ESTIMATING GENETICS ANCESTRY USING THE INVESTIGATIVE-LEAD℠ (LAW ENFORCEMENT ANCESTRY DNA) TEST

Jason Bryan, BS, Marc Bauchet, Ph.D., Victoria Vance, MS, Dan Hellwig, MFS, Lars Mouritsen, BS
Sorenson Forensics 2495 S. West Temple, Salt Lake City, Utah 84115

The utilization of many worldwide DNA databases is an essential tool in modern criminal investigations. Unfortunately, when an evidentiary DNA profile does not provide a viable suspect subsequent to a database search, the investigator may be left with little forensic direction. To assist in these critical situations, Sorenson Forensics introduces Investigative LEAD℠; a single nucleotide polymorphism (SNP) based DNA test designed to estimate genetic ancestry against a model of 5 genetically distinct, putative parental populations. The populations and the reference samples representing them are as follows: Western European (HapMap CEU, Northwest European descent residing in Utah), West Sub-Saharan African (HapMap YRI, Yoruba from Ibadan, Nigeria), East Asian (HapMap CHB from Beijing, China), Indigenous American (Compilation of samples identified as being from populations indigenous to North, Central, and South America including Maya, Pima, Karitiana, Surui, and Arawak descent), and the India Subcontinent (HapMap GIH, Gujarati Indian descent residing in Houston, TX). Our method uses 190 SNP Ancestry Informative Markers (AIMs) chosen from their scored ability to specifically differentiate between the 5 reference populations using Principal Component Analysis (PCA) as the comparative analysis tool and includes some markers identified as informative in previous genetic ancestry estimation publications. Using the program FRAPPE and uniquely designed algorithms, the method compares an unknown individual sample to at least a hundred randomly selected subsets of individuals from the reference populations. Background interference is calculated simultaneously and is used to estimate confidence intervals based on a calibration that was effected using thousands of worldwide individuals. Validation data have shown the Investigative LEAD℠ test is a viable, robust and adequately sensitive test, capable of functioning on a variety of different forensic samples and DNA extract types. We believe this test will provide law enforcement investigators valuable information regarding the genetic ancestry of potential suspects. This test can be a great benefit for solving cold cases and other criminal investigations.