Virginia State Crime Commission

Y-STR DNA Testing

2007

Y-STR DNA TESTING TECHNOLOGY

At the Crime Commission's December 13, 2007, meeting, Shawn Armbrust, Executive Director of the Mid-Atlantic Innocence Project, and Cassie Johnson, Forensics Supervisor and Technical Leader at Orchid Cellmark, presented information on the use of Y-STR (Short Tandem Repeats found on the male-specific Y chromosome) DNA testing technology. The presentation was requested so that the Commission's members could be informed about the new technology and possible legislation being considered by the Forensic Science Board of the Virginia Department of Forensic Science ("DFS").

The Commission was informed about the three primary types of DNA testing: STR, Mitochondrial DNA, and Y-STR. It was reported that both STR and Mitochondrial DNA testing enjoy widespread acceptance in the forensic community, are used in labs across the country and internationally, and are used by DFS. It was further reported, however, that Y-STR testing also enjoys widespread acceptance in the forensic community and is used across the country and internationally but, to date, is not used by DFS. This is significant because Va. Code § 19.2-327.1, which allows for a motion by a convicted felon for scientific analysis of newly discovered or previously untested scientific evidence, requires that the testing requested involve a method employed by DFS. Thus, while convicted felons in Virginia can apply for STR and Mitochondrial DNA testing, they cannot obtain Y-STR testing.

The presentation highlighted the advantages of Y-STR testing and how the pursuit of justice could be advanced in Virginia through the use of this technology as an authorized method of testing. STR testing, the Commission was informed, examines both male and female DNA, looks at 13 areas of the DNA to develop the STR profile and, with the exception of identical twins, a sample can be identified as coming from a specific individual. The methods used for Y-STR testing are very similar to that of STR testing. Y-STR testing, however, only examines male DNA and specifically ignores female DNA. It looks at 17 areas of the Y chromosome to develop a Y-STR profile. It should be noted, however, that all men from the same lineage will have the same Y-STR profile.

In the majority of cases, Y-STR testing is utilized after more conventional DNA testing is attempted or if screening indicates that little male DNA is present. It has also been demonstrated that Y-STR testing may be particularly useful in sexual assault cases. Often times, in sexual assault cases, there are large

amounts of female DNA, but only small amounts of male DNA. Often, the male DNA is obscured by that of the female and is difficult to interpret. Other times, there are no or few sperm cells, such as with seminal fluid from vascetomized males. In such cases, male DNA can be detected from epithelial cells in ejaculate, even if sperm is not present. It was further reported that Y-STR testing can be useful in homicide cases, specifically in cases where there is a mixture of male and female blood, fingernail clippings from the female victim, or where there are ligatures from strangulation. In all these scenarios, there may be contact DNA from the male in the sample. In such instances, the amount of female DNA may overwhelm any male DNA that may exist. Because Y-STR testing is a male specific test, it can easily distinguish the male DNA from that of the female.

The information presented to the Commission highlighted examples in which the availability and use of Y-STR testing led to exonerations. In an example involving the testing of a cutting from a pair of underwear, STR testing detected only female DNA. Using Y-STR testing, however, it was found that a DNA profile from a male contributor did exist but had been obscured by the female DNA. The Y-STR testing, therefore, was able to uncover the male DNA.

The Commission was informed that STR DNA testing detects both male and female DNA and can be uploaded into the Combined DNA Index System ("CODIS"), while Y-STR testing cannot. Y-STR testing, therefore, should be reserved for cases in which STR testing fails, is inconclusive, or not appropriate based upon the sample type.

Upon questioning, it was asserted that this new technology will only pick up a profile that would not have been identified through conventional DNA testing. It was further asserted that the testing is scientifically reliable, generally accepted, and used throughout the country. Because Va. Code § 19.2-327.1 mandates that the testing method used be one that is employed by DFS, a convicted felon cannot currently apply for this type of testing. The Department's Forensic Science Board considered endorsing proposed legislation that would amend § 19.2-327.1 to eliminate the requirement that the testing available be limited to that used by DFS. Upon questioning by the Commission, however, the DFS' Director asserted that they were working towards obtaining this new testing technology and was aiming towards putting it to use by May of 2008, thereby foregoing the need to amend Virginia Code § 19.2-327.1.