A141 Distinguishing Identical Twins With Antibody Profiling

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After attending this presentation, attendees will gain an understanding of how antibody profiling can be used to identify individuals and an assessment of the ability of antibody profiling to distinguish between identical twins.

This presentation will impact the forensic science community by introducing attendees to the science behind a recently available identification technology, AbP-ID™ and its ability to distinguish between identical twins. Distinguishing blood samples from identical twins is virtually impossible with other identification technologies. This technology provides a tool for investigators to use in cases where identical twins are suspects.

Antibody profiling examines individual specific autoantibodies (ISAs) that are produced by every individual; and, since ISAs are produced by the immune system through a number of random events such as error prone homologous recombination, mutations, multiple coding segments, and heavy chain/light chain re-association, the antibody profiles of identical twins should differ.

The antibody profiling technology was developed for forensic analyses at the Idaho National Laboratory (INL). This technology has been licensed to Identity Sciences, LLC who has developed a prototype test kit, AbP-ID™. The INL is currently working to scientifically validate performance of the AbP-ID™ kit under a variety of conditions. The results reported from this study represent efforts to determine if twins can

institutions involved (i.e., Colombian National Police, Law Enforcement

Antibody profiling is an alternative technique for identification of individuals. Antibody profiling is based on the presence of ISAs in the body fluids of individuals. Infants have an ISA pattern that is identical to their mother's and develop their own unique pattern over the first two years of their lives. This pattern does not appear to be affected by environmental or disease exposures. After the age of two, the ISA pattern is set and does not change over the individual's lifetime.

In this study, ten sets of identical twins were identified to test this hypothesis. Sera and swabs were collected from each twin. The swabs were sent for twin zygosity testing while the sera was analyzed in duplicate with a prototype antibody profiling kit, AbP-ID™. The AbP- ID™ kit instructions recommend using between six and 15 microliters of sera which was added to a buffered solution and incubated with test chips for 15 minutes. The chips were thoroughly washed and a detection reagent was added for a ten minute incubation. The chips were again washed and a developing reagent was added for 20 minutes for a total assay time of approximately 100 minutes. After development was complete, the chips were dried at room temperature. Images of the developed chips were captured using a desktop scanner. ImaGene 8.0, a microarray image analysis program, was used for image analysis and data extraction. Extracted data from all twin sets was compared using a standard correlation analysis.

Results from DNA solutions, Inc. indicated that each of the ten twin sets were identical with 99.9% confidence. For the ten sets of twins, the AbP-ID™ correlations between twins ranged from 0.25 to 0.75. Other testing with unrelated individuals showed similar ranges of correlation. In contrast, technical replicates of the sera samples all correlated greater than 0.9. This supports the hypothesis that ISAs in identical twins are made randomly and have no greater chance of matching than in unrelated individuals.

Antibody Profiling, Identical Twins, Identification

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