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Article abstract

This study assesses the legal and ethical frameworks for genetic testing in Lebanon, with a particular focus on paternity testing. Information collected from 16 laboratories revealed that paternity testing is performed solely in the four laboratories accredited by the Ministry of Public Health, but only half of the tests are made through the court. Interestingly, one laboratory does not require the parents' consent prior to paternity testing, and individuals are generally not informed about the possibility of misattributed paternity (73.3%) or disease predispositions (53.3%). Moreover, the disclosure of incidental findings is done by only 37.5% of laboratories. Unfortunately, genetic findings are communicated in the absence of a psychologist in 90% of cases. When deemed necessary, results are shared in 12.5% of cases with other health professionals, without the consent of the patient. Our study highlights the need to develop comprehensive guidelines and regulations that cover paternity testing in Lebanon.

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ARTICLE (ÉVALUÉ PAR LES PAIRS / PEER-REVIEWED)

DNA Paternity Testing in Lebanon: Ambiguity in Laboratory Practices, Unsolved Ethical Issues, and Need for a Legislative Framework

Mirna Azoury[a], José-Noel Ibrahim[b], Hasan Yassine[b], Fadi Abou-Mrad[a]

Résumé
Cette étude évalue les cadres juridiques et éthiques des tests génétiques au Liban, en mettant l'accent sur les tests de paternité. Les informations recueillies auprès de 16 laboratoires ont révélé que les tests de paternité sont effectués uniquement dans les quatre laboratoires accrédités par le ministère de la santé publique, mais que seulement la moitié des tests sont effectués par l'intermédiaire du tribunal. Il est intéressant de noter qu'un laboratoire n'exige pas le consentement des parents avant le test de paternité et que les personnes ne sont généralement pas informées de la possibilité d'une paternité mal attribuée (73,3 %) ou d'une prédisposition à des maladies (53,3 %). En outre, seuls 37,5 % des laboratoires divulguent les résultats fortuits. Malheureusement, les résultats génétiques sont communiqués en l'absence d'un psychologue dans 90 % des cas. Lorsqu'ils sont jugés nécessaires, les résultats sont communiqués dans 12,5 % des cas à d'autres professionnels de la santé, sans le consentement du patient. Notre étude met en évidence la nécessité d'élaborer des lignes directrices et des réglementations complètes concernant les tests de paternité au Liban.

Mots-clés
tests génétiques, tests de paternité, éthique, droit, Liban

Abstract
This study assesses the legal and ethical frameworks for genetic testing in Lebanon, with a particular focus on paternity testing. Information collected from 16 laboratories revealed that paternity testing is performed solely in the four laboratories accredited by the Ministry of Public Health, but only half of the tests are made through the court. Interestingly, one laboratory does not require the parents' consent prior to paternity testing, and individuals are generally not informed about the possibility of misattributed paternity (73.3%) or disease predispositions (53.3%). Moreover, the disclosure of incidental findings is done by only 37.5% of laboratories. Unfortunately, genetic findings are communicated in the absence of a psychologist in 90% of cases. When deemed necessary, results are shared in 12.5% of cases with other health professionals, without the consent of the patient. Our study highlights the need to develop comprehensive guidelines and regulations that cover paternity testing in Lebanon.

Keywords
genetic testing, paternity testing, ethics, law, Lebanon

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INTRODUCTION

The development of highly informative genetic biomarkers, accompanied by the progression of DNA sequencing technologies, has allowed for the increasing reliance on genetic testing as a means of both diagnosis and prognosis in predictive medicine. This progress has also facilitated the development of powerful tools for understanding the complexities of human inheritance. In fact, over the past four decades, genetic testing has resulted in an exponential increase of biomarker libraries for multiple diseases, thereby enhancing diagnostic capabilities (1). Furthermore, with a comprehensive understanding of genetic information, scientists have been able to integrate the data into clinical practice to tailor treatment efficacy and safety (2). However, the surge in detected biomarkers and advancements in genetic techniques have generated complex information that may be subject to conflicting interpretations. Misinterpretation of genetic findings can have significant consequences, including incorrect or missed diagnoses, unnecessary treatments or interventions, and increased psychosocial stress for patients and their families (3).

In addition to generating complex information, genetic testing often leads to incidental findings, defined as observations, results, or other discoveries that extend beyond the primary research objective (4). One example of incidental findings is the discovery of variants that are known to cause a predisposition to certain diseases (5). Misattributed paternity is another common and unanticipated finding (6), with implications that extend beyond determining biological relationships, affecting medical, judicial, social, and personal matters (7).

In Lebanon, Law No. 625, drafted by the Lebanese National Consultative Committee on Ethics and approved by the Ministry of Health, the Council of State, and the Council of Ministers, was the first attempt to regulate genetic testing (8). Law No. 625 establishes a National Registry for genetic data that prioritizes human dignity and rights, ensuring data confidentiality and banning commercial use. Genetic testing requires explicit consent for medical or research purposes only, prohibiting discrimination or behavioural prediction. Individuals have the right to their test results and may withdraw consent at any time.

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DNA laboratories must follow strict data protection protocols, allowing individuals to refuse data sharing, except in specific medical scenarios. Furthermore, the law ensures rigorous oversight and protection of genetic information; however, it does not address the various aspects of paternity testing.

Paternity testing in Lebanon has evolved significantly over the years, reflecting both advancements in genetic science and socio-cultural dynamics within the country. Since Lebanon is characterized by a complex sectarian structure and diverse population, paternity issues were often resolved through traditional means or by religious authorities, with little recourse to scientific methods. The introduction of DNA testing, particularly in the 1990s, marked a turning point in Lebanon, and aligned with a global trend toward increased reliance on DNA evidence in legal and personal disputes. The availability of these tests offered individuals a way to address concerns about legitimacy and inheritance rights, which are particularly sensitive subjects in Lebanon. Nonetheless, despite the potential for DNA testing to clarify paternity issues and the gradual shift in societal attitudes – spurred by growing awareness of personal rights and scientific literacy – Lebanon currently lacks a legal framework for paternity testing, which is still influenced by religious laws. As a result, many families may still opt for traditional resolutions due to the stigma or fear of social repercussions. Moreover, the high cost of genetic testing can be prohibitive for many families, thus limiting access to much of the population. This situation highlights the complex dynamics in Lebanon, and distinguishes it from other nations (9).

In this context, the lack of clear regulations on paternity testing in Lebanon raises significant ethical concerns. Indeed, the limited access to affordable genetic testing and the ease of access to paternity tests with the ability to disclose information without the consent of the parents can result in a breach of fundamental principles of transparency, consent, and respect for individuals' rights to privacy, safety, and dignity (9). Consequently, there is an urgent need for comprehensive regulations and guidelines that include specific genetic tests, and in particular paternity testing.

This study was designed to assess the legal and ethical frameworks of genetic testing among different laboratories in Lebanon with the main purpose of revising and further developing the existent law on genetic testing. A particular focus will be on paternity testing due to its controversial nature and the emotive debate that it can provoke, particularly with regard to consent issues.

MATERIALS AND METHODS

Study Design and Population

This study was conducted in accordance with the requirements of the Declaration of Helsinki and approved by the Ethics Committee of the Lebanese University. A list of the laboratories authorized by the Ministry of Public Health to perform DNA testing was prepared, and the Heads of the laboratories were then contacted by telephone to explain the nature and objectives of the study, and to get their approval to participate in the research.

Questionnaire

Data collection took place between May and August 2022 using a 29-item questionnaire (Annex 1), which was completed in person by the laboratory head. After reviewing the information sheet, participants were asked to provide their written consent for voluntary participation in the research project. The questionnaire addressed the judiciary's role in DNA paternity testing, assessing participants' knowledge of relevant laws and regulations in Lebanon, the necessity of consent forms for genetic and paternity testing, the accessibility of genetic test results, and the provision of genetic counselling prior to testing. It also addressed the management and disclosure of incidental findings, the methods of communicating results, and the handling of DNA samples along with their potential use in future analyses or research. The questionnaire received approval from several experts with extensive experience in the field.

Data confidentiality

The aim of the study was clearly presented to participants, and an informed consent was signed by all respondents prior to enrollment. They were all notified that information collected to meet our research objectives would be kept anonymous and confidential, and that personal data, such as the name of the laboratory, contact information, address, etc., were not recorded. Survey responses were directly exported to a study-specific excel sheet in which data were linked to a secret code and saved on the laptop of the principal investigator using password-protected files. The informed consent and hard copy records were carefully protected in a locked file cabinet; only the lead investigator had access to the data when necessary.

RESULTS

In total, 16 out of the 30 laboratories contacted accepted to participate in the study, for a response rate of 53%. The laboratories that opted out of participation primarily conduct routine examinations along with DNA testing. Their decision was largely influenced by concerns about the sensitive nature of the topic, as they expressed worries about potential ethical and legal ramifications, as well as the consequences of being viewed as breaching confidentiality protocols or regulatory standards. Other reasons for non-participation included a lack of interest in the research and the unavailability of the laboratory Head during the data collection period.

Out of the 16 laboratories included in the study, six were private clinical laboratories, seven were hospital laboratories, one was a forensic science laboratory, one was a specialized clinical laboratory for DNA analysis, and one was a genetic research and diagnostic laboratory affiliated with a private university. The majority of these laboratories (12/16 or 75%) are primarily involved in the identification of genetic diseases (hereditary diseases, chromosomal abnormalities, etc.), while four laboratories conduct paternity testing. Additionally, forensic investigations and prenatal diagnosis were carried out by only two laboratories. The Heads of the laboratories were asked to respond to various ethical and legal questions assessing how genetic testing, in general, and paternity testing in particular, are performed in their laboratories.

PATERNITY TESTING

Implication of the judiciary in paternity testing

First and foremost, our findings revealed that paternity testing is not performed outside of the four laboratories accredited by the Ministry of Public Health. Regarding the role of the judiciary in paternity testing, the results showed that only half of the paternity tests are initiated through a court order. Additionally, our findings indicate that in half of the cases, parents still have the option to select the laboratory where the paternity test will be conducted, even if the test is ordered by the court. Beyond those that were court-ordered, paternity tests were generally requested by either the mother or the father to establish the identity of the father or to identify a child who has not been registered at birth. Less frequently, paternity tests were ordered for issues related to inheritance (50% of cases) or to request financial support and compensation for the child (25% of cases).

Knowledge of paternity testing regulations and consent form requirements

Our analysis found that 56.5% of participating laboratories were unaware of any laws regulating paternity testing in Lebanon. Regarding the provision of consent forms, our results showed that in 75% of paternity testing cases, a written consent was collected from the concerned parties, as all four participating laboratories confirmed that consent was mandatory for test execution. Furthermore, the test cannot be performed without the consent of the parents (Table 1).

Table 1. Participants' knowledge of paternity testing regulations and consent form requirements

	Response
Knowledge about the existence of a law regulating paternity testing	
Yes	31.3%
No	12.4%
I don't know	56.3%
Requirement of an informed consent prior to testing	
Yes	75%
No	25%
I don't know	0%
Type of consent	
Written	100%
Oral	0%
Request of a DNA test on another's biological sample without the consent of the concerned person	
Yes	0%
No	100%
I don't know	0%

GENETIC TESTING

Knowledge of genetic testing regulations and consent form requirements

In laboratories conducting genetic testing other than paternity tests, 50% of participants were unaware of Law No. 625, which regulates genetic testing in Lebanon. Surprisingly, consent was required in only 35.7% of cases when a DNA test was requested. Among those instances, written consent was the norm (72.7%), while oral consent was less common (9.1%). According to participants, there was no requirement in their laboratories to obtain patient consent prior to testing. Additionally, three of the sixteen laboratories surveyed (18.8%) reported that requests for testing could be made by any individual or family member, even without the individual's consent (Table 2). Furthermore, only one-third of patients received genetic counselling before undergoing their genetic tests.

Table 2. Participants' knowledge of genetic testing regulations and consent form requirements

	Response
Knowledge of the existence of a law regulating the test	
Yes	18.7%
No	31.3%
I don't know	50%
Requirement of an informed consent prior to testing	
Yes	35.7%
No	57.2%
I don't know	7.2%
Type of consent	
Written	72.7%
Oral	9.1%
I don't know	18.2%
Request of a DNA test on another's biological sample without the consent of the concerned person	
Yes	18.8%
No	75%
I don't know	6.2%

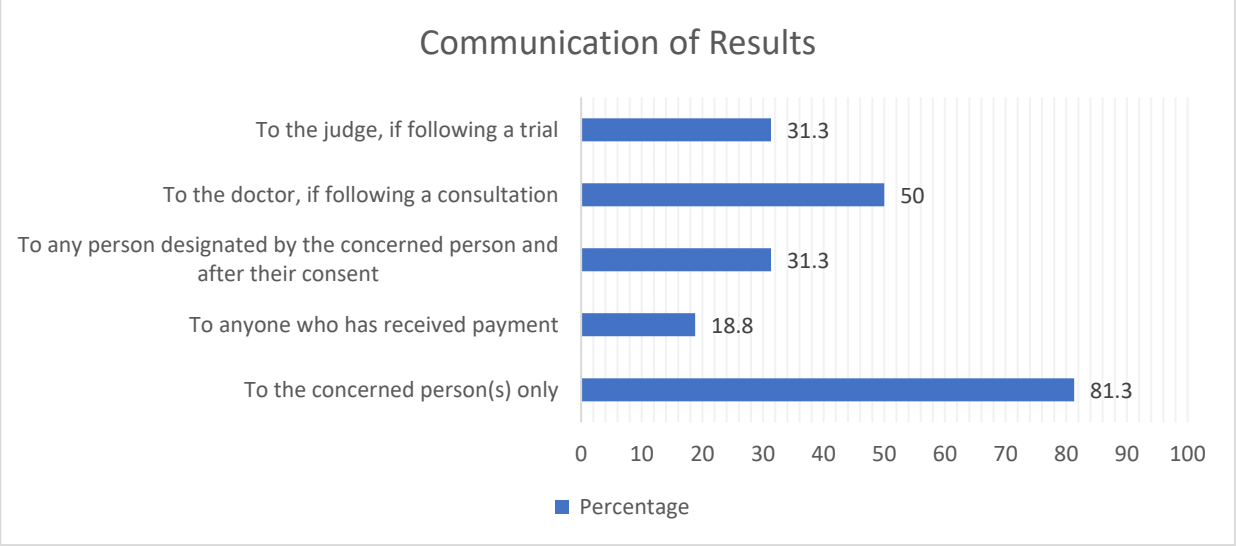
Discovery and disclosure of incidental findings

A majority of laboratories fail to inform patients of the possibility of misattributed paternity (73.3%) and the risk of being genetically predisposed to disease (53.3%). Furthermore, 61.5% of laboratories do not ask patients whether they wish to be informed about incidental findings. The disclosure of such information appears to be governed by each laboratory's internal regulations. While 37.5% of laboratories prefer to disclose incidental findings to the concerned individual, the remaining laboratories do not disclose this information.

Communication of test results

Test results were typically delivered directly to the concerned individual in 81.3% of cases. However, in some instances, results were communicated to the doctor following consultation (50%) or to the judge as part of a trial (31.3%) (Figure 1). Notably, 12.5% of participating laboratories reported that test results were disclosed to other healthcare professionals without the patient's consent, if deemed necessary. When no judicial involvement was required, results were communicated via face-to-face meetings (66.7%), phone calls (6.6%), or according to the individual's preference (26.7%). Moreover, our findings revealed that results were delivered by the laboratory head in 50% of cases, while laboratory technicians and geneticists were responsible for communicating the results in 25% and 18.8% of instances, respectively. Unfortunately, in 90% of cases, this disclosure occurred without the presence of a psychologist. The involvement of a psychologist would be valuable in helping patients navigate potentially emotionally challenging information during genetic counselling.

Figure 1. Laboratory practices regarding recipient of the genetic result



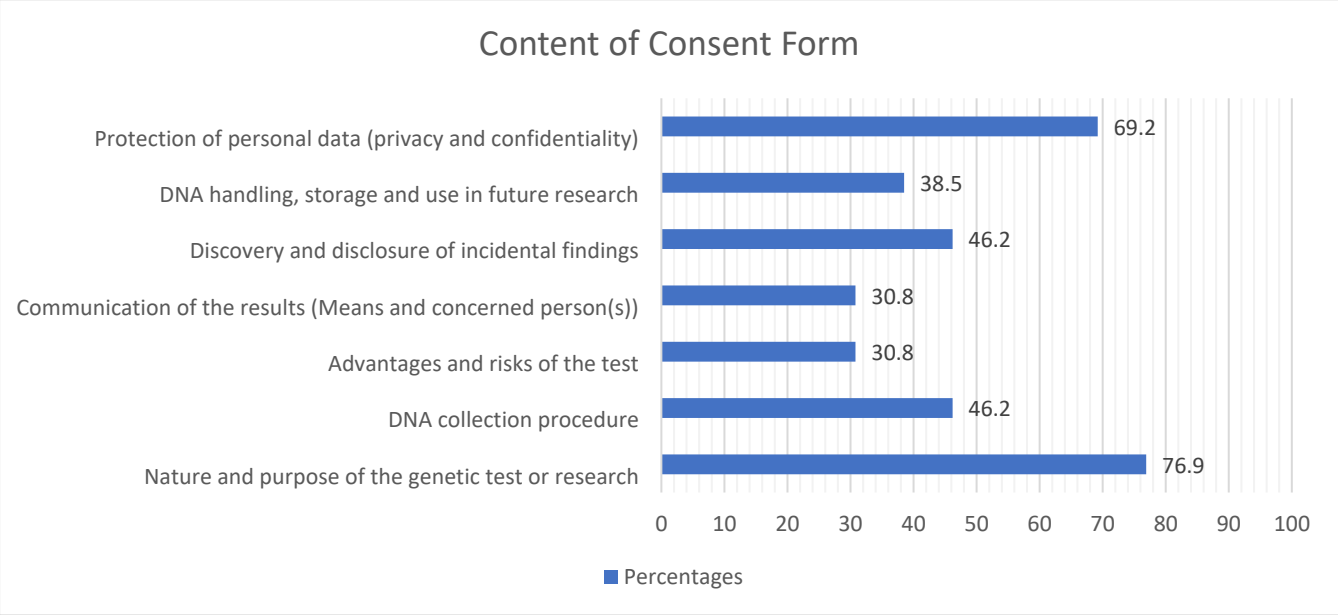
DNA storage and use in future analyses

Lastly, 62.5% of laboratories stored extracted DNA without obtaining consent from the individuals involved, and a quarter of these stored samples were used for future research or genetic analyses, also without prior patient consent. Furthermore, only 37.5% of laboratories reported that they maintained patient anonymity when storing or using DNA samples for research purposes.

Content of the consent form

The final question assessed the content of consent forms used for DNA genetic testing across various laboratories. While there was no standardized uniform consent form in place, the most commonly included items were a description of the genetic test or research nature and purpose (76.9%) and information about data protection, including privacy and confidentiality (69.2%). However, the inclusion of other critical elements, such as the DNA collection process, the advantages and risks of the test, how results would be communicated, and the handling of extracted DNA in future research, showed variability across laboratories, with fewer than 50% of consent forms covering these essential aspects (Figure 2). This highlights the need for a standardized, comprehensive consent process.

Figure 2. Content of the consent form used for genetic testing across the different laboratories



DISCUSSION

To our knowledge, this is the first study to examine the compliance of laboratories with the ethical and legal considerations associated with genetic testing in Lebanon, particularly in the context of paternity testing. Notably, paternity testing was found to be conducted exclusively by the four laboratories accredited by the Ministry of Public Health. However, our findings indicate significant gaps and shortcomings in the processes related to paternity testing, including violations of ethical principles such as protection of confidentiality and privacy, as well as the absence of protocols and guidelines for this type of testing.

First, it was observed that judges request paternity testing in only 50% of cases; in instances where a court order is not involved, parents are the primary initiators of the test. By contrast, in France, DNA paternity testing is exclusively conducted through court orders, making private testing illegal (10). Outside a legal context, in Arab countries like Saudi Arabia and Lebanon, communicating paternity test results to the father or any other member of the family may expose the mother to risk of violence due to “dishonorable infidelity” from conceiving a child outside of marriage (11). According to the Declaration of Helsinki, special protections should be taken into consideration to protect individuals or groups who are particularly vulnerable with an increased likelihood of being wronged or incurring additional harm due to their status (12). Moreover, in agreement with the Universal Declaration on the Human Genome and Human Rights, adopted at UNESCO’s 29th General Conference in 1997, fundamental freedoms, human rights, and dignity should be placed above all other interests (13,14). Lastly, regarding consent requirement, paternity testing necessitates that consent be obtained from all parties involved if no court order is present. This requirement reflects the significant legal, social, cultural, and psychological implications surrounding paternity tests, making informed consent critical in this context.

A closer examination of the processes and guidelines applied to other types of genetic testing revealed that most laboratories reported that obtaining the patient’s informed consent – whether oral or written – was not typically mandatory. This difference highlights the specific challenges and considerations that arise in the context of various genetic tests, each necessitating its own set of standards and practices tailored to the unique circumstances involved. Moreover, our results indicate that any person can perform a genetic test on another’s biological sample (hair, blood, etc.), without their knowledge or consent. This is due to the absence of adequate legislation governing DNA theft in Lebanon. The repercussions of DNA theft and unauthorized DNA testing can be significant, potentially exposing individual information about predispositions to certain

diseases or their pre-existing medical conditions. Such breaches of security and privacy can lead to social stigmatization, discrimination, and adverse effects on employment opportunities (15).

Spain encountered challenges similar to those in Lebanon regarding the regulation of genetic testing, stemming from Spanish law that mandates obtaining informed consent from legal representatives but does not clarify the implications when consent is provided solely by one parent, typically the alleged father (16). The Nuremberg Code, established in 1947, underscores the significance of obtaining voluntary consent from human subjects; any violation of this code is viewed as a breach of an individual's autonomy and human rights (17-20). Consequently, respecting personal autonomy and ensuring informed consent are essential ethical considerations in all medical and genetic testing procedures (21).

Our findings highlighted several shortcomings in the consent forms used for genetic testing in Lebanese laboratories. Many of these consent forms lack comprehensiveness, failing to include crucial information such as the methods of communicating results, the potential for incidental findings, and the processes for disclosing these results. Additionally, they often do not address patient preferences regarding the destruction or storage of DNA for future research. These deficiencies can largely be attributed to the absence of a referential legal framework and standardized consent forms. Implementing a standardized consent document could enhance information exchange between clinicians and patients, improve understanding of genetic testing, and bolster professional judgment in clinical contexts. Furthermore, it would aid genetic counsellors in providing targeted information to patients, ultimately facilitating a more effective informed decision-making process (22).

Notably, there was remarkable variability in the perspectives and practices among the participating laboratories regarding several key aspects of genetic testing. These included the necessity of genetic counselling prior to testing, methods of communicating results and sharing them with third parties, protocols for handling and disclosing incidental findings, and the storage and use of DNA samples for future genetic research. For instance, in France, genetic counselling is mandatory for all types of genetic testing and must be conducted prior to testing by either the ordering physician or a genetic counsellor associated with the physician (23). In the United Kingdom and Italy, the disclosure of unsolicited information, such as misattributed paternity, should be managed on a case-by-case basis. Healthcare professionals involved in genetic counselling could greatly benefit from existing documents supplemented by international guidelines, as these resources can aid them in developing their ethical reasoning skills in this field and assist them in addressing clinical dilemmas (24). In the UK, healthcare professionals may face disciplinary actions for failing to comply with the minimum standards of care established by the General Medical Council and the Nuffield Council on Bioethics (24). Meanwhile, the Oviedo Convention, an international legally binding instrument for the protection of human rights in the biomedical field, seeks to safeguard patient autonomy, the right to information, and the necessity of obtaining consent before any medical examination, including genetic testing (25). In Australia, the National Association of Testing Authorities (NATA) implements a national accreditation system that ensures the technical proficiency of genetic testing and paternity testing across all accredited laboratories (26). Finally, according to the 15th edition of the "Standards for Relationship Testing Laboratories" established by the US Association for the Advancement of Blood & Biotherapies (AABB), consent must be secured from each individual undergoing testing in accordance with relevant laws before sample collection. In cases involving a minor or a legally incompetent adult, consent should be obtained from a person with legal authority to provide it or from a tribunal authorized to order the testing (27).

The Guidelines for Quality Assurance in Molecular Genetic Testing (GQA), published by the OECD in 2007, advocate for a standardized framework of international quality standards for molecular genetic testing laboratories. This includes adherence to ISO 17025 standards, which pertain to laboratory accreditation, testing, and calibration, as well as ISO 15189 standards for medical laboratories. The GQA emphasizes the importance of laboratory oversight, data traceability, and quality reporting of results (28,29). The International Declaration on Human Genetic Data (HGD), adopted by UNESCO in 2003, outlines fundamental principles for the collection, processing, use, and storage of human genetic data and the biological samples from which it is derived. The declaration underscores the need for equality, justice, and solidarity in these practices (30). Additionally, according to the Husted Bioethical Decision-Making framework, every individual is unique and has the right to pursue their own independent purpose (31). This principle reinforces the need for confidentiality in test results and ensures that individuals are informed about who will have access to their data (32). Moreover, respect for autonomy entails that individuals must have control over the future use of genetic material submitted for analysis, ensuring it is used only for the specified purposes.

Considering that the Lebanese healthcare system is strongly influenced by French principles and its corresponding health system, it would be valuable to examine French legislation on paternity testing in order to establish a legal framework for Lebanon. Furthermore, exploring the feasibility and potential benefits of integrating international standards, such as the AABB guidelines, into the Lebanese healthcare system, may provide a more comprehensive and internationally comparable framework for genetic testing and paternity determination. Another critical area that merits further investigation is parentage testing. The complexities surrounding germ cell donation – including sperm and egg donation – are compounded by cultural, religious, and legal factors that significantly impact their acceptance and use. The lack of a comprehensive legal framework governing these practices creates challenges for both healthcare providers and individuals seeking these services, often leading patients to pursue options abroad. Future research should delve into the legal, ethical, and social dimensions of parentage testing in Lebanon, examining how existing cultural attitudes intersect with medical practices. Exploring this area would not only enhance our understanding of the broader implications of genetic testing but also promote the development of informed policies that can address the nuances of parentage, ultimately benefiting individuals facing such critical decisions in their reproductive journeys.

CONCLUSION

Our study highlights the need for a standardized legal framework to govern paternity testing in Lebanon. To address concerns surrounding DNA theft and the misuse of paternity test results, we propose a two-pronged approach: only a judge, in conjunction with the Ministry of Health and Ministry of Justice, should initiate paternity tests and direct the communication of results, while parents should submit to a judge for approval to choose the location of the paternity test. To ensure a secure and reliable testing environment, establishing a standardized consent form for genetic testing, imposing fines and sanctions on non-compliant laboratories, and providing healthcare professionals with education on the complexities of genetic testing are crucial. By implementing these measures, the aim would be to create a safe and trustworthy environment for individuals and their families, guarantee quality and reliability in DNA testing, and promote informed attitudes and practices among healthcare providers.

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Les recommandations des évaluateurs externes sont prises en considération de façon sérieuse par les éditeurs et les auteurs dans la préparation des manuscrits pour publication. Toutefois, être nommé comme évaluateurs n'indique pas nécessairement l'approbation de ce manuscrit. Les éditeurs de la *Revue canadienne de bioéthique* assument la responsabilité entière de l'acceptation finale et de la publication d'un article.

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ANNEX 1. PROJECT SUMMARY AND QUESTIONNAIRE

Ethical and Legal Considerations Surrounding Genetic and Paternity Testing in Lebanon

Introduction

Paternity testing involves the examination of DNA from two individuals to determine a genetic relationship, which may carry significant legal implications. This testing can clarify the biological relationship between a child and a parent, generally focusing on the father, since the mother's identity is typically known.

Study Objectives

The goal of this study is to collect information from laboratories about DNA testing for paternity and other genetic analyses. We seek to gain insights into the procedures utilized in genetic testing overall, with a specific focus on paternity testing. We believe that our findings will help enhance the development of laws and regulations governing paternity testing in Lebanon.

Participant Rights and Confidentiality

Participants have the right to withdraw their consent at any time and for any reason. Participation in this study is entirely voluntary; individuals may choose to decline or cease their involvement without needing to provide an explanation. Any data collected during the research will be processed confidentially and analyzed anonymously to protect participant privacy.

If you agree to participate in this study, we encourage you to respond to the following questions. Thank you for your contribution.

Questions about paternity testing

Question 1: Indicate the type of laboratory in which you work:

- ○ Private clinical laboratory
- ○ Hospital-affiliated clinical laboratory
- ○ Specialized laboratory for DNA analysis
- ○ University laboratory focused on genetic research
- ○ Forensic science or forensic medicine laboratory

Question 2: Please identify the most frequently requested indications for DNA analyses conducted in your laboratory: (Select all that apply)

- ○ Search for genetic diseases (hereditary diseases, chromosomal abnormalities, etc.)
- ○ Paternity test
- ○ Forensic research
- ○ Prenatal diagnosis

Question 3: Is paternity testing carried out in your Laboratory?

- ○ Yes
- ○ No

Question 4: Do you think that there is a law that regulates paternity testing in Lebanon?

- ○ Yes
- ○ No
- ○ I do not know

Question 5: Does a request for a paternity test always need to go through a judge?

- ○ Yes
- ○ No, except in the context of legal proceedings
- ○ I do not know

Question 6: Who decides which laboratory to use if a request for a paternity testing is submitted through a judge?

- ○ The judge
- ○ The parents

Question 7: If not, who usually requests the paternity test?

- The parent (father or mother) seeking to establish a parentage connection, following the submission of required supporting documents
- The child, if they are of legal age
- Extended family members (such as grandparents, uncles, aunts, etc.)
- Any individual can submit a request (including neighbors, friends, etc.)
- A geneticist
- Other

Question 8: What is (are) the reason (s) for requesting a paternity test at your laboratory? (Select all that apply)

- To establish the paternity of the alleged father
- To determine the identity of a child who was not registered at birth
- To request or terminate financial support from the presumed father (legal obligation to meet the child's needs, such as alimony, etc.)
- To obtain the right to carry the father's surname and inherit from him
- I do not know
- Other

Question 9: Is written consent obtained from all relevant individuals (father, mother, and child, if able to consent) before conducting a paternity test?

- Yes
- No
- I do not know

Question 10: Is it possible for an individual to request a paternity test analysis on a sample they possess from another person (such as a baby's pacifier, hair, blood, or bone) without the consent of the parents (the father, mother, and child, depending on the child's age)?

- Yes
- No
- I do not know

Questions about general DNA testing (Excluding paternity testing)

Question 11: Do you think that there is a law that regulates genetic testing in Lebanon?

- Yes
- No
- I do not know

Question 12: Before performing any genetic test, other than paternity testing, is informed consent obtained from the individual involved?

- Yes
- No
- I do not know

Question 13: If yes, what type of consent is it?

- Oral
- Written
- I do not know

Question 14: If not, what are the reasons that the informed consent of the individual involved was not obtained beforehand? (Select all that apply)

- Lack of time
- It is not mandatory in our laboratory
- other

Question 15: Is it possible for an individual to request a DNA analysis, excluding a paternity test, on a sample they possess (such as a baby's pacifier, hair, blood, or bone) without obtaining consent from the individual in question?

- Yes
- No
- I do not know

Question 16: Is genetic counseling provided to the patient prior to conducting a genetic test?
- ○ Yes
- ○ No
- ○ I do not know

Question 17: Prior to conducting a genetic test, is the patient made aware of the potential for incidental findings related to false paternity?
- ○ Yes
- ○ No

Question 18: Prior to conducting a genetic test, is the patient made aware of the potential for incidental findings related to genetic predisposition to a disease?
- ○ Yes
- ○ No

Question 19: If yes, do you inquire with the patient about their preference regarding being informed about any incidental findings?
- ○ Yes
- ○ No

Question 20: When communicating the results to the concerned person, are incidental findings revealed?
- ○ Yes
- ○ No

Question 21: Who receives the communicated results? (Select all that apply)
- ○ To the concerned person (s) only
- ○ To anyone who has the receipt of payment
- ○ To any person designated by the concerned person and after their consent
- ○ To the doctor, if following a consultation
- ○ To the judge, if following a trial

Question 22: In the absence of legislative procedure, what is the typical way to communicate the results to the relevant individual?
- ○ By telephone
- ○ By email
- ○ Face to face
- ○ According to the preference of the concerned person

Question 23: In the absence of legislative procedure, who is responsible for communicating the results to the concerned person?
- ○ Laboratory technician
- ○ Genetic counselor
- ○ Geneticist
- ○ Head of laboratory
- ○ Other

Question 24: Are the results disclosed in the presence of a psychologist?
- ○ Yes
- ○ No

Question 25: Are results disseminated when necessary to other health care professionals or other parties without the patient's consent?
- ○ Yes
- ○ No

Question 26: Is the extracted DNA usually destroyed or conserved after genetic testing?
- ○ Destroyed
- ○ Conserved without consent of the concerned person
- ○ Conserved after consent of the concerned person

Question 27: Is the stored DNA used in future research or genetic analysis?

- ○ Yes, without the consent of the concerned person
- ○ Yes, after consent of the concerned person
- ○ No

Question 28: Is the person's anonymity preserved when storing DNA and using it in future research or genetic analysis?

- ○ Yes
- ○ No
- ○ No unless the person agrees otherwise

Question 29: Please specify which information listed below is included in the consent form signed by the concerned person: (Select all that apply)

- ○ Nature and purpose of the genetic test or research
- ○ DNA collection procedure (nature of the biological sample and procedure)
- ○ Advantages and risks of the test o How the results are conveyed and the intended person for this communication.
- ○ Details regarding the potential for incidental findings and the individuals who may be impacted by the sharing of this information.
- ○ Future use of extracted DNA (including storage, destruction, and potential applications in research or genetic analysis).
- ○ Safeguarding personal information: ensuring confidentiality, anonymity, etc.