The Power of DNA

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Introduction

The role of the National DNA Databank (NDDB) is to assist law enforcement agencies in solving crimes and is best summarized by the following quote from the NDDB Annual Report 2001/ 2002 [1] which states.

"For Canadians, it means safe homes and safe communities. For police and the courts, it means saving considerable time and money on investigations and bringing stronger cases to trial. It means the National DNA Data Bank is working for all of us in providing timely, reliable service to police agencies in every part of the country and, eventually, around the world."

The NDDB works in partnership with all Canadian forensic laboratories that submit Crime Scene profiles (these profiles are obtained from exhibits submitted by police officers or forensic identification specialists) allowing DNA data to be shared coast to coast. The NDDB can be utilized by law enforcement agencies in a variety of ways including:

- Linking crime scenes where no suspect has been identified,
- Helping to identify suspects,
- Eliminating suspects where there is no match between crime scene DNA and the DNA data bank,
- Determining whether a serial offender is involved.

The National DNA Data Bank's profiles are derived from biological samples obtained from offenders who have been convicted of primary or secondary offences pursuant to section 487.04 of the Criminal Code. These offences are designated by the DNA Identification Act.

The NDDB is a major asset in solving criminal investigations through two distinct DNA indices: the Crime Scene Index (CSI) and the Convicted Offender Index (COI). CODIS is a databank management system that stores the DNA profiles of these indices. CODIS was provided by the FBI and the US Department of Justice. The data is stored as Convicted Offender profiles or Crime Scene profiles. Matches between Crime Scene Index samples indicate a serial or repeat offender. Matches between a Crime Scene profile and a Convicted Offender profile identify a possible new suspect in an unsolved case.

Case Studies

The following stories reveal how the work of the NDDB scientists has helped open new avenues when police had reached a dead end. The first case is one of several examples that the Toronto Cold Case Squad points to as evidence of the power of DNA evidence. Detective Borg, Toronto Police, explains that a Data Bank match, linking genetic material at two different crime scenes, has produced a vital piece of evidence in an unsolved Toronto murder.

"Last summer, a sex trade worker was murdered and our initial investigation turned up almost nothing about the killer," notes the Toronto detective.

A DNA profile was generated from samples taken from the crime scene and submitted to the National DNA Data Bank's Crime Scene Index. A hit on the system linked this case to a 1997 sexual assault on another prostitute.

"With this new lead, we went back to the '97 case and found a physical description of the attacker," explains Detective Borg. "This is a critical piece of evidence we didn't have before. We've re-opened the investigation and are much more hopeful that we'll find the perpetrator."

Detective Borg is quick to point out that DNA evidence can be vital in cracking cases other than murders and assaults. He notes that a Data Bank hit has also uncovered a key piece of evidence in a string of armed robberies dating back to December 2002. A group of suspects would enter a restaurant just before closing and order a meal. Once the restaurant had closed and the other patrons had left, the suspects would commit the robbery. The crucial piece of evidence turned up when one of the suspects had a beer.

"The Toronto lab was able to generate a DNA profile from saliva on the glass which produced a Data Bank link to an old sexual assault case," adds Detective Borg. "This is an important piece of the puzzle and it's moving the investigation in a very positive direction."

As the head of a small unit with 300 difficult cases, Detective Borg emphasizes the value of DNA in helping to make the most of limited resources – pursuing the best leads and eliminating the innocent. He's convinced the Data Bank has caused a dramatic evolution in the way police investigate serious crime.

"For us, it boils down to enhancing public safety," he says. "As far as the Data Bank is concerned, from a very practical perspective – it works. You won't find stronger supporters of the National DNA Data Bank anywhere," adds Detective Borg. "While we haven't yet solved all of our cold cases, DNA evidence has linked assaults that we would have never even considered. The Data Bank hits are a real shot in the arm for frustrated investigators and, more importantly, for the victims and their families."

The Need For More Samples

A study conducted by Consulting and Audit Canada in 1998 prior to the opening of the NDDB showed that, in Canada, there were approximately 18,600 primary offences and at least 94,500 secondary offences per year that could be eligible for entry into the Convicted Offender Index of the Data Bank.

However, current statistics (see Table 1) indicate that the NDDB is receiving only a fraction of the expected samples (less than 50% of primary offence samples and much less of the secondary offence samples). The more samples that go into the Data Bank, the better the chances of finding a match and helping to prevent or solve a crime will be.

Although the number of samples being submitted is much lower than expected the NDDB has assisted in solving the most serious crimes such as murder, attempted murder and sexual assault, which may not have been resolved otherwise (see Tables 2 & 3). The NDDB can now predict that 5% of the crime scene profiles entering the Data Bank will result in a match with a previous offender's profile. The NDDB is also providing valuable assistance to law enforcement agencies with break and enters and crimes of similar nature.

Joining Forces With Other Countries

The NDDB has worked with the Office of the Solicitor General of Canada and the Department of Justice to develop formal agreements to facilitate the international exchange of information. An agreement with Interpol has been established, offering investigators in 181 other countries the opportunity to share information developed with this powerful new crime-solving tool.

Protecting Privacy

The NDDB was created by federal legislative enactment (DNA Identification Act, Statutes of Canada 2000, c.37). The operation of the NDDB is governed by the DNA Identification Act and depends on the operation of the Criminal Code to obtain the DNA samples for inclusion in the Convicted Offenders Index. Consistent with the DNA Identification Act and the Privacy Act of Canada, the RCMP has imposed strict procedures governing the handling of DNA profiles and biological samples to ensure that privacy interests are protected. Information collected by the National DNA Data Bank can be used only for law enforcement purposes.

The NDDB Web site has been developed as a source of current information about the National DNA Data Bank for all interested parties. It also provides documentation and guidance for police officers tasked with the process of taking biological samples for the NDDB.

For further information please visit the NDDB Web site at: www.nddb-bndg.org

References

[1] National DNA Data Bank of Canada Annual Report 2001-2002 Catalogue number: JS61-13/2002, ISBN 0-662-66799-9, NCS-SNC 002

Note: The contents of this paper have been a team contribution from the National DNA Data Bank.

Figure 1: Process for Reporting Matches: Convicted offender Profile to Crime Scene Profile

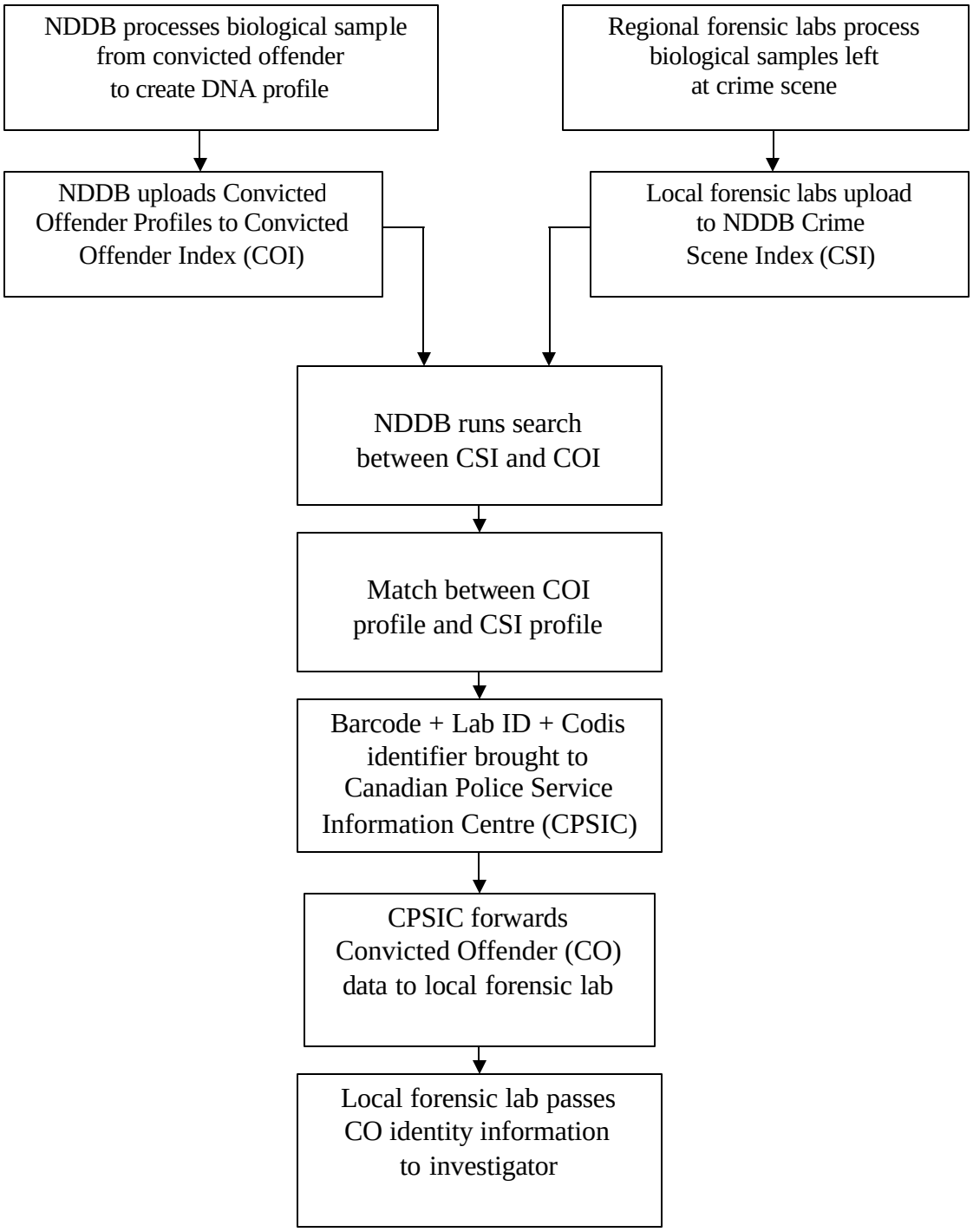

Table 1: Comparison of Samples Received vs Samples Estimated

Province	Samples[*1] Collected to Date 2000-06-30 to 2005-05-02	Total[*2] Primary Offences per Year	Total[*2] Secondary Offences per Year
ON	36,585	6,615	33,328
QC	13,712	4,134	20,648
AB	8,017	1,750	8,943
SK	3,624	1,131	5,441
NS	2,019	568	2,679
NL	1,181	341	1,948
PE	161	58	361
YT	148	88	332
BC	8,072	2,173	12,170
MB	4,647	1,075	5,025
NB	1,123	518	2,635
NT	574	212	988
NU	378	N/A[*3]	N/A[*3]

[*1] National DNA Data Bank's Statistics.

[*2] Estimated number of offences eligible per year for entry into the NDDB, data from Capital and Operating Expense Estimates for the NDDB, Consulting and Audit Canada, July 1998, prepared for the Solicitor General of Canada and the RCMP.

[*3] No statistics available since Nunavut was compiled with Yukon and NWT prior to 1998.

Table 2: National DNA Data Bank Investigations Assisted (as of May 2, 2005)

Offence	**Total**	**% of Increase past year**
Murder	209	76% - 90 cases
Sexual assault	505	56% - 182 cases
Attempted murder	74	61% - 28 cases
Robbery (Armed)	416	63% - 161 cases
Break and entering with intent, committing offence or breaking out	1,789	105% - 915 cases
Assault (+)	197	112% - 104 cases
Other	54	100 % - 27 cases
Total	3,244	87% - 1509 cases

Table 3: Match Report :Investigations Assisted (as of May 02, 2005)

3,244 Offender Hits – Crime Scene to Offender.
Note: This is an increase of 1509 cases - (87%) in one year.
408 Forensic Hits – Crime Scene to Crime Scene
Note: This is an increase of 248 cases – (155%) in one year.