

Basic DNA Information

Deoxyribonucleic acid (“DNA”) is the fundamental building block for an individual’s entire genetic makeup. Only 1/10 of a single percent of DNA differs from one person to another. Scientists can use these variable regions to generate a DNA profile of an individual using samples from blood, bone, hair, skin, teeth, perspiration, and other body tissues and products.

Forensically valuable DNA can be found in many different places, including on weapons and clothes. However, several factors can affect the DNA left at crime scene, including environmental factors (e.g., heat, moisture, and mold). Therefore, not all DNA evidence will result in a usable DNA profile.

Above information from: www.dna.gov and www.nij.gov.

DNA Testing Methods Used In Wisconsin State Crime Laboratory

STR Testing: The most commonly used type of DNA testing at the State Lab is PCR-STR analysis (or simply, STR). In general, only STR profiles can be uploaded to government DNA databases. STR testing is much more sensitive than RFLP analysis and can generate profiles from material that is invisible to the naked eye. The State Crime Lab appears to use STR for most of its “touch-DNA” analyses.

Y-STR Testing: Y-STR testing can be useful for identifying a male contributor in a sample that is predominantly female (like in a sexual assault kit). Y-STR and other forms of DNA testing may yield profiles even if preliminary tests did not reveal the presence of semen. Y-STR profiles are not uploadable to government DNA databases, but can be used for comparison purposes to other Y-STR profiles. The State Lab performs Y-STR testing.

Mitochondrial Testing: Mitochondrial testing is typically used on samples with very little or no nuclear DNA, like hair fragments without root material. Mitochondrial DNA profiles cannot be uploaded to government DNA databases, but can be used for comparison purposes to other mitochondrial profiles. To our knowledge, the State Lab does not perform mitochondrial DNA testing.

Mini-STR testing: Mini-STR can be useful to develop DNA profiles from very minute or degraded samples. Mini-STR has made DNA testing possible in cases where standard STR testing has failed to generate a profile. Mini-STR testing, for example, has been used to generate DNA profiles from fired bullet shell casings. It may also be useful in generating DNA profiles from latent fingerprint lifts. In general, mini-STR profiles are not uploadable to government DNA databases, but can be used for comparison purposes to other mini-STR profiles. Mini-STR profiles may also be comparable to standard STR profiles in certain cases. A few labs outside Wisconsin can upload mini-STR profiles to government databases, but our understanding is that this is currently a difficult process. To our knowledge, the State Lab does not perform mini-STR testing.

Above information from: Letter from Wisconsin State Crime Laboratory Regarding DNA Testing at State Crime Lab to Wisconsin Innocence Project and Memo from Wisconsin Innocence Project to Wisconsin State Public Defender. More detailed information can be found at: www.bodetech.com/forensic-solutions/dna-technologies/.

Basic Timeline of DNA Testing Methods in the Wisconsin State Crime Laboratory

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- 1994 - Restriction Fragment Length Polymorphism (“RFLP”)
 - 1997 - Polymerase Chain Reaction (“PCR”) methods, DQ Alpha, Polymaker, D1S80
 - 1999 - Short Tandem Repeat (“STR”) utilizing Profiler and Cofiler Kits
 - 2001 - STR using Powerplex 16 Kit
 - 2004 - STR using Powerplex 16 Kit, but added Power Plex Y

Note: During the different time periods, more than one type of DNA technology may have been used. Above information from: Letter from Wisconsin State Crime Laboratory Regarding DNA Testing at State Crime Lab to Wisconsin Innocence Project.