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USE OF MTDNA ANALYSIS TO RESOLVE THE GENETIC ID OF A CONTESTED URINE SAMPLE SUBMITTED FOR RANDOM DRUG TESTING.

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Voluntary and court ordered drug testing is commonplace in our criminal justice system, with court ordered drug testing being imposed to assure compliance for parole, bond and drug treatment programs. It is also frequently used by employers for screening of their employees as a condition for hiring and/or for random drug testing of staff especially those in sensitive or security positions to enforce drug –free work place policy. Hence, there exists a reliance on drug testing as a way to assure employees, athletes, or professionals are drug free during employment is standard practice in virtually all walks of life. As a result, large numbers of urine samples are being analyzed in drug testing facilities each year. The potential for a mix up or false reading of a sample is tremendous however the occurrence rate is relatively rare due to the extreme level of preventive measures in place in most, if not all, of the drug testing facilities providing this service. None-the-less, the outcome of a positive drug test can be fairly dramatic, often times resulting in termination or rejection of the employee or candidate. Drug testing positives for individuals in high profile or high security positions can be devastating to their careers. Hence, when a sample result is contested by the donor, often times a high stakes process can ensue pitting the employer, the drug testing facility and the plaintiff against one another in a legal process which can lead to a large dollar award for punitive damages or loss of employment and reputation, depending on the outcome of the trial. Many of these cases hinge on whether the sample submitted is somehow switched during the testing process or whether or not the results obtained from the sample are valid. In the case of a switched sample it is imperative to prove the identity of the actual sample tested. Drug testing laboratories take extreme measures to assure identity, chain of custody and purity of the donor sample. Ultimately, to prove identity sometimes a DNA test is required to assure that the sample was not mixed up during the drug testing process and that the results obtained from the sample submitted belongs to the donor. Unfortunately, this is sometimes easier proposed than accomplished. DNA testing on urine and hair samples can impose significant problems performing standard STR analysis in order to generate profiles sufficient for determining genetic identity. There are several factors which play into the complexity of the process. Urine samples are notoriously variable for quality and quantity of the DNA obtained and often times have insufficient quantities of DNA in the samples for standard STR analysis. Likewise DNA obtain from cut hair samples submitted for drug testing do not contain nuclear DNA, thus STR analysis is not possible. In these cases an alternative DNA analysis procedure must be used to obtain genetic identity. In this presentation we show how Mitochondrial DNA analysis was applied to correctly identify the donor of a urine sample submitted for drug testing. The details of this case are as follows: In October of 2004, a urine sample was submitted to a toxicology laboratory for random drug testing. After analysis of a portion of the urine submitted following standard procedures, the sample tested positive

for a Cocaine metabolite. The donor who was employed in the banking industry, was fired by his employer upon obtaining the results from his drug test. The donor vehemently denies any cocaine use. The donor, on the advice from his lawyer, and in attempt to gain his reputation back, subsequently submitted hair samples for drug testing which tested negative for cocaine. After an almost a three year period the remaining portion of the urine specimen was submitted to our laboratory for DNA identification. Due to the condition and age of the sample, no STR profile was obtained, however with the use of Mitochondrial DNA Analysis, identification was obtained through sequence comparison and a 100% sequence match was obtained between the drug sample and that of the reference sample submitted by the donor. Moreover, once identification was performed on the sample, subsequent retesting of the sample for cocaine and it's metabolites were negative. In this presentation we will provide the following:

1. Case History
2. Discuss the issues surrounding DNA as a means to resolve claims that samples were mixed up at the collection site or at the toxicology laboratory
3. Forensic DNA analysis, STR vs. mtDNA
4. DNA Analysis: Degree of Discrimination
5. Case Outcome (Re-testing of the sample for Cocaine)