

Evaluation of forensic evidence in DNA mixture using RMNE

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To establish the link between an arrested suspect and a crime case based on a deoxyribonucleic acid (DNA) mixture, one of the two main statistical tools used by forensic scientists is the random man not excluded (RMNE) probability. The traditional RMNE approach omits any knowledge on the number of contributors and is commonly regarded as being less powerful than the likelihood (LR) approach. In view of the simplicity of interpretation of RMNE, which is the major advantage of using it to present DNA evidences in court, we present a new concept for the interpretation and calculation of the RMNE probability. A new approach for determining the non-exclusion of a random man is proposed, upon which a general formula for the calculation of RMNE probability is developed. By taking account of the number of contributors, the new RMNE probability can be much more powerful for evaluating the evidentiary value of non excluded suspects, compared to the traditional RMNE approach. As illustrated by an example based on a real rape case, our approach can be easily implemented and can shorten the gap between the two approaches by utilizing more information of the case.

Keywords: Deoxyribonucleic acid, Probability of exclusion, Random man not excluded