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Forensic DNA Analysis and Population Genetics: Strengthening the Scientific Foundation of Criminal Investigations

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DNA evidence has transformed forensic investigations by providing highly accurate methods for human identification, kinship analysis, and criminal case resolution. This presentation examines recent advances in forensic DNA profiling, next-generation sequencing, probabilistic genotyping, and population genetics. Novel analytical approaches improve interpretation of complex DNA mixtures while reducing uncertainty in forensic evidence evaluation.

The session discusses advances in forensic genomics, bioinformatics, and statistical modeling that enhance laboratory accuracy and judicial confidence. Ethical considerations, database management, and international quality standards are also reviewed. Future developments include AI-assisted DNA interpretation and rapid forensic sequencing technologies for criminal investigations.

Biography

David Balding is Professor of Statistical Genetics at the University of Melbourne, Australia. His research focuses on forensic genetics, statistical genomics, DNA evidence interpretation, and population genetics. He is internationally recognized for advancing forensic DNA analysis and quantitative forensic science.