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Potential for incorrect relationship identification in new forensic familial searching techniques

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New research suggests that unrelated individuals may be mistakenly identified as genetic family members due to inaccurate genetic assumptions. This is particularly relevant when considering familial searching: a new technique which extends forensic identification to family members of individuals with profiles in offender/arrestee DNA databases. In a study published this week in *PLoS Genetics*, researchers at the Universities of Washington and California at Berkeley show that false familial identification may be more likely for individuals with particular genetic backgrounds; for example, in the USA, those of Asian or Native American descent.

In familial searching, a partial genetic profile match between a database entrant and a crime scene sample is used to implicate genetic relatives of the database entrant as potential sources of the crime scene sample. Unlike in traditional forensic DNA identification, where all genetic markers must match exactly, in familial searching only a portion of genetic markers need to match to suggest a biological relationship. This method can help identify suspects not currently included in databases, but it is also more prone to error.

The possibility for error can be traced to slight genetic differences between groups of people. While all humans share a recent common origin and the vast majority of their DNA, a small fraction of the genetic variation differs in frequency between groups of people according to

their population history. These population-specific frequencies are used to calculate the statistical likelihood of an observed partial match, which informs law enforcement about the strength of evidence for a genetic familial relationship.

The new research shows that when an incorrect population is assumed, genetic profiles of unrelated individuals may appear similar enough to come from close genetic relatives. In the U.S., where individuals are typically assumed to have European American, African American, or Latino genetic ancestry, this sort of error is more likely for individuals of Asian or Native American descent.

With the expansion of offender/arrestee DNA profile databases, genetic forensic identification has become commonplace in the United States criminal justice system. These results indicate that caution is warranted in the application of familial searching in structured populations, such as in the United States. The degree to which relative identification is affected in practice will depend on the exact methods and databases used.

More information: Rohlfs RV, Fullerton SM, Weir BS (2012) Familial Identification: Population Structure and Relationship Distinguishability. *PLoS Genet* 8(2): e1002469.doi:10.1371/journal.pgen.1002469

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