

## Genetic Privacy and DNA Profiling: A Comparative Legal Study of India and the United Kingdom

Shriya Pandey<sup>1</sup> & Dr. Balwinder Singh<sup>2</sup>

<sup>1</sup>Assistant Professor, School of Law, UPES, Uttarakhand, India

<sup>2</sup>Associate Professor, School of Law, UPES, Uttarakhand, India

### Abstract:

This paper examines whether the legal regime on DNA profiling in the United Kingdom can serve as a viable benchmark for the development of India's nascent genetic identification framework. By comparing legislative safeguards, institutional mechanisms, and judicial interpretations in both jurisdictions, the paper evaluates the coexistence of DNA technologies with fundamental rights, particularly the right to privacy. The hypothesis asserts that technological advancement and privacy can harmoniously coexist through a robust legal framework. The analysis underscores that the UK, especially after the *S and Marper v. United Kingdom* judgment by the European Court of Human Rights, offers a balanced model that India can emulate, albeit with culturally and constitutionally appropriate adaptations.

### Introduction:

Deoxyribonucleic acid (DNA) profiling, also known as genetic fingerprinting, has emerged as one of the most significant technological advancements in modern forensic science. Its potential to identify individuals with high accuracy has revolutionized criminal investigations, enabling both the conviction of perpetrators and the exoneration of the wrongly accused (Kumar et al., 2022). As forensic databases expand globally, the legal and ethical dimensions of DNA profiling have garnered increasing attention. At the heart of this discourse lies a fundamental tension: the imperative of public safety versus the preservation of individual civil liberties, particularly the right to privacy. DNA profiling presents a powerful tool for law enforcement, aiding in both conviction and exoneration (Jo-Anne Bright et al., 2019). However, its use implicates core rights, including privacy, bodily autonomy, and protection against surveillance. In Indian context—amid debates around the DNA Technology (Use and Application) Regulation Bill, 2019—calls for comparative insights. This paper critically evaluates the UK's comprehensive DNA framework, shaped significantly by human rights jurisprudence, to assess its applicability as a benchmark for India.

The use of DNA technology for legal purposes raises multifaceted concerns related to bodily autonomy, data protection, and potential misuse by state agencies. The long-term storage of genetic material and profiles, the absence of adequate consent mechanisms, and the risk of stigmatization or surveillance are especially critical in jurisdictions with weak regulatory oversight. In this context, establishing a robust legal framework that balances the imperatives of justice and individual rights becomes imperative.

In India, the debate has intensified with the introduction of the DNA Technology (Use and Application) Regulation Bill, 2019, which aims to regulate the use of DNA for the purposes of identification in criminal and civil matters. While the bill purports to provide for safeguards and the establishment of a regulatory board, critics argue that it lacks sufficient provisions to protect informational privacy, fails to ensure independent oversight, and permits disproportionate retention of genetic data. This regulatory vacuum is particularly concerning in the post-*Puttaswamy* legal landscape, where the Supreme Court of India has recognized the right to privacy as a fundamental right under Article 21 of the Constitution (*JUSTICE K.S. PUTTASWAMY VS. UNION OF INDIA*, 2018)

Given these developments, there is an urgent need to examine global best practices that can inform India's legislative approach. This paper posits that the legal regime governing DNA profiling in the

United Kingdom offers a valuable comparative framework. (Deryck Beyleveld & Roger Brownsword, 2012) The UK has undergone significant reform in response to human rights challenges, most notably after the landmark *S and Marper v. United Kingdom* (2008) decision by the European Court of Human Rights, which held that the indefinite retention of DNA profiles of unconvicted individuals violated Article 8 of the European Convention on Human Rights. (*S. AND MARPER v. THE UNITED KINGDOM*, 2008) Consequently, the UK enacted the Protection of Freedoms Act 2012 to recalibrate the balance between state interests and personal rights, introducing provisions for deletion, independent oversight, and proportionate use of genetic data (Protection of Freedoms Act 2012, 2012) DNA profiling has become a critical tool in modern criminal justice systems, enabling the identification of perpetrators and exoneration of the innocent. However, the collection, storage, and use of DNA data raise significant concerns related to the right to privacy and potential misuse of sensitive genetic information. This issue is particularly complex when balancing the need for effective law enforcement against the protection of individual civil liberties. In India and the United Kingdom (UK), legal frameworks governing DNA profiling differ substantially in terms of oversight, data retention policies, consent mechanisms, and privacy safeguards. While the UK has established comprehensive legislation and independent regulatory bodies to manage DNA data with specific retention limits and transparency, India is still evolving its legal landscape with efforts to enact robust DNA profiling laws that adequately protect privacy rights embedded in its Constitution. The problem lies in addressing how India can draw lessons from the UK's experience to develop and implement DNA profiling laws that uphold constitutional privacy rights, prevent arbitrary or indiscriminate use of DNA data, and ensure stringent quality management and ethical standards in forensic practices. This comparative study seeks to identify the gaps and challenges in India's current approach and propose measures based on the UK model to harmonize scientific advancement with fundamental human rights in the context of DNA profiling and privacy protection. (Sunil K. Verma & Gajendra K. Goswami, 2014)

This paper critically evaluates the structure, evolution, and effectiveness of the UK's DNA profiling legal regime, assessing its normative compatibility with India's constitutional and human rights framework. It further explores whether India, in light of its technological aspirations and constitutional values, can adopt a similarly balanced approach where forensic innovation coexists with compulsory privacy safeguards. In doing so, the study contributes to the growing body of comparative legal scholarship on bio-surveillance and fundamental rights.

### **Evolution of DNA Profiling**

Deoxyribonucleic Acid (DNA), often described as the genetic blueprint of life, is universally recognized as the most fundamental biological component responsible for determining the physical, hereditary, and genetic characteristics of every living organism. It carries genetic information that shapes an individual's unique identity, with the singular exception of monozygotic (identical) twins. Although approximately 99.7% of human DNA sequences are identical, slight variations known as microsatellites or short tandem repeats (STRs) distinguish one individual from another. (Jeffreys et al., 1992) These microsatellites are short, repetitive sequences within the DNA molecule that differ across individuals and serve as critical markers in forensic identification. The forensic value of DNA evidence lies in the ability to analyse these minute differences to accurately differentiate between individuals, even when biological material is limited or degraded.

In contemporary forensic investigations, particular emphasis is placed on the collection, preservation, and analysis of DNA evidence. One significant advancement in this domain is the identification and examination of Touch DNA — a form of biological evidence left behind by the transfer of epithelial or skin cells when a person comes into contact with an object or surface. Often invisible to the naked eye, Touch DNA is based on the Locard's Exchange Principle, which posits that "every contact leaves a trace." Given that the human body sheds approximately 400,000 skin cells daily, forensic experts can recover these cells from crime scenes to establish the presence or involvement of individuals. This

technique becomes especially valuable when no other physical evidence is present, thereby enhancing the investigative process and increasing the probability of identifying suspects or perpetrators. Even with a minimal number of cells, DNA profiling technologies enable precise identification; notably, techniques like Polymerase Chain Reaction (PCR) allow for the amplification of DNA from as few as 7–8 cells, making it possible to generate reliable profiles from low-quality or minute samples. (Frumkin et al., 2010)

When DNA evidence is introduced in judicial proceedings, it raises distinct legal and scientific considerations regarding its admissibility, probative value, and the logical inferences that can be drawn from it. Primarily, courts must determine whether the scientific summary reports containing DNA findings are admissible as evidence. Following this, the statistical significance of the DNA match is assessed, involving the evaluation of match probabilities and random match probability (RMP) statistics — a measure indicating how frequently a particular DNA profile would be expected to occur within a given population. (Gupta et al., 2005) Finally, legal scrutiny is directed towards the conclusions that may reasonably and lawfully be derived from such evidence, particularly in determining guilt, innocence, or involvement in a crime.

Standard forensic DNA cases involve the comparative analysis of evidentiary DNA samples, such as biological traces found at a crime scene, against reference samples obtained from suspects or victims. Three potential outcomes arise from this comparison: inclusion (a match), exclusion (no match), or inconclusive results. A match occurs when the DNA profile from a crime scene sample corresponds precisely with that of a suspect or victim. Exclusion indicates that the profiles do not match, while inconclusive results arise when insufficient data or degraded samples prevent a definitive conclusion. The foundation of forensic DNA profiling lies within the genetic coding regions of DNA, commonly known as genes, which are arranged in approximately 22,000 segments across 23 pairs of chromosomes in the human genome. Each parent contributes one set of chromosomes at conception, thus combining to determine an individual's unique genetic makeup. In forensic science, the segments of DNA relevant for analysis are typically polymorphic regions—areas within the DNA where significant variability exists among individuals. DNA can be extracted from various biological materials including blood, saliva, skin cells, hair follicles, and semen. The analysis involves isolating these polymorphic loci to generate a DNA profile unique to an individual. Key analytical methods in forensic genetics include Restriction Fragment Length Polymorphism (RFLP) and Polymerase Chain Reaction (PCR), each suitable for different types of samples and case circumstances. (Jeffreys et al., 1992) Regardless of the method employed, the collection and analysis of DNA evidence now play a critical and indispensable role in modern criminal investigations and the administration of justice.

### **Legal Framework on DNA Profiling**

In contrast to jurisdictions such as the United States and the United Kingdom, the integration of DNA profiling within the Indian legal system remains limited and inadequately structured. The Indian criminal justice framework, rooted in an accusatorial model, places the burden of proof squarely upon the investigating authorities. This procedural requirement often compels law enforcement agencies to accumulate conclusive evidence through extensive means, sometimes leading to procedural irregularities and questionable investigative practices. (Sunil K. Verma & Gajendra K. Goswami, 2014) The intense pressure on investigative professionals to secure convictions frequently results in the adoption of coercive methods or the exploitation of vulnerable sections of society, including the economically marginalized, illiterate, or unemployed, to strengthen expert testimonies and substantiate their findings.

A persistent challenge within India's evidentiary system is its reliance on eyewitness accounts, which, despite well-documented limitations, continue to play a decisive role in determining judicial outcomes. (Srivastava et al., 2022) In an era characterized by sophisticated technological advancements and scientifically reliable forensic methodologies, it is concerning that legal determinations often rest upon eyewitness testimonies, which are prone to inaccuracy, inconsistency,

and subjective bias. This overdependence undermines the objective administration of justice and contributes to miscarriages of justice, where actual offenders evade accountability while innocent individuals are wrongfully implicated.

Notwithstanding these shortcomings, the existing legal framework remains procedurally aligned with conventional statutes, albeit without sufficiently accommodating the evidentiary potential of modern forensic tools such as DNA profiling. The deficiencies in procedural safeguards and the absence of a comprehensive regulatory framework for the collection, analysis, and admissibility of DNA evidence have resulted in significant lacunae within the justice delivery system. Consequently, numerous instances have emerged where procedural loopholes have been exploited, leading either to the acquittal of guilty parties or the conviction of innocent persons.

Moreover, the inefficiencies and inconsistencies within investigative and prosecutorial mechanisms have gradually eroded public confidence in the criminal justice system. The alarmingly low conviction rates in serious offences further accentuate this crisis of credibility. Without the robust incorporation of reliable forensic technologies, such as DNA profiling governed by clear legal standards, the justice system risks perpetuating inequity and undermining the rule of law.

To address these concerns, there is an urgent need for India to adopt a comprehensive and rights-based legislative framework regulating DNA profiling practices. (Sunil K. Verma & Gajendra K. Goswami, 2014) Such a framework should not only facilitate the admissibility of scientifically reliable evidence but also ensure procedural fairness, data protection, and individual privacy. Drawing from comparative jurisdictions, particularly the regulatory experiences of the United Kingdom post- *S and Marper v. United Kingdom* (2008) and the subsequent *Protection of Freedoms Act, 2012*, India must formulate legal standards that reconcile the imperatives of effective criminal investigation with the constitutional mandate to safeguard individual liberties.

### **DNA Technology in U.K.**

England established its National DNA Database on April 10, 1995. One of the most important aspects of this achievement is that England was the first country to develop what is now widely known as DNA fingerprinting. This breakthrough came in 1984 when Professor Alec Jeffreys from the University of Leicester discovered a method to identify individuals using their unique genetic patterns. Since then, England has consistently led the way in the field of forensic DNA science — not only through important scientific discoveries but also by creating legal rules and regulations to manage the use of this technology responsibly.

### **National DNA Database (NDNAD)**

The National DNA Database (NDNAD) was the first system of its kind to be created anywhere in the world when it was established in England in 1995. Its development followed the passing of the **Criminal Justice and Public Order Act, 1994**, which provided the legal foundation for setting up this database. (Criminal Justice and Public Order Act 1994, 1994) Initially, the NDNAD only stored DNA profiles collected from individuals in England and Wales. Subsequently, similar forensic DNA databases were established in Scotland and Northern Ireland, each operating under its own legal framework for the collection and inclusion of profiles. Nevertheless, these regions also contribute their DNA profiles to the NDNAD, creating a more integrated system. (Amankwaa & McCartney, 2019)

The NDNAD holds two main types of DNA profiles. The first type is the individual genetic profile, which is obtained by collecting a biological sample — usually by swabbing the inside of a person's cheek. (Walsh et al., 2010) This sample is then sent to an accredited forensic laboratory, where it is analysed to produce a DNA profile for that individual. Although the profile represents only a very small portion of a person's complete DNA, it consists of a sequence of 20 numbers that are sufficient to uniquely identify them. The chances of two unrelated individuals having identical DNA profiles are extremely rare. (McCartney, 2012)

Once created, these profiles are stored in the database and can be used to search for matches with DNA collected from crime scenes or other investigations. This enables law enforcement authorities to identify potential suspects, link crimes, and support criminal investigations through genetic evidence. The creation of the NDNAD marked a significant step forward in the use of forensic science within the criminal justice system, providing a reliable scientific method for identifying individuals based on their genetic information.(Blakemore & Blake, 2012)

In England, individuals accused of a crime have the right to privacy and protection against being forced to incriminate themselves during a police investigation. This protection is provided not only under Common Law but also through **Article 6(1) of the European Convention on Human Rights (ECHR)**, which ensures the right to a fair trial and protection against self-incrimination. Additionally, **Article 8 of the ECHR** grants every person the right to respect for their private and family life. However, these rights are not absolute and can be restricted under certain circumstances. Government authorities have the power to interfere with these rights, but any such interference must be lawful, necessary, and carried out in a fair and non-arbitrary manner.

### **Legal Standards for Admissibility of DNA Evidence in U.K.**

Although relatively recent in its development, DNA evidence has rapidly become one of the most frequently utilised forms of forensic evidence in criminal proceedings. Given the significant evidentiary value attributed to DNA analysis, it is essential that such evidence is presented accurately, and that expert witnesses providing testimony remain within the bounds of their professional expertise, refraining from offering opinions on matters beyond their qualifications.

At the outset of a trial, the prosecution is legally obliged to inform the accused of all evidence it intends to rely upon in establishing guilt. This procedural requirement is governed by **Section 13(1) of the Criminal Procedure and Investigations Act 1996 (CPIA)**, which stipulates that primary disclosure must be made in accordance with Part 3 of the CPIA once the accused has been formally committed for trial. Additionally, under **Section 3(1) of the CPIA**, the prosecution is required to disclose to the defence any material in its possession which has not previously been shared and which may either undermine the prosecution's case or assist the case of the accused.(*Criminal Practice Directions 2023*, n.d.; *Criminal Procedure and Investigations Act 1996*, n.d.)

This duty of disclosure is fundamental to ensuring a fair trial and upholding the rights of the accused, as it prevents the prosecution from withholding potentially exculpatory evidence. The proper management and disclosure of DNA evidence, therefore, not only contribute to the integrity of criminal investigations but also safeguard against miscarriages of justice by ensuring that all material facts, whether incriminating or exonerating, are made available for judicial scrutiny.(Gill & Clayton, 2013)

### **DNA Technology in India**

The legal framework for DNA profiling in India has seen a gradual evolution, marked by judicial interpretations and legislative efforts to establish a comprehensive system. While India currently lacks a specific, standalone law dedicated solely to DNA profiling, its admissibility and use in courts are primarily governed by existing statutes like the Code of Criminal Procedure (CrPC) of 1973 and the Indian Evidence Act of 1872. Section 53 and Section 53A of the CrPC, for instance, authorize DNA profiling of suspects, specifically allowing it for rape suspects upon the investigating agency's request. The Indian Evidence Act, particularly Sections 45-51, facilitates the admissibility of expert testimony, which includes DNA evidence, in legal proceedings.

Despite these provisions, the absence of a dedicated, comprehensive regulatory structure has led to inconsistencies and challenges, especially concerning privacy, data retention, and consent. Recognizing this gap, the Law Commission of India, in its 271st report in 2017, proposed comprehensive legislation for DNA profiling, leading to the introduction of the DNA Technology

(Use and Application) Regulation Bill, 2019. (*The DNA Technology (Use and Application) Regulation Bill, 2019*, n.d.) This proposed bill aims to establish a regulatory framework, including a DNA Regulatory Board, accreditation for DNA laboratories, and a national DNA databank, while also addressing concerns related to privacy and misuse of genetic information. The enactment of "The Criminal Procedure Act, 2022," which replaced "The Identification of Prisoners Act, 1920," further supports the proposed DNA bill by allowing the collection of biological samples, indicating a move towards a more robust and formalized DNA profiling framework in India. (*MINISTRY OF LAW AND JUSTICE (Legislative Department)*, n.d.)

### **DNA Technology and Indian Constitution**

The introduction of forensic DNA profiling has presented considerable challenges to various individual rights, encompassing both ethical and legal dimensions. Notably, it implicates the right to privacy and the right against self-incrimination, particularly in the context of criminal proceedings. The act of obtaining a DNA sample from an individual constitutes an intrusion upon their right to bodily privacy. (Blakemore & Blake, 2012; Brown, 1998) Furthermore, when such samples are analysed to infer information about an individual's future health prospects or genetic traits, it amounts to a violation of their genetic privacy.

In addition, behavioural privacy is compromised when DNA-related information is employed to monitor an individual's movements and activities. The privacy of familial relationships is also at risk when genetic information is used to extract data about an individual's relatives, thereby infringing upon the collective privacy of the family unit.

Within the Indian constitutional framework, Article 21, when interpreted in conjunction with other fundamental rights and the Directive Principles of State Policy, affirms the existence of a constitutional right to privacy. India, as a signatory to the International Covenant on Civil and Political Rights (ICCPR) since 1966, is further bound by international human rights standards. Additionally, Article 20(3) of the Indian Constitution safeguards individuals from self-incrimination within the criminal justice process, a protection that assumes particular significance in cases involving compulsory collection and use of DNA evidence.

### **Right to Privacy and Proportionality**

The right to privacy in India, prior to the landmark *Justice K.S. Puttaswamy v. Union of India* (2017) decision, lacked an express constitutional guarantee. Although certain judicial pronouncements recognised privacy as implicit within the ambit of Article 21 of the Constitution of India, its scope and enforceability remained ambiguous. This uncertainty was decisively addressed in the *Puttaswamy* judgment, wherein a nine-judge bench of the Supreme Court of India unanimously recognised privacy as a fundamental right intrinsic to life and personal liberty. The Court established that any state action infringing this right must satisfy a threefold test: legality (existence of a law), necessity (legitimate state interest), and proportionality (a rational nexus between the means adopted and the aim pursued). This framework marked a constitutional commitment to safeguarding individuals against arbitrary and disproportionate state surveillance. (Dr. Veena Roshan Jose et al., 2022)

In the context of DNA profiling, this proportionality doctrine assumes critical importance. DNA data, by its nature, involves sensitive personal information with far-reaching implications for personal autonomy, bodily integrity, and informational privacy. Accordingly, any legislative or executive initiative involving the collection, storage, and use of genetic data must meet the criteria set forth in *Puttaswamy*. The proposed DNA Technology (Use and Application) Regulation Bill, 2019, currently pending parliamentary approval, has been scrutinised for its broad powers and inadequate privacy safeguards. Critics argue that the Bill lacks specific provisions for ensuring proportionality, data minimisation, independent oversight, and judicial review, raising serious concerns about its constitutional validity in light of the *Puttaswamy* principles.

In contrast, the United Kingdom's privacy framework draws from Article 8 of the European Convention on Human Rights (ECHR), which ensures the right to respect for private and family life. (*European Convention on Human Rights - Article 8 | European Union Agency for Fundamental Rights*, n.d.) This provision, domestically incorporated through the Human Rights Act 1998, permits interference with privacy only when it is lawful, necessary in a democratic society, and proportionate to a legitimate aim such as national security or the prevention of crime. The UK's legal standards for state interference with privacy, particularly regarding DNA profiling and forensic databases, are shaped by these principles. The European Court of Human Rights (ECtHR) in the landmark case of *S and Marper v. United Kingdom* (2008) struck down the indiscriminate retention of DNA profiles of individuals not convicted of crimes, holding it to be a disproportionate violation of privacy under Article 8. (*S. AND MARPER v. THE UNITED KINGDOM*, 2008) The judgment mandated strict necessity and proportionality assessments for the collection, retention, and use of genetic data.

In response, the UK enacted the Protection of Freedoms Act 2012, which introduced significant reforms in DNA data retention practices, mandating deletion of DNA profiles of innocent individuals and limiting the duration for which profiles of certain categories of offenders could be retained. The Police and Criminal Evidence Act (PACE) Code D further governs the procedural safeguards for the collection and use of DNA samples, ensuring transparency, accountability, and protection of individual rights. (*Police and Criminal Evidence Act 1984 (PACE) – Code D Revised Code of Practice for the Identification of Persons by Police Officers*, 2023) These statutory and procedural safeguards reflect a nuanced balance between public interest in crime control and individual privacy rights, offering valuable insights for comparative legal analysis.

A comparative examination of the proportionality doctrine as operationalised in India and the UK reveals notable divergences. While India's post-*Puttaswamy* jurisprudence mandates proportionality in state surveillance, including biometric data collection, its application to DNA profiling remains largely theoretical due to legislative and procedural inadequacies. In contrast, the UK's framework, shaped by ECtHR jurisprudence and domestic legislation, provides a detailed and structured approach to proportionality. It incorporates independent data protection oversight, periodic judicial scrutiny, clear retention and deletion policies, and explicit statutory limitations on state power.

This comparative analysis highlights significant gaps in India's legal regime concerning DNA profiling and privacy protection. The absence of clear data retention limits, independent regulatory bodies, judicial oversight, and procedural safeguards in the proposed DNA legislation stands in stark contrast to the UK's relatively robust framework. Drawing lessons from the UK's experience, India must prioritise statutory clarity on grounds and procedures for DNA collection, implement proportionality-based safeguards to prevent excessive or arbitrary surveillance, and establish independent data protection authorities to oversee compliance. Additionally, introducing stringent data retention and deletion protocols, along with avenues for judicial review of state actions infringing privacy, will be essential to ensure alignment with the constitutional mandate established in *Puttaswamy*. Incorporating these elements into India's DNA regulatory framework will help balance the state's forensic objectives with the protection of fundamental rights in a democratic society. (Blakemore & Blake, 2012; McCartney, 2012)

### **Applicability of UK Model to India**

The United Kingdom's regulatory framework for DNA profiling exemplifies a rights-based model grounded in institutional accountability, judicial oversight, and proportionality-based safeguards. Rooted in Article 8 of the European Convention on Human Rights (ECHR) and domestically enforced through the Human Rights Act 1998, the UK system seeks to balance the state's forensic and law enforcement objectives with the privacy rights of individuals. The collection, retention, and use of DNA data are governed by clear statutory instruments, notably the Protection of Freedoms Act 2012, alongside procedural safeguards such as the Police and Criminal Evidence Act (PACE) Code D. These laws establish transparent procedures, define strict conditions for DNA data collection, impose time-bound retention limits, and mandate independent oversight mechanisms to safeguard against

misuse and arbitrary state action. A significant development shaping this framework was the European Court of Human Rights (ECtHR) ruling in *S and Marper v. United Kingdom* (2008), which declared the indefinite retention of DNA profiles of unconvicted individuals a disproportionate violation of privacy under Article 8. This decision led to comprehensive reforms in UK law, making DNA profiling practices subject to proportionality and necessity tests.

For India, the UK model offers valuable normative guidance but requires careful adaptation within its constitutional framework. Indian privacy jurisprudence, especially following Justice K.S. Puttaswamy v. Union of India (2017), recognises the right to privacy as intrinsic to Article 21 of the Constitution, encompassing the principles of legality, necessity, reasonableness, and proportionality. Any framework for DNA profiling must, therefore, be consistent with these constitutional guarantees. Unlike the UK, where ECHR rights are domestically integrated through the Human Rights Act, India must directly root its privacy safeguards in constitutional provisions and judicial pronouncements.

Considering India's diverse legal, institutional, and infrastructural conditions, a phased implementation strategy is advisable for introducing privacy-compliant DNA profiling laws. Initially, DNA data collection should be restricted to serious criminal offences, with explicit statutory thresholds and narrowly defined grounds. It is imperative to incorporate **judicial safeguards, independent regulatory oversight, and grievance redress mechanisms** to deter misuse and ensure accountability. Furthermore, the legal regime governing DNA profiling must be closely aligned with India's proposed **Personal Data Protection legislation**, ensuring that sensitive genetic data receives the highest level of protection within the broader data governance framework. By progressively adopting these safeguards, drawing from the UK's accountability model while localising it within India's constitutional ethos, a balanced, rights-respecting, and effective legal framework for forensic DNA profiling can be established.

### Conclusion:

The UK's DNA legal regime—with its balance between forensic efficiency and rights protection—presents a credible benchmark for India. However, contextual tailoring is crucial. A rights-compatible Indian framework must embed principles of proportionality, consent, purpose limitation, and independent oversight, ensuring that technological advances in forensic science do not eclipse fundamental freedoms. The regulation of DNA profiling in India stands at a crucial juncture, especially in light of the constitutional recognition of the right to privacy in Justice K.S. Puttaswamy v. Union of India (2017). While DNA technology serves as a powerful forensic tool for criminal investigation and identification, it inherently involves the handling of sensitive personal and genetic data, raising significant privacy concerns. A comparative analysis of the UK's rights-based legal framework, which integrates Article 8 of the European Convention on Human Rights and emphasises proportionality, necessity, and independent oversight, offers valuable lessons for India. The UK's experience highlights the importance of clear statutory guidelines, time-bound retention policies, and judicial scrutiny in safeguarding individual rights.

### References:

1. Criminal Justice and Public Order Act 1994 (1994).
2. Amankwaa, A. O., & McCartney, C. (2019). The effectiveness of the UK national DNA database. *Forensic Science International: Synergy*, 1, 45–55. <https://doi.org/10.1016/J.FSISYN.2019.03.004>
3. Blakemore, B., & Blake, C. (2012). Can the National Dna Database Be Effective and Comply with Human Rights Legislation? *Police Journal*, 85(3), 191–202. <https://doi.org/10.1350/POJO.2012.85.3.573>
4. Brown, A. (1998). DNA as an investigative technique. *Sci Justice*, 38(4), 263–265. [https://doi.org/10.1016/s1355-0306\(98\)73036-9](https://doi.org/10.1016/s1355-0306(98)73036-9)
5. *Criminal Practice Directions 2023*. (n.d.).

6. *Criminal Procedure and Investigations Act 1996*. (n.d.).
7. Deryck Beylveeld, & Roger Brownsword. (2012). *Human Dignity in Bioethics and Biolaw*. Oxford University Press.
8. Dr. Veena Roshan Jose, Dr. Shivender Rahul, & Mr. Kaustubh Kumar. (2022). USE OF DNA TECHNOLOGY IN CRIMINAL JUSTICE ADMINISTRATION: PROBLEMS AND PERSPECTIVES. *NLUA Law Review*, 6, 1–25.
9. *European Convention on Human Rights - Article 8* | *European Union Agency for Fundamental Rights*. (n.d.). Retrieved June 17, 2025, from <https://fra.europa.eu/en/law-reference/european-convention-human-rights-article-8-0>
10. Frumkin, D., Wasserstrom, A., Davidson, A., & Grafit, A. (2010). Authentication of forensic DNA samples. *Forensic Science International: Genetics*, 4(2), 95–103. <https://doi.org/10.1016/J.FSIGEN.2009.06.009>
11. Gill, P., & Clayton, T. (2013). The current status of DNA profiling in the UK. *Handbook of Forensic Science*, 29–56. <https://doi.org/10.4324/9781843927327-4/CURRENT-STATUS-DNA-PROFILING-UK-PETER-GILL-TIM-CLAYTON>
12. Gupta, S. K., Verma, S. K., & Singh, L. (2005). Molecular insight into a wildlife crime: the case of a peafowl slaughter. *Forensic Science International*, 154(2–3), 214–217. <https://doi.org/10.1016/J.FORSCIINT.2004.12.010>
13. Jeffreys, A. J., Allen, M. J., Hagelberg, E., & Sonnberg, A. (1992). Identification of the skeletal remains of Josef Mengele by DNA analysis. *Forensic Science International*, 56(1), 65–76. [https://doi.org/10.1016/0379-0738\(92\)90148-P](https://doi.org/10.1016/0379-0738(92)90148-P)
14. Jo-Anne Bright, Hannah Kelly, Zane Kerr, Catherine McGovern, John S. Buckleton, & Duncan Taylor. (2019). The interpretation of forensic DNA profiles: an historical perspective. *Journal of the Royal Society of New Zealand*, 211–225.
15. JUSTICE K.S. PUTTASWAMY VS. UNION OF INDIA (September 26, 2018).
16. Kumar, A., Kashyap, A., & Huffine, E. (2022). DNA: The Master Molecule. In A. Kumar, G. K. Goswami, & E. Huffine (Eds.), *Handbook of DNA forensic applications and interpretation* (pp. 3–10). Springer Nature Singapore Pte Ltd. .
17. McCartney, C. (2012). Of Weighty Reasons and Indiscriminate Blankets: The Retention of DNA for Forensic Purposes. *Howard Journal of Criminal Justice*, 51(3), 245–260. <https://doi.org/10.1111/J.1468-2311.2012.00717.X>
18. *MINISTRY OF LAW AND JUSTICE (Legislative Department)*. (n.d.).
19. *Police and Criminal Evidence Act 1984 (PACE) – Code D Revised Code of Practice for the identification of persons by Police Officers*. (2023). [www.gov.uk/official-documents](http://www.gov.uk/official-documents).
20. Protection of Freedoms Act 2012, Pub. L. No. chapter 9 (2012).
21. *S. AND MARPER v. THE UNITED KINGDOM* (December 4, 2008).
22. Srivastava, A., Harshey, A., Das, T., Kumar, A., Yadav, M. M., & Shrivastava, P. (2022). Impact of DNA evidence in criminal justice system: Indian legislative perspectives. *Egyptian Journal of Forensic Sciences*, 12(1), 1–12. <https://doi.org/10.1186/S41935-022-00309-Y/TABLES/1>
23. Sunil K. Verma, & Gajendra K. Goswami. (2014). DNA evidence: Current perspective and future challenges in India. *Forensic Science International*, 241, 183–189.
24. *The DNA Technology (Use and Application) Regulation Bill, 2019*. (n.d.). Retrieved June 17, 2025, from <https://prsindia.org/billtrack/the-dna-technology-use-and-application-regulation-bill-2019>
25. Walsh, S. J., Curran, J. M., & Buckleton, J. S. (2010). Modeling forensic DNA database performance. *Journal of Forensic Sciences*, 55(5), 1174–1183. <https://doi.org/10.1111/J.1556-4029.2010.01426.X>