



MEDICAL INTERVENTIONS IN THE HUMAN GENOME AND LEGAL LIABILITY UNDER ALGERIAN LAW

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Abstract:

This study examines the legal framework governing medical interventions in the human genome under Algerian legislation, in light of international legal and ethical principles. It addresses the concept of the human genome, the requirements for lawful medical intervention, and the protection of genetic privacy and bodily integrity.

The study also analyzes civil and criminal liability arising from medical errors and unlawful interventions involving the human genome, particularly in relation to damage and causation, it concludes that existing Algerian legislation remains relatively insufficient to address the specificities of genomic interventions and recommends adopting specific legal provisions to ensure effective protection of the human genome.

Keywords: Human Genome; Medical Intervention; Genetic Privacy; Medical Liability; Algerian Law.

Introduction:

Scientific advances in the field of medicine have opened up new horizons for society that were previously unimaginable, particularly with regard to genetic engineering and its applications in medical assistance. These developments have progressed even further with the discovery of the human genome and the various possibilities for medical intervention in it for therapeutic purposes. DNA was discovered by scientists [James Watson] and [Francis Crick] in 1953. Subsequently, restriction enzymes were discovered by [Werner Arber] and [Hamilton Smith] in the late 1960s, this was followed by

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the cloning of [Dolly the sheep] by [Keith Campbell] and [Ian Wilmut] in 1997.

Research in this field continued to advance until the completion of the sequencing of the human genome by the [Human Genome Project] in 2002, this was followed by the identification of a number of protein-coding genes. In 2003, two additional categories beyond protein-coding genes were identified, namely **small RNA genes** and **post-genomic markers**, among other continuing discoveries in this field (Rizk, 2007).

These discoveries have not remained purely theoretical; rather, they have been increasingly applied for the benefit of human health, whether in the treatment of diseases, assisted reproduction, human organ transplantation, or cosmetic procedures. They have also contributed to protecting future generations from genetic mutations that may cause hereditary diseases transmitted within families. Such developments inevitably raise a number of legal issues concerning the regulation of medical ethics in this field, whether in light of existing general legal principles or under specific health-related legislation.

Significance of the Study :The significance of this study lies in examining the legal framework governing medical intervention in the human genome and assessing the adequacy of the existing legal rules under Algerian legislation in regulating the civil and criminal liability arising from such medical practices, These practices constitute a scientific and practical necessity that requires appropriate ethical and legal regulation and a comprehensive legal framework capable of addressing the challenges arising from advances in genomic medicine.

Research Problem :To what extent are the general rules governing civil and criminal liability under Algerian legislation adequate to address the harm resulting from medical intervention in the human genome?

Research Methodology :This study adopts the descriptive-analytical approach, through examining and analyzing relevant legislative provisions, international conventions, and legal scholarship, with a view to identifying the legal provisions governing medical intervention in the human genome and assessing the extent to which such intervention is legally permissible under Algerian legislation, in



light of the provisions of the Universal Declaration on the Human Genome and Human Rights of 1997.

To address the research problem, the study first examines the legality of medical intervention in the human genome and defines the scope of its regulatory framework. It then addresses the legal consequences arising from harm caused by medical errors in the human genome, in accordance with the rules governing civil and criminal liability under Algerian legislation.

1- The Legality of Medical Intervention in the Human Genome:

The unique nature of the human genome necessitates defining its concept and determining the legislative scope governing medical interventions at both the international level and under Algerian legislation, in addition to identifying the legal safeguards governing medical intervention in the human genome.

1.1- The Concept of the Human Genome and the Legal Scope of Medical Intervention: The human genome, as a product of advances in medical science, is among the concepts that require the legislator to define and establish specific legal rules governing it. This necessitates examining its concept and the legal basis for medical intervention in the human genome at both the international and Algerian legislative levels.

1.1.1- The Concept of the Human Genome:

The human genome encompasses the entirety of the different genes present in human cells. It represents the human genetic makeup and consists of deoxyribonucleic acid (DNA), which is composed of nitrogenous bases, a five-carbon sugar, and phosphate (Amna, 2017). It therefore constitutes part of the data relating to the genetic characteristics of an individual or of several related persons, as well as information concerning human health and genetic information, which the legislator classifies as sensitive personal data under Law No 18-07 on the Protection of Natural Persons with Regard to the Processing of Personal Data, as amended and supplemented (2018).

Gene editing refers to the deliberate modification of the DNA sequence within living cells through techniques that enable specific genetic sites to be targeted with a high degree of precision. These techniques make it possible to replace a defective gene with a healthy copy that performs the same biological function, making gene editing

one of the most promising medical applications in the treatment of genetic diseases, This is attributable to the fact that many such diseases result from the presence of recessive or defective genes that may potentially be replaced with healthy genes, thereby contributing to the restoration of normal cellular function and reducing pathological effects.

This technology has demonstrated therapeutic potential in addressing a wide range of diseases, including cardiovascular diseases, cancer, neurological disorders, viral hepatitis, and diabetes, in addition to its potential role in reducing congenital abnormalities in newborns. Moreover, gene-editing applications open up new prospects extending beyond therapeutic purposes to include the potential enhancement of genetic traits and the selection of certain desirable characteristics. This, in turn, raises a number of legal and ethical issues that require precise legislative regulation (Soumia, 2022).

1.1.2-The Legal Basis for Medical Intervention in the Human Genome: The United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted the Universal Declaration on the Human Genome and Human Rights in November 1997, This international instrument seeks to strike a balance between the freedom of scientific research and the respect for human rights, It establishes a set of ethical and legal principles to guide research and applications in the field of human genetics and genetic modification, particularly in light of the significant possibilities offered by these scientific advances, which may be misused in ways that could cause harm to individuals (UNESCO, Universal Declaration on the Human Genome and Human Rights, 1997).

- The human genome is regarded as the common heritage of humanity as a whole, and genetic knowledge may not, under any circumstances, be used in ways that violate human dignity or infringe upon individual freedom.

- The Declaration recognizes the principle of non-discrimination on the basis of genetic characteristics, whether in employment, insurance, or social treatment, This principle seeks to prevent the emergence of stratified societies based on genetic superiority and to avoid the marginalization of individuals carrying genetic mutations or suffering from hereditary diseases.



- Respect for the right to privacy requires the prior and explicit consent of the person subjected to any genetic intervention, in accordance with applicable international and domestic laws governing this field, and on the condition that the person is fully informed of all potential implications of the results.

The Algerian legislator prohibits any conduct that infringes upon human dignity or fundamental human rights. At the constitutional level, the inviolability of the human body is guaranteed under Article 39 of the Algerian Constitution, which prohibits any violation of the physical integrity and dignity of the individual, whether through physical or moral assault, Algerian law also criminalizes torture and cruel, inhuman, or degrading treatment, as well as human trafficking.

Under Algerian civil law, any agreement whose subject matter or cause is contrary to public order or morality is deemed absolutely null and void. Accordingly, any medical experiments aimed at enhancing human genetic characteristics for non-therapeutic purposes would be considered null and void.

Under Law No. 18-11 on Health, Article 354 and the following provisions address bioethics, defining it in relation to measures and activities involving organ removal and transplantation, tissues and cells, human blood donation and the use of blood and its derivatives, medically assisted reproduction, and biomedical research. These provisions may therefore provide a legal basis for certain forms of medical intervention involving the human genome, within the limits and conditions established by the applicable legal and ethical framework (Law No. 18-11, 2018).

Furthermore, Law No. 18-07 on the Protection of Natural Persons with Regard to the Processing of Personal Data, as amended and supplemented, contains specific provisions concerning human genetic data and classifies them as personal data subject to legal protection. The Law also establishes criminal protection by identifying unlawful acts that constitute offenses punishable under its provisions (Law No. 18-07 on the Protection of Natural Persons with Regard to the Processing of Personal Data, as amended and supplemented, 2018).

1.2-Legal and Regulatory Safeguards Governing Medical Practice Involving the Human Genome:

These safeguards consist of a set of conditions relating to the individual, as well as others relating to medical intervention and scientific research.

1.2.1-Conditions Relating to the Person Subject to Medical Intervention:They include the patient's consent and respect for human dignity in biomedical practice.

A. Patient Consent:

The patient's wishes must be respected by obtaining the free, explicit, and informed consent of the person concerned, The Universal Declaration on the Human Genome and Human Rights refers to this requirement as the prior consent of the person concerned, or, where applicable, authorization from the person legally representing him or her (Decree No. 92-276, 1992).

In Algerian legislation, Article 44 of Executive Decree No. 92-276 requires the patient's or his or her legal representative's free, explicit, and informed consent in cases involving a serious risk to the patient, These provisions are consistent with the principles set forth in the Universal Declaration on the Human Genome and Human Rights.

Furthermore, Article 343 of Law No. 18-11 on Health requires the patient's free and informed consent for all medical procedures, while Article 357 of the same Law requires the consent of the donor or his or her legal representative for organ removal, Such consent must be expressed in writing by the recipient in the presence of two witnesses, pursuant to Article 364 of the same Law, The two witnesses are subject to the capacity requirements established under the general rules of law.

Accordingly, consent in this context is essentially an unilateral expression of will, since, as a general rule, a physician may not undertake a medical intervention except at the written request of the person concerned. An exception may be made in cases of necessity justifying medical intervention without obtaining the person's consent (Hamza, 2013).

B. Respect for Human Dignity in Biomedical Practice

The UNESCO Universal Declaration on the Human Genome and Human Rights of 1997 emphasizes the need to respect human dignity, as a model international instrument that addresses this principle in several provisions. Beginning with its Preamble, the Declaration affirms the importance of respecting human dignity in research concerning the human genome and in the applications arising therefrom, Article 1 provides that the human genome underlies the



fundamental recognition of the dignity of all members of the human family, Article 2 further emphasizes respect for human dignity and human rights regardless of an individual's genetic characteristics. **Article 10** establishes, in the same context, the primacy of human dignity over the conduct of scientific research.

Similarly, the provisions of Executive Decree No. 92-276 of July 6, 1992, establishing the Code of Medical Ethics, recognize the principle of respect for human dignity and non-discrimination, Article 7 prohibits any practice that may adversely affect a person's physical or mental health, increase his or her suffering, or fail to respect the individual's life and dignity.

1.2.2- Conditions Relating to Biomedical Intervention and Scientific Research:

The Necessity of Biomedical Intervention in the Human Genome, Biomedical intervention in the human genome must be justified by a therapeutic or scientific necessity, in accordance with the relevant international principles, The Universal Declaration on Bioethics and Human Rights provides that, in the application and advancement of scientific knowledge, medical practices, and associated technologies, patients and participants should be enabled to obtain the maximum possible direct and indirect benefits, while any potential harm to which they may be exposed should be minimized as far as possible (UNESCO, Universal Declaration on Bioethics and Human Rights, 2005).

The Algerian legislator has likewise recognized the requirement of necessity under Article 364(6) of the Health Law, particularly in exceptional circumstances where postponing a medical intervention involving the transplantation of human organs, tissues, or cells could result in the recipient's death.

The necessity for medical intervention may also arise in judicial proceedings, particularly for the purpose of establishing criminal evidence in criminal offenses, or under civil law for establishing parentage, identifying deceased persons of unknown identity, locating missing persons and determining their ascendants and descendants, as well as in relation to volunteers, Such interventions may only be carried out pursuant to a judicial order, with the exception of cases involving volunteers (Law No. 16-03, 2016).

1.2.3- Physician obligations in the human genome:

Medical liability is generally based on an obligation to exercise due care rather than an obligation to achieve a specific result, and a breach of this obligation may give rise to tortious liability (Al-Sanhuri, Al-Wasit fi Sharh al-Qanun al-Madani: Nazariyyat al-Iltizam bi-Wajh ‘Amm, 1967, p. 777), The physician's obligations in the context of medical intervention in the human genome do not, in principle, differ from the medical obligations established under the general rules of law and the specific legislation governing health.

A- Non-Disclosure of Professional Confidentiality

Disclosure consists of revealing information that is confidential in nature by a person who has become aware of it by virtue of his or her professional duties, thereby enabling a third party to access such information, whether directly or indirectly, in whole or in part (Ahmed, 2016, p. 270).

Article 7 of the Universal Declaration on the Human Genome and Human Rights and Article 36 of the Code of Medical Ethics require physicians to maintain professional confidentiality, unless otherwise provided by law. Professional confidentiality covers all information entrusted to physicians and healthcare personnel in the course of performing their professional duties.

Physicians are also prohibited from disclosing the identity of a patient when conducting research and from revealing or making available documents relating to the patient, pursuant to Articles 36 to 41 of Executive Decree No. 92-276 establishing the Code of Medical Ethics

B.The Duty to Provide Information and Ensure Informed Consent

The duty to provide information and ensure that the patient is adequately informed is an obligation incumbent upon every professional, The physician must make every effort to provide the person concerned with clear and accurate information regarding the reasons for each medical procedure and to explain its potential beneficial and adverse consequences.

Although the physician's primary obligation is one of due care rather than the achievement of a specific result, the physician may, by way of exception, decide to withhold certain information from the patient, in accordance with Article 51 of the Code of Medical Ethics and



Article 5(c) of the Universal Declaration on the Human Genome and Human Rights.

C.The Duty to Safeguard the Patient's Safety for Therapeutic Purposes

As previously noted, the physician's obligation is one of due care rather than an obligation to achieve a specific result. This, however, does not relieve the physician of the duty to act properly, exercise appropriate care, and take all necessary precautions, while exerting the same degree of care that would ordinarily be expected of a reasonable person, even where the intended therapeutic outcome is not achieved, in accordance with Article 172 of the Algerian Civil Code.

In this regard, Articles 17 and 18 of the Code of Medical Ethics require physicians to perform their duties with respect for human life and personality. They also prohibit exposing a patient to a new treatment unless appropriate biological studies have first been conducted under strict supervision and it has been established that such treatment is likely to benefit the patient.

The protection of human physical integrity in this context is particularly significant in genomic medicine. First, genetic testing requires the collection of biological samples from cells associated with the human body. Second, it involves access to and processing of the individual's genetic information contained in the human genome. In such circumstances, these procedures must serve therapeutic purposes that protect the specific interests of the person concerned, or the public interest where they are undertaken for medical purposes (Al-Latif & Al-Nahwi, 2021). Their use for purposes other than those legally authorized is therefore prohibited.

D.The Duty to Examine, Prevent, and Treat Genetic Disorders

The physician is also required to examine, prevent, and treat genetic disorders with a view to preventing hereditary diseases. This may involve identifying the genes responsible for specific diseases that can be transmitted from one generation to another, performing a surgical procedure to remove or correct the genetic defect in the embryo during the early stages of its development, or introducing a healthy gene to replace a gene carrying the disease-causing defect (Al-Qader, H, 2018).

Failure to comply with these safeguards and obligations gives rise to legal consequences.

2-Legal Liability Arising from Medical Intervention in the Human Genome: The legal consequences of non-compliance with the aforementioned rules and obligations consist in the imposition of civil and criminal liability on the physician. These forms of liability will be examined in accordance with the general legal rules, with a view to assessing whether they are sufficient to adequately address and cover such consequences.

2.1-First Subheading: The civil liability of the physician arises, in accordance with the general rules, when its constituent elements are established at the time the fault is committed and results in damage, provided that a causal link exists between the fault and the damage, thereby giving rise to an obligation to compensate the injured party.

2.1.1-The Elements of Civil Liability (Fault, Damage, and Causation):

A.Medical Malpractice in the Human Genome:

Under the general rules of civil liability, fault consists in a breach of an obligation, whether contractual or statutory, where such obligation may entail either an obligation of means or an obligation to achieve a specific result.

Accordingly, medical malpractice constitutes a failure to act in a manner that would normally be expected of a reasonably prudent person placed in the same circumstances.

It is based on two elements: deviation from the required standard of conduct and awareness, that is, the person's knowledge of such deviation (Al-Mahdi & Maghni, 2023).

Under Algerian legislation, the Health Law does not provide a specific definition of medical malpractice. Article 413 of Law No. 18-11 refers to “any established professional negligence or fault...” Meanwhile, the Penal Code, in Articles 288 and 289, employs terms such as “recklessness,” “lack of precaution,” “inattention,” and “negligence.” Article 125 of the Civil Code likewise provides that a person capable of discernment is liable for damage caused to others through his or her act, omission, negligence, or lack of due care.

As for ordinary fault resulting from negligence and lack of precaution, it constitutes a negative form of conduct on the part of the physician,



consisting in failure to perform a duty that should have been performed in order to prevent a potential risk from a medical perspective (Bouguerra, pp. 1137–1155). Accordingly, fault in gene therapy arises where the physician performs his or her professional duties in a manner inconsistent with the obligations imposed by the medical profession, including the obligations referred to above.

The rules of prudence and precaution with which physicians are required to comply are intended to prevent the occurrence of harm.

Technical or professional fault, on the other hand, concerns matters in which physicians may differ with regard to the scientific principles governing the medical profession, such as errors in genetic diagnosis or treatment, in this type of situation, where the physician has not departed from an established professional standard and has chosen a particular course of treatment, his or her conduct does not constitute fault merely because the desired result was not achieved.

The Algerian Supreme Court has stated that “professional fault” for which a surgeon may be held liable includes a breach of one of the technical principles governing the profession, such as an error in diagnosing a disease, Negligence, by contrast, is assessed according to whether the surgeon exercised the requisite degree of care before and during the surgical treatment, taking into account the external circumstances surrounding the intervention, including the patient's physiological condition, the instruments available for the surgical procedure, the emergency nature of the situation, and other circumstances ordinarily known to specialists.

This assessment can only be properly made by relying on an expert report prepared by a specialist, in order to determine whether there was professional fault, negligence, or an ordinary error that could be committed even by the most competent physicians and which gives rise only to civil liability (Supreme Court).

The role of the judiciary is therefore to determine, as a general rule, the obligation incumbent upon the physician, namely the obligation to exercise due care in treating and seeking to cure the patient, except in cases where the physician is subject to an obligation to achieve a specific result, This is particularly relevant to the conduct of the general practitioner, where the issue may involve a scientific error. The judiciary must also determine whether conduct regarded by a

specialist physician as an error constitutes a legal fault, with the assessment being based on the scientific knowledge and professional standards applicable to each physician, accordingly, medical malpractice in the field of the human genome is assessed according to an objective standard (Al-Amin & Bahmawi, 2018).

B.Damage:

Damage constitutes the second element required for the establishment of liability. Medical harm refers to the injury caused by a medical act and encompasses any harm suffered by the patient as a result of an error affecting his or her physical integrity, whether in the form of material loss or psychological and non-pecuniary suffering.

Under modern legal theory, medical damage may be classified into direct or present damage and future or indirect medical damage (Makhtaria, 2017).

Damage may also take the form of a potential loss, conclusively presumed and not subject to rebuttal, although such damage is not compensable (Alian, 2022), it may further arise in the form of loss of a chance, in which compensation is assessed according to the value of the lost opportunity (Al-Amin, M., 2020).

In addition to material damage, which affects the injured person's financial interests as a result of bodily injury and may include medical expenses or any other loss resulting from the injured person's incapacity, there is non-pecuniary damage, which consists of the psychological suffering and pain experienced by the injured person.

As a general rule, damage giving rise to compensation must be certain to occur, whether it has already occurred or is certain to occur in the future.

C.Causation: Causation is established by the judge on the basis of the circumstances from which he or she may infer the indicia demonstrating its existence, or through the assistance of a physician appointed by the judge to provide technical or scientific support in assessing the individual's physical and mental condition and evaluating the civil and criminal legal implications thereof, pursuant to Article 95 of Executive Decree No. 92-276 of 6 July 1992, containing the Code of Medical Ethics, referred to above.

The physician's opinion is advisory and non-binding, as the complexity of medical matters requires the assistance of experts,



whereas legal matters fall within the exclusive jurisdiction of the judge. Once the causal link in the medical context has been established, civil liability arises.

However, one of the major legal difficulties in determining causation in medical matters lies in the complexity and difficulty of such an assessment, given the complexity of the human body and the biological differences between individuals.

Each person has a unique genetic makeup and genome, and complications may arise from hidden and complex factors and causes related to individual biological predispositions and genetic characteristics.

This makes it difficult, in many cases, to adopt and establish a causal relationship (Al-Qader B, 2025), particularly with regard to future symptoms or conditions that may manifest in subsequent generations.

2.1.2-Legal Consequences of Civil Liability:

Where an unlawful act or wrongful deviation in conduct causes harm to another, the person responsible shall bear the legal consequences arising from such misconduct, primarily in the form of compensation (Al-Qader, B, 2025), Such compensation may take several forms, including specific restitution (*restitutio in integrum*), compensation by way of monetary equivalent, and compensation for loss of opportunity (loss of chance).

As regards specific restitution (*restitutio in integrum*), it consists in remedying the harm by eliminating its effects and restoring the injured party to the position in which they would have been had the wrongful act not occurred.

At the request of the injured party, the court may order such restitution where it is factually and legally possible, in accordance with the general rules of civil liability.

In the context of medical liability, the court may, for instance, order the physician to provide the necessary treatment at his or her own expense in order to remedy the harm caused, however, this form of compensation is often difficult to achieve in kind, particularly in cases involving complex medical matters (Salha, 2017).

As for compensation by way of an equivalent, the judge resorts to it where specific restitution cannot be achieved, Such compensation is generally monetary and consists in providing the injured party with a

financial value equivalent to the value lost as a result of the physician's failure to perform his or her obligations.

Compensation by way of an equivalent may also take a non-monetary form, which constitutes a special form of reparation warranted by the circumstances in order to redress the harm. This falls within the scope of compensation for moral damage.

The Algerian legislator has adopted the principle of compensation for moral damage in both tortious and contractual liability.

Article 182 of the Algerian Civil Code provides that: "Compensation for moral damage shall cover any infringement of liberty, honour, or reputation." Likewise, Article 4 of Law No. 25-14, establishing the Code of Criminal Procedure, provides that: "A civil liability claim shall be admissible in respect of all forms of damage, whether material, bodily, or moral, provided that such damage results from the facts giving rise to the criminal proceedings" (Law No. 25-14, 2025).

The assessment of compensation for moral damage falls within the discretionary power of the judge, as there is no specific criterion prescribed as a basis for determining its amount (Sabah, 2021).

As a general rule, compensation is confined to the injured person themselves and does not pass by inheritance or contract, unless it has been transferred by agreement or pursuant to a final judgment awarding such compensation where the claim concerns the injured person's legal successors (Al-Amin, M., 2020).

As for compensation for loss of chance, French and Egyptian case law have consistently recognized, in the context of medical liability, that the loss of a chance of survival constitutes actual and compensable harm where a proven fault deprives the injured person of an opportunity to improve their health condition. Accordingly, the injured party is entitled to seek compensation for this type of damage. However, the assessment of compensation for loss of chance is based on an evaluation of the patient's medical condition at the time the fault occurred and the extent to which such fault deprived the patient of the opportunity to receive treatment or achieve recovery, rather than on the ultimate outcome of complete recovery.

This criterion assumes particular importance in diseases characterized by gradual progression and multiple stages, especially in cases involving interventions in the human genome, where the assessment of the lost chance becomes considerably more complex.

This differs from certain other diseases that do not exhibit the same degree of progression and complexity in their pathological course.



Accordingly, the practical difficulty in recognizing the right to compensation for loss of chance lies in the fact that the underlying harm does not possess absolute certainty, since the outcome of medical treatment remains inherently probabilistic. Consequently, compensation is not directed at the ultimate outcome that failed to materialize namely, recovery but rather at the serious and genuine chance lost by the injured person as a result of the harmful act. Such a chance constitutes an independent legal interest deserving of protection whenever it is based on a serious and reasonable probability (Al-Layl, p. 147).

2.2-Criminal Liability: Tortious liability arises from a physician's wrongful conduct that causes harm to a patient, where such conduct may also constitute a criminal offence under the Criminal Code or under special health legislation. Given the specific legal nature of genetic information, the following discussion will first address offences relating to genetic data, followed by offences relating to the practice of medicine.

2.2.1- Offences Relating to Genetic Data:

These offences consist of the offence of processing genetic data without obtaining the explicit consent of the data subject, **and the** offence of carrying out or using the processing of personal data for purposes other than those declared or authorized.

A- Offence of Processing Sensitive Data Without the Explicit Consent of the Data Subject

Article 57 of Law No. 18-07 on the Protection of Personal Data, as amended and supplemented, provides that:

“Any person who, without the explicit consent of the data subject and outside the cases provided for under this Law, processes sensitive data shall be punished by imprisonment for a term of two to five years and a fine ranging from DZD 200,000 to DZD 500,000.”

This provision may be directly applied to infringements involving genetic data, since genetic data fall within the category of personal data afforded legal protection. An analysis of Article 57 shows that the legal element (*actus reus* in its statutory dimension) is established by the existence of a legal provision criminalizing the conduct. The prohibited conduct consists in processing genetic data without satisfying the following two conditions: first, the absence of the explicit consent of the data subject; and second, the absence of any of the circumstances in which processing is legally permitted. It is not necessary to establish a causal relationship between the conduct and

any specific harm, since the offence is consummated merely upon the occurrence of the unlawful processing itself (Al-Husseini, 2012, p. 198).

The mens rea consists in the perpetrator's knowledge that the data being processed constitute sensitive data, together with knowledge that the explicit consent of the data subject has not been obtained or that there is no legal basis authorizing the processing, while nevertheless directing their will toward carrying out such processing.

The perpetrator may be any natural or legal person who processes sensitive data in violation of the law, whether a physician, researcher, healthcare institution, laboratory, company, or any other person responsible for processing. Accordingly, this provision constitutes one of the most significant criminal-law provisions providing direct protection for genetic data (Amina, 2017, p. 393), even in the absence of a specific provision criminalizing every form of interference with the human genome itself. This is because the provision criminalizes interference with genetic data by virtue of their classification as sensitive personal data.

B-Offence of Carrying Out or Using the Processing of Personal Data for Purposes Other Than Those Declared or Authorized

In the context of the human genome, the criminalization of such conduct assumes particular importance, given that genetic data are often collected for a specific medical or scientific purpose and may not lawfully be used for other purposes without a legal basis or the consent of the data subject.

The legal element of the offence is established under Article 58 of Law No. 18-07, which criminalizes the processing of personal data where it is carried out for a purpose different from that declared by the data controller or authorized by the competent authority. Furthermore, Article 17 of Law No. 16-03 on the Use of Genetic Fingerprints in Judicial Proceedings criminalizes the use of genetic fingerprints obtained for purposes other than those prescribed by law.

The material element is constituted by carrying out or using the processing of genetic data for a purpose that has neither been declared nor authorized. It is therefore necessary that such processing be carried out for purposes different from those previously declared or authorized.



The mental element (*mens rea*), given that this is an intentional offence, requires the perpetrator to know the purpose for which the processing was declared or authorized, to be aware that the data are being used for a different purpose, and nevertheless to direct their intention toward such unauthorized use.

The law does not prescribe any particular status or capacity for the perpetrator. Accordingly, the perpetrator may be a physician or any other person who has obtained access to or possession of the genetic data. The victim is the individual to whom the genetic personal data subject to processing relate.

Examples of such conduct include: collecting genetic samples for the purpose of diagnosing a particular disease and subsequently using them in scientific research to which the data subject has not consented; using the results of genetic tests for commercial or marketing purposes; sharing genetic data with insurance companies, employers, or other entities where such disclosure does not fall within the original purpose for which the data were collected; and establishing genetic databases for security or statistical purposes on the basis of data originally collected for treatment or diagnosis.

Despite the existence of these specific legal provisions, they do not expressly employ the term “human genome” (Razaki, 2018).

2.2.2- Offences Related to the Practice of Medicine:

These offences include breach of professional confidentiality and punishable medical errors.

A. Punishable Medical Errors

Punishable medical errors consist of acts that endanger physical integrity, including negligence, recklessness, lack of due care, and failure to take the necessary precautions, as previously discussed. Criminal liability arises from such conduct pursuant to Articles 288 and 289 of the Algerian Penal Code.

These errors may be committed by members of the medical team, while the physician is primarily responsible for the technical and medical aspects of treatment, nursing and other care-related tasks are performed by the physician’s assistants, including nurses and other healthcare personnel, who work under the physician’s supervision and in accordance with their instructions.

Where any of the aforementioned forms of misconduct particularly recklessness, negligence, or failure to take due precautions results in the death of a patient, criminal liability arises once a causal link has been

established between the wrongful conduct and the resulting harm, namely involuntary manslaughter, such conduct is therefore regarded as criminal and renders its perpetrator liable to the penalties prescribed under Articles 288 and 289 of the Algerian Penal Code.

B. Offence of Breach of Professional Confidentiality:

A breach of professional confidentiality gives rise to criminal liability. Pursuant to Article 417 of Law No. 18-11 on Health, the perpetrator is subject to the penalties provided for under Article 301 of the Algerian Penal Code, the prescribed punishment consists of imprisonment for a term ranging from one month to six months and a fine of DZD 500 to DZD 5,000. The provision also identifies the persons bound by professional secrecy and establishes the applicable penalty where such secrecy is disclosed outside the circumstances in which disclosure is authorized or required by law.

Likewise, Law No. 16-03 on the Use of Genetic Fingerprints in Judicial Proceedings and the Identification of Persons criminalizes the disclosure of genetic data and provides for the applicable penalties. Any person who discloses data recorded in the National Genetic Fingerprint Database is punishable by imprisonment for a term of six months to three years and a fine ranging from DZD 60,000 to DZD 300,000.

Article 301 of the Algerian Penal Code criminalizes the disclosure of professional secrets where the disclosure is committed by physicians, surgeons, pharmacists, midwives, or any person entrusted, by virtue of their profession or position, with confidential information and who discloses it outside the circumstances in which the law requires or permits such disclosure, accordingly, a patient's genetic record, genetic test results, genetic mutations, and genetic predisposition to disease constitute medical secrets falling within the scope of criminal-law protection, since such information comes to the knowledge of the physician or researcher in the course of professional practice, consequently, their disclosure without a legal basis falls within the scope of application of this provision.

For the material element (*actus reus*) to be established, the perpetrator must be a person legally bound to maintain professional secrecy, such as a physician, surgeon, pharmacist, or midwife, or any other person entrusted with confidential information by virtue of their permanent or temporary profession or position (Nadira, 2022).



It is also required that the subject matter of the disclosure constitute a secret, namely information that is not publicly known, that has come to the perpetrator's knowledge by reason of their profession, and in respect of which the person concerned has a legitimate interest in maintaining confidentiality. This includes genetic information, which enjoys a particularly high degree of privacy because it may reveal information concerning members of the patient's family as well as the patient themselves (Al-Latif & Al-Nahwi, 2021, p. 212).

The criminal conduct is established by any unlawful disclosure of confidential information to a person who is not authorized to access it, whether the disclosure is made orally, in writing, electronically, or by any other means. It is not necessary for the disclosure to result in actual harm, as the offence is consummated upon the occurrence of the disclosure itself, provided that the other constituent elements of the offence are satisfied.

In the context of the human genome, disclosure may occur, for example, through providing genetic test results to a third party; transmitting a patient's genetic medical record to another person; publishing genetic data in a scientific study without the data subject's consent where such consent is required; or sharing genetic data with third parties without a legal basis, however, these specific forms of conduct are not expressly and precisely defined either in the Penal Code or in the Health Law.

Conclusion:

By examining the concept of the human genome and the possibility of subjecting it to the provisions of Algerian legislation, as well as by reviewing the ethical principles established to protect and regulate medical practices involving the human genome from a legal perspective under international law and Algerian legislation, the following conclusions have been reached:

- The human genome is considered one of the elements containing sensitive personal information relating to the individual. Therefore, it may not be interfered with or subjected to any form of intervention except within the limits permitted by law.
- The physical integrity of the human person is regarded as one of the fundamental matters to which the legislator attaches particular importance. Accordingly, the law requires the explicit consent of the

person concerned before any medical intervention involving the human genome may be undertaken.

- The remarkable development of genomic technologies reveals a relative legislative gap, as the existing legal provisions are primarily designed to address medical errors in general, whether in the context of civil or criminal liability. However, they do not expressly address the specific nature of medical interventions involving the human genome, particularly their distinctive effects, which may extend to the individual's relatives, as well as the possibility of their unlawful use.

Recommendations

1- It would be appropriate for the Algerian legislator to enact specific legal provisions regulating and protecting medical interventions involving the human genome, particularly in light of the increasing reliance on genomic applications in criminal and civil proceedings, medical treatment, assisted reproduction, and other fields of use. Such provisions should establish clear rules governing the collection, processing, storage, and disclosure of genomic data, while imposing penalties commensurate with the seriousness of violations, in a manner that keeps pace with recent developments in the field of the human genome.

2- The scope of civil liability should be broadened to encompass presumed fault, without requiring proof of the physician's causal contribution, in cases involving medical interventions on the human genome, given the particular difficulty of establishing causation in this field.

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