A81   Integration of DNA Authentication Into the Forensic Procedure

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After attending this presentation, attendees will get acquainted with authentication of DNA, an emerging field in forensic science. DNA authentication is a new test that verifies that a DNA sample is genuine, rather than artificially-synthesized, as could be the case as the result of deliberate falsification or inadvertent contamination.

This presentation will impact the forensic science community and the general public by demonstrating that the current standard forensic procedure is incomplete without DNA authentication, and that adopting such an assay for casework samples is necessary for maintaining the high credibility of DNA evidence in the judiciary system.

Over the past twenty years, DNA analysis has revolutionized forensic science, and has become a dominant tool in law enforcement. Today, DNA evidence is key to the conviction or exoneration of suspects of various types of crime, from theft to rape and murder. However, the disturbing possibility that DNA evidence can be faked has been overlooked. It turns out that standard molecular biology techniques such as PCR, molecular cloning, and recently-developed whole genome amplification (WGA), enable anyone with basic equipment and know-how to produce practically unlimited amounts of *in vitro* synthesized (artificial) DNA with any desired genetic profile. This artificial DNA can then be applied to surfaces of objects or incorporated into genuine human tissues and planted in crime scenes.

This presentation will demonstrate that the current forensic procedure fails to distinguish between such samples of blood, saliva, and touched surfaces with artificial DNA, and corresponding samples with *in vivo* generated (natural) DNA. Furthermore, genotyping of both artificial and natural samples with Profiler Plus® yields full profiles with no anomalies.

An authentication assay developed will be presented, which distinguishes between natural and artificial DNA based on methylation analysis of a set of genomic loci: in natural DNA, some loci are methylated and others are unmethylated, while in artificial DNA all loci are unmethylated. Data will be presented from testing of the assay on natural and artificial samples of blood, saliva, and touched surfaces, all with complete success.

Artificial DNA, Methylation Analysis, DNA Authentication