

## **OBSERVATIONS ASSOCIATED WITH CODIS HITS OBTAINED BY SEARCHING A LARGE DNA DATABANK**

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### **INTRODUCTION**

The Virginia DNA Data Bank legislation was initially passed in July 1989 covering only felony sex offenders, but was expanded in 1990 to include all convicted felons. The legislation was again expanded in July 1996 to include all juveniles 14 years and older who were convicted of what would be considered a felony if they had been an adult. (1) The analysis of convicted offender blood samples using DNA (RFLP) began in 1992. However, the use of the RFLP technique in the analysis of convicted offender samples was discontinued in mid-1997 in favor of STR fluorescence technology. In addition, STR fluorescence technique replaced RFLP in the analysis of evidence samples from criminal cases by the end of 1998.

The Virginia DNA Data Bank and the blood samples collected from convicted offenders are maintained in the Forensic Biology section of the headquarters laboratory of the Virginia Division of Forensic Science located in Richmond, Virginia. Forensic casework DNA analysis is conducted in the Richmond laboratory, as well as in the Division's three regional laboratories.

The forensic casework DNA profiles from the three regional laboratories are housed in the CODIS local computer system in each individual laboratory, while all the convicted offenders DNA profiles and all forensic casework DNA profiles statewide are housed in the CODIS state computer system in the Richmond laboratory for searching purposes.

As of October 2000, a total of 220,709 convicted offender blood samples had been submitted to the Division from correctional facilities and regional and local jails throughout the Commonwealth. Currently, there are 124,038 DNA profiles (analyzed by STR) from convicted offenders in the Virginia DNA Data Bank. Approximately 17,000 of these profiles have results at all 13 CODIS core loci, while the remainder have results for the Promega PowerPlex® 1.1 system, which contains 8 of the 13 core loci.

As of October 2000, 1,174 STR profiles from forensic casework evidence had been entered into the Virginia DNA Data Bank. Of these, 502 profiles are from forensic non-subject cases, where the investigators have little or no information regarding the identity of the perpetrator. The remaining STR profiles are from subject cases, where the evidence profile matched the DNA profile of the individual submitted as the suspect. In all four laboratories in the Commonwealth, forensic non-subject cases are analyzed as part of the normal routine, although in general, such cases have a lower priority than cases with submitted suspects and/or court dates. When a search of the DNA profile results in a match to a convicted offender, it is always emphasized in the written report issued to the investigator that the information is provided as an investigative lead, and any connection or involvement of that individual to the case must be determined through further investigation.

## **OBSERVATIONS AND DISCUSSION**

The first DNA Data Bank hit between a non-subject case and a convicted offender was made in August 1993. As of August 2000 there had been a total of 215 CODIS hits, with the majority of these being hits to convicted offenders rather than hits between cases. In fact, there are 184 Offender Hits (OH) and 31 Forensic Hits (FH). The large number of convicted offender profiles in the DNA Data Bank is undoubtedly the reason for this result.

Of the 215 CODIS hits, 30 were made using RFLP technique, while 185 were made using STR technology. During the five years (1992 - 1997) that RFLP technology was used in convicted offender sample analysis for the DNA Data Bank, only about 10,000 RFLP convicted offender profiles were analyzed. Searches against a Data Bank of this relatively small size resulted in the 30 RFLP hits. On the other hand, the DNA Data Bank size increased rapidly beginning in the fall of 1998 as a result of the replacement of RFLP by STR technology, combined with the outsourcing of the convicted offender sample analysis to a contract laboratory. As of October 2000, there were 124,038 convicted offender STR profiles in the Data Bank. The 185 STR hits were achieved in a relatively short time span of less than two years. The contrast in number of hits, illustrates the dramatic difference between RFLP and STR technology in the requirement of sample size, sensitivity, and analytical time. The sensitivity of STR analysis allows DNA profiles to be obtained from forensic non-subject cases, which were quantitatively and qualitatively unsuitable for RFLP, with the added benefit of a shorter analytical time.

By November 1999, the Virginia DNA Data Bank had reached a size of over 100,000 convicted offender DNA profiles. In addition, six qualified DNA examiners were added to the Forensic Biology staff towards the end of 1999. Because of the increase in personnel, more non-subject cases were analyzed, and together with a large and comprehensive DNA Data Bank, more success with DNA hits was achieved. Currently, the Division of Forensic Science is averaging at least 10 CODIS hits per month.

The different crimes associated with the 215 CODIS hits are shown in Figure 1. Sixty percent of all hits were associated with violent crimes against persons, such as rapes, homicides and rape-homicides. This indicates that the DNA Data Bank has been quite helpful in solving non-subject violent crimes. As shown in Figure 1, rape is the most common type of crime being assisted by the DNA Data Bank, making up 42 % of all hits. Burglaries, the second most common type of crime assisted by the DNA Data Bank, make up 31 % of all hits.

The prior convictions of the individuals identified in all 184 Offender Hits were examined, and the distribution shown in Table 1. The largest group is comprised of individuals who were previously convicted of burglaries (25%). In fact, almost half (47%) of all the individuals who were identified as a result of a hit were previously convicted of non-violent crimes (burglary, grand larceny, drug offense, and forgery). Analysis of the prior convictions of those individuals who were identified by Offender Hits to sex crimes revealed a similar pattern, as shown in Table 2. This indicates that if the Virginia DNA Data Bank contained only profiles from offenders convicted of violent crimes, a significant number of the hits that we now have would not have

been made.

Since July 1996, the Division of Forensic Science has received blood samples from juveniles who were convicted of crimes that would have been considered felonies if they were tried as adults. The offender hits that have been made in Virginia since the law went into effect were examined to determine the percentage of hits obtained against profiles from these juvenile offenders. A total of 5 non-subject cases (one rape, one robbery, one auto larceny, and two burglaries) were connected to juveniles by hits to the DNA Data Bank. These five cases represent 2.7 % of all 184 offender hits made in the Commonwealth. Although this does not represent a large percentage of hits, it does demonstrate the usefulness of collecting blood samples from juvenile offenders.

## **CONCLUSIONS**

The conclusions drawn from an examination of the hits with the Virginia DNA Data Bank are:

A significant percentage of the hits against non-subject sex crimes and other violent crimes were made to convicted offenders who were previously convicted of only non-violent crimes.

A significant number of hits made with the Virginia DNA Data Bank would not have been possible if the Data Bank contained profiles only from individuals convicted of violent crimes.

## References:

1. Code of Virginia . 16.1-299.1 . 19.2-310.2 *et seq.* DNA data bank exchange.
2. State DNA Database Statutes - Summary of Provisions (July 1999), Federal Bureau of Investigations, U. S. Department of Justice

## Figures and Tables

Table 1. Prior Conviction of All Offender Hit Candidates

Sex crime	=	10%
Homicide	=	1%
Wounding/assault	=	5%
Robbery	=	6%
Burglary	=	25%
Grand larceny	=	8%
Drug offense	=	10%
Forgery/uttering	=	4%
Other	=	11%
Unknown	=	20%

Table 2. Prior Conviction of Offender Hit Candidate (Sex Crimes Only)

Sex crime	=	20%
Homicide	=	1%
Wounding/assault	=	7%
Robbery	=	7%
Burglary	=	19%
Grand larceny	=	7%
Drug offense	=	10%
Forgery/uttering	=	6%
Other	=	10%
Unknown	=	13%

Figure 1. Unsub Hits by Crime Type

