CASE REPORT

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The Frye Hearing in Florida: An Attempt to Exclude Scientific Evidence*

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ABSTRACT: State Supreme Courts require a minimum threshold of reliability and acceptance in the scientific community for all medical and similar evidence to be admitted at trial. In Florida and some other states, the courts adhere to what is known as the Frye standard, whereas in most states and in Federal Courts, it is the so-called Daubert standard. The jurisdiction of the present case is Hillsborough County (Tampa), Florida. Forensic pathologists seldom, if ever, are requested to participate in such hearings, unlike their toxicological and basic science colleagues who are more involved in research methodology and technical procedures.

The burden is on the proponent of the evidence to prove the general acceptance of both the underlying scientific principle of the test and procedures used to apply that principle to the facts of the case at hand. The trial judge has the sole discretion to determine this question and general acceptance must be established by a preponderance of the evidence.

The authors describe in detail a hearing in a case in which they were all involved. One author (WQS) had researched and documented the original scientific methodology in the literature. The situation involved a car and tractor trailer crash with the two occupants of the car dying of multiple trauma, whereas the truck driver was not injured. Autopsy of the auto driver revealed multiple injuries with exsanguination, and only vitreous humor and liver tissue, but not blood, were tested for ethyl alcohol. The estate of the driver of the automobile brought suit against the owner of the trucking company for wrongful death. The plaintiff requested a Frye hearing to question the reliability of testing other body specimens to translate to probable blood alcohol level. The testimony, submitted documents, and eventual decision by the judge are discussed.

KEYWORDS: forensic science, Frye hearing, scientific evidence, expert medical testimony

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State Supreme Courts require a minimum threshold of reliability and acceptance in the scientific community for all medical and similar evidence to be admitted at trial. In Florida and some other states, the courts adhere to what is known as the Frye standard, whereas in most states and in Federal Courts, it is the so-called Daubert standard. The jurisdiction of the present case is Hillsborough County (Tampa), Florida.

Frye Test

Based on the 1923 Federal Circuit Court of Appeals, District of Columbia case Frye v. United States (1), in order to introduce expert testimony deducted from a scientific principle or discovery in Florida, the principle or discovery "must be sufficiently established to have gained general acceptance in the particular field in which it belongs" (2). This test has also been referred to, for obvious reasons, as the "general acceptance" test. Essentially, in following this approach, courts require the party seeking admission of scientific evidence to first make a showing that the basis for the opinions of the expert are generally accepted within the relevant scientific community. This test has, in many jurisdictions, been superceded by Federal Rule of Civil Procedure 702, as set forth in the case Daubert v. Merrill Dow Pharmaceuticals, Inc. (3).

Daubert Test

On 28 June 1993, the United States Supreme Court replaced the Frye test with a broader criteria for admissibility of scientific evidence set forth in Federal Rule 702. According to Rule 702 (3), "if scientific or other specialized knowledge will assist the trier of fact to understand the evidence in order to determine a fact in issue, the witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise." According to the Court, nothing in the text of Rule 702 establishes "general acceptance" as an absolute prerequisite to admissibility of scientific evidence. The Supreme Court, in interpreting Rule 702, determined that a two-part test would be utilized to determine admissibility of expert testimony; a trial judge must determine whether the expert is proposing to testify to (a) scientific knowledge that (b) will assist the trier of fact to understand or determine a fact in issue (3). According to the Court, this determination "entails a preliminary assessment of whether the reasoning or methodology underlying the testimony is scientifically valid and of

whether that reasoning or methodology properly can be applied to the facts in issue" (3). The "overarching subject" of Rule 702, according to the Court, "is the scientific validity and thus the evidentiary relevance and reliability . . . of the principles that underlie a proposed submission" (3). It should be noted that the Daubert test is also applicable to test the admissibility of expert testimony other than that based solely on scientific knowledge. A recent U.S. Supreme Court case overturned an Eleventh Circuit decision by holding that Daubert's general "gate-keeping obligation" applies not only to testimony based on "scientific" knowledge, but also to testimony based on "technical" and "other specialized" knowledge (4).

Florida Standard

As previously stated, the State of Florida recognized and follows the Frye Standard even in light of the Supreme Court's rejection of that standard in Daubert and in light of Florida's Rule of Evidence 90.702, which essentially mirrors Federal Rule 702. Just three months after the United State Supreme Court's decision in Daubert, the Florida Supreme Court (5) expressly reaffirmed prior Florida case law following the test established in Frye v. United States.

More recently, the Florida Supreme Court in Ramirez v. State (6) again expressly followed Frye and incorporated that test into a four-part test to be used by Florida courts in determining the admissibility of expert opinion testimony concerning a new or novel scientific principle. That four-part test as set forth in Ramirez is as follows:

1. The trial judge must determine whether such expert testimony will assist the jury in understanding the evidence or in determining a fact in issue;
2. The trial judge must decide whether the expert's testimony is based on a scientific principle or discovery that is "sufficiently established to have gained general acceptance in the particular field in which it belongs." In stating the second standard, the Ramirez court expressly noted that its basis was the Frye test previously adopted by the Florida Supreme Court (7).
3. The third step in the process is for the trial judge to determine whether a particular witness is qualified as an expert to present opinion testimony on the subject and issue; and
4. Finally, the judge may then allow the expert to render an opinion on the subject of his or her expertise, and it is then up to the jury to determine the credibility of the expert's opinion, which it may either accept or reject.

Essentially, the Ramirez court has tried to marry the traditional Frye standard with the requirements set forth in Federal Rule 702 as codified by Florida in section 90.702 of the Florida Statutes. In so doing, the arguably narrower and more restrictive requirements of the Frye test still prohibit admission of scientific testimony that has not gained general acceptance in the particular field in which it belongs. In addition to the above requirement, the Ramirez court reaffirmed the requirement that the judge, and not the jury, has sole discretion to determine whether the above criteria have been met utilizing the preponderance of the evidence standard.

Case Report

The case under discussion involved a car and tractor trailer crash in which, according to the local medical examiner, both occupants of the car died of multiple injuries with resultant exsanguination occurring in the driver. The driver, operating a 1983 full-size luxury sedan automobile, was traveling at a high rate of speed, eastbound in the left lane of a four-lane divided highway. The operator of the tractor trailer truck had pulled out of a driveway and went across the eastbound lane and into the median crossover area in order to proceed westbound. There were 278 ft (85 m) of skid marks on the roadway. The automobile struck the side of the trailer. The operator of the semi-trailer truck was not injured. The incident occurred in the daylight hours and speed was thought to have been a factor. A history of ingestion of alcoholic beverages by the two decedents in the car was elicited. Autopsies performed by the medical examiner (MAH) confirmed the extensive trauma in both cases. Significant natural disease processes documented in the driver included arteriosclerotic cardiovascular disease, status postoperative coronary artery bypass grafts (remote), and cirrhosis with steatosis.

The co-author toxicologist (CB) tested vitreous humor (eye fluid) and liver tissue for alcohol presence in the driver. The samples were each analyzed in duplicate by gas chromatography and calculated to be 0.275 and 0.280 g% for vitreous humor and 0.156 and 0.149 g/dg for liver tissue. Blood from the driver was unavailable due to exsanguination. The estate of the driver of the automobile brought suit against the owner of the trucking company and truck driver for wrongful death. The plaintiff requested a Frye hearing to question the reliability of testing other body specimens to translate to probable blood alcohol level. The scientific issue in the case was whether alcohol presence determined from the vitreous humor (0.28 g%) and the liver (0.15 g/dg) of the driver could be converted to reliably estimated blood concentrations of alcohol.

Frye Hearing

Although a Frye hearing is not unusual for nonmedical scientists and some expert medical witnesses, it appears to be unusual for a forensic pathologist to participate in such a hearing and this represents the first time for the nonlegal authors.

The hearing was held in a "chambers session" but was structured so that the participants (one of whom was the widow of the driver) were sitting around a table. It should be noted that not all Frye hearings are held in court chambers, as some take place in an actual courtroom. The hearing involved expert medical testimony as well as submission of exhibits providing documentation of many articles in the literature, tables indicating blood/vitreous and blood/liver alcohol ratios, and a series of references from both textbooks and scientific articles (8,9). The textbook selected was *Medico-Legal Aspects of Alcohol* by Garriott (10). Several tables, figures, and chapters of this textbook were submitted. A 3 h period of direct and cross-examination ensued. One co-author (WQS) served as the principal expert witness called into the hearing by the defendant's attorney, also a co-author (TPS). The other experts and co-authors, MAH and CB, testified by deposition and were available, but not required, to testify in person at the hearing.

Co-author WQS described cases in a 1966 article in which he and his then co-author documented the first study using scientific methodology (gas chromatography analysis) comparing vitreous alcohol with blood alcohol in a variety of postmortem cases (11).

The plaintiff elicited testimony regarding whether there were studies of known antemortem blood alcohol concentrations compared to the subject's postmortem blood level. Co-author WQS responded, citing a traffic accident study he conducted in which initial survival blood alcohol levels were compared minutes or hours later to that decedent's autopsy blood alcohol level which indicated

a gradual and steady diminution of the blood alcohol over time generally consistent with the length of the hospital survival time (unpublished observations). Another question concerned a recent study of 349 cases where both postmortem blood alcohol and vitreous humor alcohol were known (12). This study developed a formula to estimate the blood alcohol level from the vitreous humor alcohol level, and compared the estimates with the actual values. These authors reported that there were eight cases among the 349 where the 95% prediction interval for the blood alcohol level (which was estimated from the vitreous humor alcohol level) did not include the actual measured blood alcohol level, and they examined these cases in detail. Plaintiff asked co-author WQS if some blood alcohol in these cases had errors as large as 60% of the measured values. He admitted knowledge of this discrepancy but noted it was in only eight cases. He did not provide the court with information that four of the eight cases in the study had been eliminated due to the possibility of sample contamination. The court was troubled by size of the error, and posed many questions itself to test the likelihood of such an error in the blood alcohol opinions being proferred by the defense experts.

Co-author WQS's testimony relied upon statistical analysis by co-author RES in his expert interpretation, and accepted it as calculated. However, he would not further amplify or comment on the statistical work, since it was outside of his field of expertise.

The judge ultimately required co-author RES to provide testimony by telephone for the court. Co-author RES explained that he was a co-author of one of the early scientific treatises with Dr. John I. Coe (13), who was an initial consultant in this case. RES testified that using the vitreous humor alone and applying the results of Pounder and Kuroda (12) produced a blood alcohol estimate of 0.241 g% with a 95% confidence interval of from 0.190 to 0.292 g%. Using the liver tissue alone and applying the results of Jenkins, Levine, and Smialek (14) yielded a blood alcohol estimate of 0.228% with a 95% confidence interval of 0.111 to 0.347 g%. The further application of statistical theory permitted the combination of these two available independent blood alcohol estimators to yield a weighted average blood alcohol estimate with the theoretically narrowest confidence interval width. This result was a single blood alcohol estimate of 0.239 g% with a confidence interval of from 0.192 to 0.286 g%. The legal limit in Florida at the time of the accident was 0.080 g%.

Conclusion

At the conclusion of the hearing, the court ultimately found that the translation of vitreous humor alcohol and liver alcohol test results into blood alcohol values was based on scientific principles that had gained general acceptance in the scientific community; that expert testimony by the scientific authors including Dr. Sherman would aid the finder of fact in understanding the evidence and determining the blood alcohol of the decedent driver; and that the testifying experts offered by the defense were qualified to render an opinion on the subject. In other words, the effort to exclude the scientific testimony in the Frye hearing failed.

The practical effect was that the ruling emasculated the claimant's trial strategy and the case settled shortly thereafter for a small portion of the original demand. The Frye hearing, though lengthy, ultimately saved the litigants, experts, and court significant time and expense that would have been necessary had the case proceeded through trial.

A forensic pathologist called to such a hearing will have little trouble if he/she reviews the literature on the subject matter at hand, and testifies thoroughly, honestly, and professionally. An attorney knowledgable in the legal procedure is immensely helpful in preparing and shepherding the expert and the exhibits through the hearing. The focus should be on educating the judge in a short amount of time on the scientific reliability of the methodology being challenged.

References

1. 293 F. 1013 (D.C. Cir 1923).
2. Flanagan v. State, 625 So.2d 827, 828 (Fla. 1993).
3. 509 U.S. 579, 113 S.Ct.2786, 125L. Ed 2d 469 (1993).
4. Kumho Tire Co. Ltd. et al. v. Patrick Carmichael et al., 119 S.Ct. 1167, 143 L.Ed.2d 238 (1999).
5. Flanagan v. State, 625 So. 2d 827 (Fla. 1993).
6. Ramirez v. State, 651 So. 2d 1164 (Fla. 1995).
7. Bundy v. State, 471 So 2d 9, 18 Fla. 1985) cert. denied, 479 U.S. 894, 107 S.Ct. 295, 93 L. Ed.2d 269 (1986).
8. Wigmore JG. A bibliography of forensic aspects of alcohols. (1872–1991). Forensic Sci Foundation Press, 1992;421–2.
9. Caplan YH, editor. Medicolegal death investigation; treatises in the forensic sciences. Forensic Sci Foundation Press, 1997;142–9.
10. Garriott JC, editor. Medicolegal aspects of alcohol. Tucson: Lawyers and Judges Publishing, 1996.
11. Sturner WQ, Coumbis R. The quantitation of ethyl alcohol in vitreous humor and blood by gas chromatography. Am J Clin Path 1966;46:349–51.
12. Pounder DJ, Kuroda N. Vitreous alcohol is of limited value in predicting blood alcohol. Forensic Sci Int 1994;65:73–80.
13. Coe JI, Sherman RE. Comparative study of postmortem vitreous humor and blood alcohol. J Forensic Sci 1970;15:185–90.
14. Jenkins AJ, Levine BS, Smialek JE. Distribution of ethanol in postmortem liver. J Forensic Sci 1995;40:611–3.

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