

Probabilistic approaches of DNA mixture interpretations: Advantages and limitations

Ranajit Chakraborty

University of North Texas Health Science Center, USA

DNA mixture, defined as a DNA profile that contains multiple (2 or more) donors, is a common DNA evidence profile from many crime scenes. Identification (or narrowing down) of sources of contributors in a DNA mixture is a complex process, for which the present DNA community is progressively using a probabilistic approach, which involves two steps. First, the DNA mixture profile is deconvoluted into single-source individual profiles with the number of contributors assumed to be known. In the second step, the likelihoods of such deconvoluted sets of profiles are computed under two alternative hypotheses of sources of such a DNA mixture, from which the strength of involvement of (one or more) known persons are assessed. In contrast, interpretation of DNA mixtures without mixture deconvolution is a simpler approach, but in most scenarios yields a diminished strength of DNA evidence. This presentation will address the advantages of the probabilistic approaches of DNA mixture interpretation, explicitly enumerating the assumptions of the probabilistic approaches and parameters required to carry out such analyses. Limitations of these methods will also be specified, particularly in the context of allele sharing between contributors in a mixed DNA sample, uneven contributions of DNA from different donors, and presence of low copy number DNA from (one or more) contributors. Current experimental studies of validation of probabilistic approaches will be reviewed to comment on the safeguard of using probabilistic approaches of interpretation of DNA mixture for law and justice.

Biography

Ranajit Chakraborty got his Ph.D. at the age of 25 years from the Indian Statistical Institute, India, and served as faculty member in many universities around the world. Currently, he is the Director of the Center for Computational Genomics, and a Professor at the Department of Forensic and Investigative Genetics of the University of North Texas Health Science Center, Fort Worth, Texas. He has published over 580 papers; edited 8 books; and served on editorial boards of 23 International journals. His works on DNA forensics provide the foundation of interpretation of DNA evidence in civil and criminal cases.

Ranajit.Chakraborty@unthsc.edu