USA v. Burke, et al. CR-96-050-M 11/10/97

UNITED STATES DISTRICT COURT

DISTRICT OF NEW HAMPSHIRE

United States of America

v. Criminal No. 96-50-1-6-M

John Burke, Stephen Burke, Matthew McDonald, Patrick McGonagle, Michael O'Halloran, and Anthony Shea

O R D E R

On May 1, 1997, a federal grand jury returned a fifteen count second superseding indictment, charging that Stephen Burke and five named co-defendants committed various felony offenses, including racketeering, conspiracy to racketeer, conspiracy to commit armed robbery, and bank robbery. Prior to trial, Burke moved to exclude certain DNA evidence which allegedly links him with some of the crimes charged in the indictment. Over the course of several days, the court conducted a hearing on the admissibility of the disputed evidence, at which the government and Burke presented several expert witnesses and numerous documentary exhibits.

After carefully considering Burke's arguments in light of all of the evidence, the court orally denied his motions to exclude evidence of the DQ Alpha and Polymarker test results. This order briefly addresses the court's basis for denying Burke's motions, supplements the findings previously made on the

record, and considers and denies his subsequent motion to exclude evidence of later D1S80 test results (a separate hearing was held on the D1S80 test results on October 30, 1997). Because Chief Judge Barbadoro recently issued a comprehensive opinion concerning the reliability and admissibility of DNA evidence, which includes a thorough discussion of the scientific principles underlying DNA testing, see United States v. Shea, 957 F.Supp. 331 (D.N.H. 1997), the court will not cover that ground again. For the purposes of this order, the court adopts Judge Barbadoro's legal analysis and conclusions with respect to the scientific reliability of DNA testing generally.

Factual Background

The FBI forensics laboratory subjected several items of evidence, collected from the scenes of various crimes charged in the indictment, to DNA testing. A mask found at the scene of the Hudson armored car robbery contained a fairly small amount of DNA. Although the quantity of DNA recovered from the mask was insufficient to permit some types of DNA testing, the government was able to perform DNA typing with regard to one genetic site, known as DQ Alpha or DQ1A.

The government also recovered a baseball cap from a vehicle believed to be the getaway car used in the West Palm Beach armored car robbery. Because that piece of evidence contained substantially more DNA, the government subjected it to a wider

array of DNA tests, which analyzed a total of seven different genetic loci. In addition to the DQ1A test, the government performed a Polymarker test, which analyzes five genetic loci: (1) Low Density Lipoprotein Receptor (LDLR); (2) Glycophorin A (GYPA); (3) Hemoglobin G Gammaglobin (HBGG); (4) D7S8; and (5) Group-Specific Component (Gc). The government also analyzed the DNA collected from the baseball cap at a seventh genetic site, known as D1S80. Finally, the government subjected a third item of evidence -- a jacket recovered from the Newton crime scene -- to D1S80 DNA testing.

Defendant Burke argued that all of the government's DNA evidence should be excluded because: (1) it is the product of scientific testing which is not sufficiently reliable to be admissible pursuant to Rules 702 and 901(b)(9) of the Federal Rules of Evidence; (2) it will not assist the trier of fact as required by Rule 702; (3) its probative value is so small that it is not relevant under Rule 401 and, therefore, should be excluded under Rule 402; and (4) the danger of unfair prejudice resulting from the admission of such evidence at trial substantially outweighs its probative value and, therefore, it should be excluded under Rule 403. Additionally, Burke claimed that the court should exclude the results of the D1S80 tests because the government disclosed those results in an untimely fashion, in violation of Local Rule 116.1 and Fed. R. Crim. P. 16(a)(1)(D).

Discussion

I. Admissibility of Expert Scientific Testimony.

When presented with a challenge to the proposed introduction of expert scientific testimony, a trial judge must initially determine "whether the expert is proposing to testify to (1) scientific knowledge that (2) will assist the trier of fact to understand or determine a fact in issue." Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S. 579, 592 (1993). See also Fed. R. Evid. 104(a) and 702. Basically, the court must determine whether the proffered expert testimony is likely to be both relevant and helpful to the jury. See Fed. R. Evid. 401.

To be admissible, however, such evidence must not only be relevant, it must also be reliable. See Daubert, 509 U.S. at 589. Among the factors which trial courts should consider in determining whether proffered scientific testimony is reliable are the following:

> (1) whether the expert's opinion can be or has been tested; (2) whether the theory or technique on which the opinion is based has been subjected to peer review and publication; (3) the technique's known or potential error rate; (4) the existence and maintenance of standards controlling the technique's operations; and (5) "general acceptance."

United States v. Shea, 957 F.Supp. at 337-38.

Even if the court concludes that proffered expert testimony is admissible under Rules 402 and 702, it may, nonetheless, be

appropriate to exclude such evidence if "its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues, or misleading the jury." Fed. R. Evid. 403. As Judge Barbadoro observed:

> Expert testimony must be closely scrutinized for compliance with Rule 403 because, as the court in Daubert recognized, "[e]xpert testimony can be both powerful and quite misleading." Nevertheless, relevant and reliable expert testimony ordinarily should be admitted notwithstanding Rule 403 unless the potential that it will be used improperly substantially outweighs any legitimate persuasive value that the evidence may have.

United States v. Shea, 957 F.Supp. at 338 (quoting Daubert, 509 U.S. at 595).

II. Polymerase Chain Reaction Amplification and DNA Typing.

The scientific principles underlying polymerase chain reaction ("PCR") amplification and genetic typing at the DQ1A, Polymarker, and D1S80 sites are fully described in Shea, 957 F.Supp. at 333-35. Several other courts have also addressed those issues at length. See, e.g., United States v. Beasley, 102 F.3d 1440, 1445-46 (8th Cir. 1996), cert. denied, 117 S.Ct. 1856 (1997); State v. Harvey, 151 N.J. 117, 156-67, 699 A.2d 596, 614-19 (N.J. 1997). Those discussions are entirely consistent with the supporting evidence submitted in this case and accurately describe the scientific principles underlying PCR amplification and DNA typing at the seven loci at issue here. Consequently, the court need not embark upon a lengthy discussion of those

scientific principles. It is sufficient to note that the process of PCR amplification and DNA typing involves three components: (1) sample processing; (2) match determination; and (3) random match probability calculations (including use of the so-called "product rule"). See United States v. Chischilly, 30 F.3d 1144, 1156 (9th Cir. 1994).

Based upon the expert testimony provided at the hearings, as well as the numerous scholarly articles and other exhibits submitted by the parties (including validation studies relating to the FBI methodologies and databases), the court concludes that each of the three components of the PCR method of typing at the DQ1A, Polymarker, and D1S80 genetic loci has been extensively tested, subjected to substantial peer review, gained almost unanimous acceptance in the scientific community, and, when the FBI testing protocols are followed, consistently yields accurate and reproducible results. See United States v. Beasley, 102 F.3d at 1448 ("[W]e believe that the reliability of the PCR method of DNA analysis is sufficiently well established to permit the courts of this circuit to take judicial notice of it in future cases"); United States v. Jakobetz, 955 F.2d 786, 799 (2d Cir. 1992) ("[A]fter careful consideration and review by this court, it appears that in future cases with a similar evidentiary issue, a court could properly take judicial notice of the general acceptability of the general theory and the use of these specific techniques"); United States v. Shea, 957 F.Supp. at 345 ("PCR is

a scientifically sound technology that can be extremely helpful in resolving questions of guilt or innocence. The theory and techniques used in PCR are sufficiently established that a court may take judicial notice of their general reliability"). See also United States v. Hicks, 103 F.3d 837, 846-47 (9th Cir. 1996) ("Though PCR forensic testing is relatively new to the federal appeals courts, its novelty should not prevent the district court from exercising its sound discretion in admitting such evidence once a proper Daubert showing has been made"), cert. denied, 117 S.Ct. 1483 (1997); United States v. Lowe, 954 F.Supp. 401, 418 (D.Ma. 1996) ("[T]he court finds that the PCR methodology passes Daubert muster with respect to the DNA profiling at the Polymarker and D1S80 [and DQ1A] loci. The relative lack of experience with the D1S80 loci testing system (as contrasted with the other loci) may affect the weight of the evidence, but the government has demonstrated that the methodology is reliable").

Accordingly, I have determined that the DNA evidence to which Burke objects is admissible under Rules 402, 702, and 901(b)(9), as well as the test articulated by the Supreme Court in Daubert. Moreover, that evidence is not excludable under Rule 403 as either unfairly prejudicial or likely to confuse the jury. Finally, I reject Burke's argument that the disputed scientific evidence lacks any probative value and is, therefore, irrelevant. For example, the mere fact that the results of the DQ1A test performed on the mask recovered from the Hudson crime scene can

only eliminate 93% of the population as potential contributors (that is to say, roughly 1 in 13 people from the general population could have contributed the DNA) does not compel the conclusion that such evidence lacks probative value. To the contrary, by eliminating 93% of the population as potential contributors, and by including Burke as a potential contributor, the test results certainly "have a tendency to make the existence of [a] fact that is of consequence to the determination of the action [i.e., whether Burke was the source of the DNA found on the crime scene mask] more probable . . . than it would be without the evidence." Fed. R. Evid. 401.

Finally, the court rules that the government may introduce evidence of a random match probability calculation, based upon the product rule. The product rule is used to calculate the probability that a number of independent events will occur simultaneously. To arrive at such a probability, the probabilities that each event will occur separately are simply multiplied.[1]

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[1] In Government of Virgin Islands v. Byers, 941 F.Supp. 513 (D.Virgin Islands 1996), the court provided the following helpful illustration of the product rule:

> If there are 52 cards in a randomly shuffled deck, the chances of drawing the ace of spades is 1/52. Once the card is replaced and the deck is reshuffled, the chances of drawing the ace of spades is again 1/52 because the act of drawing the ace of spades the first time does not affect the likelihood of drawing it a second time. The two events are said to be independent of each other. Assuming such independence, the Product Rule allows us to calculate the chances of drawing the

Although no two people (apart from identical twins) share the same overall DNA pattern, no single person has a unique profile at any given locus. United States v. Chischilly, 30 F.3d at 1155 n.14. Because the FBI lab does not attempt to determine the overall DNA pattern of a sample (it only runs typing tests at a limited number of loci), it cannot conclusively state that a particular individual contributed a specific sample of DNA. The genetic typing tests performed by the FBI laboratory can, however, determine whether the questioned sample of DNA is consistent with the defendant's DNA profile (at the specific loci tested). Use of the product rule, combined with statistical frequencies derived from the FBI databases, then permits the laboratory to generate a statistical estimate of the incidence at which people with the same DNA features as those found on the crime scene evidence would be expected to appear in the general population (i.e., suggesting whether the DNA profile shared by the defendant and the contributor of the DNA recovered from the crime scene is relatively common or, at the other end of the spectrum, very rare). Obviously, the more rare the profile, the more weighty the inference that the defendant, rather than some other person, was the source of the crime scene DNA.

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ace of spades two consecutive times as (1/52 x 1/52) or 1/2704.

Id. at 520 n.22.

Burke argues that the government's evidence regarding random match probabilities should be excluded because: (1) the FBI databases are too small to provide accurate statistical frequencies of various genetic profiles; (2) the FBI databases do not meet expectations of Hardy-Weinberg Equilibrium; and (3) the FBI databases do not meet expectations of linkage equilibrium.[2]

While defendant's expert, Dr. Laurence Mueller, identified certain aspects of the FBI databases (and the published validation studies relating to those databases) which he considered irregular, the government's expert, Dr. Ranajit Chakraborty, fully explained each such alleged deficiency to the court's satisfaction. Ultimately, Dr. Mueller's conclusions and opinions did not persuade the court that the FBI databases are unreliable or that the calculation of statistical frequencies based upon those databases was at all likely to produce erroneous results.[3]

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[2] The statistical independence of alleles within a particular locus is known as Hardy-Weinberg equilibrium; statistical independence across loci is known as linkage equilibrium. For a thorough discussion of the principles of Hardy-Weinberg Equilibrium and linkage equilibrium, see United States v. Shea, 957 F.Supp. at 336-37. See generally National Research Council, The Evaluation of Forensic DNA Evidence (1996) (the "NRC II") at 89-116 .

[3] Dr. Mueller's views are more appropriately directed to the weight that should be accorded to evidence derived from the FBI databases, rather than the admissibility of such evidence. Similarly, any argument that the government failed to adhere to the recommendations of the National Research Council in calculating random match probabilities (e.g., use of improper theta value, failure to use the so-called "factor of ten," etc.) also goes to the weight, rather than the admissibility, of such

Crediting the expert opinions of Dr. Chakraborty, and adopting the scientific and legal analysis set out in United States v. Shea, 957 F.Supp. at 341-44, the court concludes that evidence of random match probabilities based upon use of the product rule (as applied to the seven genetic loci at issue in this case) is admissible at trial, assuming a proper foundation is laid. See United States v. Chischilly, 30 F.3d at 1156; United States v. Jakobetz, 955 F.2d at 799; United States v. Lowe, 954 F.Supp. at 418-19. See generally State v. Harvey, 699 A.2d at 634 (collecting cases discussing the reliability and general acceptance in the scientific community of the product rule, as used in the context of calculating random match probabilities); NRC II at 5 ("In general, the calculation of a profile frequency should be made with the product rule").

III. The Weight to be Ascribed to Such Evidence.

Although Burke's assertions concerning deviations from established FBI protocol (e.g., testing DNA samples of insufficient quantity or weight), failures to detect illuminated allele dots in one of the DQ1A test strips, the possible presence of biological contaminants (e.g., microbial DNA), and alleged deficiencies in the FBI's databases are insufficient to warrant exclusion of the government's DNA evidence, they certainly bear upon the weight the finders of fact should give to the FBI's conclusions in this case. Accordingly, defendants are free to

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evidence.

present those opinions to the jury. As the Court of Appeals for the Eight Circuit has noted:

> In every case, of course, the reliability of the proffered test results may be challenged by showing that a scientifically sound methodology has been undercut by sloppy handling of the samples, failure to properly train those performing the testing, failure to follow the appropriate protocols, and the like.

United States v. Beasley, 102 F.3d at 1448. See also United States v. Johnson, 56 F.3d 947, 953 (8th Cir. 1995) (alleged minor deviations from established FBI protocol did not substantially undermine results and went more appropriately to the weight, rather than admissibility, of the evidence); United States v. Martinez, 3 F.3d 1191, 1198 (8th Cir. 1993) ("Not every error in the application of a particular methodology should warrant exclusion. An alleged error in the application of a reliable methodology should provide the basis for exclusion of the opinion only if that error negates the basis for the reliability of the principle itself"); United States v. Jakobetz, 955 F.2d at 800 ("The district court should focus on whether accepted protocol was adequately followed in a specific case, but the court, in exercising its discretion, should be mindful that this issue should go more to the weight than to the admissibility of the evidence. Rarely should such a factual determination be excluded from jury consideration"); United States v. Lowe, 954 F.Supp. at 420 ("The potential for and significance of contamination, the adequacy of proficiency testing, accreditation, and the significance of whether a laboratory

estimates error rates all concern the issue of quality control. Absent evidence demonstrating that the particular quality control procedures followed by the FBI laboratory violated a statute, regulation or a generally accepted industry requirement, these issues impact the weight of the evidence rather than its admissibility").

IV. Rule 16 Sanctions.

Finally, in the exercise of its discretion, the court concludes that exclusion of the D1S80 typing results is not warranted under Rule 16(d)(2) of the Federal Rules of Criminal Procedure. Although the FBI performed the D1S80 testing well after it had performed the other DNA tests on evidence collected in this case, it does not appear that the delay in testing was the result of any purposeful effort by the government to keep potentially exculpatory evidence out of Burke's hands, nor does it appear that it was intended to cause Burke to suffer any strategic disadvantage or unfair surprise. As soon as those test results were available (more than a month prior to trial, and over two months before the government sought to introduce any DNA evidence before the jury), the government disclosed them to Burke and each of the other defendants.

Burke has not shown that he suffered any prejudice arising from the late disclosure of those results. At the hearing, his counsel demonstrated a comprehensive familiarity with the

scientific principles underlying D1S80 typing, throughly cross-examined the government's witness, and ably presented expert witness testimony in support of Burke's motion to exclude such evidence. Burke's counsel also submitted a lengthy and thorough memorandum of law in support of his motion to exclude the D1S80 evidence. Finally, should Burke (or any of the other defendants) have wished to subject the baseball cap or the jacket to DNA testing of his own, he had ample opportunity and sufficient time to do so. None of the defendants availed himself of that opportunity. See NRC II at 25 ("No amount of attention to detail, auditing, and proficiency testing can completely eliminate the risk of error. There is a better approach . . . . Only an independent retest can satisfactorily resolve doubts as to the possibility that the first test was in error. . . . The best protection an innocent suspect has from a false match is an independent test, and that opportunity should be made available if at all possible.").

Conclusion

For the foregoing reasons, the court concludes that evidence derived from PCR amplification and DNA typing at the DQ1A, Polymarker, and D1S80 loci is admissible. Accordingly, Burke's motions to exclude such evidence (documents no. 186 and 565) are denied.

SO ORDERED.

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Steven J. McAuliffe
United States District Judge

November 10, 1997

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