Establishment of forensic DNA technology in India: progress and future prospects

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The application of DNA technology in legal forensic examinations was a pivotal point in the history of the legal justice system. It has helped law enforcement agencies worldwide solve cases such as rape, murder, terrorism and mass disasters. Commonly known as DNA fingerprinting or DNA profiling, this technology is used to identify individuals and establish relationships by analysing certain segments of DNA and their inheritance patterns. India was an early adopter of forensic DNA testing, which has now become an integral part of the judicial process across the country. Despite the continued success of DNA technology, laboratories across India are struggling to reach the global standards of DNA examination and have an overwhelming backlog of cases. This article reviews the development of human identification forensic DNA technologies and their adoption in India. Future prospects and challenges for the technology have also been elaborated, including a discussion on the recently introduced legal reforms assimilating modern forensic examination in the judicial process.

Keywords: DNA profiling, forensic DNA technology, forensic science laboratories, human identification, legal justice system.

MODERN forensic science in India can be traced back to the 19th century when the first chemical examiner's laboratory was established. The growth spurt in forensic science occurred in the second half of the 20th century when forensic laboratories and institutions were established across the country (Table 1). Currently, the country has 7 central, 32 state, 80 regional forensic science laboratories (FSLs) and 529 mobile forensic units[1]. About 80 universities in India, including institutions of national importance, such as National Forensic Science University (NFSU) and Rashtriya Raksha University, impart forensic education and training.

dedicated to developing DNA fingerprinting techniques, the Centre for DNA Fingerprinting and Diagnostics (CDFD) was established in Hyderabad in 1996 (ref. 5). In 1998, the Central Forensic Science Laboratory (CFSL), Kolkata, established a DNA examination facility[6]. Following the lead, laboratories have been set up at central, state and regional levels for DNA analysis. Many cases of national importance, like the assassination of former Prime Minister Rajiv Gandhi, the Naina Sahni Tandoor case, the Nithari killings, Priyadarshini Mattoo murder case and the Nirbhaya case have been solved by using DNA technology[3].