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The regulation of genetic data in law enforcement: a comparative analysis of forensic genetic genealogy

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ABSTRACT

Advances in forensic genetic technology have made genetic data an important tool in modern law enforcement, particularly for identifying perpetrators and solving cold cases. In Indonesia, the use of genetic data has a normative basis in Indonesian National Police Chief Regulation No. 1 of 2024 on the National Criminal Information Center (Piknas), which classifies DNA data as part of criminal perpetrator profiles. However, the regulation remains general and administrative, providing limited provisions on DNA collection, use, privacy protection, and data destruction. This study analyzes the regulation of genetic data use in Indonesia by comparing it with the United States Department of Justice Interim Policy on Forensic Genetic Genealogical DNA Analysis and Searching (2019). Using a normative juridical method with statutory and comparative approaches, the study finds that the DOJ policy provides more comprehensive safeguards, including case requirements, privacy protections, informed consent, restrictions on arrests based solely on genetic associations, and data destruction mechanisms. The study also examines the Draft Law on One Data Indonesia (RUU SDI), which provides general principles of data interoperability and security but does not specifically regulate forensic genetic data. Relevant provisions in Law No. 17 of 2023 on Health, Government Regulation No. 28 of 2024, Law No. 27 of 2022 on Personal Data Protection, Law No. 1 of 2023 on the Criminal Code, Law No. 20 of 2025, and Law No. 1 of 2026 on Criminal Procedure are also considered. The study concludes that Indonesia needs a comprehensive regulatory framework for forensic genetics that incorporates safeguards inspired by the DOJ model while remaining consistent with the national data governance framework under the RUU SDI.



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Introduction

The advancement of science and technology in the field of molecular genetics has brought transformative changes to modern law enforcement systems. One of the most significant innovations is the ability to analyze Deoxyribonucleic Acid (DNA) as a means of individual identification in criminal investigations. Forensic DNA technology offers a substantially higher degree of accuracy than conventional identification methods, such as fingerprint analysis or visual recognition, and has consequently become an increasingly indispensable tool for law enforcement agencies worldwide.

Recent developments in Forensic Genetic Genealogy (FGG) have introduced a revolutionary dimension to criminal investigations. By combining Single Nucleotide Polymorphism (SNP)-based DNA analysis with genealogical searches of public genetic databases, investigators are now capable of identifying criminal suspects or unidentified human remains that were previously impossible to resolve using conventional

forensic methods. The successful identification of the Golden State Killer in the United States in 2018 through FGG demonstrated the remarkable investigative potential of this technology while simultaneously triggering global debates concerning its legal and ethical implications.

In Indonesia, genetic data have begun to receive normative recognition through Regulation of the Chief of the Indonesian National Police Number 1 of 2024 concerning the Administration of the National Criminal Information Center (PIKNAS). Article 1 paragraph (8) defines DNA as "a type of nucleic acid possessing hereditary characteristics," while Article 5 paragraph (4) letter (s) explicitly classifies DNA data as part of criminal offender profiles within the national criminal information system. Nevertheless, Police Regulation No. 1 of 2024 essentially functions as a governance framework for criminal information systems rather than a substantive regulation governing the use of forensic DNA. It does not regulate procedures for DNA sample collection, limitations regarding eligible criminal offenses, informed consent mechanisms, specific safeguards for genetic privacy, or oversight mechanisms governing investigative use.

The need for a more comprehensive regulatory framework in Indonesia has become increasingly pressing in light of four major legal developments. First, the enactment of Law Number 27 of 2022 on Personal Data Protection (PDP Law), which explicitly recognizes genetic data as sensitive personal data. Second, the implementation of Law Number 17 of 2023 on Health, together with Government Regulation Number 28 of 2024, establishes a legal framework for protecting health-related data, including genetic information. Third, the reform of Indonesia's substantive and procedural criminal law through Law Number 1 of 2023 on the new Criminal Code (KUHP), as amended by Law Number 20 of 2025, and Law Number 1 of 2026 on the new Criminal Procedure Code (KUHAP) replacing the previous Criminal Procedure Code. Despite these significant reforms, neither statute explicitly regulates the admissibility standards or procedural requirements governing forensic DNA evidence. Fourth—and particularly relevant to this study—is the ongoing legislative process concerning the Draft Law on One Data Indonesia (RUU SDI).

As of February 2026, the Draft Law on One Data Indonesia remains under deliberation between the Government and the Legislation Body (Baleg) of the House of Representatives (DPR RI). The bill seeks to establish a single national source of trusted data through mandatory data standards and a clearly defined data-sharing mechanism. During a dialogue with Baleg DPR RI in Sentul on 9 February 2026, Deputy Minister of National Development Planning/Deputy Head of Bappenas, Febrian Alphyanto Ruddyard, emphasized that the Draft Law on One Data Indonesia should not be viewed merely as a technical regulatory instrument but rather as a fundamental reform of public governance. According to his statement, Indonesia's principal development challenge lies not only in resource constraints but also in deficiencies in governance and regulatory quality. This perspective is directly relevant to the regulation of forensic genetic data: without standardized data governance and well-designed interoperability mechanisms, even future substantive forensic legislation may fail to integrate effectively with the existing national criminal information system.

The use of DNA technology in criminal justice has attracted scholarly attention in Indonesia. Syaiful Bakhri (2019) examined the role of DNA technology in criminal evidence from the perspective of evidentiary law, although the study primarily focused on the admissibility of electronic evidence and did not address the emerging issues surrounding Forensic Genetic Genealogy. Putra and Nasution (2021) conducted a descriptive comparative analysis of forensic DNA regulations across several jurisdictions without exploring their specific implications for Indonesia. Wahyuningsih (2022) analyzed the protection of genetic data within the framework of the Personal Data Protection Law but did not relate the discussion to the broader regulatory needs of forensic genetics.

At the international level, Murphy, (2015) examined the privacy implications of Forensic Genetic Genealogy within the United States legal system, Guerrini et al., (2018) analyzed FGG from a bioethical perspective, and Hendricks et al. (2019) evaluated the implementation of the United States Department of Justice (DOJ) policy following the Golden State Killer investigation. However, none of these studies conducted a focused comparative analysis between Indonesia's legal framework and the United States DOJ's FGG policy, nor did they consider the implications of Indonesia's Draft Law on One Data Indonesia for the governance architecture of forensic genetic data.

Accordingly, a significant research gap remains. No previous study has systematically analyzed Indonesia's contemporary legal framework—including recently enacted legislation such as Law Number 1 of 2026 and the Draft Law on One Data Indonesia—while comprehensively comparing it with the United States Department of Justice Interim Policy on Forensic Genetic Genealogy to formulate contextually appropriate regulatory recommendations for Indonesia. This study seeks to address this gap by incorporating

the dimension of national data governance as a critical analytical variable that has largely been overlooked in previous scholarship.

Based on the foregoing discussion, this study addresses the following research question: How is the use of genetic data for forensic purposes regulated within the Indonesian legal system under Police Regulation Number 1 of 2024 and other relevant legal instruments, and to what extent is the United States Department of Justice's Forensic Genetic Genealogy (FGG) policy relevant as a model for developing Indonesia's forensic genetics regulatory framework in alignment with the national data governance agenda?

In line with this research question, the study aims to analyze the legal regulation of forensic genetic data within the Indonesian legal system and to evaluate the relevance of the United States Department of Justice's Forensic Genetic Genealogy (FGG) policy as a reference for developing a comprehensive, adaptive, and nationally integrated regulatory framework governing forensic genetics in Indonesia.

Method

This study employs a normative legal research method, which examines law as a body of written norms embodied in legislation, official government policies, and draft legislation. This method is appropriate because the research focuses on analyzing the substance of legal norms rather than the empirical behavior of legal actors or the implementation of law in society.

Research Approach

This research adopts two complementary approaches. First, the statutory approach is employed to examine the Indonesian legal instruments relevant to the regulation of forensic genetic data, including Law Number 27 of 2022 on Personal Data Protection, Law Number 17 of 2023 on Health, Government Regulation Number 28 of 2024, Law Number 1 of 2023 on the new Criminal Code, Law Number 20 of 2025, Law Number 1 of 2026 on the new Criminal Procedure Code, Regulation of the Chief of the Indonesian National Police Number 1 of 2024, and the Draft Law on One Data Indonesia (Draft of 20 April 2022 and its legislative developments as of 2026).

Second, a comparative approach is applied to compare Indonesia's regulatory framework with the United States Department of Justice (DOJ) Interim Policy on Forensic Genetic Genealogical DNA Analysis and Searching (2019). The comparison is conducted using a functional comparative method, which examines how each legal system addresses the same regulatory issues concerning the use of forensic genetic genealogy in criminal investigations.

Legal Materials

The legal materials used in this study consist of primary legal materials and secondary legal materials, with primary legal materials serving as the principal basis for identifying, interpreting, and evaluating the applicable legal norms. The primary legal materials include Regulation of the Chief of the Indonesian National Police Number 1 of 2024 concerning the Administration of the National Criminal Information Center, the United States Department of Justice Interim Policy on Forensic Genetic Genealogical DNA Analysis and Searching (2019), and other relevant Indonesian legislation, including Law Number 27 of 2022 on Personal Data Protection, Law Number 17 of 2023 on Health, Government Regulation Number 28 of 2024, Law Number 1 of 2023 as amended by Law Number 20 of 2025, Law Number 1 of 2026 on the Criminal Procedure Code, and the Draft Law on One Data Indonesia (Draft of 20 April 2022), together with its subsequent legislative developments.

The secondary legal materials comprise legal textbooks, scholarly literature, peer-reviewed journal articles, and official reports issued by relevant institutions. These materials are utilized to provide conceptual clarification, strengthen the legal analysis, and support the interpretation of the primary legal materials.

The legal materials are analyzed qualitatively using a prescriptive legal analysis method. This analytical approach is intended to evaluate the adequacy of the existing regulatory framework governing forensic genetic data and to formulate normative recommendations for the future development of Indonesia's forensic genetics regulatory system.

Results and Discussions

Regulatory Components of Forensic Genetic Data Governance

United States DOJ Interim Policy on Forensic Genetic Genealogy

The United States Department of Justice (DOJ) Interim Policy on Forensic Genetic Genealogical DNA Analysis and Searching (2019) establishes a specific operational framework for the use of Forensic Genetic Genealogy (FGG) in criminal investigations. Unlike conventional forensic DNA analysis based primarily on Short Tandem Repeats (STRs) and CODIS, FGG uses Single Nucleotide Polymorphism (SNP) profiles and genealogical databases to identify potential biological relatives and generate investigative leads.

The policy limits FGG primarily to unresolved violent crimes, including homicide and sexual offenses, the identification of unidentified human remains, and exceptional cases involving substantial threats to public or national security. FGG is positioned as a last-resort investigative technique: conventional investigative methods and CODIS searches must first be exhausted.

The policy further establishes a multi-layered authorization mechanism involving investigators, forensic laboratory officials, and prosecutors. It also regulates third-party informed consent, limits access to genealogy services according to their privacy policies, prohibits the use of genetic information for medical or psychological profiling, and prohibits arrest based solely on genealogical association. A potential suspect identified through FGG must be independently confirmed through STR DNA comparison.

Finally, the DOJ framework contains specific provisions concerning data retention and destruction. Genetic profiles and third-party reference samples must be withdrawn or destroyed when their continued retention is no longer justified, while relevant investigative activities must be documented. These components demonstrate that the DOJ framework treats FGG not merely as a forensic technique but as an investigative process requiring procedural safeguards, accountability, and privacy protection.

Indonesian Regulatory Components

Indonesia has not yet established a single legal instrument specifically governing forensic genetic genealogy. Regulation of the Chief of the Indonesian National Police No. 1 of 2024 provides the most direct recognition of DNA within the criminal justice information system by classifying DNA data as part of criminal offender profiles. However, its primary function concerns the administration of the National Criminal Information Center (PIKNAS), rather than substantive regulation of forensic DNA procedures.

Law No. 27 of 2022 on Personal Data Protection provides an additional layer of protection by recognizing genetic information as sensitive personal data and establishing principles such as purpose limitation, data minimization, security, and storage limitation. Nevertheless, these principles remain general and do not establish forensic-specific requirements regarding DNA collection, case eligibility, genealogical searches, third-party consent, or investigative oversight.

Law No. 17 of 2023 on Health and Government Regulation No. 28 of 2024 similarly recognize the confidentiality of health and genetic information, but their regulatory orientation remains within healthcare. Meanwhile, the Criminal Code and Criminal Procedure Code reforms have modernized Indonesia's criminal justice framework without establishing detailed standards governing forensic DNA collection, FGG-generated investigative leads, laboratory requirements, or specific rules concerning the retention and destruction of forensic genetic data.

The Draft Law on One Data Indonesia (RUU Satu Data Indonesia) introduces important principles concerning data standards, metadata, interoperability, access control, and information security. These principles may provide a technical foundation for future forensic data governance. However, because the Draft Law primarily concerns government data integration, it cannot by itself substitute for sector-specific forensic genetics regulation. Forensic genetic data therefore require differentiated protection within the broader national data governance architecture.

Comparative Regulatory Framework

The descriptive findings reveal that the principal difference between Indonesia and the United States does not lie merely in whether genetic data are legally recognized. Rather, the distinction concerns the degree to which such recognition has been translated into operational safeguards governing when, why, by whom, and for how long forensic genetic data may be processed.

Table 1. Regulatory Comparison Matrix for Forensic Genetic Data Governance

Regulatory Dimension	United States – DOJ Interim Policy	Indonesia – Existing Framework	Regulatory Gap/Implication
Legal Basis	Specific operational FGG policy supported by the CODIS framework	Fragmented across Police Regulation No. 1/2024, PDP Law, Health Law, criminal legislation, and RUU SDI	No dedicated forensic genetics framework
Eligible Cases	Restricted mainly to serious violent crimes, unidentified remains, and exceptional threats	No specific limitation based on offense category	Risk of disproportionate application
Last-Resort Requirement	FGG used after CODIS and reasonable investigative leads are exhausted	No equivalent requirement	Necessity threshold remains undefined
Third-Party Consent	Required, subject to narrowly controlled exceptions	General consent principles exist under PDP Law, but not specifically for forensic genealogy	Relatives and non-suspects lack specific protection
Confirmation Before Arrest	FGG association cannot independently justify arrest; STR confirmation required	No FGG-specific confirmation standard	Evidentiary status of genealogical leads remains unclear
Oversight	Investigators, laboratory officials, and prosecutors participate in authorization	Primarily administrative/information-system supervision	Absence of multi-layer investigative oversight
Purpose Limitation	Medical and psychological uses expressly prohibited	General purpose limitation exists, but no forensic-specific prohibition	Potential secondary-use uncertainty
Interoperability	FGG profiles separated from CODIS and subject to specific controls	RUU SDI promotes interoperability generally	Forensic data require explicit exemption or special safeguards
Retention and Destruction	Specific withdrawal and destruction requirements	General storage-limitation principles only	No clear forensic retention schedule
Accountability	Documentation required throughout the FGG process	General administrative accountability	No specific audit trail for forensic genetic investigations

The matrix demonstrates four broader analytical differences. First, the United States framework is procedure-oriented, whereas the Indonesian framework remains predominantly institution- and data-oriented. Indonesian regulations recognize DNA, personal data protection, health confidentiality, and government data management separately, but do not integrate these elements into a single investigative procedure.

Second, the comparison reveals a rights-operationalization gap. Indonesia already recognizes genetic information as sensitive personal data, but the implications of that status have not been translated into forensic procedures governing relatives, non-suspects, investigative necessity, confirmatory testing, or destruction of genetic information.

Third, there is an oversight gap. The DOJ model distributes decision-making among investigators, forensic experts, and prosecutors. Indonesia's current framework does not establish an equivalent authorization structure specifically for forensic genetic genealogy. Consequently, the question is not merely

whether investigators may process DNA, but which institution should determine that the intrusion into genetic privacy is necessary and proportionate.

Fourth, Indonesia faces an emerging interoperability–privacy tension. The national objective of integrated government data under the Draft Law on One Data Indonesia may improve standardization and institutional coordination. However, unrestricted interoperability would be inappropriate for genetic information because DNA is permanent, identifying, and relational. Forensic genetic information should therefore operate within controlled interoperability rather than ordinary government-wide data sharing.

Discussion

Towards a Comprehensive Regulatory Framework for Forensic Genetics in Indonesia

The findings demonstrate that the principal regulatory problem concerning forensic genetic data in Indonesia is not the complete absence of legal protection, but the fragmentation of existing norms across different legal sectors. Police Regulation No. 1 of 2024 recognizes DNA as part of criminal offender information, while Law No. 27 of 2022 protects genetic information as sensitive personal data. The Health Law and its implementing regulation also establish confidentiality standards for genetic and health information. However, these instruments have not yet been integrated into an operational framework governing when forensic genetic technologies may be used, how genetic information may be obtained, who may authorize its use, how long the information may be retained, and when it must be destroyed.

This regulatory gap becomes increasingly important with the emergence of Forensic Genetic Genealogy (FGG). Early scholarship demonstrated that familial DNA analysis could substantially expand investigative capacity by identifying suspects through biological relatives rather than direct database matches (Bieber et al., 2006). Greytak et al., (2019) subsequently demonstrated the practical application of genetic genealogy to cold and active investigations, while Wickenheiser, (2019) highlighted the ethical implications arising from the Golden State Killer investigation. These studies indicate that the investigative value of genetic genealogy is substantial, but that its expansion simultaneously generates regulatory questions beyond those associated with conventional forensic DNA profiling.

Similar conclusions are found in the broader literature on forensic genetic genealogy. Katsanis, (2020) explains that the combination of genealogy and DNA enables investigators to reconstruct familial relationships and identify individuals who may never have personally submitted DNA to law-enforcement databases. Kling et al., (2021) further demonstrate that investigative genetic genealogy differs technically from conventional STR-based identification because it relies heavily on dense SNP data, distant biological relationships, genealogical records, and direct-to-consumer databases. Glynn, (2022) similarly identifies FGG as a rapidly developing forensic method whose investigative advantages are accompanied by substantial privacy and ethical implications. Taken together, these studies support the present finding that FGG requires a regulatory framework distinct from ordinary forensic DNA database administration.

The relational nature of genetic data is particularly important. Genetic information does not concern only the individual whose DNA is analyzed but may also reveal information concerning biological relatives. Guerrini et al., (2021) identified this issue following law-enforcement access to genetic genealogy databases, emphasizing that individuals who have never uploaded genetic information may nevertheless become indirectly identifiable through relatives. McEwen et al., (2021) likewise identify consent, privacy, familial implications, data access, and governance as important ethical, legal, and social issues in investigative genetic genealogy. Guerrini et al. (2021) further clarify that debates surrounding IGG cannot be reduced to the assumption that genetic genealogy information is simply “public” information available without meaningful restrictions.

These findings have direct relevance for Indonesia. Although Law No. 27 of 2022 recognizes genetic data as sensitive personal data, conventional individual consent cannot fully resolve the issues created by genealogical searching because the investigative consequences of one person's genetic information may extend to biological relatives. Simanjuntak, (2024) similarly emphasizes the need for enhanced protection of genetic information under Indonesia's personal data protection framework. Therefore, future forensic genetic regulation should distinguish between the rights of suspects, database users, relatives identified through genealogy searches, and third parties whose DNA may be collected solely for purposes of confirming or excluding biological relationships.

Privacy protection must also be accompanied by proportionality and necessity requirements. The DOJ Interim Policy limits FGG primarily to serious offenses and generally requires conventional investigative methods to be exhausted before genealogical searching is undertaken. This approach is consistent with

Wickenheiser (2019), who discusses proportionality in the use of forensic genealogy, and with the broader governance concerns identified by Wienroth et al., (2014). Wallace et al., (2014) similarly argue that forensic DNA databases require legal and ethical safeguards capable of balancing criminal investigation with privacy and human rights. These studies strengthen the conclusion that Indonesia should not permit unrestricted use of FGG across all categories of criminal cases.

The practical experience of other jurisdictions also supports this position. Tillmar et al., (2021), examining a Swedish double-murder investigation, demonstrated that investigative genetic genealogy can generate decisive investigative leads when conventional approaches have failed. However, its effectiveness depends on careful genealogical reconstruction and confirmation through conventional forensic methods. Similarly, Tuazon et al., (2024) emphasize that the use of genetic genealogy databases by law enforcement raises interconnected questions concerning terminology, scientific methodology, privacy, legal authority, and governance. Thus, the effectiveness of FGG does not eliminate the need for procedural safeguards; rather, its investigative power makes those safeguards increasingly necessary.

Another important finding concerns the distinction between an investigative lead and criminal evidence. FGG identifies potential biological relationships and narrows investigative possibilities, but a genealogical association should not independently establish criminal responsibility. The DOJ framework therefore requires confirmatory conventional DNA testing before an individual identified through FGG can become the basis for further enforcement action. This precaution is consistent with the scientific framework described by Kling et al. (2021) and the case experience discussed by Tillmar et al. (2021). Indonesia currently lacks an equivalent FGG-specific rule, while the new Criminal Procedure Code does not specifically address the evidentiary implications of genealogical DNA searches. Consequently, future legislation should explicitly distinguish between genealogical intelligence and forensic evidence admissible in criminal proceedings.

Institutional oversight constitutes another major regulatory difference. The DOJ model involves investigators, forensic laboratory officials, and prosecutors in the decision to conduct FGG. The importance of such structured governance is supported by Wickenheiser et al. (2023), whose guidelines for establishing Forensic Investigative Genetic Genealogy programs emphasize policies, procedures, validation, quality assurance, and institutional responsibilities. More recent work by Guerrini et al., (2025) also identifies case selection, consent, privacy and security, and governance as central areas requiring policy attention. This literature indicates that effective regulation should not place authorization entirely within a single investigative institution.

Accordingly, Indonesia should consider a multi-layered authorization mechanism. Investigators should demonstrate the necessity of FGG; qualified forensic experts should determine whether the biological evidence is scientifically suitable; prosecutors should evaluate its proportionality and investigative justification; and judicial authorization should be required where genetic information is obtained from non-consenting third parties or where particularly intrusive access is contemplated. Such a structure would introduce institutional checks and balances while preserving the investigative usefulness of forensic genetics.

Data retention and destruction represent another area requiring specific regulation. The comparative findings show that the DOJ framework contains clear requirements concerning withdrawal and destruction of FGG profiles and third-party reference samples, whereas Indonesia currently relies predominantly on general data-storage principles. This gap is significant because genetic information is permanent and capable of revealing familial relationships long after the original investigation has concluded. Uberoi et al., (2024), in examining the global expansion of forensic DNA databases, argue for internationally coherent governance principles addressing the legal, ethical, and social consequences of expanding forensic DNA infrastructures. Their analysis supports the establishment of explicit retention periods, deletion requirements, access controls, and audit mechanisms rather than indefinite storage.

The issue becomes more complex when considered alongside Indonesia's emerging One Data Indonesia framework. The Draft Law promotes data standards, interoperability, and integrated public-sector data governance. From an administrative perspective, these objectives may improve consistency and institutional coordination. However, forensic genetic information differs fundamentally from ordinary government administrative data. Applying general interoperability requirements without differentiation could significantly expand access to genetic information and undermine purpose limitation.

This concern is consistent with the broader international shift toward controlled governance of forensic genetic databases. Uberoi et al. (2024) argue that the expansion of forensic DNA databases requires stronger governance principles, while Guerrini et al. (2025) identify privacy, security, consent, case selection, and governance as priority areas for IGG policy development. Tuazon et al. (2024) likewise show that law-

enforcement access to genealogy databases cannot be addressed exclusively as a scientific question because database access and data sharing also raise legal and societal considerations. Accordingly, interoperability should not mean unrestricted integration.

The present study therefore proposes a controlled-interoperability model for Indonesia. Under this model, forensic genetic information would remain technically standardized and capable of lawful exchange among authorized institutions, but would be segregated from general government data-sharing systems. Access should be purpose-specific, role-based, traceable, and subject to audit. Genetic information used for forensic purposes should also be expressly excluded from routine administrative data sharing under the One Data Indonesia framework.

This approach corresponds with Indonesian scholarship concerning data protection and criminal justice. Putra and Nasution (2021) highlight the legal importance of DNA in criminal evidence, while Wahyuningsih (2022) emphasizes the sensitive nature of genetic data. Prameswari, (2026) identifies the broader challenges associated with adapting Indonesia's criminal justice system to contemporary legal developments, and Aryaputra et al., (2026) discusses the implications of the Personal Data Protection Law for police management of criminal information. When these national studies are considered together with international research on FGG, a consistent conclusion emerges: existing general legal principles provide an important foundation, but forensic genetic technologies require sector-specific operational safeguards.

Indonesia should therefore adopt a two-level regulatory framework. At the statutory level, legislation should establish the fundamental legal principles governing forensic genetics, including legality, necessity, proportionality, purpose limitation, data minimization, protection of third parties, independent oversight, accountability, retention limitation, and the right to privacy. At the operational level, implementing regulations should regulate eligible offenses, laboratory standards, case authorization, genealogy database access, informed consent procedures, confirmatory DNA testing, documentation, data retention, destruction, and audit mechanisms.

The DOJ Interim Policy provides a useful comparative model for these operational safeguards, but it should not be transplanted mechanically. Indonesia's regulatory framework must remain compatible with its constitutional structure, statutory legal tradition, Personal Data Protection Law, criminal procedure system, and institutional capacities. The relevance of the U.S. experience therefore lies primarily in its functional principles rather than in the direct reproduction of its institutional arrangements.

Overall, the literature broadly demonstrates that the legitimacy of FGG depends not only on investigative effectiveness but also on clearly defined purposes, proportionality, third-party protection, procedural oversight, scientific confirmation, accountability, and limitations on retention and secondary use.

The central regulatory gap in Indonesia can therefore be characterized as an integration gap: relevant protections already exist across personal-data law, healthcare regulation, police information governance, and criminal procedure, but these protections have not been consolidated into a coherent forensic genetics regime. A comprehensive future framework should integrate these existing national principles with controlled interoperability and FGG-specific safeguards. Such an approach would enable Indonesia to benefit from advances in forensic genetics while maintaining privacy, due process, accountability, and public trust.

Conclusions

This study answers its research objectives through a normative legal analysis combining the statutory approach, functional comparative method, and prescriptive legal analysis. The statutory analysis of Police Regulation No. 1 of 2024, the Personal Data Protection Law, the Health Law and its implementing regulation, the Criminal Code, the Criminal Procedure Code, and the Draft Law on One Data Indonesia demonstrates that Indonesia already recognizes and protects genetic data across several legal instruments, but these norms remain fragmented and have not been integrated into a specific operational framework for forensic genetics. In particular, the existing framework does not comprehensively regulate eligible cases, DNA collection procedures, third-party protection, investigative authorization, confirmatory testing, oversight, purpose limitation, or data retention and destruction. Regarding the first research objective, the regulation of forensic genetic data in Indonesia can therefore be characterized as legally recognized but operationally fragmented, because relevant protections exist across police information governance, personal data protection, health regulation, and criminal law without being consolidated into a coherent forensic genetics regime. This conclusion results from the statutory analysis and the regulatory comparison matrix

applied to the principal dimensions of legal basis, case eligibility, necessity, consent, evidentiary confirmation, oversight, purpose limitation, interoperability, retention, and accountability. Regarding the second research objective, the functional comparative analysis demonstrates that the U.S. DOJ Interim Policy provides a relevant but non-transferable model for Indonesia, particularly in relation to case limitations, the last-resort requirement, third-party safeguards, multi-layered authorization, confirmatory STR testing, purpose limitation, documentation, and data destruction. These principles should be adapted rather than directly transplanted, taking into account Indonesia's constitutional framework, statutory legal tradition, criminal procedure system, institutional capacity, and Personal Data Protection Law. The analysis of the Draft Law on One Data Indonesia further demonstrates that its principles of data standardization, security, and interoperability may provide an important technical foundation for forensic genetic data governance, but the Draft Law cannot substitute for substantive forensic genetics regulation. Because forensic genetic data are permanent, identifying, relational, and highly sensitive, their integration into the national data architecture should follow a controlled-interoperability model. Forensic genetic data should therefore be subject to purpose-specific access, authorization, auditability, and differentiated safeguards rather than ordinary government-wide data sharing. Accordingly, Indonesia requires a dedicated forensic genetics regulatory framework that integrates existing national protections with FGG-specific procedural safeguards. At the statutory level, the framework should establish legality, necessity, proportionality, privacy, data minimization, third-party protection, independent oversight, accountability, and storage limitation. At the operational level, implementing regulations should govern eligible offenses, DNA collection, laboratory standards, authorization procedures, genealogy database access, informed consent, confirmatory testing, documentation, retention, destruction, and audit mechanisms. The DOJ framework may serve as a functional reference for these safeguards, while the Draft Law on One Data Indonesia may provide supporting technical data-governance standards. Overall, the study concludes that Indonesia's central regulatory problem is an integration gap rather than a complete absence of legal protection. Addressing this gap requires harmonizing forensic-specific regulation with existing personal data, health, criminal justice, and national data governance frameworks so that the investigative benefits of forensic genetics can be realized without compromising privacy, due process, accountability, and public trust.

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