the death penalty be fairly and justly administered.

The ABA has worked hard to foster the fair and just administration of capital punishment. The ABA's Post-conviction Death Penalty Representation Project has provided expert advice and counsel to jurisdictions attempting to improve the delivery of legal services to death row prisoners. In addition, it has recruited more than 400 volunteer attorneys to represent indigent death row inmates. The Project also has assisted in the creation of PCDO's and strongly opposed the successful effort to cut off their federal funding. The ABA has testified in support of the Racial Justice Act and actively opposed the kind of *habeas corpus* restrictions enacted in 1996. And the ABA has conducted and supported a variety of training programs for lawyers and judges in capital cases and has advocated detailed standards for capital defense counsel. Also, various ABA groups have sponsored numerous education programs examining the fairness of capital punishment as implemented.

The ABA's efforts have had some impact. But recent developments have made the impact of incompetent counsel and the instances of uncorrected due process violations substantially greater, and matters are likely to become worse in the future. It is essential that the ABA now forcefully urge that executions not occur unless each person being executed has had competent counsel and the due process protections that the ABA has long advocated.

I. Competent Counsel

The ABA is especially well positioned to identify the professional legal services that should be available to capital defendants and death row inmates. The Association has shouldered that responsibility by conducting studies and adopting policies dating back nearly twenty years. Seven years ago, the ABA recommended that "competent and adequately compensated" counsel should be provided "at all stages of capital . . . litigation," including trial, direct review, collateral proceedings in both state and federal court, and *certiorari* proceedings in the U.S. Supreme Court.[6] To implement that basic recommendation, the ABA said that death penalty jurisdictions should establish organizations to "recruit, select, train, monitor, support, and assist" attorneys representing capital clients.

[6] Resolution of the House of Delegates, Feb. 1990.

Eight years ago, the ABA published the "Guidelines for the Appointment and Performance of Counsel in Death Penalty Cases" and urged all jurisdictions that employ the death penalty to adopt them.[7] Those guidelines call for the appointment of two experienced attorneys at each stage of a capital case.[8] Appointments are to be made by a special appointing authority or committee, charged to identify and recruit lawyers with specified professional credentials, experience, and skills.[9] The guidelines make it clear that ordinary professional qualifications are inadequate to measure what is needed from counsel in "the specialized practice of capital representation." To ensure that the lawyers assigned to capital cases are able to do the work required, the guidelines state that attorneys should receive a "reasonable rate of hourly compensation which... reflects the extraordinary responsibilities inherent in death penalty litigation." Concomitantly, counsel should be provided with the time and funding necessary for proper investigations, expert witnesses, and other support services.[10]

No state has fully embraced the system the ABA has prescribed for capital trials. To the contrary, grossly unqualified and under compensated lawyers who have nothing like the support necessary to mount an adequate defense are often appointed to represent capital clients. In case after case, decisions about who will die and who will live turn not on the nature of the offense the defendant is charged with committing, but rather on the nature of the legal representation the defendant receives.[11]

Jurisdictions that employ the death penalty have proven unwilling to establish the kind of legal services system that is necessary to ensure that defendants charged with capital offenses receive the defense they require. Many death penalty states have no working public defender

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[7] Resolution of the House of Delegates, Feb. 1989.

[8] The ABA previously had urged the federal government to adopt similar procedures and standards for counsel appointed to represent death row prisoners in federal *habeas corpus* proceedings. Resolution of the House of Delegates, Feb. 1988. Before that, the ABA had urged the U.S. Supreme Court and the Congress to provide for competent counsel to handle *certiorari* proceedings and petitions for clemency before the Court. Resolution of the House of Delegates, Feb. 1979.

[9] In addition, the guidelines set forth the way in which counsel in a capital case should perform various defense functions, from plea negotiations, through jury selection, the trial and sentencing phases, and post-conviction proceedings.

[10] In August 1996, the ABA adopted a policy regarding the appropriate representation of military defendants facing execution. To date, the military has failed to implement this policy.

[11] Marcia Coyle, et al., Fatal Defense: Trial and Error in the Nation's Death Belt, Nat'l L.J., June 11, 1990 (reporting the conclusions of an extensive six-state survey: capital trials are "more like a flip of the coin than a delicate balancing of the scales" because defense counsel are "ill trained, unprepared. . . [and] grossly underpaid").

programs, relying instead upon scattershot methods for selecting and supporting defense counsel in capital cases.[12] For example, some states simply assign lawyers at random from a general list--a scheme destined to identify attorneys who lack the necessary qualifications and, worse still, regard their assignments as a burden. Other jurisdictions employ "contract" systems, which typically channel indigent defense business to attorneys who offer the lowest bids.[13] Other states

[12] *See* Stephen B. Bright, Counsel for the Poor: The Death Sentence Not for the Worst Crime, But for the Worst Lawyer, 103 Yale L.J. 1835 (1994).

[13] Richard Klein, The Emperor Gideon Has No Clothes: The Empty Promise of the Constitutional Right to Effective Assistance of Counsel, 13 Hastings Const. L.Q. 625, 679-680 (1986).

use public defender schemes that appear on the surface to be more promising, but prove in practice to be just as ineffective.[14]

[14] *See* Bright, *supra* note 12, at 1849-1852, summarizing the current situation as follows:

> The structure of indigent defense not only varies among states, it varies within many states from county to county. Some localities employ a combination of programs. All of these approaches have several things in common. They evince the gross underfunding that pervades indigent defense. They are unable to attract and keep experienced and qualified attorneys because of lack of compensation and overwhelming workloads. Just when lawyers reach the point when they have handled enough cases to begin avoiding basic mistakes, they leave criminal practice and are replaced by other young, inexperienced lawyers who are even less able to deal with the overwhelming caseloads. Generally, no standards are employed for assignment of cases to counsel or for the performance of counsel. And virtually no resources are provided for investigative and expert assistance or defense counsel training.
>
> The situation has further deteriorated in the last few years. This is largely due to

> the increased complexity of cases and the increase in the number of cases resulting from expanded resources for police and prosecution and the lack of a similar increase, and perhaps even a decline, in funding for defense programs. Id. (citations omitted).

Moreover, at an ABA Annual Meeting program in 1995, Scharlette Holdman described case after case of incompetent representation by counsel appointed by judges in California and other Western states, in which compensation is typically greater than that in most other states with capital punishment. *See* Holdman in Is There Any *Habeas* Left in this *Corpus*?, 27 Loyola U. Chicago L.J. 524, 581 (1996). Thus, as the ABA has recognized, the problem is not merely underfunding. It is also the appointment by judges of attorneys who lack either the expertise or the experience necessary to represent a capital defendant effectively.

It is scarcely surprising that the results of poor lawyering are often literally fatal for capital defendants. Systematic studies reveal the depth of the problems nationwide and thus supply the hard data to support reasoned policy-making.[15] Case after case all too frequently reveals the inexperience of lawyers appointed to represent capital clients. In Tyler v. Kemp[16] and Paradis v. Arave,[17] state trial courts assigned capital cases to young lawyers who had passed the bar only a few months earlier; in Bell v. Watkins,[18] a state trial court appointed a lawyer who had never finished a criminal trial of any kind; and in Leatherwood v. State,[19] yet another trial court allowed a third-year law student to handle most of a capital trial.

Other cases demonstrate that defense counsel in capital cases often are incapable of handling such cases properly. In Smith v. State,[20] defense counsel asked for extra time between the guilt and sentencing phases of a capital case in order to read the state death penalty statute for the first time. In Frey v. Fulcomer,[21] defense counsel, in purported compliance with a state statute, limited his presentation of mitigating evidence. Unbeknownst to defense counsel, that statute had been held unconstitutional three years earlier precisely because it restricted counsel's ability to develop mitigating evidence. In Ross v. Kemp,[22] one defense attorney advanced a weak alibi theory, while his co-counsel mounted an inconsistent mental incompetency defense that necessarily conceded that the defendant had participated in the offense.[23] In Romero v. Lynaugh,[24] defense counsel declined to offer any evidence at all during the penalty phase of a

[15] Over the years, both the ABA and local bar and legislative groups have commissioned such studies. In one instance, illustrative of other states' practices as well, researchers found that Texas typically does not use central appointing authorities to choose counsel in death penalty cases, does not monitor the performance of assigned counsel in capital cases, and does not adequately compensate appointed counsel or reimburse them sufficiently for support services. The Spangenberg Group, A Study of Representation in Capital Cases in Texas (1993).

[16] 755 F.2d 741 (11th Cir.), *cert. denied*, 474 U.S. 1026 (1985).

[17] 954 F.2d 1483 (9th Cir. 1992).

[18] 692 F.2d 999 (5th Cir. 1982).

[19] 548 So.2d 389 (Miss. 1989).

[20] 581 So.2d 497 (Ala. Crim. App. 1990).

[21] 974 F.2d 348 (3d Cir. 1992).

[22] 393 S.E.2d 244 (Ga. 1990).

[23] *See* Bright, *supra* note 12 (listing these illustrative cases and dozens more).

[24] 884 F.2d 871 (5th Cir. 1989).

capital case, and then made the following brief and ineffective closing argument: "You are an extremely intelligent jury. You've got that man's life in your hands. You can take it or not. That's all I have to say." The jury, in its turn, sentenced the defendant to death.

In Messer v. Kemp,[25] defense counsel presented very little of the mitigating evidence available, made no objections at all, then essentially told the jury that the death penalty was appropriate. That defendant, too, was sentenced to die. In Young v. Kemp,[26] the defense counsel was himself so dependent on drugs during trial that, as even he later admitted, he mounted only the semblance of a defense. His client received the death penalty, but then chanced to see the defense lawyer thereafter in a prison yard. The attorney had, in the interim, been convicted and sentenced on state and federal drug charges.

[25] 831 F.2d 946 (11th Cir. 1987).

[26] No. 85-98-2-MAC (M.D. Ga. 1985).

Even when experienced and competent counsel are available in capital cases, they often are unable to render adequate service for want of essential funding to pay the costs of investigations and expert witnesses.[27] In some rural counties in Texas, an appointed attorney receives no more than $800 to represent a capital defendant.[28] Similar limits are in place in other states. In Virginia, the hourly rate for capital defense services works out to about $13.[29] In an Alabama case, the lawyer appointed to represent a capital defendant in a widely publicized case was allowed a total of $500 to finance his work, including any investigations and expert services needed. With that budget, it is hardly surprising that the attorney conducted no investigation at all.[30]

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[27] Spangenberg Group, *supra* note 15, at 159; *see* also Anthony Paduano & Clive A.S. Smith, The Unconscionability of Sub-Minimum Wages Paid Appointed Counsel in Capital Cases, 43 Rutgers L. Rev. 281 (1991)(providing a national survey).

[28] Marianne Lavelle, Strong Law Thwarts Lone Star Counsel, Nat'l L.J., June 11, 1990, at 34. In one celebrated Texas case, the Fifth Circuit Court of Appeals noted that an appointed attorney had received only $11.84 per hour in a capital case and, at that price, had rendered particularly dreadful service to his indigent client. That, said the court, explained much of the problem. "[T]he justice system got only what it paid for." Martinez-Macias v. Collins, 979 F.2d 1067 (5th Cir. 1992).

[29] Richard Klein, The Eleventh Commandment: Thou shalt Not Be Compelled To Render the Ineffective Assistance of Counsel, 68 Ind. L.J. 363, 366 (1993).

[30] Deposition of Richard Bell, at 24-25, in Grayson v. State (Cir. Ct. Shelby County, Ala., Oct. 10, 1991). The state payment limit is now $1,000.

Poorly prepared and supported trial lawyers typically do a poor job. When they do recognize points to be explored and argued, they often fail to follow through in a professional manner. And when they do not recognize what needs to be done, they do nothing at all or they take actions that are inimical to the needs of their clients. The result of such inadequacies in representation is that counsel often fail to present crucial facts. They also may fail to raise crucial legal issues, causing their clients to forfeit their opportunity to explore those issues later--in any court. In one recent case, appointed defense counsel scarcely did *anything* to represent his client at trial and, along the way, neglected to raise three significant constitutional claims. The federal court that reviewed the case could not consider any of these omitted claims because, under state law, counsel's numerous defaults barred their later consideration.[31]

[31] Weeks v. Jones, 26 F.3d 1030 (11th Cir. 1994).

The same pattern is repeated with respect to the legal services available for the appellate and post-conviction stages of capital cases. State appellate court standards for adequate representation under state law are extraordinarily low. These courts sometimes dispose of capital appeals on the basis of inadequate briefs containing only a few pages of argument--and, in so doing, often rely on defense counsel's "default" at trial to avoid considering constitutional claims on the merits.[32] As for post-conviction, an ABA Task Force developed an enormous body of evidence in 1990 demonstrating that prisoners sentenced to death typically receive even less effective representation in post-conviction than at the trial stage.[33] The Supreme Court has held that there is no constitutional right to counsel in post-conviction proceedings, even in capital cases.[34] Although many states and the federal government once funded Post-Conviction Defender Organizations, which recruited lawyers for death row inmates at the post-conviction stage and represented others themselves, today many of those centers have been forced to close because Congress has eliminated their federal funding.[35]

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[32] *See* Bright, *supra* note 12, at 1843 & n.55.

[33] American Bar Ass'n, Toward a More Just and Effective System of Review in State Death Penalty Cases, 40 Am. U. L. Rev. 1 (1990)[hereafter cited as Toward a More Just and Effective System].

[34] Murray v. Giarratano, 492 U.S. 1 (1989).

[35] *See* generally, *The Crisis in Capital Representation*, The Record, Association of the Bar of the City of New York Vol. 51 169, 187-191 (March 4, 1996)[hereafter cited as Crisis]. The PCDO's were extremely effective. In 1989, Chief Judge Tjoflat of the United States Court of Appeals for the Eleventh Circuit told the ABA Task Force that the Resource Centers were "indispensable." Toward a More Just and Effective System, *supra* note 33, at 73. In 1994, Judge Arthur L. Alarcon of the Court of Appeals for the Ninth Circuit wrote that the PCDO's were "critical" to the efficient processing of capital cases. Memorandum to Judges Cox and

The federal courts generally have not rectified this situation. The standard for effective assistance of counsel under the Sixth Amendment is so egregiously low that the potential for relief in federal *habeas corpus* on such grounds is almost always more theoretical then real. The federal courts found the "services" rendered in the Romero, Messer, and Young cases, cited above, to be "effective" for constitutional purposes--and, accordingly, all three prisoners were executed.

Cedarbaum, Dec. 7, 1994, cited in Crisis, *supra* at 188-189. Nevertheless, they were defunded.

Compounding the effect of incompetent representation of capital defendants and death row inmates is improper representation of the state by prosecutors inadequately trained in avoiding constitutional violations. In describing this combined impact, former Pennsylvania Attorney General Ernest Preate said at an ABA Annual Meeting program, "[I]n too many capital cases, there is ineffective assistance of counsel on both sides . . . . [T]he defense counsel's ineffective assistance of counsel is not necessarily a mistake that the defense counsel originally made, but a mistake by the prosecutor. The prosecutor did something he or she shouldn't have done and the defense counsel failed to object or failed to take advantage of it . . .."[36] Unfortunately, relief rarely is granted under any of the circumstances described above.

II. Proper Processes

The ABA consistently has sought to ensure that adequate procedures are in place to determine whether a capital sentence has been entered in violation of federal law. No other organization has monitored the federal *habeas* system more closely, developed greater expertise regarding that system's strengths and weaknesses, or offered more detailed prescriptions for reform.

Fourteen years ago, the ABA publicly opposed three bills then pending in Congress that would have dramatically restricted the federal courts' ability to adjudicate state prisoners' *habeas* claims. At the same time, the ABA proposed alternatives that would have streamlined *habeas* litigation without undermining the federal courts' authority and responsibility to exercise independent judgment on the merits of constitutional claims.[37]

Since that time, the ABA has been deeply involved in the national debate over federal *habeas*--particularly in capital cases. The ABA task force that studied the situation in depth created a solid scholarly foundation for its work, then received written and oral testimony from knowledgeable individuals and organizations at hearings in several cities.[38] In 1990, the ABA House of Delegates adopted a set of recommendations for improving current law that were based

[36] Ernest Preate, in The Death of Fairness? Counsel Competency & Due Process in Death Penalty Cases, 31 Houston L. Rev. 1105, 1120-21 (1994).

[37] Resolution of the House of Delegates, Feb. 1982.

[38] *See* Toward a More Just and Effective System, *supra* note 33.

upon the Task Force's work.[39] The recommendations included the principles that a death row prisoner should be entitled to a stay of execution in order to complete one round of post-conviction litigation in state and federal court; that the federal courts should consider claims that were not properly raised in state court if the reason for the prisoner's default was counsel's ignorance or neglect; and that a prisoner should be permitted to file a second or successive federal petition if it raises a new claim that undermines confidence in his or her guilt or the appropriateness of the death sentence.

[39] Id.; Resolution of the House of Delegates, Feb. 1990.

Regrettably, none of these recommendations has been generally adopted. In fact, the Supreme Court has denied death row prisoners the very opportunities for raising constitutional claims that the ABA has insisted are essential. Prisoners have not been entitled even to a single stay of execution to maintain the status quo long enough to complete post-conviction litigation.[40] The federal courts typically have refused to consider claims that were not properly raised in state court, even if the failure to raise them was due to the ignorance or neglect of defense counsel.[41] And prisoners have often not been allowed to litigate more than one petition, even if they have offered strong evidence of egregious constitutional violations that they could not have presented earlier.[42]

The consequence of these legal tangles has been that meritorious constitutional claims often have gone without remedy. Contrary to popular belief, most *habeas* petitions in death penalty cases do not rest on frivolous technicalities. As Professor James S. Liebman has reported, in 40 percent of all capital cases, even in the face of all the procedural barriers, death row inmates still have been able to secure relief due to violations of their basic constitutional rights.[43] The percentage securing relief would be substantially higher if the federal courts had considered all death row inmates' claims on their merits.

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[40] *See* McFarland v. Scott, 114 S.Ct. 2568 (1994).

[41] E.g., Coleman v. Thompson, 111 S.Ct. 2546 (1991).

[42] E.g., McCleskey v. Zant, 499 U.S. 467 (1991). Moreover, the Supreme Court has developed numerous other door-closing doctrines that restrict death row prisoners' access to the federal courts for *habeas corpus* adjudication. *See* The Death of Fairness? Counsel Competency and Due Process in Death Penalty Cases, 31 Houston L. Rev. 1105 (1994).

[43] Memorandum of James S. Liebman, Nov. 22, 1995.

Yet, in 1996, Congress enacted legislation that will make it even more difficult for the federal courts to adjudicate federal claims in capital cases. This new law, which the ABA vigorously opposed, establishes deadlines for filing federal *habeas* petitions, limits on federal evidentiary hearings into the facts underlying federal claims, timetables for federal court action, limits on the availability of appellate review, and even more demanding restrictions on second or successive applications from a single petitioner. The new law also contains a provision that, according to the *en banc* Seventh Circuit (and contrary to the ABA's position as *amicus curiae*), prevents a federal court from awarding relief on the basis of a claim that the federal court finds to be meritorious if it concludes that the state court that rejected the claim was not "unreasonably" wrong in doing so.[44]

III. Race Discrimination

[44] Lindh v. Murphy, 96 F. 2d 856, 870 (7th Cir. 1996). For a summary and analysis of the various new *habeas corpus* provisions, *see* Yackle, A Primer on the New Habeas Corpus Statute, 44 Buffalo Law Rev. 381 (1996).

In 1988, the ABA adopted a policy of striving to eliminate "discrimination in capital sentencing on the basis of the race of either the victim or the defendant."[45] Nevertheless, longstanding patterns of racial discrimination remain in courts across the country.

Numerous studies have demonstrated that defendants are more likely to be sentenced to death if their victims were white rather than black.[46] Other studies have shown that in some jurisdictions African Americans tend to receive the death penalty more often than do white defendants.[47] And in countless cases, the poor legal services that capital clients receive are rendered worse still by racist attitudes of defense counsel.[48]

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[45] Resolution of the House of Delegates, Aug. 1988. In addition, the ABA has urged Congress to "prevent or minimize any disproportionate effects of general federal death penalty legislation on Native Americans subject to federal jurisdiction." Resolution of the House of Delegates,
Aug. 1991.

[46] *See* Tabak, Is Racism Irrelevant? Or Should the Fairness in Death Sentencing Act Be Enacted to Substantially Diminish Racial Discrimination in Capital Sentencing?, 18 N.Y.U. Rev. L. & Soc. Change 777, 780-83 (1990-91) (summarizing various studies) (this law review article is an adaptation of the ABA's testimony in support of the proposed Racial Justice Act); U.S. GENERAL ACCOUNTING OFFICE, DEATH PENALTY SENTENCING: RESEARCH INDICATES A PATTERN OF RACIAL DISPARITIES (Feb. 1990), *reprinted in* 136 CONG. REC. S6889-90 (daily ed., May 24, 1990); L. Ekstrand and H. Ganson, in panel discussion on Race and the Death Penalty, in The Death Penalty in the Twenty-First Century, 45 Amer. U. L. Rev. 239, 320-23, 341, 345, 347, 348 (1995). *See* also Samuel R. Gross & Robert Mauro, Death and Discrimination: Racial Disparities in Capital Sentencing (1989). In Kentucky, approximately 1,000 African Americans have been murdered over the past 20 years. Yet none of the prisoners on that state's death row is there for having killed a black victim. Letter from the Death Penalty Information Center, April 2, 1996.

[47] E.g., David C. Baldus, George Woodworth & Charles A. Pulaski, Jr., Equal Justice and the Death Penalty: A Legal and Empirical Analysis 399 (1990).

[48] Sadly, defense attorneys who shrink from rocking the boat locally still may fail, even in this day and age, to object to jury selection procedures that exclude African Americans from service. *See* Bright, *supra* note 12, at 1857, citing Gates v. Zant, 863 F.2d 1492, 1497-1500 (11th Cir.), *cert. denied*, 493 U.S. 945 (1989)(denying relief in such an instance). Cases in which defense attorneys use racial slurs in reference to their clients are also all too common. *See* Bright, *supra* note 12, at 1865, citing Transcript of Opening and Closing Arguments at 39, State v. Dungee, Record Excerpts at 102, (11th Cir.)(No. 85-8202), *decided sub nom.* Isaacs v. Kemp, 778 F.2d 1482 (11th Cir. 1985), *cert. denied*, 476 U.S. 1164 (1986), showing the following opening argument:

> You have got a little ole nigger man over there that doesn't weigh over 135 pounds. He is poor and he is broke. He's got an appointed lawyer. . ..He is ignorant.

I will venture to say he has an IQ of not over 80.

Unsurprisingly, the jury that heard that statement from defense counsel later sentenced the defendant to death.

Justice Blackmun lamented the Court's failure to fashion an effective means of preventing the "biases and prejudices that infect society generally" from influencing "the determination of who is sentenced to death."[49] After years of watching race play so large a role in the administration of capital punishment, he concluded, in part for that reason, that he no longer could find any execution consistent with the Constitution. The ABA need not go so far in order to resolve, as a matter of ABA policy, that executions should cease until effective mechanisms are developed for eliminating the corrosive effects of racial prejudice in capital cases.

The Supreme Court, in rejecting a constitutional challenge to the systemic pattern of racial discrimination in capital sentencing, invited legislative action to deal with this situation.[50] Thereafter, the ABA, in conformance with a resolution adopted by the House of Delegates in August 1988, supported enactment of the Racial Justice Act, a measure designed to create a remedy for such racial discrimination.[51] Although the House of Representatives twice has approved the Racial Justice Act, the full Congress has not enacted it. Accordingly, these patterns of racial discrimination remain unrectified. Ironically, Justice Powell, the author of the Supreme Court's 5-4 decision rejecting the constitutional challenge discussed above, has now indicated that he regrets his participation in that decision (as well as in other decisions upholding the death penalty) more than anything else during his tenure on the court.[52]

IV. Execution of Mentally Retarded Individuals and Juveniles

[49] Callins v. Collins, 114 S.Ct. 1127, 1135 (1994) (dissenting opinion).

[50] *See* McCleskey v. Kemp, 481 U.S. 279, 319 (1987).

[51] *See* Tabak, *supra* n. 46.

[52] *See* JEFFRIES, *supra* n. 4, at 451-452.

The ABA has established policies against the execution of both persons with "mental retardation," as defined by the American Association of Mental Retardation,[53] and persons who were under the age of 18 at the time of their offenses.[54] Nevertheless, the Supreme Court has upheld the constitutionality of executions in both of those instances.[55] While many states now bar executions of the retarded, other states continue to execute both retarded individuals and, on occasion, offenders who were under 18 at the time they committed the offenses for which they were executed.[56]

CONCLUSION

As former American Bar Association President John J. Curtin, Jr., told a congressional committee in 1991, "Whatever you think about the death penalty, a system that will take life must first give justice."[57] This recommendation would not commit the ABA to a policy regarding the morality or the advisability of capital punishment *per se*. Rather, this Recommendation would reinforce longstanding Association policies that seek to bring greater fairness to the administration of the death penalty. Those policies rest firmly on the special competence and experience that only members of the legal profession can bring to bear.

For many years, the ABA has conducted studies, held educational programs, and produced studies and law review articles[58] about the administration of the death penalty. As a

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[53] Resolution of the House of Delegates, Feb. 1989.

[54] Resolution of the House of Delegates, Aug. 1983.

[55] Penry v. Lynaugh, 492 U.S. 302 (1989)(refusing to hold that the execution of a mentally retarded prisoner violated the eighth amendment); Stanford v. Kentucky, 492 U.S. 361 (1989) (refusing to hold that the execution of prisoners who were 16 and 17 years of age at the time of their offenses violated the eighth amendment).

[56] Emily Reed, The Penry Penalty: Capital Punishment and Offenders with Mental Retardation 39 (1993)(reporting that mentally retarded prisoners account for 12% to 20% of the population on death row); Raymond Paternoster, Capital Punishment in America 95 (1991)(reporting that near the end of 1990 there were 32 death row prisoners who had been under 18 years of age at the time of their offenses); Victor Streib, Report (Sept. 19, 1995)(reporting 42 such prisoners only five years later). Since 1973, 140 death sentences have been imposed on juvenile offenders. Letter from the Death Penalty Information Center, April 2, 1996.

[57] Hearings before the Subcommittee on Civil and Constitutional Rights of the Committee on the Judiciary, U.S. House of Representatives, 102d Cong., 1st Sess. at 447 (1991).

[58] *See*, e.g., Is There Any *Habeas* Left in This *Corpus?*, 27 Loyola U. Chicago L. J. 524 (1996); The Death of Fairness?, see *supra* note 42; Politics and the Death Penalty: Can Rational Discourse and Due Process Survive the Perceived Political Pressure?, 21 Fordham Urban L. J.

result of that work, the Association has identified numerous, critical flaws in current practices. Those flaws have not been redressed; indeed, they have become more severe in recent years, and the new federal *habeas* law and the defunding of the PCDO's have compounded these problems. This situation requires the specific conclusion of the ABA that executions cease, unless and until greater fairness and due process prevail in death penalty implementation.

Respectfully submitted,

Leslie A. Harris
Chair, Section of Individual Rights and Responsibilities

February 1997

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239 (1994).

Exhibit 5

Exhibit 5

Declaration of Mark J. S. Heath, M.D.

I, Mark J.S. Heath, M.D., hereby declare as follows:

1. I am an Assistant Professor of Clinical Anesthesiology at Columbia University in New York City. I received my Medical Doctorate degree from the University of North Carolina at Chapel Hill in 1986 and completed residency and fellowship training in Anesthesiology in 1992 at Columbia University Medical Center. I am Board Certified in Anesthesiology, and am licensed to practice Medicine in New York State. My work consists of approximately equal parts of performing clinical anesthesiology, teaching residents, fellows, and medical students, and managing a neuroscience laboratory. As a result of my training and research I am familiar and proficient with the use and pharmacology of the chemicals used to perform lethal injection. I am qualified to do animal research at Columbia University and am familiar with the American Veterinary Medical Association's guidelines.

2. Over the past several years, as a result of concerns about the mechanics of lethal injection as practiced in the United States, I have performed many hundreds of hours of research into the techniques that are used during this procedure. I have testified as an expert medical witness in courts in Maryland, Georgia, Tennessee, Kentucky, Virginia, and Louisiana in the following actions: *Baker v. Saar*, No. WDQ-05-3207 (D. Md.); *Evans v. Saar*, No. 1:06-CV-00149-BEL, (D. Md.);

Reid v. Johnson, No. 3:03cv1039 (E.D. Va.); *Abdur'Rahman v. Bredesen*, No. 02-2236-III (Davidson County Chancery Ct., Tenn.); *State v. Michael Wayne Nance*, 95-B-2461-4 (Ga. Superior Ct.); *Ralph Baze & Thomas Bowling v. Rees*, 04-CI-01094 (Franklin County Circuit Ct., Ky.); *Taylor v. Crawford*, 05-4173-CV-C-FJG (W.D. Mo.); and *State v. Nathanial Code*, No.138860, (1st Judicial D. Ct. of LA for Caddo Parish 2003). I have filed affidavits that have

been reviewed by courts in the above states and also in California, Pennsylvania, New York, Alabama, North Carolina, South Carolina, Ohio, Oklahoma, Texas, Missouri, and by the United States Supreme Court.

3. During court proceedings, I have heard testimony from prison wardens who are responsible for conducting executions by lethal injection. I have testified before the Nebraska Senate Judiciary Committee regarding proposed legislation to adopt lethal injection. I have testified before the Pennsylvania Senate Judiciary Committee regarding proposed legislation to prohibit the use of pancuronium and the other neuromuscular blockers in Pennsylvania's lethal injection protocol. My research regarding lethal injection has involved both extensive conversations with recognized experts in the field of lethal injection, toxicology, and forensic pathology and the exchange of personal correspondence with the individuals responsible for introducing lethal injection as a method of execution in Oklahoma (the first state to formulate the procedure) and in the United States.

4. My qualifications are further detailed in my curriculum vitae, a copy of which is attached hereto as Exhibit A and incorporated by reference as if fully rewritten herein.

5. I have been asked by counsel for Edward Lee Beets to review the procedures concerning lethal injection currently in place in Nevada to assess whether there is a risk of the inmate experiencing pain and suffering while the lethal injection is administered. I hold all opinions expressed in this Declaration to a reasonable degree of medical certainty, except as specifically noted at the end of paragraph 35, where I make a speculative comment.

6. I have reviewed the Nevada Department of Corrections' "Confidential Execution Manual."

7. In addition, I have reviewed numerous documents, including execution logs, for California's executions. Comparable information about executions by lethal injection in Nevada is unavailable. However, Nevada's lethal injection protocol is similar to that used in California prior to the proceedings in *Morales v. Hickman.*

8 I have also reviewed Nev. Rev. Stat. § 638.005 and N.A.C. §§ 638.450 et. seq. which pertain to the training for those performing euthanasia on animals, as well as statutes pertaining to euthanasia of animals from the states of: California, Florida, Georgia, Maine, Maryland, Massachusetts, New Jersey, New York, Oklahoma, Tennessee, Texas, Connecticut, Delaware, Illinois, Kansas, Kentucky, Louisiana, Missouri, Rhode Island and South Carolina. I have also reviewed the 2000 Report of the Panel on Euthanasia of the American Veterinary Medical Association, attached hereto as Exhibit B, the American Society of Anesthesiologist's Practice Advisory for Intraoperative Awareness and Brain Function Monitoring, attached hereto as Exhibit C, and the American Society of Anesthesiologist's Standards for Basic Anesthetic Monitoring, attached hereto as Exhibit D.

9. Based upon my review of this material and my knowledge of and experience in the field of anesthesiology, I have formed several conclusions with respect to the protocol of the Nevada Department of Corrections ("NDOC") for carrying out lethal injections. These conclusions arise both from the details disclosed in the materials I have reviewed and from medically relevant, logical inferences drawn from the omission of details in those materials (e.g., details regarding the training of the personnel involved; details of all of the medical equipment used; and details of the precise methods by which the personnel involved use the equipment to carry out an execution by lethal injection).

A. NDOC's Lethal Injection Protocol

10. NDOC's lethal injection protocol calls for the administration of 5 grams of sodium thiopental, 20 milligrams of pancuronium bromide (Pavulon), and 160 milliequivalents of potassium chloride. Broadly speaking, the sodium thiopental is intended to serve as an anesthetic, rendering the inmate unconscious for the duration of the execution. Five grams of sodium thiopental is a massive, and potentially lethal, dose. The pancuronium bromide paralyzes the inmate's voluntary muscles, including those of his chest and diaphragm. Pancuronium is not an anesthetic or sedative drug, and it does not affect consciousness. Potassium chloride is a salt solution that, when rapidly administered in high concentrations, induces cardiac arrest.

11. Although the successful delivery into the circulation of 5 grams of sodium thiopental and 20 milligrams of pancuronium would be lethal, it is important to understand that the lethality of sodium thiopental and pancuronium is due to respiratory arrest, which takes several minutes to ensue and does not typically occur prior to the administration of potassium. In the execution sequence, before death is caused by respiratory arrest from sodium thiopental and pancuronium, death is caused by cardiac arrest caused by potassium. I base this opinion, that the potassium and not the pancuronium or sodium thiopental is responsible for the death of prisoners during lethal injection, on the following:

A) Review of records from EKGs from lethal injection procedures conducted in other states. During lethal injection, cardiac activity consistent with generating perfusion persists through the administration of sodium thiopental and pancuronium and only stops after potassium has been administered. The relatively sudden cessation of organized EKG activity is not consistent with a cessation of circulation due to administration of sodium thiopental and/or pancuronium and is consistent with cessation of

circulation after the administration of a large dose of potassium chloride.

B) Properties of Sodium Thiopental and Pancuronium. Sodium thiopental and pancuronium exert their effects by interacting with molecular targets in the nervous system and on muscle cells in a manner that induces unconsciousness and stops breathing. Sodium thiopental and pancuronium, unlike other chemicals such as cyanide, do not kill cells or tissues, and are useful to clinicians precisely because they do not kill or harm cells or tissues. The reason that sodium thiopental and pancuronium can cause death is that they cause the prisoner to stop breathing. Failure to breathe will result in brain damage, brain death, and cardiac arrest as the level of oxygen in the blood declines over time. These processes take a varying amount of time, depending on many factors. Physicians generally use four minutes of not breathing as the approximate benchmark time after which irreversible brain damage from lack of oxygen occurs, and death typically occurs some number of minutes after the onset of brain damage. It is worth noting, however, that this general figure of four minutes is often used in the context of cardiac arrest, in which there is no circulation of blood through the brain. If some level of blood circulation persists, it is very likely that brain damage and brain death would take longer than four minutes.

In the context of lethal injection, sodium thiopental and pancuronium, if successfully delivered into the circulation in large doses, would indeed each be lethal, because they would stop the inmate's breathing. However, as described above, in execution by lethal injection as

practiced by Nevada and other states the administration of potassium and death precede any cardiac arrest that would be caused by sodium thiopental and pancuronium.

12. Intravenous injection of concentrated potassium chloride solution causes excruciating pain. The vessel walls of veins are richly supplied with sensory nerve fibers that are highly sensitive to potassium ions. The intravenous administration of concentrated potassium in doses intended to cause death therefore would be extraordinarily painful. NDOC's selection of potassium chloride to cause cardiac arrest needlessly increases the risk that a prisoner will experience excruciating pain prior to execution. There exist, however, alternative chemicals that do not activate the nerves in the vessel walls of the veins in the way that potassium chloride does. Despite the fact that the statute authorizing lethal injection in Nevada does not specify or require the use of potassium, NDOC has failed to choose a chemical that would cause death in a painless manner.

13. Thus, NDOC chose the means of causing death by choosing a medication (potassium chloride) that causes extreme pain upon administration, instead of selecting available, equally effective yet essentially painless medications for stopping the heart. In so doing, NDOC has taken on the responsibility of ensuring, through all reasonable and feasible steps, that the prisoner is sufficiently anesthetized and cannot experience the pain of potassium chloride injection.

14. The provision of anesthesia has become a mandatory standard of care whenever a patient is to be subjected to a painful procedure. Throughout the civilized world, the United States, and Nevada, whenever a patient is required to undergo a painful procedure, it is the standard of care to provide some form of anesthesia. Circumstances arise in which prisoners in Nevada require surgery, and in many instances the surgery requires the provision of general

anesthesia. In these circumstances general anesthesia is provided, and it is provided by an individual with specific training and qualifications in the field of anesthesiology. It is critical to understand that the great majority of physicians and nurses and other health care professionals do not possess the requisite training, skills, experience, and credentials to provide general anesthesia. It would be unconscionable to forcibly subject any person, including a prisoner in Nevada, to a planned and anticipated highly painful procedure without first providing an appropriate anesthetic, and it would be unconscionable to allow personnel who are not properly trained in the field of anesthesiology to attempt to provide or supervise this anesthetic care.

15. As a living person who is about to be subjected to the excruciating pain of potassium injection, it is imperative that all prisoners undergoing lethal injection be provided with adequate anesthesia. This imperative is of the same order as the imperative to provide adequate anesthesia for any Nevada prisoner requiring general anesthesia (or any type of anesthesia) before undergoing painful surgery. Given that the injection of potassium is a scheduled and premeditated event that is known without any doubt to be extraordinarily painful, it would be unconscionable and barbaric for potassium injection to take place without the provision of sufficient general anesthesia to ensure that the prisoner is rendered and maintained unconscious throughout the procedure, and it would be unconscionable to allow personnel who are not properly trained in the field of anesthesiology to attempt to provide or supervise this anesthetic care.

B. Failure to Adhere to a Medical Standard of Care in Administering Anesthesia

16. It is my opinion to a reasonable degree of medical certainty that the lethal injection procedures selected for use in Nevada and used elsewhere subject the prisoner to an increased and unnecessary risk of experiencing excruciating pain in the course of execution.

Because of the potential for an excruciating death created by the use of potassium chloride, it is necessary to induce and maintain an appropriate and deep plane of anesthesia. The circumstances and environment under which anesthesia is to be induced and maintained according to NDOC's execution manual create, needlessly, a significant risk that inmates will suffer the pain that accompanies the injection of potassium chloride.

17. Presumably because of the excruciating pain evoked by potassium, lethal injection protocols like Nevada's plan for the provision of general anesthesia by the inclusion of sodium thiopental. When successfully delivered into the circulation in sufficient quantities, sodium thiopental causes sufficient depression of the nervous system to permit excruciatingly painful procedures to be performed without causing discomfort or distress. Failure to successfully deliver into the circulation a sufficient dose of sodium thiopental would result in a failure to achieve adequate anesthetic depth and thus failure to block the excruciating pain of potassium administration.

18. NDOC's procedures do not comply with the medical standard of care for inducing and maintaining anesthesia prior to and during a painful procedure. Likewise, NDOC's procedures are not compliant with the guidelines set forth by the American Veterinary Medical Association for the euthanasia of animals. Further, NDOC has made insufficient preparation for the real possibility, encountered in many other jurisdictions, and planned for in those jurisdictions, that peripheral IV access cannot be successfully established.

1. The Dangers of Using Sodium Thiopental as an Anesthetic

19. A major concern I have based on what I know about NDOC's lethal injection protocol relates to the use of sodium thiopental. Sodium thiopental is an ultrashort-acting barbiturate with a relatively short shelf life in liquid form. Sodium thiopental is distributed in

powder form to increase its shelf life; it must be mixed into a liquid solution by trained personnel before it can be injected.

20. When anesthesiologists use sodium thiopental, we do so for the purposes of temporarily anesthetizing patients for sufficient time to intubate the trachea and institute mechanical support of ventilation and respiration. Once this has been achieved, additional drugs are administered to maintain a "surgical depth" or "surgical plane" of anesthesia (i.e., a level of anesthesia deep enough to ensure that a surgical patient feels no pain and is unconscious). The medical utility of sodium thiopental derives from its ultrashort-acting properties: if unanticipated obstacles hinder or prevent successful intubation, patients will likely quickly regain consciousness and resume ventilation and respiration on their own.

21. The benefits of sodium thiopental in the operating room engender serious risks in the execution chamber. Although the full five grams of sodium thiopental, if properly administered into the prisoner's bloodstream, would be more than sufficient to cause unconsciousness and, eventually, death, if no resuscitation efforts were made, my research into executions by lethal injection strongly indicates that executions have occurred where the full dose of sodium thiopental listed in the protocol was not fully and properly administered. If an inmate does not receive the full dose of sodium thiopental because of errors or problems in administering the drug, the inmate might not be rendered unconscious and unable to feel pain, or alternatively might, because of the short-acting nature of sodium thiopental, regain consciousness during the execution.

22. Thus, the concerns raised in this affidavit apply regardless of the size of the dose of sodium thiopental that is prescribed under the protocol. The level of anesthesia, if any, achieved in each individual inmate depends on the amount that is successfully administered, although other factors such as the inmate's weight and sensitivity/resistance to barbiturates are

also relevant. Many foreseeable situations exist in which human or technical errors could result in the failure to successfully administer the intended dose. NDOC's execution manual both fosters these potential problems and fails to provide adequate instruction for preventing or rectifying these situations, and it does these things needlessly and without legitimate reason. Examples of problems that could prevent proper administration of sodium thiopental include, but are not limited to, the following:

a) Errors in Preparation. Sodium thiopental is delivered in powdered form and must be mixed into an aqueous solution prior to administration. This preparation requires the correct application of pharmaceutical knowledge and familiarity with terminology and abbreviations. Calculations are also required, particularly if the protocol requires the use of a concentration of drug that differs from that which is normally used.

b) Error in Labeling of Syringes. NDOC's execution manual states the syringes will be "clearly marked," but does not specify a standard order in which the syringes will be prepared or how they will be labeled. This could cause confusion in creating the syringes, leading to mislabeling, which, depending on the labeling system used, might not be detected and corrected later in the process.

c) Error in Selecting the Correct Syringe during the sequence of administration.

d) Error in Correctly Injecting the Drug into the Intravenous Line. Nevada's execution manual fails to identify the person(s) responsible for injecting the lethal drugs and further fails to identify their qualifications.

e) The IV Tubing May Leak. An "IV setup" consists of multiple components that are assembled by hand prior to use. If, as is the practice in Nevada, the personnel who are

injecting the drugs are not at the bedside but are instead in a different room or part of the room, multiple IV extension sets need to be inserted between the inmate and the administration site. Any of these connections may loosen and leak. In clinical practice, it is important to maintain visual surveillance of the full extent of IV tubing so that such leaks may be detected. Nevada's practice, by which the executioner(s) is in a separate room with no visual surveillance precludes detection of any leak that may occur.

f) Incorrect Insertion of the Catheter. If the catheter is not properly placed in a vein, the sodium thiopental will enter the tissue surrounding the vein but will not be delivered to the central nervous system and will not render the inmate unconscious. This condition, known as infiltration, occurs with regularity in the clinical setting. Recognition of infiltration requires continued surveillance of the IV site during the injection, and that surveillance should be performed by the individual who is performing the injection so as to permit correlation between visual observation and tactile feedback from the plunger of the syringe.

g) Migration of the Catheter. Even if properly inserted, the catheter tip may move or migrate, so that at the time of injection it is not within the vein. This would result in infiltration, and therefore a failure to deliver the drug to the inmate's circulation and failure to render the inmate unconscious.

h) Perforation or Rupture or Leakage of the Vein. During the insertion of the catheter, the wall of the vein can be perforated or weakened, so that during the injection some or all of the drug leaves the vein and enters the surrounding tissue. The likelihood of rupture occurring is increased if too much pressure is applied to the plunger of the syringe during injection, because a high pressure injection results in a high velocity jet of drug in the vein that can penetrate or tear the vessel wall.

i) Excessive Pressure on the Syringe Plunger. Even without damage or perforation of the vein during insertion of the catheter, excessive pressure on the syringe plunger during injection can result in tearing, rupture, and leakage of the vein due to the high velocity jet that exits the tip of the catheter. Should this occur, the drug would not enter the circulation and would therefore fail to render the inmate unconscious.

j) Securing the Catheter. After insertion, catheters must be properly secured by the use of tape, adhesive material, or suture. Movement by the inmate, even if restrained by straps, or traction on the IV tubing may result in the dislodging of the catheter.

k) Failure to Properly Administer Flush Solutions Between Injections of Drugs. Solutions of paralytic agents such as pancuronium cause sodium thiopental to precipitate out of solution on contact, thereby interfering with the delivery of the drug to the inmate and to the central nervous system. NDOC's manual does not specify if, how, or when the lines will be flushed.

l) Failure to Properly Loosen or Remove the Tourniquet from the Arm or Leg after placement of the IV catheter will delay or inhibit the delivery of the drugs by the circulation to the central nervous system. This may cause a failure of the sodium thiopental to render and maintain the inmate in a state of unconsciousness.

m) Impaired Delivery Due to Restraining Straps. Restraining straps may act as tourniquets and thereby impede or inhibit the delivery of drugs by the circulation to the central nervous system. This may cause a failure of the sodium thiopental to render and maintain the inmate in a state of unconsciousness. Even if the IV is checked for "free flow" of the intravenous

fluid prior to commencing injection, a small movement within the restraints on the part of the inmate could compress the vein and result in impaired delivery of the drug.

2. The Need for Adequate Training in Administering Anesthesia

23. Because of these foreseeable problems in administering anesthesia, in Nevada and elsewhere in the United States, the provision of anesthetic care is performed only by personnel with advanced training in the medical subspecialty of Anesthesiology. This is because the administration of anesthetic care is complex and risky, and can only be safely performed by individuals who have completed the extensive requisite training to permit them to provide anesthesia services. Failure to properly administer a general anesthetic not only creates a high risk of medical complications including death and brain damage, but also is recognized to engender the risk of inadequate anesthesia, resulting in the awakening of patients during surgery, a dreaded complication known as "intraoperative awareness." The risks of intraoperative awareness are so grave that, in October 2005, the American Society of Anesthesiologists published a new practice advisory on the subject of intraoperative awareness. If the individual providing anesthesia care is inadequately trained or experienced, the risk of these complications is enormously increased. In Nevada and elsewhere in the United States, general anesthesia is administered by physicians who have completed residency training in the specialty of Anesthesiology, and by nurses who have undergone the requisite training to become Certified Registered Nurse Anesthetists (CRNAs). Physicians and nurses who have not completed the requisite training to become anesthesiologists or CRNAs are not permitted to provide general anesthesia.

24. In my opinion, individuals providing general anesthesia in the Nevada State Prison should not be held to a different or lower standard than is set forth for individuals providing general anesthesia in any other setting in Nevada. Specifically, the individuals

providing general anesthesia within Nevada State Prison should possess the experience and proficiency of anesthesiologists and/or CRNAs. Conversely, a physician who is not an anesthesiologist or a nurse who is not a CRNA should not be permitted to provide general anesthesia within Nevada State Prison (or anywhere else in Nevada).

25. NDOC's execution protocol fails to specify whether the person or persons administering the lethal injection have any training in administering anesthesia, or, if personnel are given training, what that training might be. The absence of any details as to the training, certification, or qualifications of injection personnel raises critical questions about the degree to which condemned inmates risk suffering excruciating pain during the lethal injection procedure. The great majority of nurses are not trained in the use of ultrashort-acting barbiturates; indeed, this class of drugs is essentially only used by a very select group of nurses who have obtained significant experience in intensive care units and as nurse anesthetists. Very few paramedics are trained or experienced in the use of ultrashort-acting barbiturates. Based on my medical training and experience, and based upon my research of lethal injection procedures and practices, inadequacies in these areas elevate the risk that the lethal injection procedure will cause the condemned to suffer excruciating pain during the execution process. Failure to require that the person or persons administering the lethal injection have training equivalent to that of an anesthesiologist or a CRNA compounds the risk that inmates will suffer excruciating pain during their executions.

3. NDOC's Failure to Account for Foreseeable Problems in Anesthesia Administration

26. In addition to lacking any policy on the training necessary to perform a lethal injection, NDOC's execution manual imposes conditions that exacerbate the foreseeable risks of improper anesthesia administration described above, and fails to provide any procedures for

dealing with these risks. Perhaps most disturbingly, Nevada's lethal injection practice prevents any type of effective monitoring of the inmate's condition or whether he is anesthetized and unconscious. After the IV lines are inserted into the inmate but before the administration of the sodium thiopental, the execution chamber is closed and the prisoner is left alone in the chamber for the duration of the execution. Nevada's practice is that all prison personnel and others involved in the execution will be in a separate room. There is no window through which the executioner(s) can observe the inmate as the series of drugs is injected. This falls below the standard of care. Accepted medical practice dictates that trained personnel monitor the IV lines and the flow of anesthesia into the veins through visual and tactile observation and examination. The lack of any qualified personnel present in the chamber during the execution thwarts the execution personnel from taking the standard and necessary measures to reasonably ensure that the sodium thiopental is properly flowing into the inmate and that he is properly anesthetized prior to the administration of the pancuronium and potassium.

27. In my opinion, having a properly trained and credentialed individual examine the inmate after the administration of the sodium thiopental (but prior to the administration of pancuronium) to verify that the inmate is completely unconscious would substantially mitigate the danger that the inmate will suffer excruciating pain during his execution. As discussed later in this affidavit, this is the standard of care, and in many states the law, that is set forth for dogs and cats and other household pets when they are subjected to euthanasia by potassium injection. Yet NDOC's execution manual does not provide for such verification, and indeed Nevada practice actively prevents the person or persons administering the lethal injection from determining whether or not the inmate remains conscious by requiring that all of the drugs must be administered remotely, from another room without even visual surveillance.

28. By requiring that the drugs be administered remotely, Nevada practice

necessitates the use of multiple connection sites in the IV tubing. This unnecessarily increases the risk of leakage and/or pinching of the tubes, and therefore creates a greater risk that the inmate will not be properly sedated. Any reasonable standard of care would require a system to be in place to ensure that the prisoner is properly anesthetized.

29. Other than stating "the lethal medication will be administered at a rapid rate," NDOC's execution manual provides no specifications regarding the timing of the administration of the drugs, thereby compounding the risks described in this Declaration. This concern is greatly amplified by the use of an ultrashort-acting barbiturate and is borne out by a review of the execution records from California. In each of the executions, the time between administrations of the three drugs varied for no apparent reason. The lack of a defined schedule for the administration of the three drugs increases the risk that the sedative effect of the sodium thiopental will wear off, should the inmate not receive the full dose.

30. Nevada's lethal injection protocol does not account for procedures designed to ensure the proper preparation of the drugs used. I have not seen details regarding the credentials, certification, experience, or proficiency of the personnel who will be responsible for the mixing of the sodium thiopental from powder form, or for the drawing up of the drugs into the syringes. Preparation of drugs, particularly for intravenous use, is a technical task requiring significant training in pharmaceutical concepts and calculations. It is my opinion based on my review of lethal execution procedures in states that have disclosed more detailed information than what I have seen about Nevada's procedures, that there exist many risks associated with drug preparation that, if not properly accounted for, further elevate the risk that the drug will not be properly administered and the inmate will consciously experience excruciating pain during the lethal injection procedures.

31. The altering of established medical procedures without adequate medical review and research, by untrained personnel, causes great concern about the structure of the lethal injection protocol and its medical legitimacy. There is no indication of how Nevada's execution protocol was developed, who was consulted, what procedures were considered and why. The protocol may be something the Warden developed alone, or in consultation with other corrections personnel, some of whom may or may not have any medical training, or any specialized knowledge of anesthetic literature and practice. Appropriate mechanisms for medical review, and standardization of the implementation and amendment process, are critical features in any medical protocol so that the medical professionals and the public can be assured that proper and humane procedures are in place and being followed. Indeed, in other states, physicians and other medical personnel play a role in ensuring that any protocol is consistent with basic medical standards of care and humaneness. Otherwise, the process is subject and prone to ad hoc administration and error, if not gross negligence, or worse, an alteration of the process so as to inflict as much agony as possible. With lethal injection, such concerns are highly elevated.

32. There are no procedures contained within NDOC's execution manual for the resuscitation of the inmate once the sodium thiopental is administered. To the contrary, the manual states that "once infusion of the lethal injection has begun . . . the execution cannot be stopped." This would foreclose the possibility of altering the course of an execution in the event of legal relief. Any time up until the potassium chloride is administered, the prisoner could be readily resuscitated given the appropriately trained personnel and routine resuscitation medication and equipment. If this were to occur after the potassium chloride was administered, resuscitation would be more challenging but still possible. Resuscitation would require equipment close-by, and properly credentialed personnel, neither of which are specified in the execution manual.

33. Based on my medical training and experience, and based on my research into lethal injection procedures and practices, it is my opinion to a reasonable degree of medical certainty that any reliable, humane lethal injection procedure must account for the foreseeable circumstance of a condemned inmate having physical characteristics that prevent intravenous access from being obtained by a needle piercing the skin and entering a superficial vein suitable for the reliable delivery of drugs. There have been multiple lethal injections in which this problem has arisen from a variety of circumstances. Some of these circumstances could be due to conditions including obesity, corticosteroid treatment, history of intravenous drug use, history of undergoing chemotherapy. Additionally, some people happen to have veins that are too small or deep to permit peripheral access. It is often not possible to anticipate difficult intravenous access situations, and there are multiple examples of executions in which the personnel placing the IVs struggled to obtain peripheral IV access and eventually abandoned the effort. NDOC's execution manual is deficient in its failure to plan for the foreseeable possibility that peripheral IV access can not be obtained.

34. In this setting, state lethal injection protocols typically specify the use of a "cut-down" procedure to access a vein adequate for the reliable infusion of the lethal drugs. Aside from specifying in the "List of Needed Equipment and Materials," which "may vary," a "sterile cut-down tray if necessary," Nevada's lethal injection execution protocol contains no reference to plans for dealing with the foreseeable circumstance wherein peripheral intravenous access cannot be obtained in the arm or leg. No information regarding the training, experience, expertise, credentials, certification, or proficiency of the personnel who would perform such a "cut down" procedure is listed in the Nevada lethal injection protocol. In this regard, NDOC's lethal injection protocol is deficient in comparison to those of other states that I have reviewed. This complicated medical procedure requires equipment and skill that are not accounted for in the execution manual. It has a very high probability of not proceeding properly in the absence of

adequately trained and experienced personnel, and without the necessary equipment. If done improperly, the "cut-down" process can result in very serious complications including severe hemorrhage (bleeding), pneumothorax (collapse of a lung which may cause suffocation), and severe pain. It is well documented that lethal injection procedures in other states have at times required the use of a central intravenous line. NDOC has not, to my knowledge, released information about the need for central intravenous access during prior executions, and therefore it is not possible to make any assessment about whether the necessary safeguards have been set in place to ensure that the procedure is reasonably humane.

35. This concern over the challenges of IV placement has been demonstrated in numerous cases. For example, most recently, during the execution of Joseph Clark in Ohio, difficulties in finding a vein delayed the execution by almost 90 minutes. *See* Andrew Welsh-Huggins, *IV Flasco Led Killer to Ask for Plan B*, AP (May 12, 2006), attached hereto as Exhibit E. The execution team struggled for several minutes to find usable vein. The team placed a "shunt" in Clark's left arm, but the vein "collapsed". Subsequently, the team placed a "shunt" in Clark's right arm, but mistakenly attempted to administer the lethal drugs through the IV in the left arm where the vein had already "collapsed". The difficulties prompted Clark to sit up and tell his executioners "It don't work" and to ask "Can you just give me something by mouth to end this?" Similar problems occurred during the execution of Stanley "Tookie" Williams, the injection team took 12 minutes to insert the IV lines. The first line was placed quickly but spurted blood, and the staff struggled for 11 minutes to insert the second line, having so much difficulty that Williams asked whether they were "doing that right." *See The Execution of Stanley Tookie Williams*, SFGate.com (Dec. 14, 2005), attached hereto as Exhibit F. The difficulty of the challenge presented to the IV team is evidenced by the comment that "By 12:10 a.m., the medical tech's lips were tight and white and sweat was pooling on her forehead as she probed Williams' arm." Similarly, the execution log of Donald Beardslee's execution indicates that the

second IV line was inserted with "difficulty," and the time entries indicate that it took 12 minutes to insert the second line, which is consistent with encountering problems in inserting the IV. When it proceeds smoothly, placement of a peripheral IV should, in my experience, take on the order of two minutes or less. In the execution of William Bonin, it took the staff assigned anywhere between 18 and 27 minutes to fashion the IV lines (the records are unclear as to this point). This is an unusually long period of time for an experienced and properly trained professional. In the execution of Stephen Anderson on January 29, 2002, one of the persons who attempted to secure an IV was unable to do so without causing significant bleeding and the need to remove his gloves. Again, this indicates that the process is a difficult one and that it is necessary that the persons doing it are properly trained and experienced. As is widely recognized in the medical community, administration of intravenous medications and the management of intravenous systems are complex endeavors. While speculative and not evidence-based, it is my opinion that it is likely that IV placement is rendered more difficult in the context of executions because the inmates are often in a very anxious status, which causes the release of epinephrine (adrenalin) and norepinephrine, thereby causing constriction (narrowing) of blood vessels (including veins). When veins are constricted/narrowed it can be difficult or impossible to insert an IV catheter. This is the best explanation I can provide for the otherwise unexplained extremely high incidence of difficult or failed peripheral IV placement, in individuals lacking known risk factors for difficult IV access.

36. It is my further opinion that to ensure a lethal injection without substantial risks of inflicting severe pain and suffering, there must be proper procedures that are clear and consistent: there must be qualified personnel to ensure that anesthesia has been achieved prior to the administration of pancuronium bromide and potassium chloride, there must be qualified personnel to select chemicals and dosages, set up and load the syringes, administer "pre-injections," insert the IV catheter, and perform the other tasks required by such procedures; and

there must be adequate inspection and testing of the equipment and apparatus by qualified personnel. The Nevada Department of Corrections' written procedures for implementing lethal injection, to the extent that they have been made available, provide for none of the above.

C. The Use of Pancuronium Bromide

37. Nevada's use of the drug pancuronium bromide serves no rational or legitimate purpose and compounds the risk that an inmate may suffer excruciating pain during his execution. Pancuronium paralyzes all voluntary muscles, but does not affect sensation, consciousness, cognition, or the ability to feel pain and suffocation. Because the sodium thiopental and potassium chloride would in themselves be sufficient to cause death, and the potassium is administered well before death would result from the pancuronium alone, it is my opinion held to a reasonable degree of medical certainty that there would be no rational place in the protocol for pancuronium as the lethal amount of potassium chloride is administered.

38. Pancuronium bromide is a neuromuscular blocking agent. Its effect is to render the muscles unable to contract but it does not affect the brain or the nerves. It is used in surgery to ensure that there is no movement and that the patient is securely paralyzed so that surgery can be performed without contraction of the muscles. In surgery, pancuronium bromide is not administered until the patient is adequately anesthetized. The anesthetic drugs must first be administered so that the patient is unconscious and does not feel, see, or perceive the procedure. This can be determined by a trained medical professional, either a physician anesthesiologist or a nurse anesthetist, who provides close and vigilant monitoring of the patient, their vital signs, and various diagnostic indicators of anesthetic depth. NDOC's execution manual, to the extent disclosed, fails to provide an assurance that anesthetic depth will be properly assessed prior to the administration of pancuronium bromide.

39. If sodium thiopental is not properly administered in a dose sufficient to cause the loss of consciousness for the duration of the execution procedure, then it is my opinion held to a reasonable degree of medical certainty that the use of pancuronium places the condemned inmate at risk for consciously experiencing paralysis, suffocation and the excruciating pain of the intravenous injection of high dose potassium chloride.

40. If administered alone, a lethal dose of pancuronium would not immediately cause a condemned inmate to lose consciousness. It would totally immobilize the inmate by paralyzing all voluntary muscles and the diaphragm, causing the inmate to suffocate to death while experiencing an intense, conscious desire to inhale. Ultimately, consciousness would be lost, but it would not be lost as an immediate and direct result of the pancuronium. Rather, the loss of consciousness would be due to suffocation, and would be preceded by the torment and agony caused by suffocation. This period of torturous suffocation would be expected to last at least several minutes and would only be relieved by the onset of suffocation-induced unconsciousness or by death from potassium chloride.

41. Because the administration of a paralyzing dose of pancuronium bromide to a conscious person would necessarily cause excruciating suffering, it would be unconscionable to administer pancuronium without first ensuring that the induction of general anesthesia had successfully achieved the necessary anesthetic depth.

42. Based on the information available to me, it is my opinion held to a reasonable degree of medical certainty that Nevada's lethal injection protocol creates an unacceptable risk that the inmate will not be anesthetized to the point of being unconscious and unaware of pain for the duration of the execution procedure. If the inmate is not first successfully anesthetized, then it is my opinion to a reasonable degree of medical certainty that the pancuronium will

paralyze all voluntary muscles and mask external, physical indications of the excruciating pain being experienced by the inmate during the process of suffocating (caused by the pancuronium) and having a cardiac arrest (caused by the potassium chloride).

43. It is my understanding that NDOC's execution protocol requires the presence of six to nine official witnesses to the execution and permits media witnesses to the execution. It is my opinion based on a reasonable degree of medical certainty that pancuronium, when properly and successfully administered, effectively nullifies the ability of witnesses to discern whether or not the condemned prisoner is experiencing a peaceful or agonizing death. Regardless of the experience of the condemned prisoner, whether he or she is deeply unconscious or experiencing the excruciation of suffocation, paralysis, and potassium injection, he or she will appear to witnesses to be serene and peaceful due to the relaxation and immobilization of the facial and other skeletal muscles. The use of pancuronium, in my opinion, therefore prevents the press from fulfilling its essential function of informing the citizens, officials, and courts of Nevada about whether execution by lethal injection is conducted in Nevada State Prison in a manner that is constitutionally compliant and humane.

44. The doses of sodium thiopental and potassium chloride are lethal doses. Therefore, it is unnecessary to administer pancuronium bromide in the course of an execution when it is quickly followed by a lethal dose of potassium chloride. It serves no legitimate purpose and only places a chemical veil on the process that prevents an adequate assessment of whether or not the condemned is suffering in agony, and greatly increases the risks that such agony will ensue. Removal of pancuronium from the protocol would eliminate the risk of conscious paralysis from occurring. It would also eliminate the risk that an inhumane execution would appear humane to witnesses. Finally, removal of pancuronium would vastly reduce the possibility that the citizens, officials, and courts of Nevada could be inadvertently misled by

media reports describing a peaceful-appearing execution when in fact the prisoner could be experiencing excruciating suffering.

D. Consequences of Improper Anesthesia Administration

45. Execution records from California indicate that four out of the six inmates executed in California since 2000 continued to display activity and behavior that is inconsistent with the successful administration of 5 grams of thiopental, the amount required under California's lethal injection protocol. Five grams of thiopental, the dose required by the California protocol, is a massive dose that, if successfully administered, far exceeds the amount necessary to completely arrest respiratory activity in any prisoner. I therefore can provide no medical explanation for the inmates' continued breathing other than that the thiopental was not administered in its entirety. If the full dose of thiopental was not administered successfully – as is strongly suggested by the inmates' continued breathing – those inmates faced a significant risk of remaining conscious or regaining consciousness during the lethal injection procedure. Importantly, a person who is breathing while under general anesthesia cannot be deeply anesthetized, and may well be awakened by a painful stimulation such as a surgical incision or the administration of potassium.

46. The handwritten records of Stanley "Tookie" Williams' execution indicate that Mr. Williams did not stop breathing until 12:34, upon the injection of the potassium chloride, 12 minutes after the thiopental was injected. Thus, the thiopental did not have the effect on Mr. Williams' brain and respiratory activity that would be expected with a high degree of certainty from the delivery into the circulation of the full 5-gram dose of thiopental.

47. The execution log of Clarence Ray Allen states that Mr. Allen continued breathing for 9 minutes after the delivery of the thiopental. Again, 5 grams of thiopental, if

successfully delivered into the circulation, simply should not take 9 minutes to ablate cerebral electrical activity and respiratory activity.

48. The January 29, 2002 execution log of Stephen Wayne Anderson, reveals that Mr. Anderson continued breathing until 12:22, 5 minutes after the thiopental was administered. Again, this persistent respiratory activity is not consistent with the expected effect of 5 grams of thiopental, which would be to stop all visible respiratory activity within a minute of its delivery into the circulation.

49. The March 15, 2000 execution log of Darrell Keith Rich, states that Mr. Rich's respirations ceased at 12:08, with the administration of the pancuronium, but that Mr. Rich had "chest movements" lasting from 12:09 to 12:10. These chest movements, beginning after Mr. Rich had ostensibly stopped breathing (and while he was still alive, as shown by his heart rate of 110 beats per minute), and 3 minutes after the administration of the thiopental, are again inconsistent with successful administration of the thiopental. The chest movements are consistent, however, with an attempt to fight against the accruing paralytic effect of the pancuronium. Had the 5-gram dose of thiopental reached Mr. Rich and had the expected effect, he would not have been able to fight against the pancuronium by attempting to breathe, nor would he even have been aware of the effect of the pancuronium. Indeed, because 5 grams of thiopental would have arrested all cerebral activity, including all respiratory drive, there would have been no effort on Mr. Rich's part to attempt to breathe during the onset of the pancuronium.

E. Nevada's Execution Protocol Falls Below the Minimum Standards Mandated for Veterinary Euthanasia

50. The American Veterinary Medical Association (AVMA) states that when potassium chloride is to be used as a euthanasia agent, the animals must be under a surgical plane

of anesthesia and the personnel performing the euthanasia must be properly trained to assess the depth of anesthesia. The AVMA panel specifically states that the animal must be in a surgical plane of anesthesia characterized not simply by loss of consciousness, but also by "loss of reflex muscle response and loss of response to noxious stimuli." It is difficult to understand why the NDOC would chose, at its discretion, to use potassium to execute prisoners and would then fail to adhere to the basic requirements set forth by the AVMA to ensure that animals do not experience the excruciating pain of potassium injection during euthanasia.

51. In *Beardslee v. Woodford*, the Ninth Circuit recognized that nineteen states have enacted statutes that, like the AVMA Report, mandate the exclusive use of a sedative in the euthanasia of animals. Although Nevada has not yet enacted such a statute, Nevada law expressly contemplates the use of sodium pentobarbital and requires that personnel who perform euthanasia of animals must be properly trained in the procedure. No such requirement exists in NDOC's execution manual.

Conclusion

52. Based on my research into methods of lethal injection used by various states and the federal government, and based on my training and experience as a medical doctor specializing in anesthesiology, it is my opinion based on a reasonable degree of medical certainty that, given the apparent absence of a central role for a properly trained medical or veterinary professional in NDOC's execution procedure, the chemicals used, the lack of adequately defined roles and procedures, and the failure to properly account for foreseeable risks, the lethal injection procedure Nevada employs creates medically unacceptable risks of inflicting excruciating pain and suffering on inmates during the lethal injection procedure. All of these problems could easily be addressed, and indeed have been addressed for the euthanasia of dogs and cats. It is difficult to understand why NDOC has failed to address these problems and has failed to meet the

minimum standards set forth for veterinary euthanasia.

53. In addition, in order to more fully and fairly assess the impact of the failings of Nevada's execution protocol, it is necessary to obtain all the records and logs used, and all official witness statements from prior executions, as well as the full rules and regulations devised by NDOC for lethal injection. This would include identifying the qualifications, experience and training of those persons who apply the IVs and who administer and monitor the injection.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and that this declaration was executed on May 16, 2006 in New York City, New York.

Mark J. S. Heath, M.D.

Attachment A

Curriculum Vitae

1) Date of preparation: December 19, 2004

2) Name: Mark J. S. Heath

Birth date: March 28, 1960
Birthplace: New York, NY
Citizenship: United States, United Kingdom

3) Academic Training:

Harvard University	B.A., Biology, 1983
University of North Carolina, Chapel Hill	M.D., 1987
Medical License	New York: 177101-1

4) Traineeship:

1987 – 1988 Internship, Internal Medicine, George Washington University Hospital, Washington, DC.

1988 – 1991 Residency, Anesthesiology, Columbia College of Physicians and Surgeons, New York, NY

1991 – 1993 Fellowship, Anesthesiology, Columbia College of Physicians and Surgeons, New York, NY

5) Board Qualification:

Diplomate, American Board of Anesthesiology, October 1991.
Testamur, Examination of Special Competence in Perioperative Transesophageal Echocardiography (PTEeXAM), 2001.

6) Military Service: None

7) Professional Organizations:

American Society of Anesthesiologists
International Anesthesia Research Society
Society of Cardiovascular Anesthesiology

8) Academic Appointments:

1993 – 2002	Assistant Professor of Anesthesiology, Columbia University, New York, NY
2002 - present	Assistant Professor of Clinical Anesthesiology, Columbia University, New York, NY

9) Hospital/Clinical Appointments:

1993 – present Assistant Attending Anesthesiologist, Presbyterian Hospital, New York, NY.

10) Honors:

Magna cum laude, Harvard University
Alpha Omega Alpha, University of North Carolina at Chapel Hill
First Prize, New York State Society of Anesthesiologists Resident Presentations, 1991

11) Fellowship and Grant Support:

Foundation for Anesthesia Education and Research, Research Starter Grant Award, Principal Investigator, funding 7/92 - 7/93, $15,000.

Foundation for Anesthesia Education and Research Young Investigator Award, Principal Investigator, funding 7/93 - 7/96, $70,000.

NIH KO8 "Inducible knockout of the NK1 receptor"
Principal Investigator. KO8 funding 12/98 - 11/02,
$431,947 over three years
(no-cost extension to continue through 11/30/2002)

NIH RO1 "Tachykinin regulation of anxiety and stress responses"
Principal Investigator, funding 9/1/2002 – 8/30/2007
$1,287,000 over 5 years

12) Departmental and University Committees:

Research Allocation Panel (1998 – 2001)
Institutional Review Board (Alternate Boards 1-2, full member Board 3) (2003 - present)

13) Teaching:

Lecturer and clinical teacher: Anesthesiology Residency Program, Columbia University and Presbyterian Hospital, New York, NY

Advanced Cardiac Life Support Training

Anesthetic considerations of LVAD implantation. Recurrent lecture at Columbia University LVAD implantation course.

Invited Lectures:

NK1 receptor functions in pain and neural development, Cornell University December 1994

Anxiety, stress, and the NK1 receptor, University of Chicago, Department of Anesthesia and Critical Care, July 2000

Anesthetic Considerations of LVAD Implantation, University of Chicago, Department of Anesthesia and Critical Care, July 2000

NK1 receptor function in stress and anxiety, St. John's University Department of Medicinal Chemistry, March 2002

Making a brave mouse (and making a mouse brave), Mt.Sinai School of Medicine, May 2002

Problems with anesthesia during lethal injection procedures, Geneva, Switzerland. Duke University School of Law Conference, "International Law, Human Rights, and the Death Penalty: Towards an International Understanding of the Fundamental Principles of Just Punishment", July 2002.

NK1 receptor function in stress and anxiety, Visiting Professor, NYU School of Medicine, New York, New York. October 2002.

Anesthetic Depth, Paralysis, and other medical problems with lethal injecton protocols: evidence and concerns, Federal Capital Habeas Unit Annual Conference, Jacksonville, Florida. May 2004.

Medical Scrutinyof Lethal Injection Procedures. National Association for the Advancement of Colored People Capital Defender Conference, Airlie Conference Center, Warrenton, Virginia. July 2004.

Anesthetic considerations of LVAD implantation. Recurrent lecture at Columbia University LVAD implantation course.

14) Grant Review Committees: None

15) Publications:

Original peer reviewed articles

* Santarelli, L., Gobbi, G., Debs, P.C., Sibille, E. L., Blier, P., Hen, R., Heath, M.J.S. (2001). Genetic and pharmacological disruption of neurokinin 1 receptor function decreases anxiety-related behaviors and increases serotonergic function. Proc. Nat. Acad. Sci., 98(4), 1912 - 1917.

* King, T.E. [a], Heath M. J. S[a]., Debs, P, Davis, MB, Hen, R, Barr, G. (2000). The development of nociceptive responses in neurokinin-1 receptor knockout mice. Neuroreport.;11(3), 587-91 [a] authors contributed equally to this work

* Heath, M. J. S., Lints, T., Lee, C. J., Dodd, J. (1995). Functional expression of the tachykinin NK, receptor by floor plate cells in the embryonic rat spinal cord and brainstem. Journal of Physiology 486.1, 139 -148.

* Heath, M. J. S., Womack M. D., MacDermott, A. B. (1994). Substance P elevates intracellular calcium in both neurons and glial cells from the dorsal horn of the spinal cord. Journal of Neurophysiology 72(3), 1192 - 1197.

McGehee, D. S., Heath, M. J. S., Gelber, S., DeVay, P., Role, L.W. (1995) Nicotine enhancement of fast excitatory synaptic transmission in the CNS by presynaptic receptors. Science 269, 1692 - 1696.

Morales D, Madigan J, Cullinane S, Chen J, Heath, M. J. S., Oz M, Oliver JA, Landry DW. (1999). Reversal by vasopressin of intractable hypotension in the late phase of hemorrhagic shock. Circulation. Jul 20;100(3):226-9.

LoTurco, J. J., Owens, D. F., Heath, M. J. S., Davis, M. B. E., Krigstein, A. R. (1995). GABA and glutamate depolarize cortical progenitor cells and inhibit DNA synthesis. Neuron 15, 1287 - 1298.

Kyrozis A., Goldstein P. A., Heath, M. J. S., MacDermott, A. B. (1995). Calcium entry through a subpopulation of AMPA receptors desensitized neighboring NMDA receptors in rat dorsal horn neurons. Journal of Physiology 485.2, 373 - 381.

McGehee, D.S., Aldenberg, M. , Liu, K.-P., Heuing, S., Heath, M.J.S. , Tamir, H. (1997). Mechanism of extracellular Ca^{2+}-receptor stimulated hormone release from sheep thyroid parafollicular cells. Journal of Physiology: 502,1, 31 - 44.

Kao, J., Houck, K., Fan, Y., Haehnel, I., Ligutti, S. K., Kayton, M. L., Grikscheit, T., Chabot, J., Nowygrod, R., Greenberg, S., Kuang, W.J., Leung, D. W., Hayward, J. R., Kisiel, W., Heath, M. J. S., Brett, J., Stern, D. (1994). Characterization of a novel tumor-derived cytokine. Journal of Biological Chemistry 269, 25106 - 25119.

Dodd, J., Jahr, C.E., Hamilton, P.N., Heath, M.J.S., Matthew, W.D., Jessell, T.M. (1983). Cytochemical and physiological properties of sensory and dorsal horn neurons that transmit cutaneous sensation. Cold Spring Harbor Symposia of Quantitative Biology 48, 685 -695.

Pinsky, D.J., Naka, Y., Liao, H., Oz, M. O., Wagner, D. D., Mayadas, T. N., Johnson, R. C., Hynes, R. O., Heath, M.J.S., Lawson, C.A., Stern, D.M. Hypoxia-induced exocytosis of endothelial cell Weibel-Palade bodies. Journal of Clinical Investigation 97(2), 493 - 500.

Case reports none

Review, chapters, editorials

- Heath, M. J. S., Dickstein, M. L. (2000). Perioperative management of the left ventricular assist device recipient. Prog Cardiovasc Dis.;43(1):47-54.

- Dickstein, M.L., Mets B, Heath M.J.S. (2000). Anesthetic considerations during left ventricular assist device implantation. Cardiac Assist Devices pp 63 – 74.

- Heath, M. J. S. and Hen, R. (1996). Genetic insights into serotonin function. Current Biology 5.9, 997 -999.

- Heath, M.J.S., Mathews D. (1990). Care of the Organ Donor. Anesthesiology Report 3, 344-348.

- Heath, M. J. S., Basic physiology and pharmacology of the central synapse. (1998) Anesthesiology Clinics of North America 15(3), 473 - 485.

Abstracts

Heath, M.J.S., Davis, M., Santarelli L., Hen H. (2002). Gene targeting of the NK1 receptor blocks stress-evoked induction of c-Fos in the murine locus coeruleus. IARS American-Japan Congress A-15.

Heath, M.J.S., Davis, M., Santarelli L., Hen H. (2002). Gene targeting of the NK1 receptor blocks stress-evoked induction of c-Fos in the murine locus coeruleus. Anesthesiology 95:A-811.

Heath, M.J.S., Davis, M., Santarelli L., Hen H. (2002). Expression of Substance P and NK1 Receptor in the Murine Locus Coeruleus and Dorsal Raphe Nucleus. Anesthesia and Analgesia 93; S-212

Heath, M.J.S., Davis, M., Santarelli L., Hen H. (2002). Expression of Substance P and NK1 Receptor in the Murine Locus Coeruleus and Dorsal Raphe Nucleus. Anesthesia and Analgesia 93; S-212.

Heath, M.J.S., Santarelli L, Hen H. (2001) The NK1 receptor is necessary for the stress-evoked expression of c-Fos in the paraventricular nucleus of the hypothalamus. Anesthesia and Analgesia 92; S233.

Heath, M.J.S., Santarelli L, Deba P, Hen H. (2000). Reduced anxiety and stress responses in mice lacking the NK1 receptor. Anesthesiology 93: 3A A-755.

Heath, M.J.S., King, T., Debs, P.C., Davis M., Hen R., Barr G. (2000). NK1 receptor gene disruption alters the development of nociception. Anesthesia and Analgesia; 90; S315.

Heath, M.J.S., Lee, J.H., Debs, P.C., Davis, M. (1997). Delineation of spinal cord glial subpopulations expressing the NK1 receptor. Anesthesiology; 87; 3A; A639.

Heath, M.J.S., MacDermott A.B. (1992). Substance P elevates intracellular calcium in dorsal horn cells with neuronal and glial properties. Society for Neuroscience Abstracts; 18; 123.1.

Heath, M.J.S., Lee C.J., Dodd J. (1994). Ontogeny of NK1 receptor-like immunoreactivity in the rat spinal cord. Society for Neuroscience Abstracts; 20; 115.16.

Heath, M.J.S., Berman M.F. (1991) Isoflurane modulation of calcium channel currents in spinal cord dorsal horn neurons. Anesthesiology 75; 3A; A1037.

Attachment B

2000
Report of the
AVMA Panel on Euthanasia

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PREFACE

At the request of the AVMA Council on Research, the Executive Board of the AVMA convened a Panel on Euthanasia in 1999 to review and make necessary revisions to the fifth Panel Report, published in 1993.[1] In this newest version of the report, the panel has updated information on euthanasia of animals in research and animal care and control facilities; expanded information on ectothermic, aquatic, and fur-bearing animals; added information on horses and wildlife; and deleted methods or agents considered unacceptable. Because the panel's deliberations were based on currently available scientific information, some euthanasia methods and agents are not discussed.

Welfare issues are increasingly being identified in the management of free-ranging wildlife, and the need for humane euthanasia guidelines in this context is great. Collection of animals for scientific investigations, euthanasia of injured or diseased wildlife species, removal of animals causing damage to property or threatening human safety, and euthanasia of animals in excess population are drawing more public attention. These issues are acknowledged in this report and special considerations are described for handling animals under free-ranging conditions, where their needs are far different from those of their domestic counterparts.

This report is intended for use by members of the

veterinary profession who carry out or oversee the euthanasia of animals. Although the report may be interpreted and understood by a broad segment of the general population, a veterinarian should be consulted in the application of these recommendations. The practice of veterinary medicine is complex and involves diverse animal species. Whenever possible, a veterinarian experienced with the species in question should be consulted when selecting the method of euthanasia, particularly when little species-specific euthanasia research has been done. Although interpretation and use of this report cannot be limited, the panel's overriding commitment is to give veterinarians guidance in relieving pain and suffering of animals that are to be euthanatized. The recommendations in this report are intended to serve as guidelines for veterinarians who must then use professional judgment in applying them to the various settings where animals are to be euthanatized.

INTRODUCTION

The term euthanasia is derived from the Greek terms *eu* meaning good and *thanatos* meaning death.[2] A "good death" would be one that occurs with minimal pain and distress. In the context of this report, euthanasia is the act of inducing humane death in an animal. It is our responsibility as veterinarians and human beings to ensure that if an animal's life is to be taken, it is done with the highest degree of respect, and with an emphasis on making the death as painless and distress free as possible. Euthanasia techniques should result in rapid loss of consciousness followed by cardiac or respiratory arrest and the ultimate loss of brain function. In addition, the technique should minimize distress and anxiety experienced by the animal prior to loss of consciousness. The panel recognized that the absence of pain and distress cannot always be achieved. This report attempts to balance the ideal of minimal pain and distress with the reality of the many environments in which euthanasia is performed. A veterinarian with appropriate training and expertise for the species involved should be consulted to ensure that proper procedures are used.

Criteria for painless death can be established only after the mechanisms of pain are understood. Pain is that sensation (perception) that results from nerve impulses reaching the cerebral cortex via ascending neural pathways. Under normal circumstances, these pathways are relatively specific, but the nervous system is sufficiently plastic that activation of nociceptive pathways does not always result in pain and stimulation of other (non-nociceptive) peripheral and central neurons can give rise to pain. The term nociceptive is derived from the word *noci* meaning to injure and *ceptive* meaning to receive, and is used to describe neuronal input caused by noxious stimuli, which threaten to, or actually do, destroy tissue. These noxious stimuli initiate nerve impulses by acting at primary nociceptors and other sensory nerve endings that respond to noxious and non-noxious stimuli from mechanical, thermal, or chemical activity. Endogenous chemical substances such as hydrogen ions, potassium ions, ATP, serotonin, histamine, bradykinin, and prostaglandins, as well as electrical currents, are capable of generating nerve impulses in nociceptor nerve fibers. Activity in nociceptive pathways can also be triggered in normally silent receptors that become sensitized by chronic pain conditions.[3,4]

Nerve impulse activity generated by nociceptors is conducted via nociceptor primary afferent fibers to the spinal cord or the brainstem where it is transmitted to two general sets of neural networks. One set is related to nociceptive reflexes (eg, withdrawal and flexion reflexes) that are mediated at the spinal level, and the second set consists of ascending pathways to the reticular formation, hypothalamus, thalamus, and cerebral cortex (somatosensory cortex and limbic system) for sensory processing. It is important to understand that ascending nociceptive pathways are numerous, often redundant, and are capable of considerable plasticity under chronic conditions (pathology or injury). Moreover, even the transmission of nociceptive neural activity in a given pathway is highly variable. Under certain conditions, both the nociceptive reflexes and the ascending pathways may be suppressed, as, for example, in epidural anesthesia. Under another set of conditions, nociceptive reflex actions may occur, but activity in the ascending pathways is suppressed; thus, noxious stimuli are not perceived as pain. It is incorrect to use the term pain for stimuli, receptors, reflexes, or pathways because the term implies perception, whereas all the above may be active without consequential pain perception.[5,6]

Pain is divided into two broad categories: (1) sensory-discriminative, which indicates the site of origin and the stimulus giving rise to the pain; and (2) motivational-affective in which the severity of the stimulus is perceived and the animal's response is determined. Sensory-discriminative processing of nociceptive impulses is most likely to be accomplished by subcortical and cortical mechanisms similar to those used for processing other sensory-discriminative input that provides the individual with information about the intensity, duration, location, and quality of the stimulus. Motivational-affective processing involves the ascending reticular formation for behavioral and cortical arousal. It also involves thalamic input to the forebrain and the limbic system for perceptions such as discomfort, fear, anxiety, and depression. The motivational-affective neural networks also have strong inputs to the limbic system, hypothalamus and the autonomic nervous system for reflex activation of the cardiovascular, pulmonary, and pituitary-adrenal systems. Responses activated by these systems feed back to the forebrain and enhance perceptions derived via motivational-affective inputs. On the basis of neurosurgical experience in humans, it is possible to separate the sensory-discriminative components from the motivational-affective components of pain.[7]

For pain to be experienced, the cerebral cortex and subcortical structures must be functional. If the cerebral cortex is nonfunctional because of hypoxia, depression by drugs, electric shock, or concussion, pain is not experienced. Therefore, the choice of the euthanasia agent or method is less critical if it is to be used on an animal that is anesthetized or unconscious, provided that the animal does not regain consciousness prior to death.

An understanding of the continuum that represents stress and distress is essential for evaluating techniques that minimize any distress experienced by an animal being euthanatized. Stress has been defined as the effect of physical, physiologic, or emotional factors (stressors) that induce an alteration in an animal's homeostasis or adaptive state.[8] The response of an animal to stress represents the adaptive process that is necessary to restore the baseline mental and physiologic state. These responses may involve changes in an animal's neuroendocrinologic system, autonomic nervous system, and mental status that may result in overt behavioral changes. An animal's response varies according to its experience, age, species, breed, and current physiologic and psychologic state.[9]

Stress and the resulting responses have been divided into three phases.[10] Eustress results when harmless stimuli initiate adaptive responses that are beneficial to the animal. Neutral stress results when the animal's response to stimuli causes neither harmful nor beneficial effects to the animal. Distress results when an animal's response to stimuli interferes with its well-being and comfort.[11]

As with many other procedures involving animals, some methods of euthanasia require physical handling of the animal. The amount of control and kind of restraint required will be determined by the animal's species, breed, size, state of domestication, degree of taming, presence of painful injury or disease, degree of excitement, and method of euthanasia. Proper handling is vital to minimize pain and distress in animals, to ensure safety of the person performing euthanasia, and, often, to protect other people and animals.

An in-depth discussion of euthanasia procedures is beyond the scope of this report; however, personnel who perform euthanasia must have appropriate certification and training, experience with the techniques to be used, and experience in the humane restraint of the species of animal to be euthanatized, to ensure that animal pain and distress are minimized during euthanasia. Training and experience should include familiarity with the normal behavior of the species being euthanatized, an appreciation of how handling and restraint affects that behavior, and an understanding of the mechanism by which the selected technique induces loss of consciousness and death. Prior to being assigned full responsibility for performing euthanasia, all personnel must have demonstrated proficiency in the use of the technique in a closely supervised environment. References provided at the end of this document may be useful for training personnel.[12-21]

Selection of the most appropriate method of euthanasia in any given situation depends on the species of animal involved, available means of animal restraint, skill of personnel, number of animals, and other considerations. Available information focuses primarily on domestic animals, but the same general considerations should be applied to all species.

This report includes four appendices that summarize information from the text. Appendix 1 lists acceptable and conditionally acceptable methods of euthanasia, categorized by species. Appendices 2 and 3 provide summaries of characteristics for acceptable and conditionally acceptable methods of euthanasia. Appendix 4 provides a summary of some unacceptable euthanasia agents and methods. Criteria used for acceptable, conditionally acceptable, and unacceptable methods are as follows: acceptable methods are those that consistently produce a humane death when used as the sole means of euthanasia; conditionally acceptable methods are those techniques that by the nature of the technique or because of greater potential for operator error or safety hazards might not consistently produce humane death or are methods not well documented in the scientific literature; and unacceptable techniques are those methods deemed inhumane under any conditions or that the panel found posed a substantial risk to the human applying the technique. The report also includes discussion of several adjunctive methods, which are those methods that cannot be used as the sole method of euthanasia, but that can be used in conjunction with other methods to produce a humane death.

GENERAL CONSIDERATIONS

In evaluating methods of euthanasia, the panel used the following criteria: (1) ability to induce loss of consciousness and death without causing pain, distress, anxiety, or apprehension; (2) time required to induce loss of consciousness; (3) reliability; (4) safety of personnel; (5) irreversibility; (6) compatibility with requirement and purpose; (7) emotional effect on observers or operators; (8) compatibility with subsequent evaluation, examination, or use of tissue; (9) drug availability and human abuse potential; (10) compatibility with species, age, and health status; (11) ability to maintain equipment in proper working order; and (12) safety for predators/scavengers should the carcass be consumed.

The panel discussed the definition of euthanasia used in this report as it applies to circumstances when the degree of control over the animal makes it difficult to ensure death without pain and distress. Slaughter of animals for food, fur, or fiber may represent such situations. However, the same standards for euthanasia should be applied to the killing of animals for food, fur, or fiber, and wildlife or feral animals. Animals intended for food should be slaughtered humanely, taking into account any special requirements of the US Department of Agriculture.[22] Painless death can be achieved by properly stunning the animal, followed immediately by exsanguination. Handling of animals prior to slaughter should be as stress free as possible. Electric prods or other devices should not be used to encourage movement of animals and are not needed if chutes and ramps are properly designed to enable animals to be moved and restrained without undue stress.[23-27] Animals must not be restrained in a painful position before slaughter.

Ethical considerations that must be addressed when euthanatizing healthy and unwanted animals reflect professional and societal concerns.[28,29] These issues are complex and warrant thorough consideration by the profession and all those concerned with the welfare of animals. Whereas the panel recognizes the need for those responsible for the euthanasia of ani-

mals to be cognizant of these issues, it does not believe that this report is the appropriate forum for an in-depth discussion of this topic.

It is the intent of the panel that euthanasia be performed in accordance with applicable federal, state, and local laws governing drug acquisition and storage, occupational safety, and methods used for euthanasia and disposal of animals. However, space does not permit a review of current federal, state, and local regulations.

The panel is aware that circumstances may arise that are not clearly covered by this report. Whenever such situations arise, a veterinarian experienced with the species should use professional judgment and knowledge of clinically acceptable techniques in selecting an appropriate euthanasia technique. Professional judgment in these circumstances will take into consideration the animal's size and its species-specific physiologic and behavioral characteristics. In all circumstances, the euthanasia method should be selected and used with the highest ethical standards and social conscience.

It is imperative that death be verified after euthanasia and before disposal of the animal. An animal in deep narcosis following administration of an injectable or inhalant agent may appear dead, but might eventually recover. Death must be confirmed by examining the animal for cessation of vital signs, and consideration given to the animal species and method of euthanasia when determining the criteria for confirming death.

ANIMAL BEHAVIORAL CONSIDERATIONS

The need to minimize animal distress, including fear, anxiety, and apprehension, must be considered in determining the method of euthanasia. Gentle restraint (preferably in a familiar and safe environment), careful handling, and talking during euthanasia often have a calming effect on animals that are used to being handled. Sedation and/or anesthesia may assist in achieving the best conditions for euthanasia. It must be recognized that any sedatives or anesthetics given at this stage that change circulation may delay the onset of the euthanasia agent. Preparation of observers should also be taken into consideration.

Animals that are wild, feral, injured, or already distressed from disease pose another challenge. Methods of pre-euthanasia handling suitable for domestic animals may not be effective for them. Because handling may stress animals unaccustomed to human contact (eg, wildlife, zoo, and feral species), the degree of restraint required to perform any euthanasia procedure should be considered when evaluating various methods. When handling these animals, calming may be accomplished by minimizing visual, auditory, and tactile stimulation. When struggling during capture or restraint may cause pain, injury, or anxiety to the animal or danger to the operator, the use of tranquilizers, analgesics, and/or anesthetics may be necessary. A route of injection should be chosen that causes the least distress in the animal for which euthanasia must be performed. Various techniques for oral delivery of sedatives to dogs and cats have been described that may be useful under these circumstances.[30,31]

Facial expressions and body postures that indicate various emotional states of animals have been described for some species.[32-37] Behavioral and physiologic responses to noxious stimuli include distress vocalization, struggling, attempts to escape, defensive or redirected aggression, salivation, urination, defecation, evacuation of anal sacs, pupillary dilatation, tachycardia, sweating, and reflex skeletal muscle contractions causing shivering, tremors, or other muscular spasms. Unconscious as well as conscious animals are capable of some of these responses. Fear can cause immobility or “playing dead” in certain species, particularly rabbits and chickens. This immobility response should not be interpreted as loss of consciousness when the animal is, in fact, conscious. Distress vocalizations, fearful behavior, and release of certain odors or pheromones by a frightened animal may cause anxiety and apprehension in other animals. Therefore, for sensitive species, it is desirable that other animals not be present when individual animal euthanasia is performed.

HUMAN BEHAVIORAL CONSIDERATIONS

When animals must be euthanatized, either as individuals or in larger groups, moral and ethical concerns dictate that humane practices be observed. Human psychologic responses to euthanasia of animals need to be considered, with grief at the loss of a life as the most common reaction.[38] There are six circumstances under which we are most aware of the effects of animal euthanasia on people.

The first of these is the veterinary clinical setting where owners have to make decisions about whether and when to euthanatize. Although many owners rely heavily on their veterinarian's judgment, others may have misgivings about making their own decision. This is particularly likely if an owner feels responsible for allowing an animal's medical or behavioral problem to go unattended so that euthanasia becomes necessary. When owners choose to be present during euthanasia, they should be prepared for what will happen. What drugs are being used and how the animal could respond should be discussed. Behaviors such as vocalization, muscle twitches, failure of the eyelids to close, urination, or defecation can be distressing. Counseling services for grieving owners are now available in some communities[39] and telephone counseling is available through some veterinary schools.[40,41] Owners are not the only people affected by euthanasia of animals. Veterinarians and their staffs may also become attached to patients they have known and treated for many years and may continue to struggle with the ethical implications of ending an animal's life.

The second is animal care and control facilities where unwanted, homeless, diseased, and injured animals must be euthanatized in large numbers. Distress may develop among personnel directly involved in performing euthanasia repeatedly. Emotional uneasiness, discomfort, or distress experienced by people involved with euthanasia of animals may be minimized. The person performing euthanasia must be technically proficient, use humane handling methods, understand the reasons for euthanasia, and be familiar with the

method of euthanasia being employed (ie, what is going to happen to the animal). When the person is not knowledgeable about what to expect, he or she may mistakenly interpret any movement of animals as consciousness and a lack of movement as loss of consciousness. Methods that preclude movement of animals are more aesthetically acceptable to most technical staff even though lack of movement is not an adequate criterion for evaluating euthanasia techniques. Constant exposure to, or participation in, euthanasia procedures can cause a psychologic state characterized by a strong sense of work dissatisfaction or alienation, which may be expressed by absenteeism, belligerence, or careless and callous handling of animals.[42] This is one of the principal reasons for turnover of employees directly involved with repeated animal euthanasia. Management should be aware of potential personnel problems related to animal euthanasia and determine whether it is necessary to institute a program to prevent, decrease, or eliminate this problem. Specific coping strategies can make the task more tolerable. Some strategies include adequate training programs so that euthanasia is performed competently, peer support in the workplace, professional support as necessary, focusing on animals that are successfully adopted or returned to owners, devoting some work time to educational activities, and providing time off when workers feel stressed.

The third setting is the laboratory. Researchers, technicians, and students may become attached to animals that must be euthanatized.[43] The same considerations afforded pet owners or shelter employees should be provided to those working in laboratories.

The fourth situation is wildlife control. Wildlife biologists, wildlife managers, and wildlife health professionals are often responsible for euthanatizing animals that are injured, diseased, in excessive number, or that threaten property or human safety. Although relocation of some animals is appropriate and attempted, relocation is often only a temporary solution to a larger problem. People who must deal with these animals, especially under public pressure to save the animals rather than destroy them, can experience extreme distress and anxiety.

The fifth setting is livestock and poultry slaughter facilities. The large number of animals processed daily can take a heavy toll on employees physically and emotionally. Federal and state agricultural employees may also be involved in mass euthanasia of poultry and livestock in the face of disease outbreaks, bioterrorism, and natural disasters.

The last situation is public exposure. Because euthanasia of zoo animals, animals involved in roadside or racetrack accidents, stranded marine animals, nuisance or injured wildlife, and others can draw public attention, human attitudes and responses should be considered whenever animals are euthanatized. Natural disasters and foreign animal disease programs also present public challenges. These considerations, however, should not outweigh the primary responsibility of using the most rapid and painless euthanasia method possible under the circumstances.

MODES OF ACTION OF EUTHANATIZING AGENTS

Euthanatizing agents cause death by three basic mechanisms: (1) hypoxia, direct or indirect; (2) direct depression of neurons necessary for life function; and (3) physical disruption of brain activity and destruction of neurons necessary for life.

Agents that induce death by direct or indirect hypoxia can act at various sites and can cause loss of consciousness at different rates. For death to be painless and distress-free, loss of consciousness should precede loss of motor activity (muscle movement). Loss of motor activity, however, cannot be equated with loss of consciousness and absence of distress. Thus, agents that induce muscle paralysis without loss of consciousness are not acceptable as sole agents for euthanasia (eg, depolarizing and nondepolarizing muscle relaxants, strychnine, nicotine, and magnesium salts). With other techniques that induce hypoxia, some animals may have motor activity following loss of consciousness, but this is reflex activity and is not perceived by the animal.

A second group of euthanatizing agents depress nerve cells of the brain, inducing loss of consciousness followed by death. Some of these agents release inhibition of motor activity during the first stage of anesthesia, resulting in a so-called excitement or delirium phase, during which there may be vocalization and some muscle contraction. These responses do not appear to be purposeful. Death follows loss of consciousness, and is attributable to cardiac arrest and/or hypoxemia following direct depression of respiratory centers.

Physical disruption of brain activity, caused by concussion, direct destruction of the brain, or electrical depolarization of neurons, induces rapid loss of consciousness. Death occurs because of destruction of midbrain centers controlling cardiac and respiratory activity or as a result of adjunctive methods (eg, exsanguination) used to kill the animal. Exaggerated muscular activity can follow loss of consciousness and, although this may disturb some observers, the animal is not experiencing pain or distress.

INHALANT AGENTS

Any gas that is inhaled must reach a certain concentration in the alveoli before it can be effective; therefore, euthanasia with any of these agents takes some time. The suitability of a particular agent depends on whether an animal experiences distress between the time it begins to inhale the agent and the time it loses consciousness. Some agents may induce convulsions, but these generally follow loss of consciousness. Agents inducing convulsions prior to loss of consciousness are unacceptable for euthanasia.

Certain considerations are common to all inhalant agents. (1) In most cases, onset of loss of consciousness is more rapid, and euthanasia more humane, if the animal is rapidly exposed to a high concentration of the agent. (2) The equipment used to deliver and maintain this high concentration must be in good working order and in compliance with state and federal regulations. Leaky or faulty equipment may lead to

slow, distressful death and be hazardous to other animals and to personnel. (3) Most of these agents are hazardous to personnel because of the risk of explosions (eg, ether), narcosis (eg, halothane), hypoxemia (eg, nitrogen and carbon monoxide), addiction (eg, nitrous oxide), or health effects resulting from chronic exposure (eg, nitrous oxide and carbon monoxide). (4) Alveolar concentrations rise slowly in an animal with decreased ventilation, making agitation more likely during induction. Other noninhalant methods of euthanasia should be considered for such animals. (5) Neonatal animals appear to be resistant to hypoxia, and because all inhalant agents ultimately cause hypoxia, neonatal animals take longer to die than adults. Glass et al,[44] reported that newborn dogs, rabbits, and guinea pigs survived a nitrogen atmosphere much longer than did adults. Dogs, at 1 week old, survived for 14 minutes compared with a 3-minute survival time after a few weeks of age. Guinea pigs survived for 4.5 minutes at 1 day old, compared with 3 minutes at 8 days or older. Rabbits survived for 13 minutes at 6 days old, 4 minutes at 14 days, and 1.5 minutes at 19 days and older. The panel recommends that inhalant agents not be used alone in animals less than 16 weeks old except to induce loss of consciousness, followed by the use of some other method to kill the animal. (6) Rapid gas flows can produce a noise that frightens animals. If high flows are required, the equipment should be designed to minimize noise. (7) Animals placed together in chambers should be of the same species, and, if needed, should be restrained so that they will not hurt themselves or others. Chambers should not be overloaded and need to be kept clean to minimize odors that might distress animals subsequently euthanatized. (8) Reptiles, amphibians, and diving birds and mammals have a great capacity for holding their breath and anaerobic metabolism. Therefore, induction of anesthesia and time to loss of consciousness when using inhalants may be greatly prolonged. Other techniques may be more appropriate for these species.

Inhalant anesthetics

Inhalant anesthetics (eg, ether, halothane, methoxyflurane, isoflurane, sevoflurane, desflurane, and enflurane) have been used to euthanatize many species.[45] Halothane induces anesthesia rapidly and is the most effective inhalant anesthetic for euthanasia. Enflurane is less soluble in blood than halothane, but, because of its lower vapor pressure and lower potency, induction rates may be similar to those for halothane. At deep anesthetic planes, animals may seizure. It is an effective agent for euthanasia, but the associated seizure activity may be disturbing to personnel. Isoflurane is less soluble than halothane, and it should induce anesthesia more rapidly. However, it has a slightly pungent odor and animals often hold their breath, delaying onset of loss of consciousness. Isoflurane also may require more drug to kill an animal, compared with halothane. Although isoflurane is acceptable as a euthanasia agent, halothane is preferred. Sevoflurane is less soluble than halothane and does not have an objectionable odor. It is less potent than isoflurane or halothane and has a lower vapor pressure. Anesthetic concentrations can be achieved and maintained rapidly. Desflurane is currently the least soluble potent inhalant anesthetic, but the vapor is quite pungent, which may slow induction. This drug is so volatile that it could displace oxygen (O_2) and induce hypoxemia during induction if supplemental O_2 is not provided. Methoxyflurane is highly soluble, and slow anesthetic induction with its use may be accompanied by agitation. It is a conditionally acceptable agent for euthanasia in rodents.[46] Ether has high solubility in blood and induces anesthesia slowly. It is irritating to the eyes and nose, poses serious risks associated with its flammability and explosiveness, and has been used to create a model for stress.[47-50]

With inhalant anesthetics, the animal can be placed in a closed receptacle containing cotton or gauze soaked with an appropriate amount of the anesthetic,[51] or the anesthetic can be introduced from a vaporizer. The latter method may be associated with a longer induction time. Vapors are inhaled until respiration ceases and death ensues. Because the liquid state of most inhalant anesthetics is irritating, animals should be exposed only to vapors. Also, sufficient air or O_2 must be provided during the induction period to prevent hypoxemia.[51] In the case of small rodents placed in a large container, there will be sufficient O_2 in the chamber to prevent hypoxemia. Larger species placed in small containers may need supplemental air or O_2.[51]

Nitrous oxide (N_2O) may be used with other inhalants to speed the onset of anesthesia, but alone it does not induce anesthesia in animals, even at 100% concentration. When used by itself, N_2O produces hypoxemia before respiratory or cardiac arrest. As a result, animals may become distressed prior to loss of consciousness.

Occupational exposure to inhalant anesthetics constitutes a human health hazard. Spontaneous abortion and congenital abnormalities have been associated with exposure of women to trace amounts of inhalation anesthetic agents during early stages of pregnancy.[52] Regarding human exposure to inhalant anesthetics, the concentrations of halothane, enflurane, and isoflurane should be less than 2 ppm, and less than 25 ppm for nitrous oxide.[52] There are no controlled studies proving that such concentrations of anesthetics are safe, but these concentrations were established because they were found to be attainable under hospital conditions. Effective procedures must be used to protect personnel from anesthetic vapors.

Advantages—(1) Inhalant anesthetics are particularly valuable for euthanasia of smaller animals (< 7 kg) or for animals in which venipuncture may be difficult. (2) Halothane, enflurane, isoflurane, sevoflurane, desflurane, methoxyflurane, and N_2O are nonflammable and nonexplosive under ordinary environmental conditions.

Disadvantages—(1) Animals may struggle and become anxious during induction of anesthesia because anesthetic vapors may be irritating and can induce excitement. (2) Ether is flammable and explo-

sive. Explosions have occurred when animals, euthanatized with ether, were placed in an ordinary (not explosion proof) refrigerator or freezer and when bagged animals were placed in an incinerator. (3) Induction with methoxyflurane is unacceptably slow in some species. (4) Nitrous oxide will support combustion. (5) Personnel and animals can be injured by exposure to these agents. (6) There is a potential for human abuse of some of these drugs, especially N_2O.

Recommendations—In order of preference, halothane, enflurane, isoflurane, sevoflurane, methoxyflurane, and desflurane, with or without nitrous oxide, are acceptable for euthanasia of small animals (< 7 kg). Ether should only be used in carefully controlled situations in compliance with state and federal occupational health and safety regulations. It is conditionally acceptable. Nitrous oxide should not be used alone, pending further scientific studies on its suitability for animal euthanasia. Although acceptable, these agents are generally not used in larger animals because of their cost and difficulty of administration.

Carbon dioxide

Room air contains 0.04% carbon dioxide (CO_2), which is heavier than air and nearly odorless. Inhalation of CO_2 at a concentration of 7.5% increases the pain threshold, and higher concentrations of CO_2 have a rapid anesthetic effect.[53-58]

Leake and Waters[56] reported the experimental use of CO_2 as an anesthetic agent for dogs. At concentrations of 30% to 40% CO_2 in O_2, anesthesia was induced within 1 to 2 minutes, usually without struggling, retching, or vomiting. For cats, inhalation of 60% CO_2 results in loss of consciousness within 45 seconds, and respiratory arrest within 5 minutes.[59] Signs of effective CO_2 anesthesia are those associated with deep surgical anesthesia, such as loss of withdrawal and palpebral reflexes.[60] Time to loss of consciousness is decreased by use of higher concentrations of CO_2 with an 80 to 100% concentration providing anesthesia in 12 to 33 seconds in rats and 70% CO_2 in O_2 inducing anesthesia in 40 to 50 seconds.[61,62] Time to loss of consciousness will be longer if the concentration is increased slowly rather than immersing the animal in the full concentration immediately.

Several investigators have suggested that inhalation of high concentrations of CO_2 may be distressing to animals,[63-66] because the gas dissolves in moisture on the nasal mucosa. The resulting product, carbonic acid, may stimulate nociceptors in the nasal mucosa. Some humans exposed to concentrations of around 50% CO_2 report that inhaling the gas is unpleasant and that higher concentrations are noxious.[67,68] A brief study of swine examined the aversive nature of CO_2 exposure[69] and found that 90% CO_2 was aversive to pigs while 30% was not. For rats, exposure to increasing concentrations of CO_2 (33% achieved after 1 minute) in their home cage produced no evident stress as measured by behavior and ACTH, glucose, and corticosterone concentrations in serum.[70]

Carbon dioxide has been used to euthanatize groups of small laboratory animals, including mice, rats, guinea pigs, chickens, and rabbits,[5,71-76] and to render swine unconscious before humane slaughter.[22,63, 64] The combination of 40% CO_2 and approximately 3% CO has been used experimentally for euthanasia of dogs.[65] Carbon dioxide has been used in specially designed chambers to euthanatize individual cats[77,78] and other small laboratory animals.[51,72,79]

Studies of 1-day-old chickens have revealed that CO_2 is an effective euthanatizing agent. Inhalation of CO_2 caused little distress to the birds, suppressed nervous activity, and induced death within 5 minutes.[73] Because respiration begins during embryonic development, the unhatched chicken's environment may normally have a CO_2 concentration as high as 14%. Thus, CO_2 concentrations for euthanasia of newly hatched chickens and neonates of other species should be especially high. A CO_2 concentration of 60% to 70% with a 5-minute exposure time appears to be optimal.[73]

In studies of mink, high concentrations of CO_2 would kill them quickly, but a 70% CO_2 concentration induced loss of consciousness without killing them.[80] Some burrowing animals, such as rabbits of the species *Oryctolagus*, also have prolonged survival times when exposed to CO_2.[81] Some burrowing and diving animals have physiologic mechanisms for coping with hypercapnia. Therefore, it is necessary to have a sufficient concentration of CO_2 to kill the animal by hypoxemia following induction of anesthesia with CO_2.

Advantages—(1) The rapid depressant, analgesic, and anesthetic effects of CO_2 are well established. (2) Carbon dioxide is readily available and can be purchased in compressed gas cylinders. (3) Carbon dioxide is inexpensive, nonflammable, nonexplosive, and poses minimal hazard to personnel when used with properly designed equipment. (4) Carbon dioxide does not result in accumulation of tissue residues in food-producing animals. (5) Carbon dioxide euthanasia does not distort murine cholinergic markers[82] or corticosterone concentrations.[83]

Disadvantages—(1) Because CO_2 is heavier than air, incomplete filling of a chamber may permit animals to climb or raise their heads above the higher concentrations and avoid exposure. (2) Some species, such as fish and burrowing and diving mammals, may have extraordinary tolerance for CO_2. (3) Reptiles and amphibians may breathe too slowly for the use of CO_2. (4) Euthanasia by exposure to CO_2 may take longer than euthanasia by other means.[61] (5) Induction of loss of consciousness at lower concentrations (< 80%) may produce pulmonary and upper respiratory tract lesions.[67,84] (6) High concentrations of CO_2 may be distressful to some animals.

Recommendations—Carbon dioxide is acceptable for euthanasia in appropriate species (Tables 1 and 2). Compressed CO_2 gas in cylinders is the only recommended source of carbon dioxide because the inflow to the chamber can be regulated precisely. Carbon dioxide generated by other methods such as from dry ice, fire extinguishers, or chemical means (eg, antacids) is unacceptable. Species should be separated and cham-

bers should not be overcrowded. With an animal in the chamber, an optimal flow rate should displace at least 20% of the chamber volume per minute.[85] Loss of consciousness may be induced more rapidly by exposing animals to a CO_2 concentration of 70% or more by prefilling the chamber for species in which this has not been shown to cause distress. Gas flow should be maintained for at least 1 minute after apparent clinical death.[86] It is important to verify that an animal is dead before removing it from the chamber. If an animal is not dead, CO_2 narcosis must be followed with another method of euthanasia. Adding O_2 to the CO_2 may or may not preclude signs of distress.[67,87] Additional O_2 will, however, prolong time to death and may complicate determination of consciousness. There appears to be no advantage to combining O_2 with carbon dioxide for euthanasia.[87]

Nitrogen, argon

Nitrogen (N_2) and argon (Ar) are colorless, odorless gases that are inert, nonflammable, and nonexplosive. Nitrogen comprises 78% of atmospheric air, whereas Ar comprises less than 1%.

Euthanasia is induced by placing the animal in a closed container that has been prefilled with N_2 or Ar or into which the gas is then rapidly introduced. Nitrogen/Ar displaces O_2, thus inducing death by hypoxemia.

In studies by Herin et al,[88] dogs became unconscious within 76 seconds when a N_2 concentration of 98.5% was achieved in 45 to 60 seconds. The electroencephalogram (EEG) became isoelectric (flat) in a mean time of 80 seconds, and arterial blood pressure was undetectable at 204 seconds. Although all dogs hyperventilated prior to loss of consciousness, the investigators concluded that this method induced death without pain. Following loss of consciousness, vocalization, gasping, convulsions, and muscular tremors developed in some dogs. At the end of a 5-minute exposure period, all dogs were dead.[88] These findings were similar to those for rabbits[89] and mink.[80,90]

With N_2 flowing at a rate of 39% of chamber volume per minute, rats collapsed in approximately 3 minutes and stopped breathing in 5 to 6 minutes. Regardless of flow rate, signs of panic and distress were evident before the rats collapsed and died.[85] Insensitivity to pain under such circumstances is questionable.[91]

Tranquilization with acepromazine, in conjunction with N_2 euthanasia of dogs, was investigated by Quine et al.[92] Using ECG and EEG recordings, they found these dogs had much longer survival times than dogs not given acepromazine before administration of N_2. In one dog, ECG activity continued for 51 minutes. Quine also addressed distress associated with exposure to N_2 by removing cats and dogs from the chamber following loss of consciousness and allowing them to recover. When these animals were put back into the chamber, they did not appear afraid or apprehensive.

Investigations into the aversiveness of Ar to swine and poultry have revealed that these animals will tolerate breathing 90% Ar with 2% O_2.[69,71] Swine voluntarily entered a chamber containing this mixture, for a food reward, and only withdrew from the chamber as they became ataxic. They reentered the chamber immediately to continue eating. Poultry also entered a chamber containing this mixture for a food reward and continued eating until they collapsed.[71] When Ar was used to euthanatize chickens, exposure to a chamber prefilled with Ar, with an O_2 concentration of < 2%, led to EEG changes and collapse in 9 to 12 seconds. Birds removed from the chamber at 15 to 17 seconds failed to respond to comb pinching. Continued exposure led to convulsions at 20 to 24 seconds. Somatosensory-evoked potentials were lost at 24 to 34 seconds, and the EEG became isoelectric at 57 to 66 seconds. Convulsion onset was after loss of consciousness (collapse and loss of response to comb pinch), so this would appear to be a humane method of euthanasia for chickens.[93] Despite the availability of some information, there is still much about the use of N_2/Ar that needs to be investigated.

Advantages—(1) Nitrogen and Ar are readily available as compressed gases. (2) Hazards to personnel are minimal.

Disadvantages—(1) Loss of consciousness is preceded by hypoxemia and ventilatory stimulation, which may be distressing to the animal. (2) Reestablishing a low concentration of O_2 (ie, 6% or greater) in the chamber before death will allow immediate recovery.[69]

Recommendations—Nitrogen and Ar can be distressful to some species (eg, rats).[85] Therefore, this technique is conditionally acceptable only if O_2 concentrations < 2% are achieved rapidly, and animals are heavily sedated or anesthetized. With heavy sedation or anesthesia, it should be recognized that death may be delayed. Although N_2 and Ar are effective, other methods of euthanasia are preferable.

Carbon monoxide

Carbon monoxide (CO) is a colorless, odorless gas that is nonflammable and nonexplosive unless concentrations exceed 10%. It combines with hemoglobin to form carboxyhemoglobin and blocks uptake of O_2 by erythrocytes, leading to fatal hypoxemia.

In the past, mass euthanasia has been accomplished by use of 3 methods for generating CO: (1) chemical interaction of sodium formate and sulfuric acid, (2) exhaust fumes from idling gasoline internal combustion engines, and (3) commercially compressed CO in cylinders. The first 2 techniques are associated with problems such as production of other gases, achieving inadequate concentrations of carbon monoxide, inadequate cooling of the gas, and maintenance of equipment. Therefore, the only acceptable source is compressed CO in cylinders.

In a study by Ramsey and Eilmann,[94] 8% CO caused guinea pigs to collapse in 40 seconds to 2 minutes, and death occurred within 6 minutes. Carbon monoxide has been used to euthanatize mink[80,90] and chinchillas. These animals collapsed in 1 minute, breathing ceased in 2 minutes, and the heart stopped beating in 5 to 7 minutes.

In a study evaluating the physiologic and behavioral characteristics of dogs exposed to 6% CO in air, Chalifoux and Dallaire[95] could not determine the precise time of loss of consciousness. Electroencephalographic recordings revealed 20 to 25 seconds of abnormal cortical function prior to loss of consciousness. It was during this period that the dogs became agitated and vocalized. It is not known whether animals experience distress; however, humans in this phase reportedly are not distressed.[96] Subsequent studies have revealed that tranquilization with acepromazine significantly decreases behavioral and physiologic responses of dogs euthanatized with CO.[97]

In a comparative study, CO from gasoline engine exhaust and 70% CO_2 plus 30% O_2 were used to euthanatize cats. Euthanasia was divided into 3 phases. Phase I was the time from initial contact to onset of clinical signs (eg, yawning, staggering, or trembling). Phase II extended from the end of phase I until recumbency, and phase III from the end of phase II until death.[54] The study revealed that signs of agitation before loss of consciousness were greatest with CO_2 plus O_2. Convulsions occurred during phases II and III with both methods. However, when the euthanasia chamber was prefilled with CO (ie, exhaust fumes), convulsions did not occur in phase III. Time to complete immobilization was greater with CO_2 plus O_2 (approximately 90 seconds) than with CO alone (approximately 56 seconds).[54] In neonatal pigs, excitation was more likely to precede loss of consciousness if the pigs were exposed to a rapid rise in CO concentration. This agitation was reduced at lower flow rates, or when CO was combined with nitrogen.[98]

In people, the most common symptoms of early CO toxicosis are headache, dizziness, and weakness. As concentrations of carboxyhemoglobin increase, these signs may be followed by decreased visual acuity, tinnitus, nausea, progressive depression, confusion, and collapse.[99] Because CO stimulates motor centers in the brain, loss of consciousness may be accompanied by convulsions and muscular spasms.

Carbon monoxide is a cumulative poison.[96] Distinct signs of CO toxicosis are not evident until the CO concentration is 0.05% in air, and acute signs do not develop until the CO concentration is approximately 0.2% in air. In humans, exposure to 0.32% CO and 0.45% CO for one hour will induce loss of consciousness and death, respectively.[100] Carbon monoxide is extremely hazardous for personnel because it is highly toxic and difficult to detect. Chronic exposure to low concentrations of carbon monoxide may be a health hazard, especially with regard to cardiovascular disease and teratogenic effects.[101-103] An efficient exhaust or ventilatory system is essential to prevent accidental exposure of humans.

Advantages—(1) Carbon monoxide induces loss of consciousness without pain and with minimal discernible discomfort. (2) Hypoxemia induced by CO is insidious, so that the animal appears to be unaware. (3) Death occurs rapidly if concentrations of 4 to 6% are used.

Disadvantages—(1) Safeguards must be taken to prevent exposure of personnel. (2) Any electrical equipment exposed to CO (eg, lights and fans) must be explosion proof.

Recommendations—Carbon monoxide used for individual animal or mass euthanasia is acceptable for dogs, cats, and other small mammals, provided that commercially compressed CO is used and the following precautions are taken: (1) personnel using CO must be instructed thoroughly in its use and must understand its hazards and limitations; (2) the CO chamber must be of the highest quality construction and should allow for separation of individual animals; (3) the CO source and chamber must be located in a well-ventilated environment, preferably out of doors; (4) the chamber must be well lit and have view ports that allow personnel direct observation of animals; (5) the CO flow rate should be adequate to rapidly achieve a uniform CO concentration of at least 6% after animals are placed in the chamber, although some species (eg, neonatal pigs) are less likely to become agitated with a gradual rise in CO concentration;[98] and (6) if the chamber is inside a room, CO monitors must be placed in the room to warn personnel of hazardous concentrations. It is essential that CO use be in compliance with state and federal occupational health and safety regulations.

NONINHALANT PHARMACEUTICAL AGENTS

The use of injectable euthanasia agents is the most rapid and reliable method of performing euthanasia. It is the most desirable method when it can be performed without causing fear or distress in the animal. When the restraint necessary for giving an animal an intravenous injection would impart added distress to the animal or pose undue risk to the operator, sedation, anesthesia, or an acceptable alternate route of administration should be employed. Aggressive, fearful, wild, or feral animals should be sedated or given a nonparalytic immobilizing agent prior to intravenous administration of the euthanasia agent.

When intravenous administration is considered impractical or impossible, intraperitoneal administration of a nonirritating euthanasia agent is acceptable, provided the drug does not contain neuromuscular blocking agents. Intracardiac injection is acceptable only when performed on heavily sedated, anesthetized, or comatose animals. It is not considered acceptable in awake animals, owing to the difficulty and unpredictability of performing the injection accurately. Intramuscular, subcutaneous, intrathoracic, intrapulmonary, intrahepatic, intrarenal, intrasplenic, intrathecal, and other nonvascular injections are not acceptable methods of administering injectable euthanasia agents.

When injectable euthanasia agents are administered into the peritoneal cavity, animals may be slow to pass through stages I and II of anesthesia. Accordingly, they should be placed in small cages in a quiet area to minimize excitement and trauma.

Barbituric acid derivatives

Barbiturates depress the central nervous system in descending order, beginning with the cerebral cortex,

with loss of consciousness progressing to anesthesia. With an overdose, deep anesthesia progresses to apnea, owing to depression of the respiratory center, which is followed by cardiac arrest.

All barbituric acid derivatives used for anesthesia are acceptable for euthanasia when administered intravenously. There is a rapid onset of action, and loss of consciousness induced by barbiturates results in minimal or transient pain associated with venipuncture. Desirable barbiturates are those that are potent, long-acting, stable in solution, and inexpensive. Sodium pentobarbital best fits these criteria and is most widely used, although others such as secobarbital are also acceptable.

Advantages—(1) A primary advantage of barbiturates is speed of action. This effect depends on the dose, concentration, route, and rate of the injection. (2) Barbiturates induce euthanasia smoothly, with minimal discomfort to the animal. (3) Barbiturates are less expensive than many other euthanasia agents.

Disadvantages—(1) Intravenous injection is necessary for best results and requires trained personnel. (2) Each animal must be restrained. (3) Current federal drug regulations require strict accounting for barbiturates and these must be used under the supervision of personnel registered with the US Drug Enforcement Administration (DEA). (4) An aesthetically objectionable terminal gasp may occur in unconscious animals. (5) These drugs tend to persist in the carcass and may cause sedation or even death of animals that consume the body.

Recommendations—The advantages of using barbiturates for euthanasia in small animals far outweigh the disadvantages. Intravenous injection of a barbituric acid derivative is the preferred method for euthanasia of dogs, cats, other small animals, and horses. Intraperitoneal injection may be used in situations when an intravenous injection would be distressful or even dangerous. Intracardiac injection must only be used if the animal is heavily sedated, unconscious, or anesthetized.

Pentobarbital combinations

Several euthanasia products are formulated to include a barbituric acid derivative (usually sodium pentobarbital), with added local anesthetic agents or agents that metabolize to pentobarbital. Although some of these additives are slowly cardiotoxic, this pharmacologic effect is inconsequential. These combination products are listed by the DEA as Schedule III drugs, making them somewhat simpler to obtain, store, and administer than Schedule II drugs such as sodium pentobarbital. The pharmacologic properties and recommended use of combination products that combine sodium pentobarbital with lidocaine or phenytoin are interchangeable with those of pure barbituric acid derivatives.

A combination of pentobarbital with a neuromuscular blocking agent is not an acceptable euthanasia agent.

Chloral hydrate

Chloral hydrate depresses the cerebrum slowly; therefore, restraint may be a problem for some animals. Death is caused by hypoxemia resulting from progressive depression of the respiratory center, and may be preceded by gasping, muscle spasms, and vocalization.

Recommendations—Chloral hydrate is conditionally acceptable for euthanasia of large animals only when administered intravenously, and only after sedation to decrease the aforementioned undesirable side effects. Chloral hydrate is not acceptable for dogs, cats, and other small animals because the side effects may be severe, reactions can be aesthetically objectionable, and other products are better choices.

T-61

T-61 is an injectable, nonbarbiturate, non-narcotic mixture of 3 drugs used for euthanasia. These drugs provide a combination of general anesthetic, curariform, and local anesthetic actions. T-61 has been withdrawn from the market and is no longer manufactured or commercially available in the United States. It is available in Canada and other countries. T-61 should be used only intravenously and at carefully monitored rates of injection, because there is some question as to the differential absorption and onset of action of the active ingredients when administered by other routes.[1]

Tricaine methane sulfonate (MS 222, TMS)

MS 222 is commercially available as tricaine methane sulfonate (TMS), which can be used for the euthanasia of amphibians and fish. Tricaine is a benzoic acid derivative and, in water of low alkalinity (< 50 mg/L as $CaCo_3$); the solution should be buffered with sodium bicarbonate.[104] A 10 g/L stock solution can be made, and sodium bicarbonate added to saturation, resulting in a pH between 7.0 and 7.5 for the solution. The stock solution should be stored in a dark brown bottle, and refrigerated or frozen if possible. The solution should be replaced monthly and any time a brown color is observed.[105] For euthanasia, a concentration ≥ 250 mg/L is recommended and fish should be left in this solution for at least 10 minutes following cessation of opercular movement.[104] In the United States, there is a 21-day withdrawal time for MS 222; therefore, it is not appropriate for euthanasia of animals intended for food.

Potassium chloride in conjunction with prior general anesthesia

Although unacceptable and condemned when used in unanaesthetized animals, the use of a supersaturated solution of potassium chloride injected intravenously or intracardially in an animal under general anesthesia is an acceptable method to produce cardiac arrest and death. The potassium ion is cardiotoxic, and rapid intravenous or intracardiac administration of 1 to 2 mmol/kg of body weight will cause cardiac arrest. This is a preferred injectable technique for euthanasia of livestock or wildlife species to reduce the risk of toxicosis for predators or scavengers in situations where carcasses of euthanatized animals may be consumed.[106,107]

Advantages—(1) Potassium chloride is not a controlled substance. It is easily acquired, transported, and mixed in the field. (2) Potassium chloride, when used with appropriate methods to render an animal unconscious, results in a carcass that is potentially less toxic for scavengers and predators in cases where carcass disposal is impossible or impractical.

Disadvantage—Rippling of muscle tissue and clonic spasms may occur on or shortly after injection.

Recommendations—It is of utmost importance that personnel performing this technique are trained and knowledgeable in anesthetic techniques, and are competent in assessing anesthetic depth appropriate for administration of potassium chloride intravenously. Administration of potassium chloride intravenously requires animals to be in a surgical plane of anesthesia characterized by loss of consciousness, loss of reflex muscle response, and loss of response to noxious stimuli. Saturated potassium chloride solutions are effective in causing cardiac arrest following rapid intracardiac or intravenous injection. Residual tissue concentrations of general anesthetics after anesthetic induction have not been documented. Whereas no scavenger toxicoses have been reported with potassium chloride in combination with a general anesthetic, proper carcass disposal should always be attempted to prevent possible toxicosis by consumption of a carcass contaminated with general anesthetics.

Unacceptable injectable agents

When used alone, the injectable agents listed in Appendix 4 (strychnine, nicotine, caffeine, magnesium sulfate, potassium chloride, cleaning agents, solvents, disinfectants and other toxins or salts, and all neuromuscular blocking agents) are unacceptable and are absolutely condemned for use as euthanasia agents.

PHYSICAL METHODS

Physical methods of euthanasia include captive bolt, gunshot, cervical dislocation, decapitation, electrocution, microwave irradiation, kill traps, thoracic compression, exsanguination, stunning, and pithing. When properly used by skilled personnel with well-maintained equipment, physical methods of euthanasia may result in less fear and anxiety and be more rapid, painless, humane, and practical than other forms of euthanasia. Exsanguination, stunning, and pithing are not recommended as a sole means of euthanasia, but should be considered adjuncts to other agents or methods.

Some consider physical methods of euthanasia aesthetically displeasing. There are occasions, however, when what is perceived as aesthetic and what is most humane are in conflict. Physical methods may be the most appropriate method for euthanasia and rapid relief of pain and suffering in certain situations. Personnel performing physical methods of euthanasia must be well trained and monitored for each type of physical technique performed. That person must also be sensitive to the aesthetic implications of the method and inform onlookers about what they should expect when possible.

Since most physical methods involve trauma, there is inherent risk for animals and humans. Extreme care and caution should be used. Skill and experience of personnel is essential. If the method is not performed correctly, animals and personnel may be injured. Inexperienced persons should be trained by experienced persons and should practice on carcasses or anesthetized animals to be euthanatized until they are proficient in performing the method properly and humanely. When done appropriately, the panel considers most physical methods conditionally acceptable for euthanasia.

Penetrating captive bolt

A penetrating captive bolt is used for euthanasia of ruminants, horses, swine, laboratory rabbits, and dogs.[108] Its mode of action is concussion and trauma to the cerebral hemisphere and brainstem.[109,110] Captive bolt guns are powered by gunpowder or compressed air and must provide sufficient energy to penetrate the skull of the species on which they are being used.[109] Adequate restraint is important to ensure proper placement of the captive bolt. A cerebral hemisphere and the brainstem must be sufficiently disrupted by the projectile to induce sudden loss of consciousness and subsequent death. Accurate placement of captive bolts for various species has been described.[109-112] A multiple projectile has been suggested as a more effective technique, especially for large cattle.[109]

A nonpenetrating captive bolt only stuns animals and should not be used as a sole means of euthanasia (see "Stunning" under "Adjunctive Methods").

Advantage—The penetrating captive bolt is an effective method of euthanasia for use in slaughterhouses, in research facilities, and on the farm when use of drugs is inappropriate.

Disadvantages—(1) It is aesthetically displeasing. (2) Death may not occur if equipment is not maintained and used properly.

Recommendations—Use of the penetrating captive bolt is an acceptable and practical method of euthanasia for horses, ruminants, and swine. It is conditionally acceptable in other appropriate species. The nonpenetrating captive bolt must not be used as a sole method of euthanasia.

Euthanasia by a blow to the head

Euthanasia by a blow to the head must be evaluated in terms of the anatomic features of the species on which it is to be performed. A blow to the head can be a humane method of euthanasia for neonatal animals with thin craniums, such as young pigs, if a single sharp blow delivered to the central skull bones with sufficient force can produce immediate depression of the central nervous system and destruction of brain tissue. When properly performed, loss of consciousness is rapid. The anatomic features of neonatal calves, however, make a blow to the head in this species unacceptable. Personnel performing euthanasia by use of a blow to the head must be properly trained and monitored for proficiency with this method of euthanasia, and they must be aware of its aesthetic implications.

Gunshot

A properly placed gunshot can cause immediate insensibility and humane death. In some circumstances, a gunshot may be the only practical method of euthanasia. Shooting should only be performed by highly skilled personnel trained in the use of firearms and only in jurisdictions that allow for legal firearm use. Personnel, public, and nearby animal safety should be considered. The procedure should be performed outdoors and away from public access.

For use of a gunshot to the head as a method of euthanasia in captive animals, the firearm should be aimed so that the projectile enters the brain, causing instant loss of consciousness.[51,112-114] This must take into account differences in brain position and skull conformation between species, as well as the energy requirement for skull bone and sinus penetration.[109,115] Accurate targeting for a gunshot to the head in various species has been described.[114,116-119] For wildlife and other freely roaming animals, the preferred target area should be the head. The appropriate firearm should be selected for the situation, with the goal being penetration and destruction of brain tissue without emergence from the contralateral side of the head.[120] A gunshot to the heart or neck does not immediately render animals unconscious and thus is not considered to meet the panel's definition of euthanasia.[121]

Advantages—(1) Loss of consciousness is instantaneous if the projectile destroys most of the brain. (2) Given the need to minimize stress induced by handling and human contact, gunshot may at times be the most practical and logical method of euthanasia of wild or free-ranging species.

Disadvantages—(1) Gunshot may be dangerous to personnel. (2) It is aesthetically unpleasant. (3) Under field conditions, it may be difficult to hit the vital target area. (4) Brain tissue may not be able to be examined for evidence of rabies infection or chronic wasting disease when the head is targeted.

Recommendations—When other methods cannot be used, an accurately delivered gunshot is a conditionally acceptable method of euthanasia.[114,122-125] When an animal can be appropriately restrained, the penetrating captive bolt is preferred to a gunshot. Prior to shooting, animals accustomed to the presence of humans should be treated in a calm and reassuring manner to minimize anxiety. In the case of wild animals, gunshots should be delivered with the least amount of prior human contact necessary. Gunshot should not be used for routine euthanasia of animals in animal control situations, such as municipal pounds or shelters.

Cervical dislocation

Cervical dislocation is a technique that has been used for many years and, when performed by well-trained individuals, appears to be humane. However, there are few scientific studies to confirm this observation. This technique is used to euthanatize poultry, other small birds, mice, and immature rats and rabbits. For mice and rats, the thumb and index finger are placed on either side of the neck at the base of the skull or, alternatively, a rod is pressed at the base of the skull. With the other hand, the base of the tail or the hind limbs are quickly pulled, causing separation of the cervical vertebrae from the skull. For immature rabbits, the head is held in one hand and the hind limbs in the other. The animal is stretched and the neck is hyperextended and dorsally twisted to separate the first cervical vertebra from the skull.[72,111] For poultry, cervical dislocation by stretching is a common method for mass euthanasia, but loss of consciousness may not be instantaneous.[134]

Data suggest that electrical activity in the brain persists for 13 seconds following cervical dislocation,[127] and unlike decapitation, rapid exsanguination does not contribute to loss of consciousness.[128,129]

Advantages—(1) Cervical dislocation is a technique that may induce rapid loss of consciousness.[84,127] (2) It does not chemically contaminate tissue. (3) It is rapidly accomplished.

Disadvantages—(1) Cervical dislocation may be aesthetically displeasing to personnel. (2) Cervical dislocation requires mastering technical skills to ensure loss of consciousness is rapidly induced. (3) Its use is limited to poultry, other small birds, mice, and immature rats and rabbits.

Recommendations—Manual cervical dislocation is a humane technique for euthanasia of poultry, other small birds, mice, rats weighing < 200 g, and rabbits weighing < 1 kg when performed by individuals with a demonstrated high degree of technical proficiency. In lieu of demonstrated technical competency, animals must be sedated or anesthetized prior to cervical dislocation. The need for technical competency is greater in heavy rats and rabbits, in which the large muscle mass in the cervical region makes manual cervical dislocation physically more difficult.[130] In research settings, this technique should be used only when scientifically justified by the user and approved by the Institutional Animal Care and Use Committee.

Those responsible for the use of this technique must ensure that personnel performing cervical dislocation techniques have been properly trained and consistently apply it humanely and effectively.

Decapitation

Decapitation can be used to euthanatize rodents and small rabbits in research settings. It provides a means to recover tissues and body fluids that are chemically uncontaminated. It also provides a means of obtaining anatomically undamaged brain tissue for study.[131]

Although it has been demonstrated that electrical activity in the brain persists for 13 to 14 seconds following decapitation,[132] more recent studies and reports indicate that this activity does not infer the ability to perceive pain, and in fact conclude that loss of consciousness develops rapidly.[127-129]

Guillotines that are designed to accomplish decapitation in adult rodents and small rabbits in a uniformly instantaneous manner are commercially available.

Guillotines are not commercially available for neonatal rodents, but sharp blades can be used for this purpose.

Advantages—(1) Decapitation is a technique that appears to induce rapid loss of consciousness.[127-129] (2) It does not chemically contaminate tissues. (3) It is rapidly accomplished.

Disadvantages—(1) Handling and restraint required to perform this technique may be distressful to animals.[83] (2) The interpretation of the presence of electrical activity in the brain following decapitation has created controversy and its importance may still be open to debate.[127-129,132] (3) Personnel performing this technique should recognize the inherent danger of the guillotine and take adequate precautions to prevent personal injury. (4) Decapitation may be aesthetically displeasing to personnel performing or observing the technique.

Recommendations—This technique is conditionally acceptable if performed correctly, and it should be used in research settings when its use is required by the experimental design and approved by the Institutional Animal Care and Use Committee. The equipment used to perform decapitation should be maintained in good working order and serviced on a regular basis to ensure sharpness of blades. The use of plastic cones to restrain animals appears to reduce distress from handling, minimizes the chance of injury to personnel, and improves positioning of the animal in the guillotine. Decapitation of amphibians, fish, and reptiles is addressed elsewhere in this report.

Those responsible for the use of this technique must ensure that personnel who perform decapitation techniques have been properly trained to do so.

Electrocution

Electrocution, using alternating current, has been used as a method of euthanasia for species such as dogs, cattle, sheep, swine, foxes, and mink.[113,133-138] Electrocution induces death by cardiac fibrillation, which causes cerebral hypoxia.[135,137,139] However, animals do not lose consciousness for 10 to 30 seconds or more after onset of cardiac fibrillation. It is imperative that animals be unconscious before being electrocuted. This can be accomplished by any acceptable means, including electrical stunning.[25] Although an effective, 1-step stunning and electrocution method has been described for use in sheep and hogs, euthanasia by electrocution in most species remains a 2-step procedure.[25,63,140]

Advantages—(1) Electrocution is humane if the animal is first rendered unconscious. (2) It does not chemically contaminate tissues. (3) It is economical.

Disadvantages—(1) Electrocution may be hazardous to personnel. (2) When conventional single-animal probes are used, it may not a useful method for mass euthanasia because so much time is required per animal. (3) It is not a useful method for dangerous, intractable animals. (4) It is aesthetically objectionable because of violent extension and stiffening of the limbs, head, and neck. (5) It may not result in death in small animals (< 5 kg) because ventricular fibrillation and circulatory collapse do not always persist after cessation of current flow.

Recommendations—Euthanasia by electrocution requires special skills and equipment that will ensure passage of sufficient current through the brain to induce loss of consciousness and cardiac fibrillation in the 1-step method for sheep and hogs, or cardiac fibrillation in the unconscious animal when the 2-step procedure is used. Although the method is conditionally acceptable if the aforementioned requirements are met, its disadvantages far outweigh its advantages in most applications. Techniques that apply electric current from head to tail, head to foot, or head to moistened metal plates on which the animal is standing are unacceptable.

Microwave irradiation

Heating by microwave irradiation is used primarily by neurobiologists to fix brain metabolites *in vivo* while maintaining the anatomic integrity of the brain.[141] Microwave instruments have been specifically designed for use in euthanasia of laboratory mice and rats. The instruments differ in design from kitchen units and may vary in maximal power output from 1.3 to 10 kw. All units direct their microwave energy to the head of the animal. The power required to rapidly halt brain enzyme activity depends on the efficiency of the unit, the ability to tune the resonant cavity and the size of the rodent head.[142] There is considerable variation among instruments in the time required for loss of consciousness and euthanasia. A 10 kw, 2,450 MHz instrument operated at a power of 9 kw will increase the brain temperature of 18 to 28 g mice to 79 C in 330 ms, and the brain temperature of 250 to 420 g rats to 94 C in 800 ms.[143]

Advantages—(1) Loss of consciousness is achieved in less than 100 ms, and death in less than 1 second. (2) This is the most effective method to fix brain tissue *in vivo* for subsequent assay of enzymatically labile chemicals.

Disadvantages—(1) Instruments are expensive. (2) Only animals the size of mice and rats can be euthanatized with commercial instruments that are currently available.

Recommendations—Microwave irradiation is a humane method for euthanatizing small laboratory rodents if instruments that induce rapid loss of consciousness are used. Only instruments that are designed for this use and have appropriate power and microwave distribution can be used. Microwave ovens designed for domestic and institutional kitchens are absolutely unacceptable for euthanasia.

Thoracic (cardiopulmonary, cardiac) compression

Thoracic (cardiopulmonary, cardiac) compression is used to euthanatize small- to medium-sized free-ranging birds when alternate techniques described in this report are not practical.[144]

Advantages—(1) This technique is rapid. (2) It is apparently painless. (3) It maximizes carcass use for analytical/contaminant studies.

Disadvantages—(1) It may be considered aesthetically unpleasant by onlookers. (2) The degree of distress is unknown.

Recommendations—Thoracic (cardiopulmonary, cardiac) compression is a physical technique for avian euthanasia that has applicability in the field when other methods cannot be used. It is accomplished by bringing the thumb and forefinger of one hand under the bird's wing from the posterior and placing them against the ribs.[144] The forefinger of the other hand is placed against the ventral edge of the sternum, just below the furculum. All fingers are brought together forcefully and held under pressure to stop the heart and lungs. Loss of consciousness and death develop quickly. Proper training is needed in the use of this technique to avoid trauma to the bird. Cardiopulmonary compression is not appropriate for laboratory settings, for large or diving birds,[144] or for other species.

Kill traps

Mechanical kill traps are used for the collection and killing of small, free-ranging mammals for commercial purposes (fur, skin, or meat), scientific purposes, to stop property damage, and to protect human safety. Their use remains controversial, and the panel recognizes that kill traps do not always render a rapid or stress-free death consistent with criteria for euthanasia found elsewhere in this document. For this reason, use of live traps followed by other methods of euthanasia is preferred. There are a few situations when that is not possible or when it may actually be more stressful to the animals or dangerous to humans to use live traps. Although newer technologies are improving kill trap performance in achieving loss of consciousness quickly, individual testing is recommended to be sure the trap is working properly.[145] If kill traps must be used, the most humane available must be chosen,[146-148] as evaluated by use of International Organization for Standardization (ISO) testing procedures,[149] or by the methods of Gilbert,[150] Proulx et al,[151,152] or Hiltz and Roy.[153]

To reach the required level of efficiency, traps may need to be modified from manufacturers production standards. In addition, as specified in scientific studies, trap placement (ground versus tree sets), bait type, set location, selectivity apparatus, body placement modifying devices (eg, sidewings, cones), trigger sensitivity, and trigger type, size, and conformation are essential considerations that could affect a kill trap's ability to reach these standards.

Several kill traps, modifications, and set specifics have been scientifically evaluated and found to meet the aforereferenced standards for various species.[151,152,154-167]

Advantage—Free-ranging small mammals may be killed with minimal distress associated with handling and human contact.

Disadvantages—(1) Traps may not afford death within acceptable time periods. (2) Selectivity and efficiency is dependent on the skill and proficiency of the operator.

Recommendations—Kill traps do not always meet the panel's criteria for euthanasia. At the same time, it is recognized that they can be practical and effective for scientific animal collection when used in a manner that ensures selectivity, a swift kill, no damage to body parts needed for field research, and minimal potential for injury of nontarget species.[168,169] Traps need to be checked at least once daily. In those instances when an animal is wounded or captured but not dead, the animal must be killed quickly and humanely. Kill traps should be used only when other acceptable techniques are impossible or have failed. Traps for nocturnal species should not be activated during the day to avoid capture of diurnal species.[168] Trap manufacturers should strive to meet their responsibility of minimizing pain and suffering in target species.

Adjunctive methods

Stunning and pithing, when properly done, induce loss of consciousness but do not ensure death. Therefore, these methods must be used only in conjunction with other procedures,[123] such as pharmacologic agents, exsanguination, or decapitation to euthanatize the animal.

Exsanguination

Exsanguination can be used to ensure death subsequent to stunning, or in otherwise unconscious animals. Because anxiety is associated with extreme hypovolemia, exsanguination must not be used as a sole means of euthanasia.[170] Animals may be exsanguinated to obtain blood products, but only when they are sedated, stunned, or anesthetized.[171]

Stunning

Animals may be stunned by a blow to the head, by use of a nonpenetrating captive bolt, or by use of electric current. Stunning must be followed immediately by a method that ensures death. With stunning, evaluating loss of consciousness is difficult, but it is usually associated with a loss of the menace or blink response, pupillary dilatation, and a loss of coordinated movements. Specific changes in the electroencephalogram and a loss of visually evoked responses are also thought to indicate loss of consciousness.[60,172]

Blow to the head—Stunning by a blow to the head is used primarily in small laboratory animals with thin craniums.[9,173-175] A single sharp blow must be delivered to the central skull bones with sufficient force to produce immediate depression of the central nervous system. When properly done, consciousness is lost rapidly.

Nonpenetrating captive bolt—A nonpenetrating captive bolt may be used to induce loss of consciousness in ruminants, horses, and swine. Signs of effective stunning by captive bolt are immediate collapse and a several second period of tetanic spasm, followed by slow hind limb movements of increasing frequency.[60,176]

Other aspects regarding use of the nonpenetrating captive bolt are similar to the use of a penetrating captive bolt, as previously described.

Electrical stunning—Alternating electrical current has been used for stunning species such as dogs, cattle, sheep, goats, hogs, fish and chickens.[133,134,140,177,178] Experiments with dogs have identified a need to direct the electrical current through the brain to induce rapid loss of consciousness. In dogs, when electricity passes only between fore- and hind limbs or neck and feet, it causes the heart to fibrillate but does not induce sudden loss of consciousness.[139] For electrical stunning of any animal, an apparatus that applies electrodes to opposite sides of the head, or in another way directs electrical current immediately through the brain, is necessary to induce rapid loss of consciousness. Attachment of electrodes and animal restraint can pose problems with this form of stunning. Signs of effective electrical stunning are extension of the limbs, opisthotonos, downward rotation of the eyeballs, and tonic spasm changing to clonic spasm, with eventual muscle flaccidity.

Electrical stunning should be followed promptly by electrically induced cardiac fibrillation, exsanguination, or other appropriate methods to ensure death. Refer to the section on electrocution for additional information.

Pithing

In general, pithing is used as an adjunctive procedure to ensure death in an animal that has been rendered unconscious by other means. For some species, such as frogs, with anatomic features that facilitate easy access to the central nervous system, pithing may be used as a sole means of euthanasia, but an anesthetic overdose is a more suitable method.

SPECIAL CONSIDERATIONS

Equine euthanasia

Pentobarbital or a pentobarbital combination is the best choice for equine euthanasia. Because a large volume of solution must be injected, use of an intravenous catheter placed in the jugular vein will facilitate the procedure. To facilitate catheterization of an excitable or fractious animal, a tranquilizer such as acepromazine, or an alpha-2 adrenergic agonist can be administered, but these drugs may prolong time to loss of consciousness because of their effect on circulation and may result in varying degrees of muscular activity and agonal gasping. Opioid agonists or agonist/antagonists in conjunction with alpha-2 adrenergic agonists may further facilitate restraint.

In certain emergency circumstances, such as euthanasia of a horse with a serious injury at a racetrack, it may be difficult to restrain a dangerous horse or other large animal for intravenous injection. The animal might cause injury to itself or to bystanders before a sedative could take effect. In such cases, the animal can be given a neuromuscular blocking agent such as succinylcholine, but the animal must be euthanatized with an appropriate technique as soon as the animal can be controlled. Succinylcholine alone or without sufficient anesthetic must not be used for euthanasia.

Physical methods, including gunshot, are considered conditionally acceptable techniques for equine euthanasia. The penetrating captive bolt is acceptable with appropriate restraint.

Animals intended for human or animal food

In euthanasia of animals intended for human or animal food, chemical agents that result in tissue residues cannot be used, unless they are approved by the US Food and Drug Administration.[179] Carbon dioxide is the only chemical currently used for euthanasia of food animals (primarily swine) that does not result in tissue residues. Physical techniques are commonly used for this reason. Carcasses of animals euthanatized by barbituric acid derivatives or other chemical agents may contain potentially harmful residues. These carcasses should be disposed of in a manner that will prevent them from being consumed by human beings or animals.

Selection of a proper euthanasia technique for free-ranging wildlife must take into account the possibility of consumption of the carcass of the euthanatized animal by nontarget predatory or scavenger species. Numerous cases of toxicosis and death attributable to ingestion of pharmaceutically contaminated carcasses in predators and scavengers have been reported.[107] Proper carcass disposal must be a part of any euthanasia procedure under free-range conditions where there is potential for consumption toxicity. When carcasses are to be left in the field, a gunshot to the head, penetrating captive bolt, or injectable agents that are nontoxic (potassium chloride in combination with a nontoxic general anesthetic) should be used so that the potential for scavenger or predator toxicity is lessened.

Euthanasia of nonconventional species: zoo, wild, aquatic, and ectothermic animals

Compared with objective information on companion, farm, and laboratory animals, euthanasia of species such as zoo, wild, aquatic, and ectothermic animals has been studied less, and guidelines are more limited. Irrespective of the unique or unusual features of some species, whenever it becomes necessary to euthanatize an animal, death must be induced as painlessly and quickly as possible.

When selecting a means of euthanasia for these species, factors and criteria in addition to those previously discussed must be considered. The means selected will depend on the species, size, safety aspects, location of the animals to be euthanatized, and experience of personnel. Whether the animal to be euthanatized is in the wild, in captivity, or free-roaming are major considerations. Anatomic differences must be considered. For example, amphibians, fish, reptiles, and marine mammals differ anatomically from domestic species. Veins may be difficult to locate. Some species have a carapace or other defensive anatomic adaptations (eg, quills, scales, spines). For physical methods, access to the central nervous system may be difficult because the brain may be small and difficult to locate by inexperienced persons.

Zoo Animals

For captive zoo mammals and birds with related domestic counterparts, many of the means described previously are appropriate. However, to minimize injury to persons or animals, additional precautions such as handling and physical or chemical restraint are important considerations.[16]

Wildlife

For wild and feral animals, many recommended means of euthanasia for captive animals are not feasible. The panel recognizes there are situations involving free-ranging wildlife when euthanasia is not possible from the animal or human safety standpoint, and killing may be necessary. Conditions found in the field, although more challenging than those that are controlled, do not in any way reduce or minimize the ethical obligation of the responsible individual to reduce pain and distress to the greatest extent possible during the taking of an animal's life. Because euthanasia of wildlife is often performed by lay personnel in remote settings, guidelines are needed to assist veterinarians, wildlife biologists, and wildlife health professionals in developing humane protocols for euthanasia of wildlife.

In the case of free-ranging wildlife, personnel may not be trained in the proper use of remote anesthesia, proper delivery equipment may not be available, personnel may be working alone in remote areas where accidental exposure to potent anesthetic medications used in wildlife capture would present a risk to human safety, or approaching the animal within a practical darting distance may not be possible. In these cases, the only practical means of animal collection may be gunshot and kill trapping.[13,180-184] Under these conditions, specific methods chosen must be as age-, species-, or taxonomic/class-specific as possible. The firearm and ammunition should be appropriate for the species and purpose. Personnel should be sufficiently skilled to be accurate, and they should be experienced in the proper and safe use of firearms, complying with laws and regulations governing their possession and use.

Behavioral responses of wildlife or captive nontraditional species (zoo) in close human contact are very different from those of domestic animals. These animals are usually frightened and distressed. Thus, minimizing the amount, degree, and/or cognition of human contact during procedures that require handling is of utmost importance. Handling these animals often requires general anesthesia, which provides loss of consciousness and which relieves distress, anxiety, apprehension, and perception of pain. Even though the animal is under general anesthesia, minimizing auditory, visual, and tactile stimulation will help ensure the most stress-free euthanasia possible. With use of general anesthesia, there are more methods for euthanasia available.

A 2-stage euthanasia process involving general anesthesia, tranquilization, or use of analgesics, followed by intravenous injectable pharmaceuticals, although preferred, is often not practical. Injectable anesthetics are not always legally or readily available to those working in nuisance animal control, and the distress to the animal induced by live capture, transport to a veterinary facility, and confinement in a veterinary hospital prior to euthanasia must be considered in choosing the most humane technique for the situation at hand. Veterinarians providing support to those working with injured or live-trapped, free-ranging animals should take capture, transport, handling distress, and possible carcass consumption into consideration when asked to assist with euthanasia. Alternatives to 2-stage euthanasia using anesthesia include a squeeze cage with intraperitoneal injection of sodium pentobarbital, inhalant agents (CO_2 chamber, CO chamber), and gunshot. In cases where preeuthanasia anesthetics are not available, intraperitoneal injections of sodium pentobarbital, although slower in producing loss of consciousness, should be considered preferable over intravenous injection, if restraint will cause increased distress to the animal or danger to the operator.

Wildlife species may be encountered under a variety of situations. Euthanasia of the same species under different conditions may require different techniques. Even in a controlled setting, an extremely fractious large animal may threaten the safety of the practitioner, bystanders, and itself. When safety is in question and the fractious large animal, whether wild, feral, or domestic, is in close confinement, neuromuscular blocking agents may be used immediately prior to the use of an acceptable form of euthanasia. For this technique to be humane, the operator must ensure they will gain control over the animal and perform euthanasia before distress develops. Succinylcholine is not acceptable as a method of restraint for use in free-ranging wildlife because animals may not be retrieved rapidly enough to prevent neuromuscular blocking agent-induced respiratory distress or arrest.[185]

Diseased, Injured, or Live-Captured Wildlife or Feral Species

Euthanasia of diseased, injured, or live-trapped wildlife should be performed by qualified professionals. Certain cases of wildlife injury (eg, acute, severe trauma from automobiles) may require immediate action, and pain and suffering in the animal may be best relieved most rapidly by physical methods including gunshot or penetrating captive bolt followed by exsanguination.

Birds

Many techniques discussed previously in this report are suitable for euthanasia of captive birds accustomed to human contact. Free-ranging birds may be collected by a number of methods, including nets and live traps, with subsequent euthanasia. For collection by firearm, shotguns are recommended. The bird should be killed outright by use of ammunition loads appropriate for the species to be collected. Wounded birds should be killed quickly by appropriate techniques previously described. Large birds should be anesthetized prior to euthanasia, using general anesthetics.

Amphibians, Fish, and Reptiles

Euthanasia of ectothermic animals must take into account differences in their metabolism, respiration, and tolerance to cerebral hypoxia. In addition, it is often more difficult to ascertain when an animal is dead. Some unique aspects of euthanasia of amphibians, fishes, and reptiles have been described.[13,51,186,187]

Injectable agents—Sodium pentobarbital (60 to 100 mg/kg of body weight) can be administered intravenously, intraabdominally, or intrapleuroperitoneally in most ectothermic animals, depending on anatomic features. Subcutaneous lymph spaces may also be used in frogs and toads. Time to effect may be variable, with death occurring in up to 30 minutes.[1,187,188] Barbiturates other than pentobarbital can cause pain on injection.[189]

Clove oil—Because adequate and appropriate clinical trials have not been performed on fish to evaluate its effects, use of clove oil is not acceptable.

External or topical agents—Tricaine methane sulfonate (TMS, MS-222) may be administered by various routes to euthanatize. For fish and amphibians, this chemical may be placed in water.[190-193] Large fish may be removed from the water, a gill cover lifted, and a concentrated solution from a syringe flushed over the gills. MS 222 is acidic and in concentrations ≥ 500 mg/L should be buffered with sodium bicarbonate to saturation resulting in a solution pH of 7.0 to 7.5.[105] MS 222 may also be injected into lymph spaces and pleuroperitoneal cavities.[194] These are effective but expensive means of euthanasia.

Benzocaine hydrochloride, a compound similar to TMS, may be used as a bath or in a recirculation system for euthanasia of fish[184] or amphibians.[13] Benzocaine is not water soluble and therefore is prepared as a stock solution (100 g/L), using acetone or ethanol, which may be irritating to fish tissues. In contrast, benzocaine hydrochloride is water soluble and can be used directly for anesthesia or euthanasia.[105] A concentration ≥ 250 mg/L can be used for euthanasia. Fish should be left in the solution for at least 10 minutes following cessation of opercular movement.[104]

The anesthetic agent 2-phenoxyethanol is used at concentrations of 0.5 to 0.6 ml/L or 0.3 to 0.4 mg/L for euthanasia of fish. Death is caused by respiratory collapse. As with other agents, fish should be left in solution for 10 minutes following cessation of opercular movement.[195,196]

Inhalant agents—Many reptiles and amphibians, including chelonians, are capable of holding their breath and converting to anaerobic metabolism, and can survive long periods of anoxia (up to 27 hours for some species).[197-202] Because of this ability to tolerate anoxia, induction of anesthesia and time to loss of consciousness may be greatly prolonged when inhalants are used. Death in these species may not occur even after prolonged inhalant exposure.[203] Lizards, snakes, and fish do not hold their breath to the same extent and can be euthanatized by use of inhalant agents.

Carbon dioxide—Amphibians,[1] reptiles,[1] and fish[203-205] may be euthanatized with CO_2. Loss of consciousness develops rapidly, but exposure times required for euthanasia are prolonged. This technique is more effective in active species and those with less tendency to hold their breath.

Physical methods—Line drawings of the head of various amphibians and reptiles, with recommended locations for captive bolt or firearm penetration, are available.[13] Crocodilians and other large reptiles can also be shot through the brain.[51]

Decapitation with heavy shears or a guillotine is effective for some species that have appropriate anatomic features. It has been assumed that stopping blood supply to the brain by decapitation causes rapid loss of consciousness. Because the central nervous system of reptiles, fish, and amphibians is tolerant to hypoxic and hypotensive conditions,[13] decapitation must be followed by pithing.[188]

Two-stage euthanasia procedures—Propofol and ultrashort-acting barbiturates may be used for these species to produce rapid general anesthesia prior to final administration of euthanasia.

In zoos and clinical settings, neuromuscular blocking agents are considered acceptable for restraint of reptiles if given immediately prior to administration of a euthanatizing agent.

Most amphibians, fishes, and reptiles can be euthanatized by cranial concussion (stunning) followed by decapitation, pithing, or some other physical method.

Severing the spinal cord behind the head by pithing is an effective method of killing some ectotherms. Death may not be immediate unless both the brain and spinal cord are pithed. For these animals, pithing of the spinal cord should be followed by decapitation and pithing of the brain or by another appropriate procedure. Pithing requires dexterity and skill and should only be done by trained personnel. The pithing site in frogs is the foramen magnum, and it is identified by a slight midline skin depression posterior to the eyes with the neck flexed.[187]

Cooling—It has been suggested that, when using physical methods of euthanasia in ectothermic species, cooling to 4 C will decrease metabolism and facilitate handling, but there is no evidence that whole body cooling reduces pain or is clinically efficacious.[206] Local cooling in frogs does reduce nociception, and this may be partly opioid mediated. [207] Immobilization of reptiles by cooling is considered inappropriate and inhumane even if combined with other physical or chemical methods of euthanasia. Snakes and turtles, immobilized by cooling, have been killed by subsequent freezing. This method is not recommended.[13] Formation of ice crystals on the skin and in tissues of an animal may cause pain or distress. Quick freezing of deeply anesthetized animals is acceptable.[208]

Marine Mammals

Barbiturates or potent opioids (eg, etorphine hydrochloride [M 99] and carfentanil) are the agents of choice for euthanasia of marine mammals,[209] although it is recognized their use is not always possible and can

be potentially dangerous to personnel. An accurately placed gunshot may also be a conditionally acceptable method of euthanasia for some species and sizes of stranded marine mammals.[51,209,210]

For stranded whales or other large cetaceans or pinnipeds, succinylcholine chloride in conjunction with potassium chloride, administered intravenously or intraperitoneally, has been used.[211] This method, which is not an acceptable method of euthanasia as defined in this report, leads to complete paralysis of the respiratory musculature and eventual death attributable to hypoxemia.[209] This method may be more humane than allowing the stranded animal to suffocate over a period of hours or days if no other options are available.

Euthanasia of animals raised for fur production

Animals raised for fur are usually euthanatized individually at the location where they are raised. Although any handling of these species constitutes a stress, it is possible to minimize this by euthanatizing animals in or near their cages. For the procedures described below, please refer to previous sections for more detailed discussion.

Carbon monoxide—For smaller species, CO appears to be an adequate method for euthanasia. Compressed CO is delivered from a tank into an enclosed cage that can be moved adjacent to holding cages. Using the apparatus outside reduces the risk to humans; however, people using this method should still be made aware of the dangers of CO. Animals introduced into a chamber containing 4% CO lost consciousness in 64 ± 14 seconds and were dead within 215 ± 45 seconds.[80] In a study involving electroencephalography of mink being euthanatized with 3.5% CO, the mink were comatose in 21 ± 7 seconds.[212] Only 1 animal should be introduced into the chamber at a time, and death should be confirmed in each case.

Carbon dioxide—Administration of CO_2 is also a good euthanasia method for smaller species and is less dangerous than CO for personnel operating the system. When exposed to 100% CO_2, mink lost consciousness in 19 ± 4 seconds and were dead within 153 ± 10 seconds. When 70% CO_2 was used with 30% O_2, mink were unconscious in 28 seconds, but they were not dead after a 15-minute exposure.[80] Therefore, if animals are first stunned by 70% CO_2, they should be killed by exposure to 100% CO_2 or by some other means. As with carbon monoxide, only one animal should be introduced into the chamber at a time.

Barbiturates—Barbiturate overdose is an acceptable procedure for euthanasia of many species of animals raised for fur. The drug is injected intraperitoneally and the animal slowly loses consciousness. It is important that the death of each animal be confirmed following barbiturate injection. Barbiturates will contaminate the carcass; therefore the skinned carcass cannot be used for animal food.

Electrocution—Electrocution has been used for killing foxes and mink.[135] The electric current must pass through the brain to induce loss of consciousness before electricity is passed through the rest of the body. Electrical stunning should be followed by euthanasia, using some other technique. Cervical dislocation has been used in mink and other small animals and should be done within 20 seconds of electrical stunning.[213] Use of a nose-to-tail or nose-to-foot method[135] alone may kill the animal by inducing cardiac fibrillation, but the animal may be conscious for a period of time before death. Therefore, these techniques are unacceptable.

Prenatal and neonatal euthanasia

When ovarian hysterectomies are performed, euthanasia of feti should be accomplished as soon as possible after removal from the dam. Neonatal animals are relatively resistant to hypoxia.[44,214]

Mass euthanasia

Under unusual conditions, such as disease eradication and natural disasters, euthanasia options may be limited. In these situations, the most appropriate technique that minimizes human and animal health concerns must be used. These options include, but are not limited to, CO_2 and physical methods such as gunshot, penetrating captive bolt, and cervical dislocation.

POSTFACE

This report summarizes contemporary scientific knowledge on euthanasia in animals and calls attention to the lack of scientific reports assessing pain, discomfort, and distress in animals being euthanatized. Many reports on various methods of euthanasia are either anecdotal, testimonial narratives, or unsubstantiated opinions and are, therefore, not cited in this report. The panel strongly endorses the need for well-designed experiments to more fully determine the extent to which each procedure meets the criteria used for judging methods of euthanasia.

Each means of euthanasia has advantages and disadvantages. It is unlikely that, for each situation, any means will meet all desirable criteria. It is also impractical for this report to address every potential circumstance in which animals are to be euthanatized. Therefore, the use of professional judgment is imperative.

Failure to list or recommend a means of euthanasia in this report does not categorically condemn its use. There may occasionally be special circumstances or situations in which other means may be acceptable. For research animals, these exceptions should be carefully considered by the attending veterinarian and the Institutional Animal Care and Use Committee. In other settings, professional judgment should be used.

The panel discourages the use of unapproved products for euthanasia, unless the product has a clearly understood mechanism of action and pharmacokinetics, and studies published in the literature that scientifically verify and justify its use. Those responsible for euthanasia decisions have a critically important responsibility to carefully assess any new technique, method, or device, using the panel's criteria. In the absence of definitive proof or reasonable expectation, the best interest of the animal should guide the decision process.

References cited in this report do not represent a comprehensive bibliography on all methods of euthanasia. Persons interested in additional information on a particular aspect of animal euthanasia are encouraged to contact the Animal Welfare Information Center, National Agricultural Library, 10301 Baltimore Blvd, Beltsville, MD 20705.

The Panel on Euthanasia is fully committed to the concept that, whenever it becomes necessary to kill any animal for any reason whatsoever, death should be induced as painlessly and quickly as possible. It has been our charge to develop workable guidelines for veterinarians needing to address this problem, and it is our sincere desire that these guidelines be used conscientiously by all animal care providers. We consider this report to be a work in progress with new editions warranted as results of more scientific studies are published.

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References

1. Andrews EJ, Bennet BT, Clark JD, et al. 1993 Report on the AVMA panel on euthanasia. *J Am Vet Med Assoc* 1993;202:230–247.

2. *Webster's ninth new collegiate dictionary*. Springfield: Merriam-Webster Inc, 1990.

3. Wall PD. Defining pain in animals. In: Short CE, Poznak AV, eds. *Animal pain*. New York: Churchill-Livingstone Inc, 1992;63–79.

4. Vierck CJ, Cooper BY, Ritz LA, et al. Inference of pain sensitivity from complex behaviors of laboratory animals. In: Chapman CR, Loeser JD, eds. *Issues in pain measurement*. New York: Raven Press, 1989;93–115.

5. Breazile JE, Kitchell RL. Euthanasia for laboratory animals. *Fed Proc* 1969;28:1577–1579.

6. Zimmerman M. Neurobiological concepts of pain, its assessment and therapy. In: Bromm B, ed. *Pain measurement in man: neurophysiological correlates of pain*. Amsterdam: Elsevier Publishing Co, 1984;15–35.

7. Kitchell RL, Erickson NH, Carstens E, et al, eds. *Animal pain: perception and alleviation*. Bethesda: American Physiological Society, 1983.

8. Kitchen N, Aronson AL, Bittle JL, et al. Panel report on the colloquium on recognition and alleviation of animal pain and distress. *J Am Vet Med Assoc* 1987;191:1186–1191.

9. National Research Council. *Recognition and alleviation of pain and distress in laboratory animals*. Washington, DC: National Academy Press, 1992.

10. Breazile JE. Physiologic basis and consequences of distress in animals. *J Am Vet Med Assoc* 1987;191:1212–1215.

11. McMillan FD. Comfort as the primary goal in veterinary medical practice. *J Am Vet Med Assoc* 1998;212:1370–1374.

12. Grier RL, Clovin TL. *Euthanasia guide (for animal shelters)*. Ames, Iowa: Moss Creek Publications, 1990.

13. Cooper JE, Ewbank R, Platt C, et al. *Euthanasia of amphibians and reptiles*. London: UFAW/WSPA, 1989.

14. Greyhavens T. *Handbook of pentobarbital euthanasia*. Salem, Ore: Humane Society of Willamette Valley, 1989;1–126.

15. *Operational guide for animal care and control agencies*. Denver: American Humane Association, 1988.

16. Fowler ME, Miller RE, eds. *Zoo and wild animal medicine: current therapy 4*. Philadelphia: WB Saunders Co, 1999;1–747.

17. Clark R, Jessup DA. *Wildlife restraint series*. Salinas, Calif: International Wildlife Veterinary Services Inc, 1992.

18. Kreeger T. *Handbook of wildlife chemical immobilization*. Laramie, Wyo: Wildlife Veterinary Services Inc, 1996.

19. Nielsen L. *Chemical immobilization of wild and exotic animals*. Ames, Iowa: Iowa State University Press, 1999.

20. McKenzie A, ed. *The capture and care manual*. South Africa: Wildlife Decision Support Services/The South African Veterinary Foundation, 1993.

21. Amass K, Neilsen L, Brunson D. *Chemical immobilization of animals*. Mount Horeb, Wis: Safe-Capture International Inc, 1999.

22. Humane slaughter regulations. *Fed Reg* 1979;44: 68809–68817.

23. Grandin T. Observations of cattle behavior applied to design of cattle-handling facilities. *Appl Anim Ethol* 1980;6:19–31.

24. Grandin T. Pig behavior studies applied to slaughter-plant design. *Appl Anim Ethol* 1982;9:141–151.

25. Grandin T. Farm animal welfare during handling, transport, and slaughter. *J Am Vet Med Assoc* 1994;204:372–377.

26. Grandin T. Objective scoring of animal handling and stunning practices at slaughter plants. *J Am Vet Med Assoc* 1998;212: 36–39.

27. Grandin T. Effect of animal welfare audits of slaughter plants by a major fast food company on cattle handling and slaughter practices. *J Am Vet Med Assoc* 2000;216:848–851.

28. Tannenbaum J. Issues in companion animal practice. In: *Veterinary ethics*. Baltimore: The Williams & Wilkins Co, 1989;208–225.

29. Rollin BE. Ethical question of the month. *Can Vet J* 1992;33:7–8.

30. Ramsey EC, Wetzel RW. Comparison of five regimens for oral administration of medication to induce sedation in dogs prior to euthanasia. *J Am Vet Med Assoc* 1998;213:240–242.

31. Wetzel RW, Ramsay EC. Comparison of four regimens for oral administration of medication to induce sedation in cats prior to euthanasia. *J Am Vet Med Assoc* 1998;213:243–245.

32. Beaver BV. *Feline behavior: a guide for veterinarians*. Philadelphia: WB Saunders Co, 1992;1–276.

33. Houpt KA. *Domestic animal behavior for veterinarians and animal scientists*. 3rd ed. Ames, Iowa: Iowa State University Press, 1998;1–495.

34. Hart BL. *The behavior of domestic animals*. New York: WH Freeman & Co, 1985;1–390.

35. Beaver BV. *Canine behavior: a guide for veterinarians*. Philadelphia: WB Saunders Co, 1999;1–355.

36. Beaver BV. *The veterinarian's encyclopedia of animal behavior*. Ames, Iowa: Iowa State University Press, 1994;1–307.

37. Schafer M. *The language of the horse: habits and forms of expression*. New York: Arco Publishing Co, 1975;1–187.

38. Hart LA, Hart BL, Mader B. Humane euthanasia and companion animal death: caring for the animal, the client, and the veterinarian. *J Am Vet Med Assoc* 1990;197:1292–1299.

39. Neiburg HA, Fischer A. *Pet loss, a thoughtful guide for adults and children*. New York: Harper & Row, 1982.

40. Hart LA, Mader B. Pet loss support hotline: the veterinary students' perspective. *Calif Vet* 1992;Jan-Feb:19–22.

41. Pet loss support hotlines (grief counseling). *J Am Vet Med Assoc* 1999;215:1804.

42. Arluke A. Coping with euthanasia: a case study of shelter culture. *J Am Vet Med Assoc* 1991;198:1176–1180.

43. Wolfle TL. Laboratory animal technicians: their role in stress reduction and human-companion animal bonding. *Vet Clin North Am Small Anim Pract* 1985;15:449–454.

44. Glass HG, Snyder FF, Webster E. The rate of decline in resistance to anoxia of rabbits, dogs, and guinea pigs from the onset of viability to adult life. *Am J Physiol* 1944;140:609–615.

45. Booth NH. Inhalant anesthetics. In: Booth NH, McDonald LE, eds. *Veterinary pharmacology and therapeutics*. 6th ed. Ames, Iowa: Iowa State University Press, 1988;181–211.

46. Wixon SK, Smiler KL. Anesthesia and analgesia in rodents. In: Kohn DF, Wixson SK, White WJ, et al, eds. *Anesthesia and analgesia in laboratory animals*. New York: Academic Press Inc, 1997;165–203.

47. Knigge U, Soe-Jensen P, Jorgensen H, et al. Stress-induced release of anterior pituitary hormones: effect of H3 receptor-mediat-

ed inhibition of histaminergic activity or posterior hypothalamic lesion. *Neuroendocrin* 1999;69:44–53.

48. Tinnikov AA. Responses of serum conticosterone and corticosteroid-binding globulin to acute and prolonged stress in the rat. *Endocrine* 1999;11:145–150.

49. Zelena D, Klem DT, Barna I, et al. Alpha 2-adrenoreceptor subtypes regulate ACTH and beta-endorphon secretions during stress in the rat. *Psychoneuroendocrin* 1999;24:333–343.

50. Van Herck H, Baumans V, DeBoer SF, et al. Endocrine stress response in rats subjected to singular orbital puncture while under diethyl-ether anaesthesia. *Lab Anim* 1991;25:325–329.

51. *Humane killing of animals*. Preprint of 4th ed. South Mimms, Potters Bar, Herts, England: Universities Federation for Animal Welfare, 1988;16–22.

52. *Occupational exposure to waste anesthetic gases and vapors*. No. 77-140. Washington, DC: Department of Health, Education, and Welfare (National Institute for Occupational Safety and Health), 1977.

53. Lecky JH, ed. *Waste anesthetic gases in operating room air: a suggested program to reduce personnel exposure*. Park Ridge, Ill: The American Society of Anesthesiologists, 1983.

54. Simonsen HB, Thordal-Christensen AA, Ockens N. Carbon monoxide and carbon dioxide euthanasia of cats: duration and animal behavior. *Br Vet J* 1981;137:274–278.

55. Klemm WR. Carbon dioxide anesthesia in cats. *Am J Vet Res* 1964;25:1201–1205.

56. Leake CD, Waters RM. The anesthetic properties of carbon dioxide. *Curr Res Anesthesiol Analg* 1929;8:17–19.

57. Mattsson JL, Stinson JM, Clark CS. Electroencephalographic power—spectral changes coincident with onset of carbon dioxide narcosis in rhesus monkey. *Am J Vet Res* 1972;33:2043–2049.

58. Woodbury DM, Rollins LT, Gardner MD, et al. Effects of carbon dioxide on brain excitability and electrolytes. *Am J Physiol* 1958;192:79–90.

59. Glen JB, Scott WN. Carbon dioxide euthanasia of cats. *Br Vet J* 1973;129:471–479.

60. Blackmore DK, Newhook JC. The assessment of insensibility in sheep, calves and pigs during slaughter. In: Eikelenboom G, ed. *Stunning of animals for slaughter*. Boston: Martinus Nijhoff Publishers, 1983;13–25.

61. Coenen AML, Drinkenburg WHIM, Hoenderken R, et al. Carbon dioxide euthanasia in rats: oxygen supplementation minimizes signs of agitation and asphyxia. *Lab Anim* 1995;29:262–268.

62. Kohler I, Meier R, Busato A, et al. Is carbon dioxide (CO_2) a useful short acting anaesthetic for small laboratory animals? *Lab Anim* 1998;33:155–161.

63. Hoenderken R. Electrical and carbondioxide stunning of pigs for slaughter. In: Eikelenboom G, ed. *Stunning of animals for slaughter*. Boston: Martinus Nijhoff Publishers, 1983;59–63.

64. Gregory NG, Moss BW, Leeson RH. An assessment of carbon dioxide stunning in pigs. *Vet Rec* 1987;121:517–518.

65. Carding AH. Mass euthanasia of dogs with carbon monoxide and/or carbon dioxide: preliminary trials. *J Small Anim Pract* 1968;9:245–259.

66. Britt DP. The humaneness of carbon dioxide as an agent of euthanasia for laboratory rodents. In: *Euthanasia of unwanted, injured or diseased animals for educational or scientific purposes*. Potters Bar, UK: UFAW, 1987;19–31.

67. Danneman PJ, Stein S, Walshaw SO. Humane and practical implications of using carbon dioxide mixed with oxygen for anesthesia or euthanasia of rats. *Lab Anim Sci* 1997;47:376–385.

68. Anton F, Euchner I, Handwerker HO. Psycophysical examination of pain induced by defined CO_2 pulses applied to nasal mucosa. *Pain* 1992;49:53–60.

69. Raj ABM, Gregory NG. Welfare implications of gas stunning pigs 1. Determination of aversion to the initial inhalation of carbon dioxide or argon. *Anim Welfare* 1995;4:273–280.

70. Hackbarth H, Kppers N, Bohnet W. Euthanasia of rats with carbon dioxide-animal welfare aspects. *Lab Anim* 2000;34:91–96.

71. Raj ABM, Gregory NG. Investigation into the batch stunning/killing of chickens using carbon dioxide or argon-induced hypoxia. *Res Vet Sci* 1990;49:364–366.

72. Hughes HC. Euthanasia of laboratory animals. In: Melby EC, Altman NH, eds. *Handbook of laboratory animal science*. Vol 3. Cleveland, Ohio: CRC Press, 1976;553–559.

73. Jaksch W. Euthanasia of day-old male chicks in the poultry industry. *Int J Stud Anim Prob* 1981;2:203–213.

74. Kline BE, Peckham V, Hesic HE. Some aids in handling large numbers of mice. *Lab Anim Care* 1963;13:84–90.

75. Kocula AW, Drewniak EE, Davis LL. Experimentation with in-line carbon dioxide immobilization of chickens prior to slaughter. *Poult Sci* 1961;40:213–216.

76. Stone WS, Amiraian K, DueIl C, et al. Carbon dioxide anesthetization of guinea pigs to increase yields of blood and serum. *Proc Care Panel* 1961;11:299–303.

77. Euthanasia (carbon dioxide). In: *Report and accounts 1976-1977*. South Mimms, Potters Bar, Herts, England: Universities Federation for Animal Welfare, 1977;13–14.

78. Hall LW. The anaesthesia and euthanasia of neonatal and juvenile dogs and cats. *Vet Rec* 1972;90:303–306.

79. Blackshaw JK, Fenwick DC, Beattie AW, et al. The behaviour of chickens, mice and rats during euthanasia with chloroform, carbon dioxide and ether. *Lab Anim* 1988;22:67–75.

80. Hansen NE, Creutzberg A. Simonsen HB. Euthanasia of mink (*Mustela vison*) by means of carbon dioxide (CO_2), carbon monoxide (CO) and nitrogen (N_2). *Br Vet J* 1991;147:140–146.

81. Hayward JS, Lisson PA. Carbon dioxide tolerance of rabbits and its relation to burrow fumigation. *Aust Wildl Res* 1978;5:253–261.

82. Bereger-Sweeney J, Berger UV, Sharma M, et al. Effects of carbon dioxide-induced anesthesia on cholinergic parameters in rat brain. *Lab Anim Sci* 1994;44:369–371.

83. Urbanski HF, Kelly SF. Sedation by exposure to gaseous carbon dioxide-oxygen mixture: application to studies involving small laboratory animal species. *Lab Anim Sci* 1991;41:80–82.

84. Iwarsson K, Rehbinder C. A study of different euthanasia techniques in guinea pigs, rats, and mice. Animal response and postmortem findings. *Scand J Lab Anim Sci* 1993;20:191–205.

85. Hornett TD, Haynes AP. Comparison of carbon dioxide/air mixture and nitrogen/air mixture for the euthanasia of rodents: design of a system for inhalation euthanasia. *Anim Technol* 1984;35: 93–99.

86. Smith W, Harrap SB. Behavioral and cardiovascular responses of rats to euthanasia using carbon dioxide gas. *Lab Anim* 1997; 31:337–346.

87. Hewett TA, Kovacs MS, Artwohl JE, et al. A comparison of euthanasia methods in rats, using carbon dioxide in prefilled and fixed flow rate filled chambers. *Lab Anim Sci* 1993;43:579–582.

88. Herin RA, Hall P, Fitch JW. Nitrogen inhalation as a method of euthanasia in dogs. *Am J Vet Res* 1978;39:989–991.

89. Noell WK, Chinn HI. Time course of failure of the visual pathway in rabbits during anoxia. *Fed Proc* 1949;8:119.

90. Vinte FJ. *The humane killing of mink*. London: Universities Federation for Animal Welfare, 1957.

91. Stonehouse RW, Loew FM, Quine JP, et al. The euthanasia of dogs and cats: a statement of the humane practices committee of the Canadian Veterinary Medical Association. *Can Vet J* 1978;19: 164–168.

92. Quine JP, Buckingham W, Strunin L. Euthanasia of small animals with nitrogen; comparison with intravenous pentobarbital. *Can Vet J* 1988;29:724–726.

93. Raj ARM, Gregory NG, Wotton SR. Changes in the somatosensory evoked potentials and spontaneous electroencephalogram of hens during stunning in Argon-induced anoxia. *Br Vet J* 1991;147:322–330.

94. Ramsey TL, Eilmann HJ. Carbon monoxide acute and chronic poisoning and experimental studies. *J Lab Clin Med* 1932; 17:415–427.

95. Chalifoux A, Dallaire A. Physiologic and behavioral evaluation of CO euthanasia of adult dogs. *Am J Vet Res* 1983;44: 2412–2417.

96. Haldane J. The action of carbonic oxide in man. *J Physiol* 1895;18:430–462.

97. Dallaire A, Chalifoux A. Premedication of dogs with acepromazine or pentazocine before euthanasia with carbon monoxide. *Can J Comp Med* 1985;49:171–178.

98. Lambooy E, Spanjaard W. Euthanasia of young pigs with carbon monoxide. *Vet Rec* 1980;107:59–61.

99. Lowe-Ponsford FL, Henry JA. Clinical aspects of carbon monoxide poisoning. *Adverse Drug React Acute Poisoning Rev* 1989;8:217–240.

100. Bloom JD. Some considerations in establishing divers' breathing gas purity standards for carbon monoxide. *Aerosp Med* 1972;43:633–636.

101. Norman CA, Halton DM. Is carbon monoxide a workplace teratogen? A review and evaluation of the literature. *Ann Occup Hyg* 1990;34:335–347.

102. Eechter LD. Neurotoxicity of prenatal carbon monoxide exposure. Research report. *Health Effects Inst* 1987;Vol:3–22.

103. Wojtczak-Jaroszowa J, Kubow S. Carbon monoxide, carbon disulfide, lead and cadmium—four examples of occupational toxic agents linked to cardiovascular disease. *Med Hypotheses* 1989;30: 141–150.

104. Noga E. *Fish disease: diagnosis and treatment*. St. Louis: CV Mosby, 1996;1–367.

105. Stoskopf MK. Anaesthesia. In: Brown LA, ed. *Aquaculture for veterinarians: fish husbandry and medicine*. Oxford, UK: Pergamon Press, 1993;161–167.

106. Lumb W. Euthanasia by noninhalant pharmacologic agents. *J Am Vet Med Assoc* 1974;165:851–852.

107. Barbiturates. In: Ciganovich E, ed. *Field manual of wildlife diseases*. US Department of the Interior/US Geological Survey, Biological Resources Division, Information and Technical Report 1999-2001.

108. Dennis MB, Dong WK, Weisbrod KA, et al. Use of captive bolt as a method of euthanasia in larger laboratory animal species. *Lab Anim Sci* 1988;38:459–462.

109. Blackmore DK. Energy requirements for the penetration of heads of domestic stock and the development of a multiple projectile. *Vet Rec* 1985;116:36–40.

110. Daly CC, Whittington PE. Investigation into the principal determinants of effective captive bolt stunning of sheep. *Res Vet Sci* 1989;46:406–408.

111. Clifford DH. Preanesthesia, anesthesia, analgesia, and euthanasia. In: Fox JG, Cohen BJ, Loew FM, eds. *Laboratory animal medicine*. New York: Academic Press Inc, 1984;528–563.

112. Australian Veterinary Association. Guidelines on humane slaughter and euthanasia. *Aust Vet J* 1987;64:4–7.

113. Carding T. Euthanasia of dogs and cats. *Anim Reg Stud* 1977;1:5–21.

114. Longair JA, Finley GG, Laniel M-A, et al. Guidelines for euthanasia of domestic animals by firearms. *Can Vet J* 1991;32: 724–726.

115. Finnie JW. Neuroradiological aspects of experimental traumatic missle injury in sheep. *N Z Vet J* 1994;42:54–57.

116. Blackmore DK, Madie P, Bowling MC, et al. The use of a shotgun for euthanasia of stranded cetaceans. *N Z Vet J* 1995; 43:158–159.

117. Blackmore DK, Bowling MC, Madie, P, et al. The use of a shotgun for emergency slaughter or euthanasia of large mature pigs. *N Z Vet J* 1995;43:134–137.

118. Denicola AJ. Non-traditional techniques for management of overabundant deer populations. *Wildl Soc Bull* 1997;25:496–499.

119. McAninch JB, ed. Urban deer: a manageable resource? in *Proceedings.* Symp 55th Midwest Fish Wildl Conf 1993;1–175.

120. Finnie JW. Traumatic head injury in ruminant livestock. *Aust Vet J* 1997;75:204–208.

121. Blackmore DK, Daly CC, Cook CJ. Electroencephalographic studies on the nape shooting of sheep. *N Z Vet J* 1995;43:160–163.

122. *On-farm euthanasia of swine—options for the producer*. Perry, Iowa: American Association of Swine Practitioners and Des Moines, Iowa: National Pork Producers, 1997.

123. *Practical euthanasia of cattle: considerations for the producer, livestock market operator, livestock transporter, and veterinarian*. Rome, Ga: American Association of Bovine Practitioners, 1999.

124. *The emergency euthanasia of horses*. Sacramento: California Department of Food and Agriculture and Davis, Calif: University of California's Veterinary Medical Extension, 1999.

125. *The emergency euthanasia of sheep and goats*. Sacramento: California Department of Food and Agriculture and Davis, Calif: University of California's Veterinary Medical Extension, 1999.

126. Gregory NG, Wotton SB. Comparison of neck dislocation and percussion of the head on visual evoked responses in the chicken's brain. *Vet Rec* 1990;126:570–572.

127. Vanderwolf CH, Buzak DP, Cain RK, et al. Neocortical and hippocampal electrical activity following decapitation in the rat. *Brain Res* 1988;451:340–344.

128. Derr RF. Pain perception in decapitated rat brain. *Life Sci* 1991;49:1399–1402.

129. Holson RR. Euthanasia by decapitation: evidence that this technique produces prompt, painless unconsciousness in laboratory rodents. *Neurotoxicol Teratol* 1992;14:253–257.

130. Keller GL. Physical euthanasia methods. *Lab Anim* 1982;11:20–26.

131. Feldman DB, Gupta BN. Histopathologic changes in laboratory animals resulting from various methods of euthanasia. *Lab Anim Sci* 1976;26:218–221.

132. Mikeska JA, Klemm WR. EEG evaluation of humaneness of asphyxia and decapitation euthanasia of the laboratory rat. *Lab Anim Sci* 1975;25:175–179.

133. Warrington R. Electrical stunning, a review of the literature. *Vet Bull* 1974;44:617–628.

134. Lambooy E, van Voorst N. Electrocution of pigs with notifiable diseases. *Vet Q* 1986;8:80–82.

135. Loftsgard G, Rraathen S, Helgebostad A. Electrical stunning of mink. *Vet Rec* 1972;91:132–134.

136. Hatch RC. Euthanatizing agents. In: Booth NH and McDonald LE, eds. *Veterinary pharmacology and therapeutics*.6th ed. Ames, Iowa: Iowa State University Press, 1988;1143–1148.

137. Croft PG, Hume CW. Electric stunning of sheep. *Vet Rec* 1956;68:318–321.

138. Roberts TDM. Electrocution cabinets. *Vet Rec* 1974;95:241–242.

139. Roberts TDM. Cortical activity in electrocuted dogs. *Vet Rec* 1954;66:561–567.

140. Anil MH, McKinstry JL. Reflexes and loss of sensibility following head-to-back electrical stunning in sheep. *Vet Rec* 1991;128:106–107.

141. Stavinoha WR. Study of brain neurochemistry utilizing rapid inactivation of brain enzyme activity by heating and mirowave irradiation. In: Black CL, Stavinoha WB, Marvyama Y, eds. *Microwave irradiation as a tool to study labile metabolites in tissue*. Elmsford, NY: Pergamon Press, 1983;1–12.

142. Stavinoha WB, Frazer J, Modak AT. Microwave fixation for the study of acetylcholine metabolism. In: Jenden DJ, ed. *Cholinergic mechanisms and psychopharmacology*. New York: Plenum Publishing Corp, 1978;169–179.

143. lkarashi Y, Marvyama Y, Stavinoha WB. Study of the use of the microwave magnetic field for the rapid inactivation of brain enzymes. *Jpn J Pharmacol* 1984;35:371–387.

144. Gaunt AS, Oring LW. *Guidelines to the use of wild birds in research*. Washington DC: The Ornithological Council, 1997;1–52.

145. Federal Provincial Committee for Humane Trapping. *Final report: committee of the federal provincial wildlife conference*. Ottawa: Canadian Wildl Service, 1981;1–172.

146. *Agreement on international humane trapping standards*. The European Community, the Government of Canada, and the Government of the Russian Federation. Department of Foreign Affairs and International Trade, 1997;1–32.

147. Canadian General Standards Board. *Animal (mammal) traps—mechanically powered, trigger-activated killing traps for use on land*. No. CAN/CGSB-144.1-96. Ottawa: Canadian General Standards Board, 1996;1–36.

148. Nolan JW, Barrett MW. *Description and operation of the humane trapping research facility at the Alberta Environmental Centre, AECV90-R3*. Vegreville, AB: Alberta Environmental Centre, 1990.

149. *Animal (mammal) traps-part 4: methods for testing killing trap systems used on land or underwater, TC 191, ISO/DIS 10990-4E*. International Standardization Organization, 2000;1–15.

150. Gilbert FF. Assessment of furbearer response to trapping devices. In: Chapman JA, Pursley D, eds. *Worldwide furbearer conference proceedings*. Frostburg, Md: 1981;1599–1611.

151. Proulx G, Barrett MW. Evaluation of the Bionic Trap to quickly kill mink (*Mustela vison*) in simulated natural environments. *J Wildl Dis* 1991;27:276–280.

152. Proulx G, Barrett MW. Field testing of the C120 magnum trap for mink. *Wildl Soc Bull* 1993;21:421–426.

153. Hiltz M, Roy LD. Rating killing traps against humane trapping standards using computer simulations, in *Proceedings*. 19th Vertebrate Pest Conf 2000.

154. Proulx G, Barret M. Evaluation of the Bionic Trap to quickly kill fisher (*Martes pennanti*) in simulated natural environments. *J Wildl Dis* 1993;29:310–316.

155. Proulx G, Pawlina IM, Wong RK. Re-evaluation of the C120 magnum and bionic traps to humanely kill mink. *J Wildl Dis* 1993;29:184.

156. Proulx G, Barrett MW, Cook SR. The C120 Magnum with pan trigger: a humane trap for mink (*Mustela vison*). *J Wildl Dis* 1990;26:511–517.

157. Proulx G, Kolenosky AJ, Cole PJ. Assessment of the Kania trap to humanely kill red squirrels (*Tamiasciurus hudsonicus*) in enclosures. *J Wildl Dis* 1993;29:324–329.

158. Proulx G, Kolenosky AJ, Badry MJ, et al. Assessment of the Savageau 2001-8 trap to effectively kill arctic fox. *Wildl Soc Bull* 1993;21:132–135.

159. Proulx G, Kolenosky AJ, Cole PJ, et al. A humane killing trap for lynx (*Felis lynx*): the Conibear 330 with clamping bars. *J Wildl Dis* 1995;1:57–61.

160. Proulx G, Barret MW, Cook SR. The C120 Magnum: an effective kill trap for marten. *Wildl Soc Bull* 1989;17:294–298.

161. Proulx G, Cook SR, Barrett MW. Assessment and preliminary development of the rotating jaw Conibear 120 trap to effectively kill marten (*Martes americana*). *Can J Zool* 1989;67:1074–1079.

162. Naylor BJ, Novak M. Catch efficiency and selectivity of various traps and sets used for capturing American martens. *Wildl Soc Bull* 1994;22:489–496.

163. Hill EP. *Evaluation of improved traps and trapping techniques*. Alabama Department of Conservation and Natural Resources P-R Project Report W-44-5 Job IV-B:1-19.

164. King CM. The effects of two types of steel traps upon captured stoats (*Mustela erminea*). *J Zool (Lond)* 1995;553–554.

165. Cooper JE, Ewbank R, Platt C, et al. *Euthanasia of amphibians and reptiles*. London: UFAQ/WSPA, 1989.

166. Twitchell C, Roy LD, Gilbert FF, et al. Effectiveness of rotating-jaw killing traps for beaver (*Castor canadensis*), in *Proceedings*. North Am Aquatic Furbearer Symp 1999.

167. Warburton B, Hall JV. Impact momentum and clamping force thresholds for developing standards for possum kill traps. *N Z J Zool* 1995;22:39–44.

168. Guidelines for the capture, handling, and care of mammals as approved by the American Society of Mammalogists. *J Mammal* 1998;79:1416–1431.

169. *Improving animal welfare in US trapping programs*. Washington, DC: International Association of Fish and Wildlife Agencies, 1997.

170. Blackmore DK. Differences in behaviour between sheep and cattle during slaughter. *Res Vet Sci* 1984;37:223–226.

171. Gregory NG, Wotton SB. Time to loss of brain responsiveness following exsanguination in calves. *Res Vet Sci* 1984;37:141–143.

172. Blackmore DK. Non-penetrative percussion stunning of sheep and calves. *Vet Rec* 1979;105:372–375.

173. Canadian Council on Animal Care. *Guide to the care and use of experimental animals*. Vol 1. Ottawa: Canadian Council on Animal Care, 1980.

174. Green CJ. Euthanasia. In: *Animal anaesthesia*. London: Laboratory Animals Ltd, 1979;237-241.

175. Clifford DH. Preanesthesia, anesthesia, analgesia, and euthanasia. In: Fox JG, Cohen BJ, Loew FM, eds. *Laboratory animal medicine*. Orlando: Academic Press Inc, 1984;527–562.

176. Finnie JW. Neuropathologic changes produced by non-penetrating percussive captive bolt stunning of cattle. *N Z Vet J* 1995;43: 183–185.

177. Gregory NG, Wotton SB. Effect of slaughter on spontaneous and evoked activity of the brain. *Br Poult Sci* 1986;27:195–205.

178. Eikelenboom G, ed. *Stunning of animals for slaughter*. Boston: Martinus Nijhoff Publishers, 1983;1–227.

179. Booth NH. Drug and chemical residues in the edible tissues of animals. In: Booth NH, McDonald LE, eds. *Veterinary pharmacology and therapeutics*. 6th ed. Ames, Iowa: Iowa State University Press, 1988;1149–1205.

180. Acceptable field methods in mammalogy: preliminary guidelines approved by the American Society of Mammalogists. *J Mammal* 1987;68(Suppl 4):1–18.

181. American Ornithologists' Union. Report of committee on use of wild birds in research. *Auk* 1988;105(Suppl):1A–41A.

182. American Society of Ichthyologists and Herpetologists, Herpetologist League, Society for the Study of Amphibians and Reptiles. Guidelines for the use of live amphibians and reptiles in field research. *J Herpetol* 1987;21(suppl 4):1–14.

183. American Society of Ichthyologists and Herpetologists, American Fisheries Society, American Institute of Fisheries Research Biologists. Guidelines for use of fishes in field research. *Copeia Suppl* 1987;1–12.

184. Cailliet GM. *Fishes: a field guide and laboratory manual on their structure, identification, and natural history*. Belmont, Calif: Wadsworth, 1986.

185. Schwartz JA, Warren R, Henderson D, et al. Captive and field tests of a method for immobilization and euthanasia of urban deer. *Wildl Soc Bull* 1997;25:532–541.

186. Zwart P, deVries HR, Cooper JE. The humane killing of fishes, amphibia, reptiles and birds. *Tijdsehr Diergeneeskd* 1989; 114:557–565.

187. Burns R. Considerations in the euthanasia of reptiles, fish and amphibians, in *Proceedings*. AAZV, WDA, AAWV Joint Conference 1995;243–249.

188. National Research Committee on Pain and Distress in Laboratory Animals. *Recognition of pain and distress in laboratory animals*. Washington DC: National Academy Press, 1992.

189. Heard DJ. Principles and techniques of anesthesia and analgesia for exotic practice. *Vet Clin North Am Small Anim Pract* 1993;23:1301–1327.

190. Canadian Council on Animal Care. *Guide to the use and care of experimental animals*. Vol 2. Ottawa: Association of Universities and Colleges of Canada, 1984;1–16.

191. Harrell L. Handling euthanasia in production facilities. In: Schaeffer DO, Kleinow KM, Krulisch L, eds. *The care and use of amphibians, reptiles and fish in research*. Bethesda, Md: Scientists Center for Animal Welfare, 1992;129.

192. Ferguson HW. *Systemic pathology of fish*. Ames, Iowa: Iowa State University Press, 1989.

193. Letcher J. Intracelomic use of tricaine methane sulfonate for anesthesia of bullfrogs (*Rana catesbeiana*) and leopard frogs *(Rana pipens*). *Zoo Biol* 1992;11:242–251.

194. Brown LA. Anesthesia in fish. *Vet Clin North Am Small Anim Pract* 1988;18:317–330.

195. Josa A, Espinosa E, Cruz JI, et al. Use of 2-phenoxyethanol as an anesthetic agent in goldfish (*Cyprinus carpio*). *Vet Rec* 1992;131:468.

196. Noga EJ. *Fish disease. Diagnosis and treatment*. St Louis: Mosby, 1996.

197. Brannian RE, Kirk E, Williams D. Anesthetic induction of kinosternid turtles with halothane. *J Zoo Anim Med* 1987;18:115–117.

198. Calderwood HW. Anesthesia for reptiles. *J Am Vet Med Assoc* 1971;159:1618–1625.

199. Jackson OF, Cooper JE. Anesthesia and surgery. In: Cooper JE, Jackson OF, eds. *Diseases of the reptilia*. Vol. 2. New York: Academic Press Inc, 1981;535–549.

200. Johlin JM, Moreland FB. Studies of the blood picture of the turtle after complete anoxia. *J Biol Chem* 1933;103:107–114.

201. Moberly WR. The metabolic responses of the common iguana, *Iguana iguana*, to walking and diving. *Comp Biochem Physiol* 1968;27:21–32.

202. Storey KB. Life in a frozen state: adaptive strategies for natural freeze tolerance in amphibians and reptiles. *Am J Physiol* 1990;258:R559–R568.

203. Burns R, McMahan B. Euthanasia methods for ectothermic vertebrates. In: Bonagura JD, ed. *Continuing veterinary therapy XII*. Philadelphia: WB Saunders Co, 1995;1379–1381.

204. Cooper JE, Ewbank R, Platt C, et al. *Euthanasia of amphib-*

ians and reptiles. London: Universities Federation for Animal Welfare and World Society for the Protection of Animals, 1989.

205. Zwart P, deVries HR, Cooper JE. Humane methods of killing fish, amphibians and birds. *Tijdschr Diergeneedkd* 1989;114:557–565.

206. Martin B. Evaluation of hypothermia for anesthesia in reptiles and amphibians. *ILAR News* 1995;37:186–190.

207. Suckow MA, Terril LA, Grigdesby CF, et al. Evaluation of hypothermia-induced analgesia and influence of opioid antagonists in Leopard frogs (*Rana pipiens*). *Pharmacol Biochem Behav* 1999;63: 39–43.

208. Schaffer DO. Anesthesia and analgesia in nontraditional laboratory animal species. In: Kohn DF, Wixson SK, White WJ, et al. eds. *Anesthesia and analgesia in laboratory animals*. San Diego: Academic Press Inc, 1997;337–378.

209. Greer LL, Rowles T. Euthanasia. In: Dierauf LA, ed. *CRC handbook of marine mammal medicine: health, disease, and rehabilitation*. 2nd ed. Boca Raton, Fla: CRC Press, in press.

210. Blackmore DK, Madie P, Bowling MC, et al. The use of a shotgun for euthanasia of stranded cetaceans. *N Z Vet J* 1995;43:158–159.

211. Hyman J. Euthanasia in marine animals. In: Dierauf LA, ed. *CRC handbook of marine mammal medicine: health, disease, and rehabilitation*. Boca Raton, Fla: CRC Press, 1990;265–266.

212. Lambooy E, Roelofs JA, Van Voorst N. Euthanasia of mink with carbon monoxide. *Vet Rec* 1985;116:416.

213. *Recommended code of practice for the care and handling of mink*. Ottawa: Agriculture Canada, 1988;1–17.

214. Singer D. Neonatal tolerance to hypoxia: a comparative-physiological approach. *Comp Biochem Physiol* 1999;123:221–234.

215. Ludders JW, Schmidt RH, Dein J, et al. Drowning is not euthanasia. *Wildlife Soc Bull* 1999;27(3):1.

Appendix 1

Agents and methods of euthanasia by species (refer to Appendix 4 for unacceptable agents and methods.)

Species	Acceptable* (refer to Appendix 2 and text for details)	Conditionally acceptable† (refer to Appendix 3 and text for details)
Amphibians	Barbiturates, inhalant anesthetics (in appropriate species), CO_2, CO, tricaine methane sulfonate (TMS, MS 222), benzocaine hydrochloride, double pithing	Penetrating captive bolt, gunshot, stunning and decapitation, decapitation and pithing
Birds	Barbiturates, inhalant anesthetics, CO_2, CO, gunshot (free-ranging only)	N_2, Ar, cervical dislocation, decapitation, thoracic compression (small, free-ranging only)
Cats	Barbiturates, inhalant anesthetics, CO_2, CO, potassium chloride in conjunction with general anesthesia	N_2, Ar
Dogs	Barbiturates, inhalant anesthetics, CO_2, CO, potassium chloride in conjunction with general anesthesia	N_2, Ar, penetrating captive bolt, electrocution
Fish	Barbiturates, inhalant anesthetics, CO_2, tricaine methane sulfonate (TMS, MS 222), benzocaine hydrochloride, 2-phenoxyethanol	Decapitation and pithing, stunning and decapitation/pithing
Horses	Barbiturates, potassium chloride in conjunction with general anesthesia, penetrating captive bolt	Chloral hydrate (IV, after sedation), gunshot, electrocution
Marine mammals	Barbiturates, etorphine hydrochloride	Gunshot (cetaceans < 4 meters long)
Mink, fox, and other mammals produced for fur	Barbiturates, inhalant anesthetics, CO_2 (mink require high concentrations for euthanasia without supplemental agents), CO, potassium chloride in conjunction with general anesthesia	N_2, Ar, electrocution followed by cervical dislocation
Nonhuman primates	Barbiturates	Inhalant anesthetics, CO_2, CO, N_2, Ar
Rabbits	Barbiturates, inhalant anesthetics, CO_2, CO, potassium chloride in conjunction with general anesthesia	N_2, Ar, cervical dislocation (< 1 kg), decapitation, penetrating captive bolt
Reptiles	Barbiturates, inhalant anesthetics (in appropriate species), CO_2 (in appropriate species)	Penetrating captive bolt, gunshot, decapitation and pithing, stunning and decapitation
Rodents and other small mammals	Barbiturates, inhalant anesthetics, CO_2, CO, potassium chloride in conjunction with general anesthesia, microwave irradiation	Methoxyflurane, ether, N_2, Ar, cervical dislocation (rats < 200 g), decapitation
Ruminants	Barbiturates, potassium chloride in conjunction with general anesthesia, penetrating captive bolt	Chloral hydrate (IV, after sedation), gunshot, electrocution
Swine	Barbiturates, CO_2, potassium chloride in conjunction with general anesthesia, penetrating captive bolt	Inhalant anesthetics, CO, chloral hydrate (IV, after sedation), gunshot, electrocution, blow to the head (< 3 weeks of age)
Zoo animals	Barbiturates, inhalant anesthetics, CO_2, CO, potassium chloride in conjunction with general anesthesia	N_2, Ar, penetrating captive bolt, gunshot
Free-ranging wildlife	Barbiturates IV or IP, inhalant anesthetics, potassium chloride in conjunction with general anesthesia	CO_2, CO, N_2, Ar, penetrating captive bolt, gunshot, kill traps (scientifically tested)

*Acceptable methods are those that consistently produce a humane death when used as the sole means of euthanasia. †Conditionally acceptable methods are those that by the nature of the technique or because of greater potential for operator error or safety hazards might not consistently produce humane death or are methods not well documented in the scientific literature.

Continued on next page.

Appendix 2

Acceptable agents and methods of euthanasia—characteristics and modes of action (refer to text for details)

Agent	Classification	Mode of action	Rapidity	Ease of performance	Safety for personnel	Species suitability	Efficacy and comments
Barbiturates	Hypoxia attributable to depression of vital centers	Direct depression of cerebral cortex, subcortical structures, and vital centers; direct depression of heart muscle	Rapid onset of anesthesia	Animal must be restrained; personnel must be skilled to perform IV injection	Safe except human abuse potential; DEA-controlled substance	Most species	Highly effective when appropriately administered; acceptable IP in small animals and IV
Benzocaine hydrochloride	Hypoxia attributable to depression of vital centers	Depression of CNS	Very rapid, depending on dose	Easily used	Safe	Fish, amphibians	Effective but expensive
Carbon dioxide (bottled gas only)	Hypoxia attributable to depression of vital centers	Direct depression of cerebral cortex, subcortical structures, and vital centers; direct depression of heart muscle	Moderately rapid	Used in closed container	Minimal hazard	Small laboratory animals, birds, cats, small dogs, rabbits, mink (high concentrations required), zoo animals, amphibians, fish, some reptiles, swine	Effective, but time required may be prolonged in immature and neonatal animals
Carbon monoxide (bottled gas only)	Hypoxia	Combines with hemoglobin, preventing its combination with oxygen	Moderate onset time, but insidious so animal is unaware of onset	Requires appropriately maintained equipment	Extremely hazardous, toxic, and difficult to detect	Most small species including dogs, cats, rodents, mink, chinchillas, birds, reptiles, amphibians, zoo animals, rabbits	Effective; acceptable only when equipment is properly designed and operated
Inhalant anesthetics	Hypoxia attributable to depression of vital centers	Direct depression of cerebral cortex, subcortical structures, and vital centers	Moderately rapid onset of anesthesia, excitation may develop during induction	Easily performed with closed container; can be administered to large animals by means of a mask	Must be properly scavenged or vented to minimize exposure to personnel	Some amphibians, birds, cats, dogs, furbearing animals, rabbits, some reptiles, rodents and other small mammals, zoo animals, fish, free-ranging wildlife	Highly effective provided that subject is sufficiently exposed; either is conditionally acceptable
Microwave irradiation	Brain enzyme inactivation	Direct inactivation of brain enzymes by rapid heating of brain	Very rapid	Requires training and highly specialized equipment	Safe	Mice, rats	Highly effective for special needs
Penetrating captive bolt	Physical damage to brain	Direct concussion of brain tissue	Rapid	Requires skill, adequate restraint, and proper placement of captive bolt	Safe	Horses, ruminants, swine	Instant loss of consciousness, but motor activity may continue
2-Phenoxyethanol	Hypoxia attributable to depression of vital centers	Depression of CNS	Very rapid, depending on dose	Easily used	Safe	Fish	Effective but expensive
Potassium chloride (intracardially or intravenously in conjunction with general anesthesia only)	Hypoxia	Direct depression of cerebral cortex, subcortical structures, and vital centers secondary to cardiac arrest.	Rapid	Requires training and specialized equipment for remote injection anesthesia, and ability to give IV injection of potassium chloride	Anesthetics may be hazardous with accidental human exposure	Most species	Highly effective, some clonic muscle spasms may be observed
Tricaine methane sulfonate (TMS, MS 222)	Hypoxia attributable to depression of vital centers	Depression of CNS	Very rapid, depending on dose	Easily used	Safe	Fish, amphibians	Effective but expensive

Appendix 3

Conditionally acceptable agents and methods of euthanasia—characteristics and modes of action (refer to text for details)

Agent	Classification	Mode of action	Rapidity	Ease of performance	Safety	Species suitability	Efficacy and comments
Blow to the head	Physical damage to brain	Direct concussion of brain tissue	Rapid	Requires skill, adequate restraint, and appropriate force	Safe	Young pigs < 3 weeks old	Must be properly applied to be humane and effective
Carbon dioxide (bottled gas only)	Hypoxia due to depression of vital centers	Direct depression of cerebral cortex, subcortical structures and vital centers; direct depression of heart muscle	Moderately rapid	Used in closed container	Minimal hazard	Nonhuman primates, free-ranging wildlife	Effective, but time required may be prolonged in immature and neonatal animals
Carbon monoxide (bottled gas only)	Hypoxia	Combines with hemoglobin, preventing its combination with oxygen	Moderate onset time, but insidious so animal is unaware of onset	Requires appropriately maintained equipment	Extremely hazardous, toxic, and difficult to detect	Nonhuman primates, free-ranging wildlife	Effective; acceptable only when equipment is properly designed and operated
Cervical dislocation	Hypoxia due to disruption of vital centers	Direct depression of brain	Moderately rapid	Requires training and skill	Safe	Poultry, birds, laboratory mice, rats (< 200 g), rabbits (< 1 kg)	Irreversible; violent muscle contractions can occur after cervical dislocation
Chloral hydrate	Hypoxia from depression of respiratory center	Direct depression of brain	Rapid	Personnel must be skilled to perform IV injection	Safe	Horses, ruminants, swine	Animals should be sedated prior to administration
Decapitation	Hypoxia due to disruption of vital centers	Direct depression of brain	Rapid	Requires training and skill	Guillotine poses potential employee injury hazard	Laboratory rodents; small rabbits; birds; some fish, amphibians, and reptiles (latter 3 with pithing)	Irreversible; violent muscle contraction can occur after decapitation
Electrocution	Hypoxia	Direct depression of brain and cardiac fibrillation	Can be rapid	Not easily performed in all instances	Hazardous to personnel	Used primarily in sheep, swine, foxes, mink (with cervical dislocation), ruminants, animals > 5 kg	Violent muscle contractions occur at same time as loss of consciousness
Gunshot	Hypoxia due to disruption of vital centers	Direct concussion of brain tissue	Rapid	Requires skill and appropriate firearm	May be dangerous	Large domestic and zoo animals, reptiles, amphibians, wildlife, cetaceans (< 4 meters long)	Instant loss of consciousness, but motor activity may continue
Inhalant anesthetics	Hypoxia due to depression of vital centers	Direct depression of cerebral cortex, subcortical structures, and vital centers	Moderately rapid onset of anesthesia; excitation may develop during induction	Easily performed with closed container; can be administered to large animals by means of a mask	Must be properly scavenged or vented to minimize exposure to personnel; ether has explosive potential and exposure to ether may be stressful	Nonhuman primates, swine; ether is conditionally acceptable for rodents and small mamals; methoxyflurane is conditionally acceptable for rodents and small mammals.	Highly effective provided that subject is sufficiently exposed
Nitrogen, argon	Hypoxia	Reduces partial pressure of oxygen available to blood	Rapid	Used in closed chamber with rapid filling	Safe if used with ventilation	Cats, small dogs, birds, rodents, rabbits, other small species, mink, zoo animals, nonhuman primates, free-ranging wildlife	Effective except in young and neonates; an effective agent, but other methods are preferable
Penetrating captive bolt	Physical damage to brain	Direct concussion of brain tissue	Rapid	Requires skill, adequate restraint and proper placement of captive bolt	Safe	Dogs, rabbits, zoo animals, reptiles, amphibians, free-ranging wildlife	Instant loss of consciousness but motor activity may continue
Pithing	Hypoxia due to disrution of vital centers, physical damage to brain	Trauma of brain and spinal cord tissue	Rapid	Easily performed but requires skill	Safe	Some ectotherms	Effective, but death not immediate unless brain and spinal cord are pithed
Thoracic compresion	Hypoxia and cardiac arrest	Physical interference with cardiac and respiratory function	Moderately rapid	Requires training	Safe	Small- to medium-sized free-ranging birds	Apparently effective

Appendix 4

Some unacceptable agents and methods of euthanasia (refer to text for details)

Agent or method	Comments
Air embolism	Air embolism may be accompanied by convulsions, opisthotonos, and vocalization. If used, it should be done only in anesthetized animals.
Blow to the head	Unacceptable for most species.
Burning	Chemical or thermal burning of an animal is not an acceptable method of euthanasia.
Chloral hydrate	Unacceptable in dogs, cats, and small mammals.
Chloroform	Chloroform is a known hepatotoxin and suspected carcinogen and, therefore, is extremely hazardous to personnel.
Cyanide	Cyanide poses an extreme danger to personnel and the manner of death is aesthetically objectionable.
Decompression	Decompression is unacceptable for euthanasia because of numerous disadvantages. (1) Many chambers are designed to produce decompression at a rate 15 to 60 times faster than that recommended as optimum for animals, resulting in pain and distress attributable to expanding gases trapped in body cavities. (2) Immature animals are tolerant of hypoxia, and longer periods of decompression are required before respiration ceases. (3) Accidental recompression, with recovery of injured animals, can occur. (4) Bleeding, vomiting, convulsions, urination, and defecation, which are aesthetically unpleasant, may develop in unconscious animals.
Drowning	Drowning is not a means of euthanasia and is inhumane.
Exsanguination	Because of the anxiety associated with extreme hypovolemia, exsanguination should be done only in sedated, stunned, or anesthetized animals.
Formalin	Direct immersion of an animal into formalin, as a means of euthanasia, is inhumane.
Household products and solvents	Acetone, quaternary compounds (including CCl_4), laxatives, clove oil, dimethylketone, quaternary ammonium products*, antacids, and other commercial and household products or solvents are not acceptable agents for euthanasia.
Hypothermia	Hypothermia is not an appropriate method of euthanasia.
Neuromuscular blocking agents (nicotine, magnesium sulafte, potassiumchloride, all curariform agents)	When used alone, these drugs all cause respiratory arrest before loss of consciousness, so the animal may perceive pain and distress after it is immobilized.
Rapid freezing	Rapid freezing as a sole means of euthanasia is not considered to be humane. If used, animals should be anesthetized prior to freezing.
Strychnine	Strychnine causes violent convulsions and painful muscle contractions.
Stunning	Stunning may render an animal unconscious, but it is not a method of euthanasia (except for neonatal animals with thin craniums). If used, it must be immediately followed by a method that ensures death.
Tricaine methane sulfonate (TMS, MS 222)	Should not be used for euthanasia of animals intended as food.

*Roccal D Plus, Pharmacia & Upjohn, Kalamazoo, Mich.

Attachment C

Practice Advisory for Intraoperative Awareness and Brain Function Monitoring

(Approved by the House of Delegates on October 25, 2005)

A Report by the American Society of Anesthesiologists Task Force on Intraoperative Awareness[*]

PRACTICE advisories are systematically developed reports that are intended to assist decision-making in areas of patient care. Advisories provide a synthesis and analysis of expert opinion, clinical feasibility data, open forum commentary, and consensus surveys. Advisories are not intended as standards, guidelines, or absolute requirements. They may be adopted, modified, or rejected according to clinical needs and constraints.

The use of practice advisories cannot guarantee any specific outcome. Practice advisories summarize the state of the literature and report opinions derived from a synthesis of task force members, expert consultants, open forums and public commentary. Practice advisories are not supported by scientific literature to the same degree as are standards or guidelines because sufficient numbers of adequately controlled studies are lacking. Practice advisories are subject to periodic revision as warranted by the evolution of medical knowledge, technology, and practice.

Methodology

A. Definitions

Intraoperative awareness under general anesthesia is a rare occurrence, with a reported incidence of 0.1-0.2%.[1-4] Significant psychological sequelae (e.g., post traumatic stress disorder) may occur

[*] Developed by the American Society of Anesthesiologists Task Force on Intraoperative Awareness: Jeffrey L. Apfelbaum, M.D., (Chair), Chicago, Illinois; James F. Arens, M.D., Houston, Texas; Daniel J. Cole, M.D., Phoenix, Arizona; Richard T. Connis, Ph.D., Woodinville, Washington; Karen B. Domino, M.D., Seattle, Washington; John C. Drummond, M.D., San Diego, California; Cor J. Kalkman, M.D., Ph.D., Utrecht, the Netherlands; Ronald D. Miller, M.D., San Francisco, California; David G. Nickinovich, Ph.D., Bellevue, Washington; and Michael M. Todd, M.D., Iowa City, Iowa.

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following an episode of intraoperative awareness, and affected patients may remain severely disabled for extended periods of time.[5] However, in some circumstances, intraoperative awareness may be unavoidable in order to achieve other critically important anesthetic goals.

The following terms or concepts discussed in this Advisory include: consciousness, general anesthesia, depth of anesthesia or depth of hypnosis, recall, amnesia, intraoperative awareness, and brain function monitors. Consistent definitions for these terms are not available in the literature. For purposes of this Advisory, these terms are operationally defined or identified as follows:

(1) Consciousness: Consciousness is a state in which a patient is able to process information from his or her surroundings. Consciousness is assessed by observing a patient's purposeful responses to various stimuli. Identifiers of purposeful responses include organized movements following voice commands or noxious/painful stimuli.[†] For example, opening of the eyes is one of several possible identifiers or markers of consciousness. Purposeful responses may be absent when paralysis is present as a consequence of neurological disease or the administration of a neuromuscular blocking drug.

(2) General anesthesia: General anesthesia is defined as a drug-induced loss of consciousness during which patients are not arousable, even by painful stimulation.[‡] The ability to maintain ventilatory function independently is often impaired. Patients often require assistance in maintaining a patent airway, and positive pressure ventilation may be required because of depressed spontaneous ventilation or drug-induced depression of neuromuscular function. Cardiovascular function may be impaired.

[†] Reflex withdrawal from a painful stimulus is NOT considered a purposeful response, as indicated by the "continuum of depth of sedation, definition of general anesthesia, and levels of sedation/analgesia;" American Society of Anesthesiologists, 2004.

[‡] American Society of Anesthesiologists: Continuum of depth of sedation, definition of general anesthesia, and levels of sedation/analgesia;" ASA Standards, Guidelines and Statements, 2004.

(3) Depth of anesthesia: Depth of anesthesia or depth of hypnosis refers to a continuum of progressive central nervous system depression and decreased responsiveness to stimulation.

(4) Recall: For the purpose of this Advisory, recall is the patient's ability to retrieve stored memories. Recall is assessed by a patient's report of previous events, in particular, events that occurred during general anesthesia. *Explicit memory* is assessed by the patient's ability to recall specific events that took place during general anesthesia. *Implicit memory* is assessed by changes in performance or behavior without the ability to recall specific events that took place during general anesthesia that led to those changes.[6] A report of recall may be spontaneous or it may only be elicited in a structured interview or questionnaire. This Advisory does not address implicit memory.

(5) Amnesia: Amnesia is the absence of recall. Many anesthetic drugs produce amnesia at concentrations well below those necessary for suppression of consciousness. Anterograde amnesia is intended when a drug with amnestic properties is administered before induction of anesthesia. Retrograde amnesia is intended when a drug such as a benzodiazepine is administered after an event that may have caused or been associated with intraoperative consciousness in the hope that it will suppress memory formation and "rescue" from recall.

(6) Intraoperative awareness: Intraoperative awareness occurs when a patient becomes conscious during a procedure performed under general anesthesia and subsequently has recall of these events. For the purpose of this Advisory, recall is limited to explicit memory, and does not include the time before general anesthesia is fully induced or the time of emergence from general anesthesia, when arousal and return of consciousness are intended. Dreaming is not considered intraoperative awareness.

(7) Brain function monitors: Brain function monitors are devices that record or process brain electrical activity and convert these signals mathematically into a continuous measure

typically scaled from 0 to 100. In addition to spontaneous cortical electrical activity (electroencephalogram, EEG), these devices may also record and process evoked cortical and subcortical activity (auditory evoked potentials, or AEP) as well as electromyographic (EMG) activity from scalp muscles. For the purpose of this Advisory, only monitors purported to measure depth of anesthesia or hypnosis will be considered. Other, non-EEG/AEP/EMG devices are also available, but are not addressed by this Advisory.

B. Purposes of the Advisory

Intraoperative awareness under general anesthesia is an important clinical problem that clearly is within the foundation of training and continuing medical education in anesthesiology. The purposes of this Advisory are to identify risk factors that may be associated with intraoperative awareness, provide decision tools that may enable the clinician to reduce the frequency of unintended intraoperative awareness, stimulate the pursuit and evaluation of strategies that may prevent or reduce the frequency of intraoperative awareness, and provide guidance for the intraoperative use of brain function monitors as they relate to intraoperative awareness.

C. Focus

This Advisory focuses on the perioperative management of patients who are undergoing a procedure during which general anesthesia is administered. This Advisory is not intended for the perioperative management of minimal, moderate, or deep sedation in the OR or ICU; regional or local anesthesia without general anesthesia; monitored anesthesia care; tracheal intubation of patients or those undergoing resuscitation in emergency trauma after the administration of a neuromuscular block, or intentional intraoperative wake-up testing (e.g., for the purposes of assessing intraoperative neurologic function). In addition, this Advisory is not intended to address the perioperative management of pediatric patients.

D. Application

This Advisory is intended for use by anesthesiologists, other physicians who supervise the administration of general anesthesia, and all other individuals who administer general anesthesia. The Advisory may also serve as a resource for other physicians and health care professionals who are involved in the perioperative management of patients receiving general anesthesia.

E. Task Force Members and Consultants

The American Society of Anesthesiologists (ASA) appointed this Task Force of 10 members to (1) review and assess the currently available scientific literature on intraoperative awareness, (2) obtain expert consensus and public opinion, and (3) develop a practice advisory. The Task Force is comprised of anesthesiologists from various geographic areas of the United States, an anesthesiologist from the Netherlands, and two methodologists from the ASA Committee on Practice Parameters.

The ASA appointed the 10 members to the Task Force because of their knowledge or expertise in the medical specialty of anesthesiology, and the development of practice parameters. The members include but are not limited to anesthesiologists with specialized knowledge or expertise in the area of neuroanesthesiology. Two of the 10 members disclosed receipt of funds from or a financial interest in a company developing or manufacturing brain function monitors, which companies have a direct financial interest in the expanded use of such monitors. Other members may have received funds from or have a financial interest in other companies, such as developers or manufacturers of anesthetics, that may be indirectly affected by the expanded use of brain function monitors. The Task Force did not request its members to disclose such interests because they were deemed too remote and speculative to present conflicts of interest.

The Task Force, in turn, sought input from consultants, many of whom who had particularized knowledge, expertise and/or interest in intraoperative awareness and brain function monitors. Such knowledge or expertise is based in part in some cases on research or investigational activities funded

by a company developing or manufacturing brain function monitors. Fifty-four percent of the consultants disclosed receipt of funds from or a financial interest in a company developing or manufacturing brain function monitors. Consultants also may have received funds from or have a financial interest in other companies that may be indirectly affected by the use of brain function monitors. The Task Force did not request its consultants to disclose such interests because they were deemed too remote and speculative to present conflicts of interest.

The Task Force used a six-step process. First, the members reached consensus on the criteria for evidence of effective perioperative interventions for the prevention of intraoperative awareness. Second, they evaluated original articles published in peer-reviewed journals relevant to this issue. Third, consultants who had expertise or interest in intraoperative awareness and who practiced or worked in diverse settings (e.g., scientists and/or physicians in academic and private practice) were asked to participate in opinion surveys on the effectiveness of various perioperative management strategies, and to review and comment on a draft of the Advisory developed by the Task Force. Fourth, additional opinions were solicited from a random sample of active members of the ASA. Fifth, the Task Force held open forums at three national and international anesthesia meetings to solicit input on the key concepts of this Advisory. Sixth, all available information was used to build consensus within the Task Force on the Advisory.

The draft document was made available for review on the ASA website, and commentary was invited via e-mail announcement to all ASA members. All submitted comments were considered by the Task Force in preparing the final draft.

F. Availability and Strength of Evidence

Practice advisories are developed by a protocol similar to that of an ASA evidence-based practice guideline, including a systematic search and evaluation of the literature. However, practice advisories lack the support of a sufficient number of adequately controlled studies to permit

aggregate analyses of data with rigorous statistical techniques such as meta-analysis. Nonetheless, literature-based evidence from case reports and other descriptive studies are considered during the development of the Advisory. This literature often permits the identification of recurring patterns of clinical practice.

As with a practice guideline, formal survey information is collected from consultants and members of the ASA. The following terms describe survey responses for any specified issue. Responses are solicited on a 5-point scale; ranging from 1 (strongly disagree) to 5 (strongly agree) with a score of 3 being equivocal. Survey responses are summarized based on median values as follows:

Strongly Agree:	Median score of 5 (At least 50% of the responses are 5)
Agree:	Median score of 4 (At least 50% of the responses are 4 or 4 and 5)
Equivocal:	Median score of 3 (At least 50% of the responses are 3, or no other response category or combination of similar categories contain at least 50% of the responses)
Disagree:	Median score of 2 (At least 50% of responses are 2 or 1 and 2)
Strongly Disagree:	Median score of 1 (At least 50% of responses are 1)

Additional information is obtained from open forum presentations and other invited and public sources. The advisory statements contained in this document represent a distillation of the current spectrum of clinical opinion and literature-based findings.[§]

Advisories

I. Preoperative Evaluation

A preoperative evaluation includes (1) obtaining a focused history (i.e., medical records, laboratory reports, patient or patient and family interview), (2) conducting a physical examination, (3) identifying patients at risk for intraoperative awareness (e.g., planned anesthetics, type of surgery), and (4) informing selected patients of the possibility of intraoperative awareness.

[§] Refer to appendix 1 for a summary of the advisories.

Descriptive studies and case reports suggest that certain patient characteristics may be associated with intraoperative awareness, including age, gender, ASA status, and drug resistance or tolerance.[4,7-11] Descriptive studies and case reports suggest that certain procedures (e.g., cesarean section, cardiac surgery, trauma surgery) [4,8,12-29] as well as anesthetic techniques (e.g., rapid-sequence induction, reduced anesthetic doses with or without the presence of paralysis)[2,3,9,13,16,21, 23,30-33] may be associated with an increased risk of intraoperative awareness. No studies were found that examined the clinical impact of informing the patient prior to surgery of the possibility of intraoperative awareness.

The consultants and ASA members agree that a preoperative evaluation may be helpful in identifying patients at risk for intraoperative awareness.[**] In addition, they agree that a focused preoperative evaluation to identify patients at risk of intraoperative awareness should include review of a patient's medical record, a thorough physical examination, and a patient or patient and family interview. They agree that patient characteristics that may place a patient at risk for intraoperative awareness include: substance use or abuse, limited hemodynamic reserve, and ASA status of 4 or 5. The consultants strongly agree and the ASA members agree that a history of intraoperative awareness may place a patient at risk. The consultants disagree and the ASA members are equivocal regarding whether all patients should be informed of the possibility of intraoperative awareness. The consultants strongly agree and the ASA members agree that only patients considered to be at elevated risk of intraoperative awareness should be informed of the possibility of intraoperative awareness. Finally the consultants and the ASA members disagree that informing the patient preoperatively of the risk of intraoperative awareness increases the *actual* risk of intraoperative awareness.

Advisory. The Task Force believes that some components of the preoperative evaluation may be useful in identifying a patient at increased risk for awareness. An evaluation should include, if possible, a review of a patient's medical records for previous occurrences of awareness or other

[**] Refer to appendix 2 for complete results of the consultant and ASA membership surveys.

potential risk factors, a patient interview to assess level of anxiety or previous experiences with anesthesia, and a physical examination. Potential risk factors to consider for patients undergoing general anesthesia include substance use or abuse (e.g., opioids, benzodiazepines, cocaine), a history of awareness, a history of difficult intubation or anticipated difficult intubation, chronic pain patients on high doses of opioids, cardiac surgery, Cesarean section, trauma and emergency surgery, reduced anesthetic doses in the presence of paralysis, planned use of muscle relaxants during the maintenance phase of general anesthesia, total intravenous anesthesia, the planned use of nitrous oxide-opioid anesthesia, ASA status of 4 or 5, and limited hemodynamic reserve. The consensus of the Task Force is that patients whom the individual clinician considers to be at substantially increased risk of intraoperative awareness should be informed of the possibility of intraoperative awareness when circumstances permit.

II. Preinduction Phase of Anesthesia

Issues concerned with the preinduction phase of anesthesia related to the prevention of intraoperative awareness include checking the functioning of anesthesia delivery systems, and the prophylactic administration of benzodiazepines.

Although checking the functioning of anesthesia delivery systems is standard practice, some cases of intraoperative awareness have resulted from too low concentrations of inspired volatile anesthetics or drug errors, including drug delivery errors.[8,34-39] One double-blind randomized clinical trial evaluated the efficacy of the prophylactic administration of midazolam as an anesthetic adjuvant during ambulatory procedures under total intravenous anesthesiaand reported a lower frequency of intraoperative awareness in the midazolam groups compared to the placebo group.[40] Two randomized clinical trials examined anterograde amnesia by providing pictures as stimuli after administration of midazolam but before induction of general anesthesia. Although these studies

reported reduced recall in patients administered midazolam, the presence of consciousness during general anesthesia and subsequent intraoperative awareness was not examined.[41,42]

The consultants and ASA members strongly agree that the functioning of anesthesia delivery systems (e.g., vaporizers, infusion pumps, fresh gas flow, IV lines) should be checked to reduce the risk of intraoperative awareness. The consultants disagree, and the ASA members are equivocal that a benzodiazepine or scopolamine should be used as a component of the anesthetic to reduce the risk of intraoperative awareness for *all* patients. The consultants agree that a benzodiazepine or scopolamine should be used for patients requiring smaller dosages of anesthetics, patients undergoing cardiac surgery, and patients undergoing trauma surgery. They are equivocal regarding patients undergoing Cesarean section, emergency surgery, and with total intravenous anesthesia. The ASA members agree that a benzodiazepine or scopolamine should be used for patients requiring smaller dosages of anesthetics, patients undergoing cardiac surgery, emergency surgery, trauma surgery, and total intravenous anesthesia. They are equivocal regarding patients undergoing Cesarean section.

Advisory. Since intraoperative awareness may be caused by equipment malfunction or misuse, the Task Force believes that there should be adherence to a checklist protocol for anesthesia machines and equipment to assure that the desired anesthetic drugs and doses will be delivered. These procedures should be extended to include verification of the proper functioning of intravenous access, infusion pumps and their connections. The Task Force consensus is that the decision to administer a benzodiazepine prophylactically should be made on a case-by-case basis for selected patients (e.g., patients requiring smaller dosages of anesthetics). The Task Force cautions that delayed emergence may accompany the use of benzodiazepines.

III. Intraoperative Monitoring

Intraoperative awareness cannot be measured during the intraoperative phase of general anesthesia, since the recall component of awareness can only be determined postoperatively by

obtaining information directly from the patient. Therefore, the primary issue regarding intraoperative monitoring addressed by this Advisory is whether the use of clinical techniques, conventional monitoring systems, or brain function monitors reduce the occurrence of intraoperative awareness.

The majority of literature obtained during the search and review process did not directly address whether these techniques, systems, or monitors reduce the frequency of intraoperative awareness. However, many studies were found that report intraoperative measures or index values from monitoring activities. This literature, while not directly assessing the impact of an intervention on awareness, often reported patterns or values that occurred at identifiable times during the perioperative period with the intention of describing or predicting variations in the depth of anesthesia. Therefore, commonly reported findings from this literature are summarized below.

The literature for each intervention is presented in the following order: (1) randomized clinical trials, (2) nonrandomized comparative studies (e.g., quasi-experimental, prospective cohort studies), (3) correlational studies (e.g., correlations of index values with end-tidal concentrations of hypnotic drugs or with movement in response to noxious stimuli), (4) descriptive reports of monitor index values at particular times during a procedure; and (5) case reports of unusual or unintended benefits or harms occurring during a monitoring activity. Correlational studies often report a measure of association between two continuous variables (e.g., the correlation between index values and anesthetic drug concentrations). Other correlational measures include a prediction probability (Pk) value that provides a measure of how well a monitor or technique can differentiate between two different clinical states (e.g., response versus no response to verbal command).[43] A Pk value of 1.0 indicates perfect association between an index value and a clinical state, while a Pk value of 0.50 indicates a prediction probability equal to chance.

A. Clinical Techniques and Conventional Monitoring:

Among the clinical techniques utilized to assess intraoperative consciousness are checking for movement, response to commands, opened eyes, eyelash reflex, pupillary responses or diameters, perspiration and tearing. Conventional monitoring systems include ASA standard monitoring[††] as well as the end-tidal anesthetic analyzer.

No clinical trials or other comparative studies were found that examine the effect of clinical techniques or conventional monitoring on the incidence of intraoperative awareness. Correlational studies reported Pk values ranging from 0.74 to 0.76 for the association between reflex or purposeful movement and indicators for depth of anesthesia.[44] One study reported a significant association between response to command and memory when continuous infusions of propofol were used as the induction anesthetic.[45] Pk values for mean arterial pressure (MAP) ranged from 0.68 to 0.94 for distinguishing a responsive state from an unresponsive state, and from 0.81 to 0.89 for distinguishing an anesthetized state from emergence following anesthesia (i.e., first response). Pk values for heart rate (HR) ranged from 0.50 to 0.82 for distinguishing a responsive state from an unresponsive state, and from 0.54 to 0.67 for emergence.[46-48] Wide ranges of mean MAP and HR values were reported during various intraoperative times. Studies reported ranges of mean MAP values as follows: before induction or baseline, 90 to 103 mmHg; at induction, 58.4 to 88 mmHg; during surgery, 78 to 102 mmHg; at emergence or end of surgery, 58.7 to 97 mmHg; and during postoperative recovery, 86 to 104mmHg. Mean HR ranges were reported as follows: before induction or baseline, 61 to 82 bpm; at induction, 55 to 67 bpm; during surgery, 74 to 82 bpm; at emergence or end of surgery, 59 to 92 bpm; and during postoperative recovery, 82 to 89 bpm.[49-56] Awareness has been reported to occur in the absence of tachycardia or hypertension.[8,23,24]

The consultants and ASA members agree that clinical techniques (e.g., checking for purposeful or reflex movement) are valuable and should be used to assess intraoperative consciousness. In

[††] American Society of Anesthesiologists: Standards for basic anesthetic monitoring. *In* ASA Standards, Guidelines and Statements; American Society of Anesthesiologists Publication: October, 2004.

addition, the consultants and ASA members agree that conventional monitoring systems (e.g, ECG, BP, HR, end-tidal anesthetic analyzer, capnography) are valuable and should be used to help assess intraoperative consciousness.

B. Brain Electrical Activity Monitoring:

Most of the devices designed to monitor brain electrical activity for the purpose of assessing anesthetic effect record electroencephalographic (EEG) activity from electrodes placed on the forehead. Systems can be subdivided into those that process spontaneous EEG and electromyographic (EMG) activity and those that acquire evoked responses to auditory stimuli (auditory evoked potential, AEP). After amplification and conversion of the analog EEG signal to the digital domain, various signal processing algorithms are applied to the frequency, amplitude, latency and/or phase relationship data derived from the raw EEG or AEP to generate a single number, often referred to as an "index" typically scaled between 100 and zero. This index represents the progression of clinical states of consciousness ('awake', 'sedated', 'light anesthesia', 'deep anesthesia'), with a value of 100 being associated with the awake state, and values of zero occurring with an isoelectric EEG (or absent middle latency AEP). These processing algorithms may either be published and in the public domain or proprietary. Detailed descriptions of the various approaches to EEG signal processing, including bispectral analysis may be found elsewhere.[57] Artifact recognition algorithms intended to avoid contaminated, and therefore spurious, 'index' values are an important component of the software in most monitors.

Although EMG activity from scalp muscles can be considered an artifact from the viewpoint of pure EEG analysis, it may be an important source of clinically relevant information. Sudden appearance of frontal (forehead) EMG activity suggests somatic response to noxious stimulation resulting from inadequate analgesia and may give warning of impending arousal. For this reason, some monitors separately provide information on the level of EMG activity.

1. Spontaneous EEG Activity Monitors.

Bispectral Index. Bispectral index (BIS) is a proprietary algorithm (Aspect Medical Systems) that converts a single channel of frontal EEG into an index of hypnotic level (bispectral index; BIS). BIS is available either as a separate device (BIS monitor; Aspect Medical Systems) or incorporated - under license from Aspect Medical Systems - in 'BIS modules' made by various anesthesia equipment manufacturers. To compute the BIS, several variables derived from the EEG time domain (burst-suppression analysis), frequency domain (power spectrum, bispectrum: interfrequency phase relationships) are combined into a single index of hypnotic level. BIS values are scaled from 0 to 100, with specific ranges (e.g., 40-60) reported to reflect a low probability of consciousness under general anesthesia. The weight factors for the various components in the multivariate model that generates the BIS were empirically derived from a prospectively collected database of over 1500 anesthetics. The BIS model accounts for the nonlinear stages of EEG activity by allowing different parameters to dominate the resulting BIS as the EEG changes its character with increasing plasma concentrations of various anesthetics, resulting in a linear decrease in BIS. As more data have become available and as methods and algorithms to suppress artifacts have been improved, revised iterations of the algorithm and optimized hardware have been released.

Several RCTs have compared outcomes with BIS-guided anesthetic administration versus standard clinical practice without BIS. In one RCT that enrolled 2500 patients at high risk of intraoperative awareness, explicit recall occurred in 0.17% of patients when BIS monitors were used and in 0.91% of patients managed by routine clinical practice ($p < 0.02$).[58] A small ($N = 30$) single-blinded RCT (i.e., the anesthesiologists were blinded to the recorded BIS values) compared BIS monitoring with clinical signs during cardiac surgery), and reported one episode of recall in

the clinical signs group compared to no episodes in the BIS-monitored group ($p > 0.50$).[59] In other RCTs, times to awakening, first response, or eye opening and consumption of anesthetic drugs were reduced with the use of BIS.[8,60-68]

One nonrandomized comparison of the use of BIS monitoring versus a cohort of historical controls (N = 12,771) found explicit recall occurring in 0.04% of the BIS monitored patients versus 0.18% of the historical controls ($p < 0.038$).[68] Another prospective nonrandomized cohort study (N = 19,575) designed to establish the incidence of awareness with recall during routine general anesthesia and to determine BIS values associated with intraoperative awareness events reported no statistically significant difference when BIS was used (0.18% of patients) compared to when BIS was not used (0.10% of patients). Other nonrandomized comparative studies reported higher index values upon arrival in the PACU, shorter recovery times, and lower anesthetic usage among patients monitored with BIS compared to patients not monitored with BIS.[70,71] Numerous correlational studies reported Pk values for BIS ranging from 0.72 to 1.00 for awake versus loss of response following induction with propofol (with or without opioids); and from 0.79 to 0.97 for anesthetized versus first response.[46-48,72-78] One study reported a Pk value of 0.86 for movement from electrical stimulation.[44] Wide ranges of mean BIS values have been reported during various intraoperative times. Ranges of mean BIS values were as follows: before induction or baseline, 80 to 98; at or after induction, 37 to 70; during surgery, 20 to 58; at emergence or end of surgery, 42 to 96; and during postoperative recovery, 64 to 96.[50,51,54-56,79-110] Several case reports indicate that intraoperative events unrelated to titration of anesthetic agents can produce rapid changes in BIS values, e.g., cerebral ischemia or hypoperfusion, gas embolism, unrecognized hemorrhage, inadvertent blockage of anesthesia drug delivery.[111-119] Other case reports suggest that routine intraoperative events (e.g., administration of depolarizing muscle relaxants, activation of electromagnetic equipment or devices, patient warming or planned

hypothermia) may interfere with BIS functioning.[120-128] Two case reports were found that reported patients experiencing intraoperative awareness in spite of monitored values indicating an adequate depth of anesthesia.[129,130] Finally, still other case reports suggested that certain patient conditions may affect BIS values.[131-133]

Entropy. Entropy (GE Healthcare Technologies) describes the irregularity, complexity, or unpredictability characteristics of a signal. A single sine wave represents a completely predictable signal (entropy = 0), whereas noise from a random number generator represents entropy = 1. The algorithm for calculation of entropy in the EEG signal (as incorporated in the Datex-Ohmeda S/5 entropy Module) is in the public domain and detailed descriptions have recently been published.[134]

Entropy is independent of absolute scales such as the amplitude or the frequency of the signal. The commercially available Datex-Ohmeda module calculates entropy over time windows of variable duration and reports two separate entropy values. State entropy (SE) is an index ranging from zero to 91 (awake), computed over the frequency range from 0.8 Hz to 32 Hz, reflecting the cortical state of the patient. Response Entropy (RE) is an index ranging from zero to 100 (awake) computed over a frequency range from 0.8 Hz to 47 Hz, containing the higher EMG-dominated frequencies, and will thus also respond to the increased EMG activity resulting from inadequate analgesia. No clinical trials or other comparative studies were found that examine the impact of entropy monitoring on the incidence of intraoperative awareness. One clinical trial reported reduced times to eye opening, response to command, and consumption of anesthetic drugs with the use of entropy monitoring.[135]

Correlational studies report the following Pk values for loss of consciousness: for RE, 0.83 to 0.97; for SE, 0.81 to 0.90.[45,136-137] For anesthetized versus first response, the following Pk values are reported: for RE, 0.85; and for SE, 0.82.[46] Ranges of mean RE and SE values were as

follows: before induction or baseline, 98 (RE) and 89 to 91 (SE); during surgery, 34 to 52 (RE) and 50 to 63 (SE); and at emergence or end of surgery, 96 (RE) and 85 (SE).[52,135,138,139]

Narcotrend. The Narcotrend (MonitorTechnik) is derived from a system developed for the visual classification of the EEG patterns associated with various stages of sleep. After artifact exclusion and Fourier transformation, the original electronic algorithm classified the raw (frontal) EEG according to the following system: A (awake), B (sedated), C (light anesthesia), D (general anesthesia), E (general anesthesia with deep hypnosis), F (general anesthesia with increasing burst suppression). The system included a series of sub-classifications resulting in a total of 14 possible sub-stages: A, B0–2, C0–2, D0–2, E0–1, and F0–1.[140] In the most recent iteration of the Narcotrend software (version 4.0), the alphabet-based scale has been "translated" into a dimensionless index, the Narcotrend index, scaled from zero (deeply anesthetized) to 100 (awake), with the stated intention of producing a scale quantitatively similar to the BIS index.

No clinical trials or other comparative studies were found that examine the impact of Narcotrend monitoring on the incidence of intraoperative awareness. One RCT has compared the use of Narcotrend-controlled versus clinically controlled anesthetic administration and found a shorter recovery time in the Narcotrend group (i.e., opened eyes) after termination of anesthesia.[63] Pk values for Narcotrend ranged from 0.93 to 0.99 for awake versus loss of response following induction with propofol combined with an opioid, and from 0.94 to 0.99 for anesthetized versus first response.[47,48] Reported mean Narcotrend values are as follows: after induction (loss of response), 72 to 80; and at emergence or end of surgery (spontaneously opened eyes), 80.[73]

Patient State Analyzer. The Patient State Index, or PSI (Physiometrix) is derived from a 4-channel EEG. The derivation of the PSI is based on the observation that there are reversible spatial changes in power distribution of quantitative EEG at loss and return of consciousness. The Patient State Index (PSI) has a range of 0 to 100, with decreasing values indicating

decreasing levels of consciousness or increasing levels of sedation, similar to BIS, Entropy and Narcotrend. The PSI algorithm was constructed using stepwise, discriminant analysis based on multivariate combinations of quantitative EEG variables, derived after Fourier transformation of the raw EEG, and found to be sensitive to changes in the level of anesthesia.

No clinical trials or other comparative studies were found that examine the impact of PSI monitoring on the incidence of intraoperative awareness. One correlational study reported a Pk value of 0.70 for predicting response to command, with a sensitivity of 85.6% and specificity of 38.8%,[77] and another study reported a significant correlation of the PSI with unconsciousness.[141] Reported mean PSI values are as follows: before induction or baseline, 92; during surgery, 32; at emergence or end of surgery, 53; and during postoperative recovery, 81.[141]

SNAP index. The SNAPII (Everest Biomedical Instruments) calculates a "SNAP index" from a single channel of EEG. The index calculation is based on a spectral analysis of EEG activity in the 0-18 Hz and 80-420 Hz frequency ranges, and a burst suppression algorithm. There are no published data on the actual algorithm used to calculate the SNAP index, which is based on a composite of both low (0-40 Hz) and high (80-420 Hz) frequency components.

No clinical trials or other comparative studies were found that examine the impact of SNAP monitoring on the incidence of intraoperative awareness. One correlational study was found that reported a mean SNAP index of 71 to be predictive of a loss of consciousness in 95% of elective surgery patients.[142]

Danmeter Cerebral State Monitor/Cerebral State Index. The Danmeter CSM is a handheld device that analyzes a single channel EEG and presents a cerebral state 'index' scaled from 0-100. In addition, it also provides EEG suppression percentage and a measure of EMG activity (75-85 Hz).

No published literature was found that examined the impact of Danmeter CSM monitoring on

the incidence of intraoperative awareness.

2. Evoked Brain Electrical Activity Monitors.

AEP Monitor/2 (Danmeter). Auditory evoked potentials (AEP) are the electrical responses of the brainstem, the auditory radiation and the auditory cortex to auditory sound stimuli (clicks) delivered via headphones. The effects of anesthetics on AEP have been studied since the early 1980s.[143-145] The brainstem response is relatively insensitive to anesthetics while early cortical responses, known as the middle-latency AEP (MLAEP) change predictably with increasing concentrations of both volatile and intravenous anesthetics. The typical AEP response to increasing anesthetic concentrations is increased latency and decreased amplitude of the various waveform components. These signals are extremely small (less than one microvolt) necessitating extraction from the spontaneous EEG using signal averaging techniques. Prior to recent innovations, signal averaging was relatively time consuming (several minutes per averaged waveform). More recent signal filtering advances have resulted in an instrument (A-Line) that can record and rapidly update a single channel of AEP from forehead electrodes. From a mathematical analysis of the AEP waveform, the device generates an 'AEP-index' that provides a correlate of anesthetic concentration. The AEP index, or AAI, is scaled from 0 to 100. In contrast to many EEG indices, the AAI corresponding with low probability of consciousness is less than 25, rather than the higher numeric thresholds associated with the other monitors. The device is FDA approved but is not currently marketed in North America.

RCTs that compared MLAEP monitoring (e.g., to titrate anesthetics) to standard clinical practice without MLAEP reported reduced times to eye opening or orientation.[63,64,146] A Pk value of 0.79 was reported for loss of eyelash reflex following induction with propofol and an opioid,[74] and Pk values of 0.63 and 0.66 were reported for responsiveness following discontinuation of remifentanil or sevoflurane, respectively.[147] One study reported a Pk value of 0.87 for

movement,[148] and another study reported a Pk value of 0.99 for awareness after LMA insertion,[149] Descriptive studies reported ranges of mean values as follows: before induction or baseline, 73.5 to 85; at or after induction, 33.4 to 61; during surgery, 21.1 to 37.8; at emergence or end of surgery, 24.6 to 40; and during postoperative recovery, 89.7.[74,80,144,150-151]

C. Consultant and ASA Member Survey Findings.

Consultants who participated in this Advisory typically either had a particular knowledge or an expressed interest in intraoperative awareness and brain function monitors. The majority of these consultants disclosed receipt of funds from or a financial interest in a company developing or manufacturing brain function monitors. Consultants were not asked to disclose similar relationships with other companies that may be indirectly affected by the use of brain function monitors. ASA members were randomly selected from a list of active members of the society.

The consultants and ASA members disagree that a brain electrical activity monitor is valuable and should be used to reduce the risk of *intraoperative awareness* for *all* patients. The consultants and ASA members disagree that a brain electrical activity monitor is valuable and should be used to reduce the risk of intraoperative awareness for *no* patient. The consultants agree that a brain electrical activity monitor should be used for patients with conditions that may place them at risk, patients requiring smaller doses of general anesthetics, trauma surgery, Cesarean section, and total intravenous anesthesia. They are equivocal regarding the use of brain electrical activity monitoring for cardiac surgery and emergency surgery. The ASA members agree with the use of such monitors for patients with conditions that may place them at risk, patients requiring smaller doses of general anesthetics, and patients undergoing cardiac surgery. They are equivocal regarding the use of these monitors for patients undergoing Cesarean section, emergency surgery, trauma surgery, and total intravenous anesthesia.

The consultants and ASA members disagree that a brain electrical activity monitor is valuable

and should be used to assess intraoperative *depth of anesthesia* for *all* patients. The consultants and ASA members disagree with the statement that "a brain electrical activity monitor is valuable and should be used to assess intraoperative depth of anesthesia for *no* patient." The consultants agree that a brain electrical activity monitor should be used to assess intraoperative depth of anesthesia for selected patients. The ASA members agree with the use of brain electrical activity monitors for patients with conditions that may place them at risk and patients requiring smaller doses of general anesthetics. They are equivocal regarding the use of such monitors for patients undergoing cardiac surgery, Cesarean section, emergency surgery, trauma surgery, and total intravenous anesthesia.

Advisory. Intraoperative monitoring of depth of anesthesia, for the purpose of minimizing the occurrence of awareness, should rely on multiple modalities, including clinical techniques (e.g., checking for clinical signs such as purposeful or reflex movement) and conventional monitoring systems (e.g., ECG, BP, HR, end-tidal anesthetic analyzer, capnography). The use of neuromuscular blocking drugs may mask purposeful or reflex movements, and adds additional importance to the use of monitoring methods that assure the adequate delivery of anesthesia.

Brain function monitors are dedicated to the assessment of the effects of anesthetics on the brain, and provide information that correlates with some depth of anesthesia indicators, such as plasma concentrations of certain anesthetics (e.g., propofol). In general, the indices generated by these monitors vary in parallel with other established correlates of depth of anesthesia, although the values generated by individual devices in any given anesthetic state differ among the various monitoring technologies. In addition, the values generated by individual devices in the face of a given depth of anesthesia achieved by different combinations of anesthetic drugs (e.g., with or without opioids) will also differ. In other words, a specific numerical value may not correlate with a specific depth of anesthesia. Furthermore, the measured values do not have uniform sensitivity across different anesthetic drugs or types of patients. As with other monitors, common occurrences in the OR may

introduce artifacts into the values derived by these monitors (e.g., electrocautery, lasers, warming devices).

The general clinical applicability of these monitors in the prevention of intraoperative awareness has not been established. While a single randomized clinical trial reported a decrease in the frequency of awareness in high-risk patients, there is insufficient evidence to justify a standard, guideline, or absolute requirement that these devices be used to reduce the occurrence of intraoperative awareness in high-risk patients undergoing general anesthesia. In addition, there is insufficient evidence to justify a standard, guideline, or absolute requirement that these devices be used to reduce the occurrence of intraoperative awareness for any other group of patients undergoing general anesthesia.

It is the consensus of the Task Force that brain function monitoring is not routinely indicated for patients undergoing general anesthesia, either to reduce the frequency of intraoperative awareness or to monitor depth of anesthesia. This consensus is based, in part, on the state of the literature and survey responses from the consultants and ASA membership, who generally disagree with the following statements: "Brain function monitors are valuable and should be used to reduce the risk of intraoperative awareness for all patients under general anesthesia," and "Brain function monitors are valuable and should be used when possible to assess intraoperative depth of anesthesia for all patients under general anesthesia" (see above and tables 1 and 2).

It is the consensus of the Task Force that the decision to use a brain function monitor should be made on a case-by-case basis by the individual practitioner for selected patients (e.g., light anesthesia). This consensus is based, in part, on the state of the literature and survey response patterns from consultants and ASA members regarding specific risk factors (see above and tables 1 and 2). The Task Force cautions that maintaining low brain function monitor values in an attempt to prevent intraoperative awareness may conflict with other important anesthesia goals (e.g.,

preservation of vital organ functions, minimizing the risks of aggravating existing co-morbidities [152]). It is the opinion of the Task Force that brain function monitors currently have the status of the many other monitoring modalities that are currently used in selected situations at the discretion of individual clinicians.

IV. Intraoperative and Postoperative Interventions

Intraoperative and postoperative interventions include: (1) the intraoperative administration of benzodiazepines to patients who may have become conscious, (2) providing a postoperative structured interview to patients to define the nature of the episode after an episode of intraoperative awareness has been reported, (3) providing a postoperative questionnaire to patients to define the nature of the episode, and (4) offering postoperative counseling or psychological support.

No studies were found that evaluated the efficacy of the intraoperative administration of benzodiazepines to patients who have unexpectedly become conscious in reducing the occurrence of awareness. Two randomized clinical trials examined retrograde amnesia by providing pictures as stimuli to awake patients before administration of midazolam and induction of general anesthesia. The studies reported no evidence of retrograde amnesia.[41,42] However, these studies did not examine the effect of administering a benzodiazepine to patients after the apparent occurrence of consciousness during general anesthesia.

Although several studies have applied structured interviews and questionnaires to obtain additional information about reported incidences of intraoperative awareness,[4,11,26,28,153-157] no studies were found that demonstrated improvements in patient well-being or psychological state following such interactions. No studies were found that followed up on the efficacy of counseling or psychological support provided to patients who experienced a documented incidence of intraoperative awareness.

The consultants are equivocal and ASA members agree that benzodiazepines or scopolamine

should be administered intraoperatively to prevent awareness after a patient has unexpectedly become conscious. The consultants strongly agree, and the ASA members agree that, once an episode of intraoperative awareness has been reported, a structured interview should be conducted to define the nature of the episode. Both the consultants and ASA members are equivocal regarding whether a questionnaire should be given to define the nature of the episode. The consultants strongly agree, and the ASA members agree that, in documented cases of intraoperative awareness, patients should be offered counseling or psychological support. Finally, the consultants strongly agree, and the ASA members agree that, in documented cases of intraoperative awareness, an occurrence report concerning the event should be completed for the purpose of quality management.

Advisory. The Task Force consensus is that the decision to administer a benzodiazepine intraoperatively after a patient unexpectedly becomes conscious should be made on a case-by-case basis. . This consensus is based, in part, on the state of the literature and on responses from the Consultants and ASA members who generally agree with the following statement: "Benzodiazepines or scopolamine should be administered intraoperatively to prevent awareness after a patient has unexpectedly become conscious." However, the Task Force believes that evidence from the literature is not sufficient to provide guidance regarding this issue. Finally, the Task Force cautions that the use of scopolamine may result in unintended side-effects (e.g., emergence delirium).

Practitioners should speak with patients who report recall of intraoperative events to obtain details of the event and to discuss possible reasons for its occurrence.[‡‡] A questionnaire or structured interview may be used to obtain a detailed account of the patient's experience. Once an episode of intraoperative awareness has been reported, an occurrence report concerning the event should be completed for the purpose of quality management. Finally, the patient should be offered counseling or psychological support.

[‡‡] Refer to the ASA Director of Communications at 847-825-5586 for further information and guidance.

Appendix 1: Summary of Practice Advisory

Preoperative Evaluation

- Review patient medical records for potential risk factors
    - Substance use or abuse
    - Previous episode of intraoperative awareness
    - History of difficult intubation or anticipated difficult intubation
    - Chronic pain patients on high doses of opioids
    - ASA status 4-5
    - Limited hemodynamic reserve
- Interview patient
    - Assess level of anxiety
    - Obtain information regarding previous experiences with anesthesia
- Determine other potential risk factors
    - Cardiac surgery
    - Cesarean section
    - Trauma surgery
    - Emergency surgery
    - Reduced anesthetic doses in the presence of paralysis
    - Planned use of muscle relaxants during the maintenance phase of general anesthesia
    - Planned use of nitrous oxide-opioid anesthesia
- Patients whom the individual clinician considers to be at substantially increased risk of intraoperative awareness should be informed of the possibility of intraoperative awareness when circumstances permit

Preinduction Phase of Anesthesia

- Adhere to a checklist protocol for anesthesia machines and equipment to assure that the desired anesthetic drugs and doses will be delivered
- Verifiy the proper functioning of intravenous access, infusion pumps and their connections, including the presence of appropriate back-flow check valves
- The decision to administer a benzodiazepine prophylactically should be made on a case-by-case basis for selected patients (e.g., patients requiring smaller dosages of anesthetics)

Intraoperative Monitoring

- Use multiple modalities to monitor depth of anesthesia
    - Clinical techniques (i.e., checking for purposeful or reflex movement)
        - Neuromuscular blocking drugs may mask purposeful or reflex movement
    - Conventional monitoring systems (e.g., ECG, BP, HR, end-tidal anesthetic analyzer, capnography
    - Brain function monitoring
        - Not routinely indicated for general anesthesia patients
        - The decision to use a brain function monitor should be made on a case-by-case basis by the individual practitioner for selected patients (e.g., light anesthesia)

Intraoperative and Postoperative Management

- The decision to administer a benzodiazepine intraoperatively after a patient unexpectedly becomes conscious should be made on a case-by-case basis
- Speak with patients who report recall of intraoperative events to obtain details of the event and to discuss possible reasons for its occurrence
- A questionnaire or structured interview may be used to obtain a detailed account of the patient's experience
- Once an episode of intraoperative awareness has been reported, an occurrence report concerning the event should be completed for the purpose of quality management
- Offer counseling or psychological support to those patients who report an episode of intraoperative awareness

Appendix 2: Literature Review and Consensus-Based Evidence

For this Advisory, a literature review was used in combination with opinions obtained from experts and other sources (e.g., professional society members, open forums, web-based postings) to provide guidance to practitioners regarding intraoperative awareness. Both the literature review and opinion data were based on *evidence linkages*, consisting of directional statements about relationships between specific perioperative interventions and intraoperative awareness. The interventions for the evidence linkages are listed below:

Preoperative Evaluation

- Focused history (i.e., medical records, patient interview, physical exam)
- Patient characteristics associated with risk of awareness
- Procedures associated with higher risk of intraoperative awareness
- Anesthetic techniques may be associated with higher risk of intraoperative awareness
- Informing patients of the possiblity of intraoperative awareness

Preinduction Phase of Anesthesia

- Check anesthesia delivery systems to reduce errors
- Prophylactic administration of benzodiazepines as co-anesthetics

Intraoperative Monitoring

- Commonly used clinical techniques
- Conventional monitoring systems
- Brain function monitors
  - Spontaneous electrical activity (EEG/EMG)
    - Bispectral index (BIS)
    - Danmeter Cerebral State Monitor/Cerebral State Index
    - Entropy
    - Narcotrend
    - Patient state analyzer (PSA)
    - SNAP index
  - Evoked electrical activity (auditory evoked potential monitoring)
    - AEP Monitor/2

Intraoperative and Postoperative Interventions

- Intraoperative use of benzodiazepines for unexpected consciousness
- Structured interview of patients who report recall of intraoperative events
- Questionnaire administered to patients who report recall of intraoperative events
- Patient counseling for patients who report recall of intraoperative events

A. State of the Literature.

A study or report that appears in the published literature is included in the development of an advisory if the study: (1) is related to one of the specified linkage statements, (2) reports a finding or set of findings that can be tallied or measured (e.g., articles that contain only opinion are not included), and (3) is the product of an original investigation or report (i.e., review articles or follow-up studies that summarize previous findings are not included).

For the literature review, potentially relevant studies were identified via electronic and manual searches of the literature. The electronic search covered a 40-year period from 1966 through 2005. The manual search covered a 36-year period of time from 1970 through 2005. Over 1500 citations were initially identified, yielding a total of 711 non-overlapping articles that addressed topics related to the evidence linkages and met our criteria for inclusion. Following review of the articles, 389 studies did not provide direct evidence, and were subsequently eliminated. A total of 322 articles contained direct linkage-related evidence. No evidence linkage contained enough studies with well-defined experimental designs and statistical information to conduct a quantitative analysis (i.e., meta-analysis).

Interobserver agreement among Task Force members and two methodologists was established by interrater reliability testing. Agreement levels using a kappa (κ) statistic for two-rater agreement pairs were as follows: (1) type of study design, $\kappa = 0.60$ to 0.85; (2) type of analysis, $\kappa = 0.60$ to 0.93; (3) evidence linkage assignment, $\kappa = 0.77$ to 0.88; and (4) literature inclusion for database, $\kappa = 0.76$ to 1.00. Three-rater chance-corrected agreement values were: (1) study design, Sav = 0.82, Var (Sav) = 0.007; (2) type of analysis, Sav =0.73, Var (Sav) = 0.008; (3) linkage assignment, Sav = 0.69 Var (Sav) = 0.012; (4) literature database inclusion, Sav = 0.84, Var (Sav) = 0.014. These values represent moderate-to-high levels of agreement.

The primary focus of this Advisory was to examine studies with hypothesis-driven research designs, such as RCTs, that examined the effect of an intervention (such as a brain function monitor) on reducing the occurrence or frequency of intraoperative awareness. To date, only two randomized controlled trials were found that reported intraoperative awareness as the primary study endpoint.[55,56] Additional controlled trials will be necessary before data from published literature can be aggregated to provide a basis for quantitative evidence (i.e., meta-analysis).

Several other RCTs were reviewed that reported primary outcomes other than intraoperative awareness, including emergence time, consumption of anesthetic drugs and recovery characteristics. In addition, many other published studies applied non-hypothesis driven research designs to obtain non-causal or indirect data. For example, descriptive literature (i.e., reports of frequency or incidence) may provide an indication of the scope of the problem. Correlational or predictive data provides information regarding the direction and strength of association of values obtained from patient monitoring devices with other intraoperative measures such as blood concentrations of anesthetic drugs, time to loss of eyelash reflex, and time to awakening. Case reports are typically employed as a forum for reporting and recognizing unusual or unintended benefits or harms. Often, case reports, as well as descriptive or correlational data provide useful hypotheses-generating information that may stimulate additional causal examination of the topic of intraoperative awareness.

Future studies should focus on prospective methodologies, when possible, that utilize traditional hypothesis testing techniques. Use of the following methodological procedures for assessing the impact of interventions for intraoperative awareness is recommended: (1) comparison studies assessing the efficacy of one technique versus other techniques; (2) random assignment to treatment groups with blinding if appropriate; and (3) full reporting of sample size, effect size estimates, test scores, measures of variability, and p-values. The Task Force recognizes that conducting such

studies may be difficult and expensive, because intraoperative awareness is a very low incidence event. The required sample size for a RCT to test the impact of an intervention (e.g., brain function monitor) on the incidence of intraoperative awareness is invariably large. The Task Force also recognizes that, with low incidence data, a difference in the recording of one or two cases of intraoperative awareness can affect the statistical significance of study findings.

Limiting the study to patient subgroups thought to have a higher risk for intraoperative awareness (e.g., cardiac surgery, cesarean section, emergency trauma surgery) may allow for a smaller sample size and provide useful information regarding these subgroups. However, the Task Force recognizes that the generalizability of these findings to the larger population of general anesthesia patients may be limited.

B. Consensus-Based Evidence.

Consensus was obtained from multiple sources, including: (1) survey opinion from Consultants who were selected based on their knowledge or expertise in intraoperative awareness, (2) survey opinions from a randomly selected sample of active members of the American Society of Anesthesiologists, (3) testimony from attendees of three open forums held at national anesthesia meetings,[§§] (4) internet commentary, and (5) Task Force opinion and interpretation. The survey rate of return was 60% (N = 57/95) for Consultants, and 30% (N=151/500) for the ASA membership. Survey results are presented in the text of the document and in tables 1 and 2.

Ninety-one percent of the consultants and 72% of the ASA members indicated that they had personally used a brain function device in the past. Fifty-seven percent of the consultants indicated that they make use in their current practice of a brain function device either always (11.1%), frequently (20.4%), or sometimes (25.9%). Thirty-six percent of the ASA members

[§§] American Society of Anesthesiologists, Annual Meeting, October 25, 2004 in Las Vegas, NV; International Anesthesia Research Society, 79th Clinical and Scientific Congress, March 12, 2005 in Honolulu, HI; and Association of University Anesthesiologists 52nd Annual Meeting, May 6, 2005 in Baltimore, MD.

indicated that they make use in their current practice of a brain function device either always (6.0%), frequently (13.4%), or sometimes (16.8%).

The Consultants were also asked to indicate which, if any, of the evidence linkages would change their clinical practices if the Advisory was instituted. The rate of return was 18% (N = 17/95). The percent of responding Consultants expecting *no change* associated with each linkage were as follows: preoperative evaluation - 82%; informing patients of the possibility of intraoperative awareness - 65%; check anesthesia delivery systems - 94%; prophylactic use of benzodiazepines as co-anesthetics - 100%; use of clinical techniques to monitor for intraoperative awareness - 94%; use of conventional monitoring systems to monitor for intraoperative awareness - 100%; use of brain function monitors to monitor for intraoperative awareness - 59%; intraoperative use of benzodiazepines for uuunexpected consciousness - 100%; use of a structured interview for patients who report recall of intraoperative events - 41%; use of a questionnaire for patients who report recall of intraoperative events - 53% and counseling for patients who report recall of intraoperative events - 76%. Seventy-one percent of the respondents indicated that the Advisory would have *no effect* on the amount of time spent on a typical case. Four respondents (24%) indicated that there would be an increase in the amount of time they would spend on a typical case with the implementation of this Advisory. The amount of increased time anticipated by these respondents ranged from 1 to 20 minutes.

Table 1. Consultant Survey Responses [***]

		Percent Responding to Each Item				
Preoperative evaluation:	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. Helpful to identify pts at risk of intraoperative awareness	57	31.6	43.9*	7.0	10.5	7.0
2. A preop eval should include:						
Review of medical records	48	41.7	45.8*	4.2	6.3	2.1
A physical examination	47	21.3	34.0*	17.0	25.5	2.1
A patient/family interview	48	39.6	35.4*	14.6	8.3	2.1
3. Potential patient risk factors:						
Substance use or abuse	54	38.9	42.6*	5.6	13.0	0.0
Pt history of intraop awareness	55	52.7*	29.1	10.9	7.3	0.0
Limited hemodynamic reserve	54	38.9	40.7*	13.0	7.4	0.0
ASA status of 4 or 5	54	24.1	48.1*	20.4	7.1	0.0
4. Procedures/ anesthetic techniques that may place a patient at risk for intraop awareness:						
Cesarean section under GA, cardiac surgery, trauma, emergency surgery	57	75.4*	24.6	0.0	0.0	0.0
Planned use of reduced doses of anesthetics in the presence of paralysis	56	66.1*	25.0	5.4	1.8	1.8
Planned use of muscle relaxants for maintenance	57	26.4	45.6*	8.8	17.5	1.8
Planned use of total intravenous anesthesia	57	10.5	33.3	24.6*	21.1	10.5
Planned use of volatile anesthetics	57	3.5	5.3	12.3	57.9*	21.1
Planned use of nitrous oxide-narcotic anesthesia	57	29.8	35.1*	14.0	19.3	1.8
Preoperative or intraoperative use of beta-blockers under general anesthesia	57	5.3	35.1	26.3*	29.8	3.5
Rapid-sequence induction	57	5.3	29.8	19.3*	42.1	3.5
5. All pts should be informed of the possibility of intraop awareness	57	10.5	31.6	5.3	42.1*	10.5
6. Only patients considered to be at elevated risk of intraop awareness should be informed of the possibility of intraop awareness	40	17.5	60.0*	5.0	7.5	10.0

[***] N = the number of consultants who responded to each item. An astrisk beside a percentage score indicates the median.

	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
7. Informing the pt preoperatively of the risk of intraop awareness increases the actual risk of intraoperative awareness	53	3.8	5.7	30.2	35.8*	24.5
Preinduction activities:						
8. The functioning of anesthesia delivery systems should be checked preoperatively to reduce the risk of intraop awareness	57	77.2*	17.5	1.8	3.5	0.0
9. A benzodiazepine or scopolamine should be used as a component of the anesthetic to reduce the risk of intraop awareness:						
For all patients under GA	54	7.4	24.1	1.9	33.3*	33.3
For no patients under GA	54	3.7	3.7	3.7	46.3*	42.6
For pts with conditions that may place them at risk for intraop awareness	53	20.8	58.5*	7.5	7.5	5.7
For patients requiring smaller dosages of general anesthetics (“light anesthesia”)	53	17.0	43.4*	11.3	20.8	7.5
For patients undergoing cardiac surgery	54	22.2	44.4*	11.1	16.7	5.6
For patients undergoing Cesarean section under GA	54	7.4	29.6	20.4*	31.5	11.1
For patients undergoing emergency surgery under GA	53	15.1	30.2	20.8*	28.3	5.7
For patients undergoing trauma surgery under GA	54	16.7	35.2*	20.4	22.2	5.6
For patients undergoing total intravenous anesthesia	54	16.7	31.5	18.5*	24.1	9.3
Intraoperative Monitoring:						
10. Commonly used clinical techniques (e.g., checking for purposeful or reflex movement) are valuable and should be used to detect intraop consciousness	53	18.9	47.2*	5.7	18.9	9.4
11. Conventional monitoring systems are valuable and should be used to detect intraoperative consciousness	53	22.6	41.5*	5.7	24.5	5.7

	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
12. Brain function monitors are valuable and should be used to reduce the risk of intraoperative awareness:						
For all patients under GA	57	7.0	21.1	19.3	15.8*	36.8
For no patients under GA	56	3.6	7.1	14.3	35.7*	39.3
For pts with conditions that may place them at risk for intraop awareness	57	36.8	26.3*	14.0	14.0	8.8
For patients requiring smaller dosages of general anesthetics (“light anesthesia”)	56	26.8	32.1*	14.3	19.6	7.1
For patients undergoing cardiac surgery	57	28.1	21.1	26.3*	14.0	10.5
For patients undergoing Cesarean section under GA	57	31.6	21.1*	21.1	17.5	8.8
For patients undergoing emergency surgery under GA	57	21.1	28.1	24.6*	17.5	8.8
For patients undergoing trauma surgery under GA	57	26.3	24.6*	24.6	15.8	8.8
For patients undergoing total intravenous anesthesia	56	16.1	39.3*	23.2	14.3	7.1
13. Brain function monitors are valuable and should be used when possible to assess intraoperative depth of anesthesia:						
For all patients under GA	56	12.5	21.4	10.7	14.3*	41.1
For no patients under GA	54	9.3	5.6	9.3	37.0*	38.9
For pts with conditions that may place them at risk for intraop awareness	56	33.9	30.4*	8.9	14.3	12.5
For patients requiring smaller dosages of general anesthetics (“light anesthesia”)	56	28.6	35.7*	10.7	10.7	14.3
For patients undergoing cardiac surgery	56	26.8	28.6*	16.1	14.3	14.3
For patients undergoing Cesarean section under GA	56	28.6	32.1*	12.5	12.5	14.3

	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
For patients undergoing emergency surgery under GA	57	21.1	36.8*	10.5	17.5	14.0
For patients undergoing trauma surgery under GA	57	22.8	38.6*	10.5	14.0	14.0
For patients undergoing total intravenous anesthesia	57	26.3	35.1*	17.5	8.8	12.3
Intraoperative & Postoperative Interventions:						
14. Benzodiazepines or scopolamine should be administered intraoperatively to prevent awareness after a pt has unexpectedly become conscious	57	21.1	26.3	15.8*	21.1	15.8
15. Once an episode of intraoperative awareness has been reported, a structured interview should be conducted to define the nature of the episode	57	63.2*	31.5	1.8	0.0	0.0
16. Once an episode of intraop awareness has been reported, a questionnaire should be given to define the nature of the episode	57	10.5	19.3	36.8*	28.1	5.3
17. Once an episode of intraop awareness has been reported and documented, the pt should be offered counseling or psychological support	56	69.6*	25.0	5.4	0.0	0.0
18. Once an episode of intraop awareness has been reported, an occurrence report concerning the event should be completed for the purpose of quality management	57	54.4*	40.4	0.0	5.3	0.0

Table 2. ASA Member Survey Responses[†††]

		Percent Responding to Each Item				
Preoperative evaluation:	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. Helpful to identify pts at risk of intraoperative awareness	146	27.4	46.6*	14.4	10.3	1.4
2. A preop eval should include:						
Review of medical records	121	38.8	47.9*	7.4	5.0	0.8
A physical examination	118	23.7	37.3*	18.6	17.8	2.5
A patient/family interview	121	46.3	43.0*	6.6	3.3	0.8
3. Potential patient risk factors:						
Substance use or abuse	147	31.3	44.2*	16.3	6.8	1.4
Pt history of intraop awareness	146	45.2	31.5*	11.0	11.6	0.7
Limited hemodynamic reserve	145	46.3	38.6*	6.9	6.9	1.4
ASA status of 4 or 5	145	33.1	40.7*	11.0	13.1	2.1
4. Procedures/ anesthetic techniques that may place a patient at risk for intraop awareness:						
Cesarean section under GA, cardiac surgery, trauma, emergency surgery	151	70.2*	27.2	0.7	1.3	0.7
Planned use of reduced doses of anesthetics in the presence of paralysis	148	48.6	44.6*	4.1	2.7	0.0
Planned use of muscle relaxants for maintenance	147	21.1	34.7*	16.3	26.5	1.4
Planned use of total intravenous anesthesia	146	13.0	26.7	24.0*	32.2	4.1
Planned use of volatile anesthetics	148	0.7	10.1	10.1	63.5*	15.5
Planned use of nitrous oxide-narcotic anesthesia	147	11.6	46.9*	18.4	19.7	3.4
Preoperative or intraoperative use of beta-blockers under general anesthesia	148	4.7	31.1	23.0*	36.5	4.7
Rapid-sequence induction	148	3.4	31.1	18.9*	41.9	4.7
5. All pts should be informed of the possibility of intraop awareness	147	15.0	28.6	10.9*	40.1	5.4
6. Only patients considered to be at elevated risk of intraop awareness should be informed of the possibility of intraop awareness	112	17.0	49.1*	7.1	21.4	5.4

[†††] N = the number of members who responded to each item. An astrisk beside a percentage score indicates the median.

	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
7. Informing the pt preoperatively of the risk of intraop awareness increases the *actual* risk of intraoperative awareness	147	2.7	10.9	33.3	38.8*	14.3
Preinduction activities:						
8. The functioning of anesthesia delivery systems should be checked preoperatively to reduce the risk of intraop awareness	148	60.8*	37.8	0.7	0.7	0.0
9. A benzodiazepine or scopolamine should be used as a component of the anesthetic to reduce the risk of intraop awareness:						
For all patients under GA	150	15.3	34.0	6.0*	30.7	14.0
For no patients under GA	144	0.7	2.8	3.5	50.7*	42.4
For pts with conditions that may place them at risk for intraop awareness	148	37.8	56.1*	3.4	2.7	0.0
For patients requiring smaller dosages of general anesthetics ("light anesthesia")	150	31.3	60.7*	4.7	3.3	0.0
For patients undergoing cardiac surgery	147	39.5	48.3*	9.5	2.7	0.0
For patients undergoing Cesarean section under GA	151	13.2	23.2	27.8*	28.5	7.3
For patients undergoing emergency surgery under GA	151	21.1	42.4*	21.9	13.9	0.7
For patients undergoing trauma surgery under GA	150	24.0	44.7*	22.7	8.7	0.0
For patients undergoing total intravenous anesthesia	150	23.3	48.0*	14.0	12.7	2.0
Intraoperative Monitoring:						
10. Commonly used clinical techniques (e.g., checking for purposeful or reflex movement) are valuable and should be used to detect intraop consciousness	151	10.6	50.3*	21.2	13.9	4.0
11. Conventional monitoring systems are valuable and should be used to detect intraoperative consciousness	150	20.7	56.7*	9.3	10.7	2.7

	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
12. Brain function monitors are valuable and should be used to reduce the risk of intraoperative awareness:						
For all patients under GA	149	10.7	10.7	16.1	37.6*	24.8
For no patients under GA	146	2.7	3.4	24.7	44.5*	24.7
For pts with conditions that may place them at risk for intraop awareness	147	21.1	48.3*	19.0	10.2	1.4
For patients requiring smaller dosages of general anesthetics (“light anesthesia”)	147	19.7	38.8*	24.5	13.6	3.4
For patients undergoing cardiac surgery	148	20.3	33.8*	30.4	12.2	3.4
For patients undergoing Cesarean section under GA	148	12.8	34.5	25.0*	23.0	4.7
For patients undergoing emergency surgery under GA	146	17.8	26.0	28.8*	24.0	3.4
For patients undergoing trauma surgery under GA	148	18.9	29.7	28.4*	19.6	3.4
For patients undergoing total intravenous anesthesia	148	13.5	35.1	25.7*	20.3	5.4
13. Brain function monitors are valuable and should be used when possible to assess intraoperative depth of anesthesia:						
For all patients under GA	150	12.0	9.3	16.0	30.7*	32.0
For no patients under GA	147	2.7	4.8	24.5	41.5*	26.5
For pts with conditions that may place them at risk for intraop awareness	148	20.3	43.2*	20.9	10.8	4.7
For patients requiring smaller dosages of general anesthetics (“light anesthesia”)	149	20.1	37.6*	20.8	15.4	6.0
For patients undergoing cardiac surgery	149	20.1	27.5	28.2*	19.5	4.7
For patients undergoing Cesarean section under GA	149	13.4	30.2	22.8*	26.2	7.4
For patients undergoing emergency surgery under GA	149	14.8	26.8	24.8*	26.8	5.4
For patients undergoing trauma surgery under GA	149	16.1	28.9	25.5*	24.2	5.4
For patients undergoing total intravenous anesthesia	149	15.4	32.9	24.8*	20.1	6.7

	N	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
Intraoperative & Postoperative Interventions:						
14. Benzodiazepines or scopolamine should be administered intraoperatively to prevent awareness after a pt has unexpectedly become conscious	151	33.1	49.7*	9.9	7.3	0.0
15. Once an episode of intraoperative awareness has been reported, a structured interview should be conducted to define the nature of the episode	151	49.0	43.0*	7.3	0.7	0.0
16. Once an episode of intraop awareness has been reported, a questionnaire should be given to define the nature of the episode	151	19.9	21.9	38.4*	18.5	1.3
17. Once an episode of intraop awareness has been reported and documented, the pt should be offered counseling or psychological support	151	44.4	39.1*	14.6	1.3	0.7
18. Once an episode of intraop awareness has been reported, an occurrence report concerning the event should be completed for the purpose of quality management	151	47.7	41.1*	9.3	1.3	0.7

References[‡‡‡]

1. Myles PS, Williams D, Hendrata M, Anderson H, Weeks A: Patient satisfaction after anaesthesia and surgery: results of a prospective survey of 10,811 patients. Br J Anaesth 2000; 84:6-10
2. Nordstrom O, Engstrom AM, Persson S, Sandin R: Incidence of awareness in total i.v. anaesthesia based on propofol, alfentanil and neuromuscular blockade. Acta Anaesthesiol Scand 1997; 41:978-984
3. Sandin RH, Enlund G, Samuelsson P, Lennmarken C: Awareness during anaesthesia: a prospective case study. Lancet 2000; 355:707-311
4. Sebel PS, Bowdle TA, Ghoneim MM, Rampil IJ, Padilla RE, Gan TJ, Domino KB: The incidence of awareness during anesthesia: a multicenter United States study. Anesth Analg 2004; 99:833-839
5. Lennmarken C, Bildfors K, Enlund G, Samuelsson P, Sandin R: Victims of awareness. Acta Anaesthesiol Scand 2002; 46:229-231
6. Schacter DL: Implicit expressions of memory in organic amnesia: learning of new facts and associations. Hum Neurobiol 1987; 6:107-118
7. Brundidge PK, Leavell ME, Tempelhoff R: EEG-controlled "overdosage" of anesthetics in a patient with a history of intra-anesthetic awareness. J Clin Anesth 1994; 6:496-499
8. Domino KB, Posner KL, Caplan RA, Cheney FW: Awareness during anesthesia: a closed claims analysis. Anesthesiology 1999; 90:1053-1061
9. Gan TJ, Glass PS, Sigl J, Sebel P, Payne F, Rosow C, Embree P: Women emerge from general anesthesia with propofol/alfentanil/nitrous oxide faster than men. Anesthesiology 1999; 90:1283-1287
10. Lopez U, Iselin-Chaves I, Habre W, Van der Linden M: Incidence of awareness during general anaesthesia in children. Br J Anaesth 2004; 93:490P-491P
11. Lopez-Candel E, Canovas E, Lopez-Candel J, Garcia R, Soler J, Fernandez S, Hernandez JP, Vargas J: Awareness: Report of a case in pediatric surgery. Cirugia Pediatr 2000; 13:81-83
12. Adams DC, Hilton HJ, Madigan JD, Szerlip NJ, Cooper LA, Emerson RG, Smith CR, Rose EA, Oz MC. Evidence for unconscious memory processing during elective cardiac surgery. Circulation 1998; 98:II289-292
13. Baraka A, Siddik S, Assaf B: Supplementation of general anaesthesia with tramadol or fentanyl in parturients undergoing elective caesarean section. Can J Anaesth 1998; 45:631-634
14. Bogetz MS, Katz JA: Recall of surgery for major trauma. Anesthesiology 1984; 61:6-9
15. Bogod DG, Orton JK, Yau HM, Oh TE: Detecting awareness during general anaesthetic caesarean section. An evaluation of two methods. Anaesthesia 1990; 45:279-284
16. Brahams D: Caesarean section: pain and awareness without negligence. Anaesthesia 1990; 45:161-162
17. Gilron I, Solomon P, Plourde G: Unintentional intraoperative awareness during sufentanil anaesthesia for cardiac surgery. Can J Anaesth 1996; 43:295-298
18. Goldmann L, Shah MV, Hebden MW: Memory of cardiac anaesthesia. Psychological sequelae in cardiac patients of intra-operative suggestion and operating room conversation. Anaesthesia 1987; 42:596-603

[‡‡‡] The references listed here do not represent a complete bibliography of the literature reviewed. A complete bibliography is available by writing to the American Society of Anesthesiologists or by accessing the *Anesthesiology* Web site: http//www.anesthesiology.org

19. Jeon SY, Lim HJ, Cho H, Lee BW: Awareness detection during a cesarean section under general anesthesia using bispectral index monitoring. Korean J Anesth 2000; 39:632-637
20. Lubke GH, Kerssens C, Gershon RY, Sebel PS: Memory formation during general anesthesia for emergency cesarean sections. Anesthesiology 2000; 92:1029-1034
21. Lyons G, Macdonald R: Awareness during caesarean section. Anaesthesia 1991; 46:62-64
22. Mark JB, Greenberg LM: Intraoperative awareness and hypertensive crisis during high-dose fentanyl-diazepam-oxygen anesthesia. Anesth Analg 1983; 62:698-700
23. Moerman A, Herregods L, Foubert L, Poelaert J, Jordaens L, D'Hont L, Rolly G: Awareness during anaesthesia for implantable cardioverter defibrillator implantation. Recall of defibrillation shocks. Anaesthesia 1995; 50:733-735
24. Moerman N, Bonke B, Oosting J: Awareness and recall during general anesthesia. Facts and feelings. Anesthesiology 1993; 79:454-464
25. Phillips AA, McLean RF, Devitt JH, Harrington EM: Recall of intraoperative events after general anaesthesia and cardiopulmonary bypass. Can J Anaesth 1993; 40:922-926
26. Ranta SO, Herranen P, Hynynen M: Patients' conscious recollections from cardiac anesthesia. J Cardiothorac Vasc Anesth 2002; 16:426-430
27. Ranta SO, Jussila J, Hynyen M: Recall of awareness during cardiac anaesthesia: Influence of feedback information to the anaesthesiologist. Acta Anaesth Scand 1996; 40:554-560
28. Russell IF, Wang M: Absence of memory for intraoperative information during surgery under adequate general anaesthesia. Br J Anaesth 1997; 78:3-9
29. Schultetus RR, Hill CR, Dharamraj CM, Banner TE, Berman LS: Wakefulness during cesarean section after anesthetic induction with ketamine, thiopental, or ketamine and thiopental combined. Anesth Analg 1986; 65:723-728
30. Dowd NP, Cheng DC, Karski JM, Wong DT, Munro JA, Sandler AN: Intraoperative awareness in fast-track cardiac anesthesia. Anesthesiology 1998; 89:1068-1073
31. Ranta SO, Laurila R, Saario J, Ali-Melkkila T, Hynynen M: Awareness with recall during general anesthesia: incidence and risk factors. Anesth Analg 1998; 86:1084-1089
32. Rowan KJ: Awareness under TIVA: a doctor’s personal experience. Anesth Intens Care 2002; 30:505-506
33. Sandin RH, Norstrom O: Awareness during total i.v. anaesthesia. Br J Anaesth 1993; 71:782-787
34. Bergman IJ, Kluger MT, Short TG: Awareness during general anaesthesia: a review of 81 cases from the Anaesthetic Incident Monitoring Study. Anaesthesia 2002; 57:549-556
35. Caplan RA, Vistica MF, Posner KL, Cheney FW: Adverse anesthetic outcomes arising from gas delivery equipment. Anesthesiology 1997; 87:741-748
36. Lamberty JM, Lerman J: Intraoperative failure of a Fluotec Mark II vapourizer. Can Anaesth Soc J 1984; 31:687-689
37. Masuda A, Arai Y, Hirota K, Shibuya N, Ito Y: Misuse of infusion pump during propofol anaesthesia. Can J Anaesth 1998; 145:187-188
38. Slinger PD, Scott WA, Kliffer AP: Intraoperative awareness due to malfunction of a Siemens 900B ventilator. Can J Anaesth 1990; 37:258-261
39. Tong D, Chung F: Recall after total intravenous anaesthesia due to an equipment misuse. Can J Anaesth 1997; 44:73-77
40. Miller DR, Blew PG, Martineau RJ, Hull KA: Midazolam and awareness with recall during total intravenous anaesthesia. Can J Anaesth 1996; 43:946-953

41. Bulach R, Myles PS, Russnak M: Double-blind randomized controlled trial to determine extent of anmesia with midazolam given immediately before general anesthesia. Br J Anaesth 2005; 94:300-305
42. Twersky RS, Hartung J, Berger BJ, McClain J, Beaton C: Midazolam enhances anterograde but not retrograde amnesia in pediatric patients. Anesthesiology 1993; 78:51-55
43. Smith WD, Dutton RC, Smith NT: Measuring the performance of anesthetic depth indicators. Anesthesiology 1996; 84:38-51
44. Leslie K, Sessler DI, Smith WD, Larson MD, Ozaki M, Blanchard D, Crankshaw DP: Prediction of movement during propofol/nitrous oxide anesthesia. Performance of concentration, electroencephalographic, pupillary, and hemodynamic indicators. Anesthesiology 1996; 84:52-63
45. Dutton RC, Smith WD, Smith NT: Wakeful response to command indicates memory potential during emergence from general anesthesia. J Clin Monit 1995; 11:35-40
46. Schmidt G, Bischoff P, Standl T, Hellstern A, Teuber O, am Schulte Esch J: Comparative evaluation of the Datex-Ohmeda S/5 entropy module and the bispectral index monitor during propofol-remifentanil anesthesia. Anesthesiology 2004; 101:1283-1290
47. Schmidt GN, Bischoff P, Standl T, Jensen K, Voigt M, Schulte Am Esch J: Narcotrend and Bispectral index monitor are superior to classic electroencephalographic parameters for the assessment of anesthetic states during propofol-remifentanil anesthesia. Anesthesiology 2003; 99:1072-1077
48. Schmidt GN, Bischoff P, Standl T, Lankenau G, Hilbert M, Schulte am Esch J: Comparative evaluation of narcotrend, bispectral index, and classical electroencephalographic variables during induction, maintenance, and emergence of a propofol/remifentanil anesthesia. Anesth Analg 2004; 98:1346-1353
49. Atallah MM, el-Mohayman HA, el-Metwally RE: Ketamine-midazolam total intravenous anaesthesia for prolonged abdominal surgery. Eur J Anaesthesiol 2001; 18:29-35
50. Coste C, Guignard B, Menigaux C, Chauvin M: Nitrous oxide prevents movement during orotracheal intubation without affecting BIS value. Anesth Analg 2000; 91:130-135
51. Hackner C, Detsch O, Schneider G, Jelen-Esselborn S, Kochs E: Early recovery after remifentanil-pronounced compared with propofol-pronounced total intravenous anaesthesia for short painful procedures. Br J Anaesth 2003; 91:580-582
52. Iannuzzi M, Iannuzzi E, Rossi F, Berrino L, Chiefari M: Relationship between bispectral index, electroencephalographic state entropy and efect-site EC50 for propofol at different clinical endpoints. Br J Anaesth 2005; 94:613-16
53. Lehmann A, Zeitler C, Thaler E, Isgro F, Boldt J: Comparison of two different anesthesia regimens in patients undergoing aortocoronary bypass grafting surgery: sufentanil-midazolam versus remifentanil-propofol. J Cardiothorac Vasc Anesth 2000; 14:416-420
54. McCann ME, Brustowicz RM, Bacsik J, Sullivan L, Auble SG, Laussen PC: The bispectral index and explicit recall during the intraoperative wake-up test for scoliosis surgery. Anesth Analg. 2002; 94:1474-1478
55. McDonald T, Hoffman WE, Berkowitz R, Cunningham F, Cooke B: Heart rate variability and plasma catecholamines in patients during opioid detoxification. J Neurosurg Anesthesiol 1999; 11:195-199
56. Ting CK, Hu JS, Teng YH, Chang YY, Tsou MY, Tsai SK: Desflurane accelerates patient response during the wake-up test for scoliosis surgery. Can J Anesth 2004; 51:393-397
57. Rampil IJ: A primer for EEG signal processing in anesthesia. Anesthesiology 1998; 89:980-1002

58. Myles PS, Leslie K, McNeil J, Forbes A, Chan MTV: Bispectral index monitoring to prevent awareness during anaesthesia: the B-aware randomised controlled trial. Lancet 2004; 363:1757-1763
59. Puri GD, Murthy SS: Bispectral index monitoring in patients undergoing cardiac surgery under cardiopulmonary bypass. Eur J Anaesth 2003; 20:451-456
60. Bannister CF, Brosius KK, Sigl JC, Meyer BJ, Sebel PS: The effect of bispectral index monitoring on anesthetic use and recovery in children anesthetized with sevoflurane in nitrous oxide. Anesth Analg 2001; 92:877-881
61. Basar H, Ozcan S, Buyukkocak U, Akpinar S, Apan A: Effect of bispectral index monitoring on sevoflurane consumption. Eur J Anaesth 2003; 20:396-400
62. Gan TJ, Glass PS, Windsor A, Payne F, Rosow C, Sebel P, Manberg P: Bispectral index monitoring allows faster emergence and improved recovery from propofol, alfentanil, and nitrous oxide anesthesia. Anesthesiology 1997; 87:808-815
63. Kreuer S, Biedler A, Larsen R, Altmann S, Wilhelm W: Narcotrend monitoring allows faster emergence and a reduction of drug consumption in propofol-remifentanil anesthesia. Anesthesiology 2003; 99:34-41
64. Recart A, Gasanova I, White PF, Thomas T, Ogunnaike B, Hamza M, Wang A: The effect of cerebral monitoring on recovery after general anesthesia: a comparison of the auditory evoked potential and bispectral index devices with standard clinical practice. Anesth Analg 2003; 97:1667-1674
65. Song D, Joshi GP, White PF: Titration of volatile anesthetics using bispectral index facilitates recovery after ambulatory anesthesia. Anesthesiology 1997; 87:842-848
66. White PF, Ma H, Tang J, Wender RH, Sloninsky A, Kariger R: Does the use of electroencephalographic bispectral index or auditory evoked potential index monitoring facilitate recovery after desflurane anesthesia in the ambulatory setting? Anesthesiology 2004; 100:811-817
67. Wong J, Song D, Blanshard H, Grady D, Chung F: Titration of isoflurane using BIS index improves early recovery of elderly patients undergoing orthopedic surgeries. Can J Anaesth 2002; 49:13-18
68. Yli-Hankala A, Vakkuri A, Annila P, Korttila K: EEG bispectral index monitoring in sevoflurane or propofol anaesthesia: analysis of direct costs and immediate recovery. Acta Anaesthesiol Scand 1999; 43:545-549
69. Ekman A, Lindholm ML, Lennmarken C, Sandin R: Reduction in the incidence of awareness using BIS monitoring. Acta Anaesth Scand 2004; 48:20-26
70. Burrow B, McKenzie B, Case C: Do anaesthetized patients recover better after bispectral index Monitoring? Anaesth Intensive Care 2001; 29:239-245
71. Guignard B, Coste C, Menigaux C, Chauvin M: Reduced isoflurane consumption with bispectral index monitoring. Acta Anaesthesiol Scand 2001; 45:308-314
72. Glass PS, Bloom M, Kearse L, Rosow C Sebel P, Manberg P: Bispectral analysis measures sedation and memory effects of propofol, midazolam, isoflurane, and alfentanil in healthy individuals. Anesthesiology 1997; 86:836-837
73. Kreuer S, Bruhn J, Larsen R, Bialas P, Wilhelm W: Comparability of Narcotrend index and bispectral index during propofol anaesthesia. Br J Anaesth 2004; 93:235-240
74. Kreuer S, Bruhn J, Larsen R, Hoepstein M, Wilhelm W: Comparison of Alaris AEP index and bispectral index during propofol-remifentanil anaesthesia. Br J Anaesth 2003; 91:336-340

75. Lysakowski C, Dumont L, Pellegrini M, Clergue F, Tassonyi E: Effects of fentanyl, alfentanil, remifentanil and sufentanil on loss of consciousness and bispectral index during propofol induction of anaesthesia. Br J Anaesth 2001; 86:523-527
76. Schmidt GN, Bischoff P, Standl T, Issleib M, Voigt M, Schulte Am Esch J: ARX-derived auditory evoked potential index and bispectral index during the induction of anesthesia with propofol and remifentanil. Anesth Analg 2003; 97:139-144
77. Schneider G, Gelb AW, Schmeller B, Tschakert R, Kochs E: Detection of awareness in surgical patients with EEG-based indices—bispectral index and patient state index. Br J Anaesth 2003; 91:329-935
78. Schraag S, Bothner U, GajraJ R, Kenny GN, Georgieff M: The performance of electroencephalogram bispectral index and auditory evoked potential index to predict loss of consciousness during propofol infusion. Anesth Analg 1999; 89:1311-1315
79. Absalom AR, Sutcliffe N, Kenny GN: Closed-loop control of anesthesia using bispectral index: performance assessment in patients undergoing major orthopedic surgery under combined general and regional anesthesia. Anesthesiology 2002; 96:67-73
80. Anderson RE, Barr G, Assareh H, Jakobsson J: The AAI index, the BIS index and end-tidal concentration during wash in and wash out of sevoflurane. Anaesthesia 2003; 58:531-535
81. Barvais L, Engelman E, Eba JM, Coussaert E, Cantraine F, Kenny GN: Effect site concentrations of remifentanil and pupil response to noxious stimulation. Br J Anaesth 2003; 91:347-352
82. Billard V, Gambus PL, Chamoun N, Stanski DR, Shafer SL: A comparison of spectral edge, delta power, and bispectral index as EEG measures of alfentanil, propofol, and midazolam drug effect. Clin Pharmacol Ther 1997; 61:45-58
83. Brosius KK, Bannister CF: Oral midazolam premedication in preadolescents and adolescents. Anesth Analg 2002; 94:31-36
84. Chawathe MS, Francis V, Hall JE, Mecklenburth JS, Aguilera IM: Interpretation of BIS values in children using aspect 2000 monitor during i.v. induction. Br J Anaesth 2004; 92:301P-302P
85. Choudhry DK, Brenn BR: Bispectral index monitoring: a comparison between normal children and children with quadriplegic cerebral palsy. Anesth Analg 2002; 95:1582-1585
86. Denman WT, Swanson EL, Rosow D, Ezbicki K, Connors PD, Rosow CE: Pediatric evaluation of the bispectral index (BIS) monitor and correlation of BIS with end-tidal sevoflurane concentration in infants and children. Anesth Analg 2000; 90:872-877
87. El-Kerdawy HM, Zalingen EE, Bovill JG: The influence of the alpha2-adrenoceptor agonist, clonidine, on the EEG and on the MAC of isoflurane. Eur J Anaesth 2000; 17:105-110
88. Flaishon R, Windsor A, Sigl J, Sebel PS: Recovery of consciousness after thiopental or propofol. bispectral index and isolated forearm technique. Anesthesiology 1997; 86:613-619
89. Friedberg BL: The effect of a dissociative dose of ketamine on the bispectral index (BIS) during propofol hypnosis. J Clin Anesth 1999; 11:4-7
90. Gajraj RJ, Doi M, Mantzaridis H, Kenny GN: Comparison of bispectral EEG analysis and auditory evoked potentials for monitoring depth of anaesthesia during propofol anaesthesia. Br J Anaesth 1999; 82:672-678
91. Gale T, Leslie K, Kluger M: Propofol anaesthesia via target controlled infusion or manually controlled infusion: effects on the bispectral index as a measure of anaesthetic depth. Anaesth Intens Care 2001; 29:579-584
92. Goto T, Nakata Y, Saito H, Ishiguro Y, Niimi Y, Suwa K, Morita S: Bispectral analysis of the electroencephalogram does not predict responsiveness to verbal command in patients emerging from xenon anaesthesia. Br J Anaesth 2000; 85:359-363

93. Greif R, Greenwald S, Schweitzer E, Laciny S, Rajek A, Caldwell JE, Sessler DI: Muscle relaxation does not alter hypnotic level during propofol anesthesia. Anesth Analg 2002; 94:604-608
94. Gunawardane PO, Murphy PA, Sleigh JW: Bispectral index monitoring during electroconvulsive therapy under propofol anaesthesia. Br J Anaesth 2002; 88:184-187
95. Jellish WS, Leonetti JP, Avramov A, Fluder E, Murdoch J: Remifentanil-based anesthesia versus a propofol technique for otologic surgical procedures. Otolaryngol Head Neck Surg 2000; 122:222-227
96. Kim DW, Kil HY, White PF: Relationship between clinical endpoints for induction of anesthesia and bispectral index and effect-site concentration values. J Clin Anesth 2002; 14:241-245
97. Kuizenga K, Wierda JM, Kalkman CJ: Biphasic EEG changes in relation to loss of consciousness during induction with thiopental, propofol, etomidate, midazolam or sevoflurane. Br J Anaesth 2001; 86:354-360
98. McDonald TB, Berkowitz RA, Hoffman WE: Median EEG frequency is more sensitive to increases in sympathetic activity than bispectral index. J Neurosurg Anesth 1999; 11:255-259
99. Menigaux C, Guignard B, Adam F, Sessler DI, Joly V, Chauvin M: Esmolol prevents movement and attenuates the BIS response to orotracheal intubation. Br J Anaesth 2002; 89:857-862
100. Mi W, Sakai T, Kudo T, Kudo M, Matsuki A: The interaction between fentanyl and propofol during emergence from anesthesia: monitoring with the EEG-Bispectral index. J Clin Anesth 2003; 15:103-107
101. Mi WD, Sakai T, Singh H, Kudo T, Kudo M, Matsuki A: Hypnotic endpoints vs. the bispectral index, 95% spectral edge frequency and median frequency during propofol infusion with or without fentanyl. Eur J Anaesth 1999; 16:47-52
102. Mi WD, Sakai T, Takahashi S, Matsuki A: Haemodynamic and electroencephalograph responses to intubation during induction with propofol or propofol/fentanyl. Can J Anaesth 1998; 45:19-22
103. Sakai T, Singh H, Mi WD, Kudo T, Matsuki A: The effect of ketamine on clinical endpoints of hypnosis and EEG variables during propofol infusion. Acta Anaesthesiol Scand 1999; 43:212-216
104. Shao X, Li H, White PF, Klein KW, Kulstad C, Owens A: Bisulfite-containing propofol: is it a cost-effective alternative to Diprivan for induction of anesthesia? Anesth Analg 2000; 91:871-875
105. Singh H, Sakai T, Matsuki A: Movement response to skin incision: analgesia vs.bispectral index and 95% spectral edge frequency. Eur J Anaesthesiol 1999; 16:610-614
106. Sleigh JW, Donovan J: Comparison of bispectral index, 95% spectral edge frequency and approximate entropy of the EEG, with changes in heart rate variability during induction of general anaesthesia. Br J Anaesth 1999; 82:666-671
107. Sun R, Watcha MF, White PF, Skrivanek GD, Griffin JD, Stool L, Murphy MT: A cost comparison of methohexital and propofol for ambulatory anesthesia. Anesth Analg 1999; 89:311-316
108. Vernon JM, Lang E, Sebel PS, Manberg P: Prediction of movement using bispectral electroencephalographic analysis during propofol/alfentanil or isoflurane/alfentanil anesthesia. Anesth Analg 1995; 80:780-785

109. White PF, Wang B, Tang J, Wender RH, Naruse R, Sloninsky A: The effect of intraoperative use of esmolol and nicardipine on recovery after ambulatory surgery. Anesth Analg 2003; 97:1633-1638
110. Wuesten R, Van Aken H, Glass PS, Buerkle H: Assessment of depth of anesthesia and postoperative respiratory recovery after remifentanil- versus alfentanil-based total intravenous anesthesia in patients undergoing ear-nose-throat surgery. Anesthesiology 2001; 94:211-217
111. Chazot T, Liu N, Tremelot L, Joukovsky P, Fischler M: Detection of gas embolism by bispectral index and entropy monitoring in two cases. Anesthesiology 2004; 101:1053-1054
112. Hayashida M, Chinzei M, Komatsu K, Yamamoto H, Tamai H, Orii R, Hanaoka K, Murakami A: Detection of cerebral hypoperfusion with bispectral index during paediatric cardiac surgery. Br J Anaesth 2003; 90:694-698
113. Honan DM, Breen PJ, Boylan JF, McDonald NJ, Egan TD: Decrease in bispectral index preceding intraoperative hemodynamic crisis: evidence of acute alteration of propofol pharmacokinetics. Anesthesiology 2002; 97:1303-1305
114. Kakinohana M, Miyata Y, Kawabata T, Kawashima S, Tokumine J, Sugahara K: Bispectral index decreased to "0" in propofol anesthesia after a cross-clamping of descending thoracic aorta. Anesthesiology 2003; 99:1223-1225
115. Kin N, Konstadt S, Sato K, Hanaoka K: Reduction of bispectral index value associated with clinically significant cerebral air embolism. J Cardiothorac Vasc Anesth 2004; 18:82-84
116. Luginbuhl M, Schnider TW: Detection of awareness with the bispectral index: two case reports. Anesthesiology 2002; 96:241-243
117. Merat S, Levecque J, Le Gulluche Y, Diraison Y, Brinquin L, Hoffmann J: BIS monitoring may allow the detection of severe cerebral ischemia. Can J Anesth 2001; 48:1066-1069
118. Mourisse J, BooiJ L: Bispectral index detects period of cerebral hypoperfusion during cardiopulmonary bypass. J Cardiothorac Vasc Anesth 2003; 17:76-78
119. Welsby IJ, Ryan JM, Booth JV, Flanagan E, Messier RH, Borel CO: The bispectral index in the diagnosis of perioperative stroke: a case report and discussion. Anesth Analg 2003; 96:435-427
120. Bruhn J, Bouillon TW, Shafer SL: Electromyographic activity falsely elevates the bispectral index. Anesthesiology 2000; 92:1485-1487
121. Gallagher JD: Pacer-induced artifact in the bispectral index during cardiac surgery. Anesthesiology 1999; 90:636
122. Hemmerling TM, Desrosiers M: Interference of electromagnetic operating systems in otorhinolaryngology surgery with bispectral index monitoring. Anesth Analg 2003; 96:1698-1699
123. Hemmerling TM, Fortier JD: Falsely increased bispectral index values in a series of patients undergoing cardiac surgery using forced-air-warming therapy of the head. Anesth Analg 2002; 95:322-323
124. Hemmerling TM, Migneault B: Falsely increased bispectral index during endoscopic shoulder surgery attributed to interferences with the endoscopic shaver device. Anesth Analg 2002; 95:1678-1679
125. Morimoto Y, Matsumoto A, Koizumi Y, Gohara T, Sakabe T, Hagihira S: Changes in the bispectral index during intraabdominal irrigation in patients anesthetized with nitrous oxide and sevoflurane. Anesth Analg 2005; 100:1370-1374
126. Mychaskiw G, Heath BJ, Eichhorn JH: Falsely elevated bispectral index during deep hypothermic circulatory arrest. Br J Anaesth 2000; 85:798-800

127. Myles PS, Cairo S: Artifact in the bispectral index in a patient with severe ischemic brain injury. Anesth Analg 2004; 98:706-707
128. Puri GD, Bagchi A, Anandamurthy B, Dhaliwal RS: The Bispectral index and induced hypothermia--electrocerebral silence at an unusually high temperature. Anaesth Intensive Care 2003; 31:578-580
129. Mychaskiw G 2nd, Horowitz M, Sachdev V, Heath BJ: Explicit intraoperative recall at a bispectral index of 47. Anesth Analg 2001; 92:808-809
130. Rampersad SE, Mulroy MF: A case of awareness despite an "adequate depth of anesthesia" as indicated by a bispectral index monitor. Anesth Analg 2005; 100:1363-1364
131. Chinzei M, Sawamura S, Hayashida M, Kitamura T, Tamai H, Hanaoka K: Change in bispectral index during epileptiform electrical activity under sevoflurane anesthesia in a patient with epilepsy. Anesth Analg 2004; 98:1734-1736
132. Hagihira S, Okitsu K, Kawaguchi M: Unusually low bispectral index values during emergence from anesthesia. Anesth Analg 2004; 98:1036-1038
133. Schnider TW, Luginbuhl M, Petersen-Felix S, Mathis J: Unreasonably low bispectral index values in a volunteer with genetically determined low-voltage electroencephalographic signal. Anesthesiology 1998; 89:1607-1608
134. Viertio-Oja H, Maja V, Sarkela M, Talja P, Tenkanen N, Tolvanen-Laakso H, Paloheimo M, Vakkuri A, Yli-Hankala A, Merilainen P: Description of the entropy algorithm as applied in the Datex-Ohmeda S/5 Entropy Module. Acta Anaesth Scand 2004; 48:154-161
135. Vakkuri A, Yli-Hankala A., Sandin R, Mustola S, Høymork S, Nyblom S, Talja P, Sampson T, van Gils M, Viertiö-Oja H: Spectral entropy monitoring is associated with reduced propofol use and faster emergence in propofol-nitrous oxide-alfentanil anesthesia. Anesthesiology 2005; 103:274-279
136. Bruhn J, Bouillon TW, Radulescu L, Hoeft A, Bertaccini E, Shafer SL: Correlation of approximate entropy, bispectral index, and spectral edge frequency 95 (SEF95) with clinical signs of "anesthetic depth" during coadministration of propofol and remifentanil. Anesthesiology 2003; 98:621-627
137. Vanluchene ALG, Struys MMRF, Heyse BEK, Mortier EP: Spectral entropy measurement during propofol and remifentanil. A comparison with the bispectral index. Br J Anaesth 2004; 93:645-654
138. Anderson RE, Barr G, Owell A, Jakobsson J: Entropy during propofol hypnosis including an episode of wakefulness. Anaesthesia 2004; 59:52-56
139. Wheeler PJ, Baughman VL, Koenig HM, Hoffman WE: The role of facial EMG and entropy EEG in evaluating adequacy of anesthesia. J Neurosurg Anesthesiol 2004; 16:373-4
140. Schultz B, Schultz A, Grouven U. Sleeping stage based systems (Narcotrend). In: Bruch HP, Kockerling F, Bouchard R, et al. (eds): New aspects of high technology in medicine 2000. Bolognia: Monduzzi Editore, 285–91
141. Chen X, Tang J, White PF, Wender RH, Ma H, Sloninsky A, Kariger R: A comparison of patient state index and bispectral index values during the perioperative period. Anesth Analg 2002; 95:1669-1674
142. Wong CA, Fragen RJ, Fitzgerald PC, McCarthy RJ: The association between propofol-induced loss of consciousness and the SNAP^{TM} index. Anesth Analg 2005; 100:141-148
143. Thornton C, Konieczko KM, Jones JG, Jordan C, Dore CJ, Heneghan CPH: Effect of surgical stimulation on the auditory evoked response. Br J Anaesth 1988; 60:372-378
144. Kenny GN, Mantzaridis H: Closed-loop control of propofol anaesthesia. Br J Anaesth 1999; 83:223-228

Attachment D

STANDARDS FOR BASIC ANESTHETIC MONITORING

Committee of Origin: Standards and Practice Parameters

(Approved by the ASA House of Delegates on October 21, 1986, and last amended on October 25, 2005)

These standards apply to all anesthesia care although, in emergency circumstances, appropriate life support measures take precedence. These standards may be exceeded at any time based on the judgment of the responsible anesthesiologist. They are intended to encourage quality patient care, but observing them cannot guarantee any specific patient outcome. They are subject to revision from time to time, as warranted by the evolution of technology and practice. They apply to all general anesthetics, regional anesthetics and monitored anesthesia care. This set of standards addresses only the issue of basic anesthetic monitoring, which is one component of anesthesia care. In certain rare or unusual circumstances, 1) some of these methods of monitoring may be clinically impractical, and 2) appropriate use of the described monitoring methods may fail to detect untoward clinical developments. Brief interruptions of continual† monitoring may be unavoidable. These standards are not intended for application to the care of the obstetrical patient in labor or in the conduct of pain management.

STANDARD I

Qualified anesthesia personnel shall be present in the room throughout the conduct of all general anesthetics, regional anesthetics and monitored anesthesia care.

OBJECTIVE

Because of the rapid changes in patient status during anesthesia, qualified anesthesia personnel shall be continuously present to monitor the patient and provide anesthesia care. In the event there is a direct known hazard, e.g., radiation, to the anesthesia personnel which might require intermittent remote observation of the patient, some provision for monitoring the patient must be made. In the event that an emergency requires the temporary absence of the person primarily responsible for the anesthetic, the best judgment of the anesthesiologist will be exercised in comparing the emergency with the anesthetized patient's condition and in the selection of the person left responsible for the anesthetic during the temporary absence.

STANDARD II

During all anesthetics, the patient's oxygenation, ventilation, circulation and temperature shall be continually evaluated.

OXYGENATION

OBJECTIVE

To ensure adequate oxygen concentration in the inspired gas and the blood during all anesthetics.

METHODS

l) Inspired gas: During every administration of general anesthesia using an anesthesia machine, the concentration of oxygen in the patient breathing system shall be measured by an oxygen analyzer with a low oxygen concentration limit alarm in use.*

† Note that "continual" is defined as "repeated regularly and frequently in steady rapid succession" whereas "continuous" means "prolonged without any interruption at any time."

* Under extenuating circumstances, the responsible anesthesiologist may waive the requirements marked with an asterisk (*); it is recommended that when this is done, it should be so stated (including the reasons) in a note in the patient's medical record.

2) Blood oxygenation: During all anesthetics, a quantitative method of assessing oxygenation such as pulse oximetry shall be employed.* When the pulse oximeter is utilized, the variable pitch pulse tone and the low threshold alarm shall be audible to the anesthesiologist or the anesthesia care team personnel.* Adequate illumination and exposure of the patient are necessary to assess color.*

VENTILATION

OBJECTIVE

To ensure adequate ventilation of the patient during all anesthetics.

METHODS

l) Every patient receiving general anesthesia shall have the adequacy of ventilation continually evaluated. Qualitative clinical signs such as chest excursion, observation of the reservoir breathing bag and auscultation of breath sounds are useful. Continual monitoring for the presence of expired carbon dioxide shall be performed unless invalidated by the nature of the patient, procedure or equipment. Quantitative monitoring of the volume of expired gas is strongly encouraged.*

2) When an endotracheal tube or laryngeal mask is inserted, its correct positioning must be verified by clinical assessment and by identification of carbon dioxide in the expired gas. Continual end-tidal carbon dioxide analysis, in use from the time of endotracheal tube/laryngeal mask placement, until extubation/removal or initiating transfer to a postoperative care location, shall be performed using a quantitative method such as capnography, capnometry or mass spectroscopy.* When capnography or capnometry is utilized, the end tidal CO_2 alarm shall be audible to the anesthesiologist or the anesthesia care team personnel.*

3) When ventilation is controlled by a mechanical ventilator, there shall be in continuous use a device that is capable of detecting disconnection of components of the breathing system. The device must give an audible signal when its alarm threshold is exceeded.

4) During regional anesthesia and monitored anesthesia care, the adequacy of ventilation shall be evaluated by continual observation of qualitative clinical signs and/or monitoring for the presence of exhaled carbon dioxide.

CIRCULATION

OBJECTIVE

To ensure the adequacy of the patient's circulatory function during all anesthetics.

METHODS

1) Every patient receiving anesthesia shall have the electrocardiogram continuously displayed from the beginning of anesthesia until preparing to leave the anesthetizing location.*

2) Every patient receiving anesthesia shall have arterial blood pressure and heart rate determined and evaluated at least every five minutes.*

3) Every patient receiving general anesthesia shall have, in addition to the above, circulatory function continually evaluated by at least one of the following: palpation of a pulse, auscultation of heart sounds, monitoring of a tracing of intra-arterial pressure, ultrasound peripheral pulse monitoring, or pulse plethysmography or oximetry.

* Under extenuating circumstances, the responsible anesthesiologist may waive the requirements marked with an asterisk (*); it is recommended that when this is done, it should be so stated (including the reasons) in a note in the patient's medical record.

STANDARDS FOR BASIC ANESTHETIC MONITORING

BODY TEMPERATURE

OBJECTIVE

To aid in the maintenance of appropriate body temperature during all anesthetics.

METHODS

Every patient receiving anesthesia shall have temperature monitored when clinically significant changes in body temperature are intended, anticipated or suspected.

Attachment E

The Columbus Dispatch
Ohio's Greatest Online Newspaper

IV fiasco led killer to ask for plan B

Friday, May 12, 2006

Andrew Welsh - Huggins
ASSOCIATED PRESS

A condemned inmate asked prison staffers to find another way to kill him after difficulty finding a vein delayed his execution by almost 90 minutes, state prison records show.

"Can you just give me something by mouth to end this?" convicted killer Joseph Clark asked members of the execution team as they struggled to find a way to insert an intravenous line after the first try failed.

Joseph Clark, 57, was executed on May 2 for killing a clerk while robbing a gas station in Toledo in 1984.

Clark's execution was plagued with problems from the beginning, when team members struggled for several minutes to find a vein to take the IV. After proceeding with a shunt in Clark's left arm, the vein collapsed and the execution team had to start over.

After finally attaching a shunt to Clark's right arm, the execution team apparently tried to administer the lethal drugs through the original IV line by mistake, according to written accounts of the execution obtained by the Associated Press.

A member of the execution team said he realized a problem "upon noticing the wrong reaction by Inmate Clark again," the member's statement said.

"I noticed I had picked up the wrong line. Once I switched to proper IV line, execution was completed successfully."

The team member noticed Clark moved his left foot, said prisons spokeswoman Andrea Dean.

During the first attempt to administer the drugs, Clark continued to move and then finally pushed himself up and said, "It don't work."

Clark, 57, sentenced to die in November 1984 for killing David Manning, had been facing execution longer than all but 11 of the 193 men on Ohio's Death Row.

The problems with the execution fueled a growing debate about lethal injection, with many Death Row inmates saying that their executions could be painful, either because of the drug combination or because the procedure is not handled by specially trained medical personnel.

A lawyer representing Clark's family said the records underscore the need for a thorough investigation.

"There's something drastically wrong with the procedures that are in place, and we hope that this leads to an honest evaluation and discussion of these problems," Alan Konop said. "This should never happen and hopefully will never happen again."

The Department of Rehabilitation and Correction is re- viewing the execution because of the problems but doesn't think its procedures are flawed.

"The vein simply collapsed; that wasn't a flaw in the process," Dean said.

The handwritten reports by members of the execution team, who volunteer for the job, provide an intimate though emotionless view of the execution process. No report indicated a team member was upset by what happened, and the reports do not include the prison employees' names.

"I assisted by holding the inmate's feet, patting them in an attempt to calm him down," one team member wrote.

The team appeared to anticipate problems early on. "As an observer for the insertion of the IV catheters, I noted that Mr. Clark's veins were not going to be easy to find," one member wrote.

Several team members said they didn't think Clark suffered during the ordeal, which began at 9:58 a.m. when members of the team entered a holding cell to insert the shunts.

"Clark showed no signs of suffering during this process," one report said.

But another report said the "inmate seemed to have some discomfort" where the left shunt was placed.

The same team member who picked up the wrong line wrote, "Inmate Clark was afraid, but not in any distress."

As the troubles finding Clark's vein continued, a team member standing with reporters, Clark's attorney and members of Manning's family decided to draw the curtain that blocked public view of the death chamber.

That decision elicited a protest from the American Civil Liberties Union, which previously sued to force the prison system to show more of the state's execution process.

The team member defended the decision, saying people were getting upset.

"I could feel the tension rising inside the viewing chamber, and upon that time closed the curtain," the team member wrote. "I personally felt this was a very wise decision to alleviate extra stress upon all witnesses until the team could determine what happened."

Dean, a witness of this and several other executions, gave a slightly different account.

"There was an air of apprehension because we didn't know what was going on because this had never happened before," she said.

The team, numbering between 15 and 18, consists mostly of guards with some medical technicians and other prison employees.

Every capital-punishment state but one uses lethal injection; Nebraska still uses the electric chair.

A North Carolina inmate was executed last month only after the state changed its procedures to

satisfy a federal judge.

In California, executions are on hold while a federal judge considers the constitutionality of that state's protocol. A hearing is scheduled in September.

Attachment F

[redacted]

THE EXECUTION OF STANLEY TOOKIE WILLIAMS

Eyewitness: Prisoner did not die meekly, quietly

Kevin Fagan, Chronicle Staff Writer
Wednesday, December 14, 2005

It took 36 agonizing minutes to get to the defining moment of Stanley Tookie Williams' execution by lethal injection early Tuesday, and when it came it shot through the stuffy, crowded witness room like lightning.

Williams lay dead, strapped to his gurney. It was 12:35 a.m. The prison guards had just ordered the 39 witnesses to leave, and the first to go were three friends Williams had asked to watch his final moments. It was so quiet that when one man jangled his pocket change, it echoed off the walls.

Then, just as they crossed the doorway to the chilly outdoors, the three whipped their heads back and screamed in unison: "The state of California just killed an innocent man!" Across the room sat Lora Owens, stepmother of one of the murder victims -- and the stone face she'd worn for the entire execution dissolved. Her eyes filled with horror, and she burst into tears, pressing a tissue to her face.

And there it was: The twin emotions enveloping the execution of the 12th man put to death by California since capital punishment was revived in 1992 after a quarter-century hiatus.

On one side were the furious supporters of Williams, 51, who co-founded the Crips gang in the early 1970s but later renounced violence while in prison and wrote influential books advocating peace. On the other was the trail of survivors left grieving for the four people he was convicted of shotgunning to death in 1979 in Southern California.

The two sides never came to a meeting of the minds. Not even in the end.

The dramatics seemed far from anybody's mind when the execution began precisely at 11:59 p.m. Monday.

The oval door of the death chamber popped open -- it looks like a submarine hatch -- and Williams shuffled in with a green-uniformed guard on each side, loosely holding his arms, and three following behind. His wrists were handcuffed to a waist chain. His eyes were calm behind steel-frame glasses, lips set firmly above a gray beard.

It looked like it would be just like the nine lethal injections before it: controlled, noiseless, practically antiseptic.

With a chest like a barrel and bulging arms the size of toned thighs, Williams had to squeeze with his guards along the 7 1/2-foot-wide chamber's glass window just to get to the side of the gurney. There, he lay down slowly, and after the guards unlocked his wrists, he helpfully spread his arms along the gurney and became still. In two minutes, the team had him lashed down tight: black straps with buckles at his shoulders, chest, waist, knees and feet, and brown-leather Velcro straps at his wrists.

Williams stared straight up and his lips moved rapidly, praying quietly. At one point, a tiny tear slid down his cheek.

The three guards left, and five others walked in.

It was time to insert the needles.

Watching tensely the whole while were the 39 witnesses. They'd been marched into the witness room by a phalanx of guards a few minutes before midnight and placed in a half-circle around the death chamber -- 11 in chairs at the window, the rest on risers against three walls. It's impossible to tell who many witnesses are, because by prison rules nobody can move from their spot or talk, but they always consist of four groups: Supporters of the condemned man, supporters of his victims, 17 media representatives, and more than dozen law enforcement and legal officials.

In this execution, at least five were related to the four people Williams was convicted of killing -- convenience store clerk Albert Owens, 26, and motel owners Yen-I Yang, 76, Tsai-Shai Chen Yang, 63, and their daughter Yee-Chen Lin, 43. Prison sources said the victim witnesses were all from the Owens family.

The three who shouted on their way out were led by bushy-haired Barbara Becnel, co-author of his anti-gang books. Also witnessing on Williams' behalf were his attorney, Peter Fleming, and another lawyer.

Nobody said a word at first. Everybody stood rigidly.

The first catheter slid in messily at the crook of Williams' right elbow, taking just two minutes to seat but spurting so much blood at the needle point that a cotton swab was soaked, shining deep red before it was taped off.

Then came the real trouble. A medical technician, a woman with short black hair, had to poke for 11 minutes before her needle hit home.

At the first stick, at 12:04, Williams clenched his toes. At 12:05, he struggled mightily against the straps holding him down to look up at the press gallery behind him, dishing out a hard stare for six long seconds. By 12:10 a.m., the medical tech's lips were tight and white and sweat was pooling on her forehead as she probed Williams' arm.

"You guys doing that right?" Williams asked angrily, frustration clear on his face. The female guard whispered something back; it was hard to hear anything through the thick

glass walls of the death chamber. One guard, jaw clenched tightly, patted Williams' shoulder as if to comfort him.

Outside the chamber, Becnel stood with her two companions -- a woman and a man -- at the only window with a clear line of sight into Williams' eyes, and it was as if they were trying to will themselves right through the glass to stand alongside their friend. They thrust their fists up in what seemed to be a black power salute, and the man called out softly, "Tookie." They whispered "I love you" and "God bless you" as they looked adoringly into Williams' eyes.

Meanwhile, 10 feet away, Lora Owens sat stiffly, looking through the glass at the top of Williams' head. Her thick red hair never moved, and her mouth was a tight line. A blond woman sitting next to her put her arm around her, and then removed it and clasped her hands in her lap.

At 12:16 a.m., the second needle was inserted. His hands were taped, mummy-like, to the gurney arms. The guards hurried out the door and sealed it, leaving Williams alone with two clear intravenous lines snaking off his arms and into holes in the back wall of the death chamber.

At 12:18 a.m., a female prison guard loudly read off the warrant proclaiming that prisoner number C29300 had been sentenced to die and "the execution shall now proceed." Williams forced his head up one last time to stare into the eyes of his five friends -- and he kept it raised until he passed out 1 1/2 minutes later from the first salvo of chemicals, sodium pentothal to put him to sleep. Sorrow washed over the faces of Becnel and her female companion as his head sank, and they clasped their hands in prayer.

From there on it was a nail-biting vigil for everyone outside staring in. There was no way to know which chemicals were being administered because the plungers sending them into the intravenous tubes are pressed by unseen hands behind the chamber walls. Williams' chest heaved several times as he lay with his eyes closed, but somewhere in the 15 minutes from 12:20 to 12:35 a.m., the executioners filled his veins with pancuronium bromide to stop his breathing, then potassium chloride to stop his heart.

Finally, someone behind the walls called out, "He's flatlined," and it was over. A hand shoved a paper through a peephole in the witness room, a guard read off a quick statement affirming Williams' death, and 30 seconds later the room was cleared.

That's when the outburst happened. It was the first time since California restarted executions in 1992 that anybody had yelled or even spoken loudly during the grim procedure -- and as much as anything, that is what set this execution apart.

All of the other men killed by lethal injection lay so quietly on the gurney that, except for a few small movements, it was hard to tell if they were even awake. Even in the two gassings at San Quentin that preceded the injections, Robert Alton Harris and David Edwin Mason faced their ends stoically. The witnesses, too, have never done more than mouth a few silent words and cry quietly -- and the victim and prisoner advocates certainly never reacted to each other.

Williams and his friends were different.

It was like they were determined to get through his final minutes on Earth on their own terms -- even up to the tradition of the condemned man issuing a final statement. Williams, ever-defiant against the system he considered unfair, gave no final words to Warden Steve Ornoski, who said later that Williams chose instead to leave his final message with Becnel. Sources said she may reveal it at a funeral in Los Angeles on Tuesday.

The main complication in the death chamber this time was the excruciatingly long wait for the poisons to work. During the last execution, when triple-killer Donald Beardslee was killed in January, the actual injection process took four fewer minutes; injections for "Freeway Killer" William Bonin required only four minutes in 1996. But prison officials had an explanation.

He was a big man," Warden Steve Ornoski said in a post-execution briefing. The techs didn't have to administer extra shots of chemicals, he said; the poisons just needed time to work.

It made sense. Williams was the most muscular man put to death in the modern era of executions in California, and it appeared as if his bulky body was fighting off the inevitable, even after consciousness and the ability to move had fled.

This was not a man who went meekly.

This was the sixth execution witnessed by Kevin Fagan. E-mail him at kfagan@sfchronicle.com.

A look at California's 647 Death Row inmates

Here is a statistical summary of inmates sentenced to death in California.

By ethnicity

White	39.51%
Black	35.34%
Hispanic	18.98%
Other	6.17%

By age range

10-19	0%
20-29	4.0%
30-39	31.4%
40-49	36.5%
50-59	21.3%
60-69	5.3%
70-79	0.8%
80-89	0%
90 and above	0%

Figures as of December 2005. Numbers may not total 100% because of rounding

Executions Name, year executed and time spent on Death Row:

Robert Alton Harris (1992; 13 years, 1 month)

Keith Daniel Williams (1996; 17 years)
Robert Lee Massie (2001; 21 years, 10 months)
Darrell Keith Rich (2000; 19 years, 1 month)
Kelvin Malone* (1999; 15 years, 6 months)
Stephen Wayne Anderson (2002; 20 years, 6 months)
Donald Beardslee (2005; 20 years, 10 months)
Stanley Tookie Williams (2005; 24 years, 8 months)
William George Bonin (1996; 13 years, 1 month)
Manuel Babbitt (1999; 16 years, 10 months)
Jaturun Siripongs (1999; 15 years, 9 months)
David Edwin Mason (1993; 9 years, 7 months)
Thomas M. Thompson (1998; 14 years, 1 month)
* Extradited to Missouri and executed in that state.

By sentencing county

Bay Area totals

County	Total	Percentage
Alameda	86	13.3%
Santa Clara	52	8.0
Contra Costa	34	5.3
San Mateo	28	4.3
Sonoma	8	1.2
Napa	4	0.6
Solano	4	0.6
Marin	2	0.3
San Francisco	2	0.3

Sources: California Department of Corrections, Associated Press

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URL: http://sfgate.com/cgi-bin/article.cgi?file=/c/a/2005/12/14/MNG05G7QMA1.DTL

Exhibit 6

Exhibit 6

SUanisi-TO-VR00003

TATAU MO'ONI 'O HA LESISITA FA'ELE
TRUE COPY OF BIRTH REGISTRATION

FIKA LESISITA: 1716/1970 142577
REGISTRATION NO:

Hingoa 'o e Tamasi'i: *Name of Child:*	SIAOSI VANISI
Fa'ele'i 'i fe: *Place of Birth:*	KOLOFO'OU, TONGATAPU
Fa'ele'i 'anefe: *Date of Birth:*	
Tangata pe Fefine: *Sex:*	MALE
Tamai: *Father's Name:*	MAKA'AFA VANISI
Fa'ele'i 'i fe: *Place of Birth:*	KOLOFO'OU
Fa'e: *Mother's Name:*	LU'ISA TAFUNGA VANISI
Fa'ele'i 'i fe: *Place of Birth:*	PANGAI HP
Tamasi'i mali pe 'ikai: *Legitimate or Illegitimate:*	LEGITIMATE
Tohinima 'o e Lesisita: *By Whom Registered:*	L.T VANISI

'Oku ou fakamo'oni 'eni koe ngaahi me'a kuo tohi 'i 'oluŋga ko e tatau mo'oni ia 'o e me'a 'oku tu'u 'i he Lesisita Fa'ele ki he
I hereby certify that the above is a true copy of particulars contained in the Birth Register for the

vahefonua 'o *District of* Tongatapu **ki he ta'u** *for the year* 1970

Vakai he'eku tohinima hingoa moe sila 'o e Fakamaau'anga Lahi na'e fai 'i he
Witness my hand and the seal of the Supreme Court dated the

15th **'o e mahina ko** *of the month of* November 2010

Vahefonua 'o *District of* Tongatapu

Failesisita 'o e Fa'ele, Pekia moe Mali, TONGA
Registrar of Births, Deaths and Marriages, TONGA

FAKATOKANGA: Koe tohi ni 'oku fokotu'u 'i loto ha ngaahi me'a malu'i
CAUTION: This document contains inbuilt security features.

AA00422

TO-VR00003

Exhibit 7

Exhibit 7

OPTIONAL FORM 155
Formerly FS-511
January 1975
DEPT OF STATE

50155-101

FORM I-151 MAILED

IMMIGRANT VISA AND ALIEN REGISTRATION

I-151 [illegible]

IV 6327399

THE IMMIGRANT ☐ HAS ☒ HAS NOT BEEN PREVIOUSLY IN THE UNITED STATES

OF: (Family Name) VANISI, (First Name) Siaosi (Middle Name)

I & NS FILE NUMBER, IF KNOWN

ACTION BY IMMIGRANT INSPECTOR

170

THE IMMIGRANT NAMED ABOVE ARRIVED IN THE UNITED STATES VIA

(Name of vessel or flight no. of arrival)

INELIGIBILITY FOR VISA WAIVED UNDER SECTION

☐ 212(e) ☐ 212(h)

☐ 212(g) ☐ 212(i)

SEC. 212(a)(14) LABOR CERTIFICATION

☒ NOT APPLICABLE

☐ STATUTORILY EXEMPT

☐ ATTACHED

☐ NOT REQUIRED

COUNTRY OF BIRTH	OCCUPATION	COUNTRY OF LAST RESIDENCE	MARITAL STATUS	SEX	NATIONALITY
Tonga	Minor	Tonga	☐M ☒S ☐W ☐D ☐SEP	☒M ☐F	Tongan

FINAL ADDRESS IN THE UNITED STATES	STREET ADDRESS	CITY, STATE, AND ZIP CODE, IF AVAILABLE
	199 Fernwood Drive	San Bruno, California 041

ACTION OF S.I.O.	ACTION ON APPEAL	U.S.P.H.S.
		4

This visa is issued under Section 221 of the Immigration and Nationality Act, and upon the basis of the facts stated in the application. Possession of a visa does not entitle the bearer to enter the United States if at the time he seeks to enter he is found to be inadmissible. Upon arrival in the United States, it must be surrendered to a United States Immigration Officer.

AMERICAN Embassy

AT Suva, Fiji

Walter V. Hall

Consul of the United States of America.

Tariff Item No. 21
Fee Paid $20
Local Cy Equiv F$15.50

IMMIGRANT CLASSIFICATION

CLASSIFICATION SYMBOL P5-3 4/7

FOREIGN STATE [illegible] Tonga

IMMIGRANT VISA NO. 392

ISSUED ON (Day) 31 (Month) May (Year) 1976

THE VALIDITY OF THIS VISA EXPIRES MIDNIGHT AT THE END OF (Day) 30 (Month) September (Year) 1976

PASSPORT

NO. 3116/72

OR OTHER TRAVEL DOCUMENTS (Describe) - - -

ISSUED TO Luisa Finau Vanisi

BY Minister of Police, Tonga

ON 12/7/71

EXPIRES 12/7/76

IV 6327399

AA004247

USDHS00079

Exhibit 8

Exhibit 8

ORIGINAL

IN THE SUPREME COURT OF THE STATE OF NEVADA

SIAOSI VANISI,

Appellant,

vs.

THE STATE OF NEVADA,

Respondent.

No. 35249

Appeal from A Judgment of Conviction
Second Judicial District Court of the State of Nevada
The Honorable Connie Steinheimer, District Judge

APPELLANT'S OPENING BRIEF

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ATTORNEYS FOR RESPONDENT

06-06279

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Trial

WHETHER JUDGE STEINHEIMER COMMITTED REVERSIBLE ERROR WHEN SHE DENIED APPELLANT'S PRETRIAL *FARETTA* MOTION FOR SELF-REPRESENTATION WHERE, AS HERE, THE RECORD DOES NOT SUPPORT, AND SOES NOT PROVIDE, A BASIS FOR THAT DENIAL?

WHETHER THE REASONABLE DOUBT INSTRUCTION GIVEN IN THIS CASE IMPERMISSIBLY REDUCED THE STATE'S BURDEN OF PROVING MURDER IN THE FIRST DEGREE BEYOND A REASONABLE DOUBT IN VIOLATION OF DUE PROCESS OF LAW.

Penalty

WHETHER THE DEATH PENALTY IN THIS CASE WAS EXCESSIVE AND MUST BE SET ASIDE AS BEING INFLUENCED BY ONE IMPROPER AGGRAVATOR AND BEING THE PRODUCT OF PASSION AND PREJUDICE AS EVIDENCED BY THE FAILURE OF THE JURY TO FIND EVEN ONE MITIGATING FACTOR.

STATEMENT OF THE CASE

This is an appeal from a judgment of conviction following a jury trial. Appellant, Siaosi Vanisi (hereinafter "Mr. Vanisi"), was convicted of one (1) count of murder with the use of a deadly weapon a violation of NRS 200.010, NRS 200.030 and NRS 193.165, a felony; three (3) counts of robbery with the use of a deadly weapon, a violation of NRS 200.380 and NRS 193.165, each a felony; and one (1) count of grand larceny, a violation of NRS 205.220, a felony. The jury imposed a sentence of death by lethal injection on the murder count.[1] On November 22, 1999, Judge Steinheimer entered a judgment of conviction consistent with the jury's verdict specifically, a sentence of death on the murder count. ROA Vol. 6 at 1845-1846 (Judgment); ROA Vol. 6 at 1843-1844 (Order of Committal); ROA Vol. 6 at 1847-1848

(Order of Execution); and ROA Vol. 6 at 1849-1852 (Warrant of Execution).[2] At that time Mr. Vanisi was also sentenced, on each of the robbery counts, to a maximum term of 180 months with a minimum parole eligibility of 72 months plus a consecutive like sentence due to the weapon enhancement. On the grand larceny count Mr. Vanisi was sentenced to a term of 120 months with a minimum parole eligibility of 48 months and was further ordered to pay a fine in the amount of $10,000.00. These sentences were ordered to be served consecutive to each other and consecutive to the death penalty imposed herein on the murder count. Mr. Vanisi was given credit for 667 days time served. ROA Vol. 6 at 1845-1846 (Judgment). Mr. Vanisi was also ordered to pay a $25.00 administrative assessment, a DNA testing fee in the amount of $250.00 and attorney fees in the amount of $750.00. Id.[3]

On November 23, 1999, Judge Steinheimer entered an Order Staying Execution Pending Direct Appeal. ROA Vol. 6 at 1853. A notice of appeal was filed on November 30, 1999. ROA Vol. 6 at 1854-1854A (Notice of Appeal).

STATEMENT OF THE FACTS[4]

Guilt Phase

On January 13, 1998, Dr. Ellen Clark -- a board specialized forensic pathologist -- performed an autopsy upon the body of Sergeant George Sullivan. ROA Vol. 22 at 519, 521, and 523. She concluded that Sergeant Sullivan "died of multiple injuries of the skull and brain due to blunt impact trauma." Id at 527. She found a total of at least 20 "separate and discrete

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[1] Record on Appeal Vol. 6 at 1768-1769 (Verdict).
[2] "ROA" stands for the Record on Appeal which, pursuant to Supreme Court Rule 250, has been docketed with this Court by the clerk of the district court.
[3] And See ROA Vol. 33 (Transcript of Proceedings: Sentencing/ Imposition of Jury Sentence).
[4] The following statement of facts is taken from the trial transcripts. Citation will be to the reporters' original pagination.

impacts to the face and head." Id. She also found that each of the wounds were "all acute and of the same age." Id at 540. That is, they occurred at roughly the same time and were of such a nature that "the survival interval would have been relatively short." Id at 541.

On the night of January 12, 1999, Brenda Martinez drove to the University of Nevada to pick up her father -- a custodian at the University. Id at 545-547. She arrived just after midnight. Id. While waiting in the University parking lot for her father to arrive she saw a dog that caught her attention. She also saw a man. Id at 548. The man was walking "kind of funny" and was wearing a beanie cap. He had long hair, a full beard and he was wearing a long coat and had baggy pants. Id at 550.[5] She picked up her dad and left the campus. Id. While driving down Virginia Street, by the University, she saw the man again. He was in the student union parking lot and was walking towards the lake that is located on campus. Id at 551. At trial Ms. Martinez identified Mr. Vanisi as the man she saw walking on campus that night. Id at 553-554.

Carl Smith, a police officer for the University of Nevada, testified that on January 13, 1998, he was on duty. At about 17 minutes after midnight on the 13th he responded to Ninth and Center streets because Sergeant Sullivan had effected a traffic stop there. Id at 563-564, and 565-566, 568. Prior to arriving at the scene he saw a person near the area where Sergeant Sullivan was. This individual looked dark-skinned and had dreadlocks. According to the officer this individual "gave [him] a glaring stare like, Let's [sic] fight." Id. at 569. But he noted that that was something an officer occasionally sees. Id at 569-570. At trial Officer Smith identified Mr. Vanisi as the man he saw on campus that night. Id at 572. Officer Smith

then drove up and stopped behind Sergeant Sullivan's car. Id at 573. After completing the task at hand Sergeant Sullivan drove up to the University and up to a kiosk located there. Id at 578. According to Officer Smith the lighting in that area is good for writing reports and taking care of routine administrative details. Id at 579. At about 1:00 that morning Officer Smith was dispatched to the area of the kiosk. Id at 581-582. When he arrived he found Sergeant Sullivan laying several feet away from his vehicle. He was on the ground facing up. Id at 582. Sergeant Sullivan's gun belt, holster and gun were missing. Id at 586.

On January 13, 1998, Andrew Ciocca was walking through the campus grounds on his was home from visiting a friend. Id at 603-604. Upon cresting a hill he saw a UNR police car that was parked. Later he noticed someone who appeared to be under the police car. Id at 606. Moments later he realized that what he had thought to be leaking fluid from the police car was actually blood. Id at 607. Mr. Ciocca went to the body and felt for a pulse. He noticed that the body was warm. Mr. Ciocca ran to a nearby pay phone and called 911. He then returned to the police vehicle and called for assistance on the police radio. Id. Shortly thereafter Officer Smith arrived. Id at 610.

In January 1998, Mele Maveni was a student at Hug High School. Id at 647, 649. At about 9:00 on the Friday night prior to the death of Sergeant Sullivan, Ms. Maveni went to a local WalMart with Mr. Vanisi and her cousin Saia. Id at 650. Ms. Maveni had met Mr. Vanisi about two weeks earlier and considered him a friend. Id at 648-649. While inside WalMart Mr. Vanisi looked at some guns; however he did not purchase a gun. Id at 653. He

[5] On cross-examination Ms. Martinez explained that the man was walking "slanted kind of as if he was maybe drunk." ROA Vol. 22 at 557. She also said that he "was funny. He was kind of like when you get drunk, or you are sleepy and you're walking nowhere." Id at 558.

did purchase a hatchet[6] and some gloves.[7] According to Ms. Maveni, once the three of them were back in her van Mr. Vanisi made statements indicating that he hated police officers and wanted to kill them. Id at 655-656. He also said he did not like white people because they took a lot from the Polynesians. Id at 656. Apparently at one point as they drove passed the police station Mr. Vanisi asked to be dropped off because he wanted to kill a cop. Id at 657-658. But Ms. Maveni and Saia thought he was joking. Id at 658. Later, as they were driving, there was a police car in front of them and Mr. Vanisi again asked to be dropped off. He again expressed a desire to kill a police officer. Id at 659. The following Monday morning Ms. Maveni saw Mr. Vanisi. Id at 661. He was wearing some beige corduroy pants and a dreadlocks wig. Id at 662.[8]

Sateki Taukiuvea met Mr. Vanisi through his girlfriend, Renee Peaua. ROA Vol. 23 at 688-689. When he first met him Mr. Vanisi was wearing a long hair wig. Id at 690. In the evening of Monday January 12, 1998, Mr. Taukiuvea drove Mr. Vanisi over to Renee's house, which was located on Sterling way near the University. Id at 696-697. At that time Mr. Vanisi was wearing the wig, a maroon coat and brown corduroy pants. Id at 697. Mr. Tauliuvea then drove back to a house located on Rock Boulevard and went to sleep. Id at 697-698. At about 1:30 that morning he woke up when Mr. Vanisi walked into the house. Id at 698.[9] Mr. Vanisi

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[6] Later DNA testing of stains found on the hatchet showed them to belong to Sergeant Sullivan. ROA Vol. 22 at 641.

[7] Later DNA testing of stains found on the gloves showed some to belong to Sergeant Sullivan and to Mr. Vanisi. ROA Vol. 22 at 642.

[8] Several others testified for the State concerning Mr. Vanisi's expressions (made around the same time) of a desire to kill a police officer. See ROA Vol. 23 at 672-687 (Makaleta Kavapalu); Id at 688-696 (Sateki Taukiuvea); ROA Vol. 23 at 743, 747-748 (Maria Louis); ROA Vol. 23 at 766-778 (William Louis); ROA Vol. 23 at 779-783 (Priscilla Endemann).

[9] Manaoui Peaua, Renee's brother, gave him a ride to the house on Rock Boulevard. ROA Vol. 23 at 784-785, 787-788

was carrying a white plastic shopping bag. Id at 699.[10] Mr. Vanisi did not have his wig with him. Id at 700. Later, through some friends Mr. Taukiuvea learned of Sergeant Sullivan's death. Id at 701. At some point thereafter he asked Mr. Vanisi if he had any involvement in that death. According to Mr. Taukiuvea Mr. Vanisi said that he had "killed the cop." Id. Mr. Vanisi also showed him a gun. Id at 702.[11]

Renee Peaua is Mr. Vanisi's cousin. Id at 705, 707. On January 12, 1998 Ms. Peaua was living in a house on Sterling Way. Id at 709. At about 10:30 that night Mr. Vanisi was there, eating. Id at 710-711. When Ms. Peaua left the house Mr. Vanisi stayed. He was wearing his beanie and his wig. Id at 711. Ms. Peaua next saw Mr. Vanisi at a house on Rock Boulevard sometime after 12:30 a.m. Id at 715. He did not have his wig and he was carrying a white bag. Id at 716. When he walked in that morning Mr. Vanisi went in to the kitchen. Id at 718. Later that morning Ms. Peaua saw Mr. Vanisi sitting in the kitchen looking at his hatchet. Id at 723. That morning Ms. Peaua asked Mr. Vanisi if he had killed a policeman. Id at 740. He answered affirmatively. Id.

In January 1998, Maria Louis was living on North Rock Boulevard in Sparks. Id at 743-744. Mr. Vanisi is Ms. Louis's uncle. Id at 745. At approximately 1:15 a.m. on the morning of January 13, 1998, Mr. Vanisi walked into the apartment. Id at 748-749. He was carrying a little white plastic bag. Id at 761. Later, while watching the news, Ms. Louis learned that the

[10] Later fingerprint analysis identified prints belonging to Mr. Vanisi on this bag. ROA Vol. 22 at 623.
[11] The wig was recovered by a sheriff's search and rescue volunteer in the Orr Ditch. ROA Vol. 24 at 836, 838. While in Utah Mr. Vanisi told a relative that he had thrown his wig and hat in a ditch near the University. Id at 825.

police were looking items relating to the instant case. Id at 757. Ms. Louis found those items in a kitchen cabinet at her house. Id at 758. She then called the police. Id at 759.[12] [13]

On January 13, 1998, Louis Hill owned a black Toyota 1992 Camry. Id at 841-842. On that night he had his car outside warming up. He was in his house. When he came outside the car was gone. The car was later recovered in Utah. Id at 842.

On January 13, 1998, Patricia Misito was working as a clerk at a 7-11 store located on Baring Boulevard. At about 10:20 that night she notice an individual standing near the door of the store. Id at 846-848. A customer purchased some Copenhagen with a 20-dollar bill. Id at 849. When she had the change drawer open to give the customer his change the man that had been standing by the door came in and asked if Ms. Misito could help him out. The man showed her a gun and she put the drawer on the counter and said, "help yourself." Id at 850. At trial Ms. Misito identified Mr. Vanisi as the man with the gun. Id at 851. Mr. Vanisi took the money from the drawer -- approximately $99.00. Id at 854. The customer sought to give Mr. Vanisi his change but Mr. Vanisi told him "No thanks, man" and left after telling Ms. Misito not to call the cops. Id.[14]

At about 10:30 in the evening of January 13, 1998, Diana Shouse was working as a clerk at a Jackson's Market on MacCarran and Clear Acre. Id at 861. A man came in and laid his gun on the counter and told her to empty the cash drawer into a paper bag. Ms. Shouse did as

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[12] Reno Police Detective Jim Duncan was among those officers who responded to the call and as a result, collected items from the house including the hatchet. ROA Vol. 24 at 800-821. Detective Duncan also noted that the police had received a "secret witness" call that Mr. Vanisi had committed a "187" -- 187 being the California Penal Code for murder. Id at 809-810.

[13] Detective Duncan also testified that an arrest warrant for the arrest of Mr. Vanisi was sought and obtained. ROA Vol. 24 at 823. The information was placed on a national crime computer and subsequently the police were contacted by the Salt Lake County Sheriff's Office, Salt Lake, Utah. Id at 823.

she was told. Id at 862. The man then left the store. Id. At trial Ms. Shouse identified Mr. Vanisi as the man who took the money. Id at 864.

David Kinikini lives in Salt Lake City, Utah. Mr. Vanisi is his cousin. ROA Vol. 25 at 909-910. On January 14, 1998, Mr. Vanisi unexpectedly arrived at Mr. Kinikini's house. Id at 913. Mr. Kinikini described Mr. Vanisi as being "very excited" and anxious to visit with relatives. Id at 914.[15] Around 3:00 or 4:00 in the afternoon a relative informed Mr. Kinikini that the police were looking for Mr. Vanisi. Subsequently the police directly contacted him. Id at 915. At this time Mr. Vanisi was not at the house, having gone down to a youth rec center to play basketball. Id at 916. Eventually Mr. Vanisi returned to the house and the police arrived. Id at 918.[16]

Salt Lake County Sheriff Investigator Keith Stephens was one of the officers that responded to Mr. Kinikini's house on January 14, 1998. Id at 929, 933. He arrived around 5:30, 6:00 that evening. Id at 933. The police gave several commands to Mr. Vanisi to give up and come out of the house. Id at 935.[17] Mr. Vanisi did not respond. Id.

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[14] Caleb Bartelheim was the customer in the store that night. ROA Vol. 24 at 855-856. He too identified Mr. Vanisi. Id at 858. He also acknowledged that Mr. Vanisi did not take his money though he offered to give it to him. Id at 859.

[15] Vainga Kinikini ("Vainga") was staying at Mr. Kinikini's house when Mr. Vanisi arrived. ROA Vol. 25 at 954, 956. He too noticed that Mr. Vanisi was "excited or real hyper." Id at 959. According to Vainga Mr. Vanisi told him that he had committed a murder. Vainga did not believe him. Id at 960. But Mr. Vanisi showed him a gun and told him it was a cop's gun. Id at 963. Vainga testified that Mr. Vanisi told him that he waited around for a campus police officer to complete a traffic stop investigation. Id at 975. That he then crept up on the officer who appeared to be doing some paperwork. Id at 976. He knocked on the window and the officer asked if he could help. Then Mr. Vanisi started swinging with the hatchet. Id at 977-979. Mr. Vanisi told Vainga that he took a gun and a belt from the officer. Id at 981. Mr. Vanisi also told Vainga that at the time of this killing his disguise was a "beanie with dreadlocks, fake dreadlocks attached to it" [Id at 982], which he later threw in a nearby canal. Id at 984.

[16] Mr. Kinikini remembers seeing about 20 plus police officers stationed outside. ROA Vol. 25 at 921.

[17] Mr. Kinikini and others who had been in the house had left the residence before the police commands to Mr. Vanisi started. That is, Mr. Vanisi was alone in the house. ROA Vol. 25 at 934.