F28 Disputed DNA Stats for a Low-Level Sample: A Case Study

Dan Krane, PhD, 3640 Colonel Glenn Highway, Dept Bio Sci, Dayton, OH 45435; Carrie Rowland, MSc, Wright State University, 2850 Presidential Drive, Ste 160, Fairborn, OH 45324; and Nathaniel D. Adams, BS, Wright State University, 3640 Colonel Glenn Highway, Dayton, OH 45435*

After attending this presentation, attendees will better understand the challenges associated with selecting a method for assigning statistical weights to a DNA sample involving dropout and an unknown number of contributors. Defense and prosecution arguments for and against a particular method of assigning a statistical weight in a specific court martial will be presented.

This presentation will impact the forensic science community by: (1) highlighting issues surrounding statistical weights in low-level samples; (2) describing incorrect but current practices in calculating statistical weights; and, (3) the arguments that were used to establish that a government laboratory's long-standing practice was unsound in this particular case.

The scenario surrounding the case in question involved an alleged sexual assault. A partial, low-level profile foreign to the victim was developed from a mixed sample taken from her underwear. The testing laboratory performed a modified Random Match Probability (mRMP) calculation on this "minimal minor" profile. While acknowledging that drop-out may have occurred and that it could not infer the number of contributors to the "minimal minor," the testing laboratory excluded as possible contributors all male genotypes considered in this case except for that of the suspect. A statistical weight of 1 in 220 was reported for the failure to exclude the suspect as a possible contributor.

The defense disputed the general acceptance of the testing laboratory's method of assigning a statistical weight and filed a motion *in limine* to exclude the laboratory's expert testimony on the matter. The defense argued that there is no generally accepted method for assigning a statistical weight to a mixed sample with an unknown number of contributors where drop-out may have occurred. The defense pointed out discrepancies between the description of the mRMP in the Scientific Working Group on DNA Analysis Methods' (SWGDAM) 2010 Short Tandem Repeat (STR) Interpretation Guidelines, the description of the mRMP in the testing laboratory's own Standard Operating Procedures, and the use of the mRMP calculation in the instant case.

The testing laboratory argued that its use of the constraints for using the mRMP described by SWGDAM were only recommendations rather than standards or guidelines and that it had independently "modified" the Random Match Probability to be used for samples with an unknown number of contributors where drop-out may have occurred. The testing laboratory further suggested that its accrediting agency, the American Society of Crime Laboratory Directors (ASCLD), had not found issue with its statistical approach.

The defense demonstrated that the laboratory had not independently developed a novel statistical method and that their calculations were identical to the mRMP formula described by SWGDAM.

The Judge Advocate granted the defense's motion, finding that the pertinent section of the SWGDAM guidelines "contains definitive, almost mandatory language," that the testing laboratory "used a statistical calculation in this case that does precisely what the Guidelines state is 'precluded,' " and that "a preponderance of the evidence does not indicate it is widely accepted in the field of forensic DNA testing despite…testimony to the contrary," and that "even if this Court were to determine…the resulting statistical calculations were reliable, the evidence fails the Military Rule of Evidence (MRE) 403 balancing test. The probative value is minimal." The Court's decision concludes, "the probative value is substantially outweighed by the danger of unfair prejudice, misleading the panel members, and a waste of time."

DNA, Statistics, Admissibility

*Presenting Author