Y-STRs IN COURT

Introducing Y-STR DNA Testing in the Courts

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INTRODUCTION

In July 2004, the San Diego Police Department (SDPD) Forensic Biology unit began using the PowerPlex®Y System(c) for Y-STR DNA testing in casework. To date, we have performed such testing in approximately ten cases and testified in three of those cases. Here we present a summary of these cases, including the corresponding court experiences.

CASE #1: A GANG-RELATED HOMICIDE

by David Cornacchia

On June 15, 2003, 23-year-old Travis Thomas was shot and killed at Mission Bay Park in San Diego. Based in part on video captured by a nearby security camera, homicide detectives arrested eleven documented gang members. Eight of those arrested subsequently pled guilty to charges ranging from manslaughter to assault. Na'il Downey, Darrell Tittle and Jerome Silvels all maintained their innocence and chose to be tried for murder. Although it was unclear from the video, eyewitnesses identified Na'il Downey as the shooter.

In preparation for trial, the District Attorney's Office asked the SDPD crime lab to perform DNA testing on a red leather jacket, a green bandana and a pair of black leather gloves to determine if Na'il Downey could be a habitual wearer of this visually distinctive attire that eyewitnesses attributed to the shooter. The results were anything but distinguishing! Each item yielded a complex DNA mixture from at least three individuals. Based on results at thirteen autosomal-STR markers, Na'il Downey was excluded as a source of the DNA from the bandana but could not be included or excluded as a potential DNA contributor to the gloves and jacket. Based on results at the amelogenin locus, it appeared that at least one female was a major contributor to the DNA mixture obtained from the jacket.

After speaking with the prosecuting attorney assigned to the case, we decided to see if Y-STR testing could clarify whether Na'il Downey's DNA could be a component of the mixture from the jacket. A ten-locus Y-STR profile from at least two males was obtained from the sample. This time Na'il Downey was definitively excluded as being a DNA contributor. I was encouraged by the results. As we had predicted, by eliminating the sizeable female component in the DNA mixture, we got a much clearer look at the male component.

TESTIFYING IN COURT

On September 15, 2004, I got an opportunity to testify to all my DNA results, including for the first time, Y-STRs. As a relative greenhorn, I found myself in the advantageous position of being essentially unchallenged as to the merits of Y-STR testing. The prosecution requested the work be performed and so was in no position to question its use. As you can imagine, the defense fully embraced my results and therefore had no interest in raising a legal challenge.

During my direct examination, I simply was asked if I was able to use DNA from the jacket to exclude the defendant. Clearly, the prosecutor was all too willing to let the topic of Y-STR testing slide. Cross-examination proceeded much the same way. Just when I thought this golden learning opportunity had passed, the attorney

Y-STRs IN COURT

representing Na'il Downey began to ask detailed questions on how and why Y-STR testing was different from standard forms of DNA testing. In preparation for my testimony, I had decided that the easiest way to present Y-STR testing to a jury was to circumvent the concept of chromosomes altogether. In the simplest terms possible, I explained that Y-STRs are unique in that we examine that portion of the DNA molecule that is responsible for defining males. Since females lack this region, only DNA from males produce results. While perhaps oversimplified, I found this approach to be generally well received by both the jurors and the attorneys.

In the end, Na'il Downey was convicted of second degree murder, Darrell Tittle was found guilty of manslaughter, and the jury hung on the case against Jerome Silvels.

CASE #2: ALLEGED SEXUAL ASSAULT OF AN UNCONSCIOUS VICTIM

by Ian Fitch

In May 2004, the victim in this case attended a social event where she apparently drank too much and passed out. She awoke in a hotel room to find herself in bed with three males. Complaining of discomfort to her vagina and anus, she submitted to a sexual assault response team (SART) exam. One of the three males was subsequently developed as a possible rape suspect.

The SART kit and items of the victim's clothing were examined by a criminalist at the SDPD crime lab. Semen was found on several items, and the DNA results implicated the suspect as the source of the sperm DNA from the vaginal swabs, shallow rectal swabs, external anal swabs and a cutting from the victim's dress. DNA from semen consistent with the victim's boyfriend was also found on cuttings from the victim's underwear, and he appeared to be a minor contributor to the sperm DNA from the vaginal swabs, external anal swabs and dress cutting.

After narrowly avoiding the subject several times in the past, this time I did discuss the product rule and why the closely linked Y-STR markers were not subject to this method of DNA profile frequency determination.

My colleague also examined a deep rectal swab and observed a low number of sperm cells—too few for autosomal-STR testing. However, we thought Y-STR testing might be appropriate for analyzing this sample for two reasons. First, in our hands the PowerPlex®Y System is somewhat more sensitive than the Profiler Plus™ system used for autosomal-STR testing, and second, we reasoned that DNA from the limited number of sperm cells could be analyzed regardless of the amount of nonsperm DNA from the victim.

I was asked to do the Y-STR testing. The resulting Y-STR profile from the sperm fraction indicated a single male (or male lineage) and matched the suspect in this case. The victim's boyfriend was excluded. The occurrence of the profile (or haplotype) in the PowerPlex®Y database of 2,443 profiles was 13. No Y-STR DNA types were detected in the nonsperm fraction from this item.

TESTIFYING IN COURT

I was asked to testify at the preliminary hearing to determine if the suspect should go on trial on rape and sodomy charges. The prosecutor in this case had some knowledge of Y-STR testing but had not tried a case involving its application before. During the hearing, she asked if I'd performed such testing in this case. I stated "yes", and the subsequent line of questioning allowed me to explain the difference between standard STR and Y-STR testing, when and why we performed such testing, and why we did so in this case.

I stressed that the two methods of DNA testing were technologically similar, but the DNA markers examined in Y-STR testing were male-specific and not present in DNA from females. I explained that Y-STR testing was useful in certain cases and, in particular, sexual assaults, where a relatively small amount of DNA from the male perpetrator is often mixed with a much larger amount of DNA from the female victim, which can mask the male component during standard DNA testing.

After introducing the technology, I presented my findings. The prosecutor asked why the profile frequency of about 1 in 200 was in such contrast to the 1 in billions or trillions we have all come to expect for DNA evidence. I explained that Y-STR markers are clustered on the same piece of DNA (the Y chromosome) and are not subject to the same methods for determining DNA profile frequencies as standard STRs. Not wishing to discuss the product rule, I didn't elaborate. The prosecutor had no further questions. My direct examination took no more than about 15 minutes.

The defense attorney on cross-examination seemed unconcerned that a relatively new technology was used in this case or that the Y-STR

Y-STRs IN COURT

profile that matched his client was relatively common in the general male population. However he was curious that sperm DNA matching his client had been found on the deep rectal swab, but no such DNA from skin cells had been found. During the act of anal sex would I not expect male skin cells to be shed? It was not really within my area of expertise. We moved on! The subsequent questioning went smoothly, and attention was shifted to standard STR testing. All in all, my first Y-STR testimony was relatively painless. The suspect was bound over for trial.

CASE #3: ALLEGED SEXUAL ASSAULT OF A MINOR BY A VASECTOMIZED MALE

by Ian Fitch

This case relates to the alleged molestation of a 17-year-old girl by her vasectomized stepfather. A pair of the victim's underwear, collected by her suspicious mother, was submitted to the SDPD crime lab. Stains on the crotch area of the underwear tested positive for acid phosphatase and P30, but microscopically no sperm cells were observed. I received two cuttings from the underwear for DNA testing. Autosomal-STR testing generated a predominant profile consistent with the victim from each cutting. The suspect was included as a possible minor contributor to the DNA from one of the cuttings, but it was inconclusive if he was included or excluded as a possible contributor to the DNA from the second cutting. I performed Y-STR testing on both cuttings and generated a Y-STR profile from a single male (or male lineage) that matched the suspect. The occurrence of the profile (or haplotype) in the PowerPlex®Y database of 2,443 profiles was 0.

TESTIFYING IN COURT

The suspect was in the military, and on February 7, 2005, I testified at an article 32 hearing (the military equivalent of a preliminary hearing). The prosecutor had not tried a DNA case before and seemed enthusiastic. Upon discussing the Y-STR testing, he suggested that a Daubert hearing might be required should the case go to trial.

This acceptance is encouraging in light of the fact that, since going online with PowerPlex® Y, we have realized that its application in casework is notably broader than originally expected.

The prosecutor asked a few introductory questions, and then I was allowed to present my findings without interruption. I explained that tests had suggested the presence of semen from a sterile or vasectomized male on the underwear and that two methods of DNA testing had been used to analyze the DNA on the two cuttings. I discussed the difference between standard and Y-STR testing and why the latter had been used in this case. My direct examination went smoothly.

The same cannot be said for my cross-examination. The defense attorney went through my education, background, training and all aspects of forensic DNA testing with a fine-tooth comb. He was not hostile but rather curious and thorough. He asked why we'd been using Y-STR testing only since July. I explained that it was a relatively new technology but assured him it was generally accepted by the forensics community. He asked me if I knew of other labs that were using this technology. I knew a few but also explained that, while the forensics community had been discussing Y-STR testing for some time, implementing new technology for use in casework was a slow process.

I spent considerable time talking about statistical approaches. After narrowly avoiding the subject several times in the past, I did discuss the product rule and why the closely linked Y-STR markers, inherited as a unit from father to son, were not subject to this method of DNA profile frequency determination. The defense attorney asked if I knew the source of samples in the PowerPlex®Y database. This was a very good question—one I was pleased I'd asked previously myself. I explained that they were samples available to the different laboratories in North America that participated in the development of the PowerPlex®Y System, which we use for Y-STR testing.

Thus, my second testimony involving Y-STR testing was more grueling than the first but not because the defense mounted any specific attack on the new technology. He wanted details about everything. At the time of writing, the hearing is still ongoing.

CONCLUSION

In all three cases, the Y-STR testing results were accepted in the courtroom with very little specific opposition from the attorneys or the bench. This acceptance is encouraging in light of the fact that, since going online with PowerPlex®Y, we have realized that its application in casework is notably broader than originally expected, and we anticipate using this new system with some regularity.

Editor's Note: As of March 2005, the PowerPlex®Y database has been expanded to 4,004 profiles.