GOBIERNO DE ESPAÑA
MINISTERIO DE JUSTICIA

NATIONAL COMMISSION FOR THE FORENSIC USE OF DNA

Activities 2018-2019

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PRESENTATION

DNA analysis has gained a key role as a form of evidence in proceedings for courts of justice, in the investigation and prosecution of criminal procedures, in the identification of corpses or the investigation of missing persons, and in civil procedures to determine filiation, both paternal or maternal.

DNA´s growth in forensic use, coupled with the breakneck speed of its scientific development requires the National Commission for the Forensic use of the DNA to continuously study facts that come to light in the determination of genetic profiling. Also to confront new challenges brought about by the need to balance legal and scientific criteria with conflicting fundamental rights and legitimate interests, and in so doing, in responding ethically and legally to social demands and improve the public service of justice.

Thus, during the last two years, the Commission has not only complied with its annual functions, such as accreditation and quality control of laboratories and creation of scientific and technical recommendations, but also adopted, in the plenary session on 24 October 2019, a guide to the forensic use of DNA, the result of preparatory work done by the Legal and Bioethical group and the Permanent Technical Commission.

This guide, directed towards professionals in the department of justice (judges, magistrates, forensic doctors, professionals from institutes of toxicology or forensic science, security forces, among others), contains a list of good practices. Discussed via the different legal precepts that regulate its application, and presents the general points of a scientific basis for DNA testing, concluding with a recommendation centered on the need for new legal regulation that covers new DNA markers as well as granting legal certainty to the existing gaps in the law.

In light of the above, I am pleased to present the workings of the National Commission for the Forensic use of DNA which, as one can appreciate, have been intense and rigorous due to the nature of the themes discussed and result from undoubted selfless efforts and in-depth, thoughtful study of the experts and collaborators in its working groups, to whom I would like to extend my most sincere thanks and congratulations.

Madrid, 23 October 2020

PRESIDENT OF THE NATIONAL COMMISSION FOR THE FORENSIC USE OF DNA
Concepción López-Yuste Padial
General Director of the Public Justice Service

1. PLENARY SESSION FOR THE NATIONAL COMMISSION FOR THE FORENSIC USE OF DNA (CNUFADN)

1.1 MEMBERS (2018-2019)

The members of the National Commission for the Forensic Use of DNA (UNCDF) who attended the Plenary Sessions in 2018 (20/09/2018) and 2019 (24/10/2019) were the following:

UNCDF Plenary Meeting for the year 2018.

PRESIDENT:
Miss. Esmeralda Rasillo López (General Director for Relations with the Justice Administration).

VICE PRESIDENTS:
Mr. Antonio Gómez García (Director of the National Toxicology Institute and Forensic Sciences).

SPOKE PERSONS:
Mr. Ignacio José Fernández Soto (Magistrate. Advisor. General Direction for Relations with the Justice Administration).
Miss. Patricia Rodríguez Lastras (Prosecutor. Advisor. General Direction of Relation with the Justice Administration).
Mr. Guillermo García-Panasco Morales (Lieutenant Public Prosecutor of the Technical Secretariat of the Attorney General's Office).
Miss. Gemma Barroso Villarreal (Head of the Central Scientific Analysis Unit - Scientific Police Headquarters).
Mr. Pedro Sogo Sánchez (Head of the Analytical Coordination Service - General Office of the Scientific Police).
Mr. Nicomedes Expósito Márquez (Lieutenant Colonel Head of the Identification and Crime Scene Section of the Guardia Civil)
Mr. Víctor José Esteban Ramos (Commander of the Guardia Civil. Criminalistics Service).
Mr. Joseba Mirena Urrutia (Chief Commissioner of the Scientific Police Ertaintza).
Mr. Jokin Alfageme García (Head of Operational and Technical Management Scientific Police Ertzaintza).
Mr. Javier Bueno Ocáriz (Head of the Forensic Police Unit of the Navarra Police Force).
Mr. Daniel Martínez Ortega (Deputy Head of the Mossos d'Esquadra Forensic Division).
Miss. Carmen Conejero Guillén (Forensic Doctor of the Toxicological Information Service of the National Institute of Toxicology and Forensic Sciences).
Mr. José Antonio Lorente Acosta (Laboratory Director of Genetic Identification, Granada University)
Miss. Pilar Madero Barrajón (Expert in genetics designated by the Minister of Economy and Competitivity).
Miss. María Casado González (Bioethical Observatory UB).

SECRETARY:
Mr. Antonio Alonso Alonso (Faculty member of the Biology Service of the Madrid Department of the National Institute of Toxicology and Forensic Sciences).

VISITORS:
Mr. Fernando Martínez López (General Director of Historical Memory).
Mr. Eduardo Ranz Alonso (Advisory member of the Cabinet of the Minister of Justice).
Miss. Judith González Pedraz (Subdirector - General Subdirectorate for the Organisation and Territorial Coordination of the Administration of Justice).
Miss. Marta Grijalba Mazo (Forensic Doctor. Advisor. Directorate-General for Relations with the Administration of Justice).

CNUFADN Plenary meeting corresponding to 2019.

PRESIDENT:
Miss. Esmeralda Rasillo López (General Director for Relations with the Administration of Justice).

VICE PRESIDENTE:
Mr. Antonio Alonso Alonso (Director from the National Institute of Toxicology and Forensic Sciences).

SPOKEPERSONS:
Mr. Ignacio José Fernández Soto (Magistrate. Advisor. General Direction of Relations with the Justice Administration).
Miss. Yolanda Gutiérrez García (Public prosecutor. Consultant. Directorate General for Relations with the Administration of Justice).
Mr. Rafael Carlos de Vega Irañeta (Public Prosecutor's Office -Technical Secretary-).
Mr. Pedro Mélida Lledó (General Commissioner of the Scientific Police. National Police Force).
Mr. Pedro Sogo Sánchez (Head of the Analytical Coordination Service - General Office of the Scientific Police. National Police Force).
Mr. José Luis Herráez Martín (Colonel of the Guardia Civil, Head of the Criminalistic Service of the Guardia Civil).
Mr. José Juan Fernández Serrano (Commander of the Guardia Civil. Civil Guard Criminalistics Service).
Mr. Miguel Ángel García Alvira (Major, Head of the Scientific Police Division Mossos d'Esquadra).
Mr. Alejandro Barros Manuel (Scientific Police Division Mossos d'Esquadra).
Mr. Jokin Alfageme García (Head of Operational and Technical Management, Policía Científica Ertzaintza).
Mr. Torcuato Muñoz Serrano (Commissioner, Scientific Police of the Foral Police Force of Navarre).

Miss. Lydia Feito Grande (University Complutense of Madrid, expert in bioethics appointed by the Minister of Justice).
Mr. José Antonio Lorente Acosta (Director of the Genetic Identification Laboratory. University of Granada).
Miss. Pilar Madero Barrajón (Expert in clinical and forensic genetics appointed by the Minister of Economy and Competitiveness).
Mr. José Luis Miguel Pedrero (Forensic Doctor of the Toxicological Information Service of the National Institute of Toxicology and Forensic Sciences).

SECRETARY:
Mr. Manuel Crespillo Márquez (Head of the Biology Service of the Barcelona Department of the National Institute of Toxicology and Forensic Sciences).

VISITORS:
Mr. Eusebio López Reyes (State Secretariat for Security. National DNA Database Administrator).
Miss. Mª Cristina Santaolalla López (Territorial Organisation and Coordination Sub-Directorate. Ministry of Justice).

1.2 ACTIVITIES AND AGREEMENTS

During the last two years, the CNUFADN has continued with one of its fundamental functions, as recommended by Organic law 10/2007, dated 8 October, which regulates the police database´s use of identifications made through DNA. Article 5 of the law specifies means of accreditation for all laboratories performing DNA analyses and contributing genetic profiles to the police database through DNA-based identifiers. Following these requirements, only laboratories approved by the CNUFADN, which also agree to submit to regular quality checks, will be allowed to perform DNA analysis for genetic identification in the cases covered by this specific law.

Both in 2018 (Annex I) and in 2019 (Annex II), the CNUFADN approved lists of accredited laboratories on the proposal of the Permanent technical Commission (CTP) and after the review of annual documentation presented by this country´s genetic forensics laboratories relating to quality assurance and accreditation. These lists have been published on the CNUFADN website and communicated to the Public Prosecutor's Office and the Judiciary General Counsel.

In 2018, Mr. Fernando Martínez López, Director of Historical Memory from the Ministry of Justice stood before the Plenary of the CNUFADN and stated the strong will of the Ministry of Justice to put the historical memory plan into action, in collaboration with Autonomous Communities, Town Halls, and Provincial Councils. The plan would consist of actions and policies in the field of historical memory, including the creation of an up-to-date map of graves, and the exhumation and identification of the Civil War victims and dictatorship.

Accordingly, in 2018, the first meeting in the matter of historical memory took place and the need for a census of war victims was agreed upon unanimously. A proposal has been made to create a set-owned DNA bank to facilitate the identification of disappeared persons once their remains have been exhumed, work which has already begun in regions such as Andalusia, Catalonia, Euskadi, and Navarra.

In the same vein, and to fulfill another important task that the CNUFADN is entrusted within its role of ensuring the quality and credibility of the DNA tests in Spain, on 23 May 2018, a meeting took place in Madrid attended by representatives from official DNA laboratories involved in the identification of war victims of various regions more specifically Andalusia, Basque Country, Navarra, Catalonia. The aim of the meeting was to coordinate and look at various technical aspects with the objective of broadening the discussion of scientific and technical matters, thus ensuring the quality and trustworthiness of studies in the genetics of Spanish Civil War victims. To this end, there is a clear need for the creation of a national database of historical memory, participated by various regions, and independent from the national database of genetic profiles (Organic Law 10/2007, of 8 October, regulating the police database on identifiers obtained from DNA).

Elsewhere, in 2018 a meeting was held by the Plenary, of the European directive (2016/680) from 27 April 2016 discussing the protection of persons about the handling of personal data by relevant authorities when preventing, investigating, detecting, or judging criminal offenses, and the free movement of such data, thus repealing the Framework Decision 2008/977/JAI from Counsel. The directive discussed sensitive issues such as:

- Restrictions on the collection and processing of personal data
- High-levels of security of the stored data and in its transmission internationally.
- Differentiated treatments of different categories of interested parties (condemned, suspect, victim, witness, collaborator…) (specific informed consents, different sample categories of BD).
- Conservation and suppression of samples and DNA profiles
- Minimizing the potential for racial bias.

2019 was a successful year for the CNUFADN and a number of relevant and important documents were approved due to their content or the relevance of such.

With the aim of fulfilling another function of the CNUFADN with the regard to the establishment of criteria for coordination criteria between state laboratories in genetics forensics, and in all related scientifical, technical, organizational, ethical, and legal aspects which guarantee the smooth functioning of laboratories included in the police database of DNA-obtained identifications, various documents, previously drawn up and discussed among the CNUFADN, the CTP and ethical-juridic groups, were presented so that they could be considered and approved by the Plenary. These are detailed below:

Firstly, to further the interest of the Ministry Justice in its intention to implement the Historical Memory Act, and to complement this, the CTP drew up a document whose principal objective was the establishment of a set of general recommendations to ensure the quality and reliability of the study of the Spanish Civil War victim´s remains. These recommendations cover the collection of DNA profiles from exhumed remains, the collection of DNA from family members, searches of DNA databases approved for forensic use, the interpretation of findings, and the communication of identifications made. The recommendations specify standards of scientific and technical as well as the technological and operational infrastructure necessary for the different phases of genetic identification. All of this is aimed in coordinating the different initiatives currently proceeding and being developed by different regions for the identification of corpse remains. The aim is to develop a network of forensic genetics laboratories with identical performance criteria (scientific standards of analysis and interpretation) and a common DNA profile repository (national DNA database of Historical Memory). The document titled *Recommendations on genetic identification studies of the Civil War victims* addresses the following aspects (Annex III):

- The selection criteria and collection of familial reference samples as well as the development of informed consent forms.
- Criteria for the selection and collection of bone samples in corpse exhumations.
- The use of genetic markers and available technologies (markers of DNA: STR, Y-STR, X-STR, mtDNA, ancestry SNPs, and phenotypic SNPs,…).
- Requirements relating to laboratory accreditation (ISO 17025).
- Forensically validated DNA database search and registration procedures (secure network exchange, identity searches, family tree searches using different inheritance searches, simultaneous statistical analysis system, match and compatibility management, and documentation systems, ...).
- Aspects concerning the criteria for interpretation and communication of compatibility of eventual identifications (as recommended by the *International Society for Forensic Genetics* —ISFG—).

With this in mind, in 2019 and in the face of a surge in new technologies which improved the potential for genetic analysis to identify humans, the Plenary of the CNUFADN endorsed a report and recommendations from the *CTP on new technologies in genetic analysis and new DNA markers of biogeographical origin and external phenotypic traits* (Annex IV). Said report covers relevant aspects such as:

- Single nucleotide polymorphisms (SNPs) and their potential as genetic identification tools.
- The use of new technologies based on massively parallel sequencing in Forensic Genetics.

- The use of DNA studies and the possibility of establishing the ancestry of certain genetic profiles.
- The DNA analysis and the potential to define certain phenotypic character traits (Forensic DNA Phenotyping —FDP— of External Visible Characteristics -EVC-)
- Coding and non-coding DNA regions.
- Recommendations for the use of new markers and new technologies of DNA.

Noteworthy were the efforts of the members of the CNUFADN in looking for a maximum standardization in documents pertaining to relevant aspects of genetic testing, and accordingly in 2019 documents were approved relating to informed consent for the taking of **known** samples from defendants, the accused, or victims in a criminal investigation. These documents were published on the CNUFADN website and were the result of intense effort in coordination and discussion among the legal-ethical group from the CNUFADN. Following the approval of the forms by the CNUFADN Plenary, those designed for use in Legal Medicine Institutes were, for the record, distributed among these Institutes. The approved forms are the following:

- Form/act of taking biological samples from investigated/defendants with informed consent in a criminal investigation (Annex V).
- Form/act of taking biological samples from a victim with informed consent in a criminal investigation (Annex VI).
- Form/act of taking biological samples from investigators/defendants with informed consent in a criminal investigation (for use in Forensic Medicine Institutes) (Annex VII).
- Form/act of taking biological samples from victims with informed consent in a criminal investigation (for use in Forensic Medicine Institutes) (Annex VIII).

In 2019, The Plenary of the CNUFADN approved one of its most significant documents due to its practical utility and it was directed in particular towards judges and magistrates. This was the *Guide to the forensic use of DNA*. (https://www.mjusticia.gob.es/es/AreaTematica/DocumentacionPublicaciones/InstListDownload/Guide_to_the_Forensic_use_of_DNA.PDF).

The guide was produced in the setting of the bioethics legal group and was late debated in the CTP, and resulting from that work it saw the light of day and now strives to be an important piece of reference literature for those working in the legal field, facilitating their understanding about the use of the genetic sampling, as its interpretation, and use in law. The guide includes a complete and practical index for the process of the genetic sampling, including links related to national and international regulations that make it very interactive. At the same time, it includes an explanatory glossary to some key terms used in the guide. The guide´s content it´s divided into:

- Introduction.
- Purpose of the guide.
- Regulation.

- Collection of the sample.
- DNA analysis (accredited laboratories, genetic markers, its use, post-custody conservation, and destruction of the samples).
- DNA databases (records and databases, incorporation, transfer, and cancelation of data).
- Other registers of criminal interest.
- The DNA utility as means of evidence (interpretation standards, evaluation of the test in the civil and criminal fields).
- New technologies.
- Glossary terms.
- Annexes:
  – Annex I includes consent forms for defendants and victims in criminal procedures with multiple victims or in the theft of newborns.
  – Annex II (recommendations by the legal and bioethics group on the use of new DNA markers)
  – Annex III (relevant judicial decisions).

2. PERMANENT TECHNICAL COMMISSION (CTP)

2.1 MEMBERS ASSISTING TO THE MEETINGS (2018-2019)

The delegates from the official laboratories represented in the Permanent Technical Commission (CTP) did during 2018 a work meeting on-site in the headquarters of the National Institute of Toxicology from las Rozas ended with the approval of the minutes on 21/06/2018. In the headquarters during 2019, the CTP had two meetings generating the minutes approved on 25/06/2019 and 19/07/2019.

GENERAL COMMISSARIAT OF SCIENTIFIC POLICE

DNA Laboratory of the General Commissariat for Scientific Police
– Ms. Elena Rivas San Martín
– Mr. Emilio García Poveda
– Ms. Isabel Martínez

GUARDIA CIVIL

Central Criminalistics Laboratory of the Guardia Civil:
– Mr. Víctor Esteban
– Mr. Miguel Ángel García
– Mr. Carlos Cubría
– Mr. Juan Luis Martín Martín
– Mr. José Juan Fernández Serrano

– Ms. Mª Ángeles Olaya

MOSSOS D´ESQUADRA

Scientific Police Division of the Mossos d'Esquadra (Catalan Autonomous Police)
– Ms. Ana Donate
– Mr. Alejandro Barros Manuel

ERTZAINTZA

Ertzaintza Forensic Science Police Unit
– Mr. Oscar García Fernández

NATIONAL INSTITUTE OF TOXICOLOGY AND FORENSIC SCIENCES

– Mr. Antonio Alonso Alonso (Secretary-2018-) (President of the CTP since May 2019)
– Mr. Manuel Crespillo (Secretary of the CTP since May 2019)

FORAL POLICE OF NAVARRA

Foral Police - Nasertic
– Mr. Javier de Miguel Zurbano
– Ms. Mariola Elia López
– Ms. Susana Pedrosa

2.2 ACTIVITIES (2018-2019)

2.2.1 ACCREDITATION OF LABORATORIES

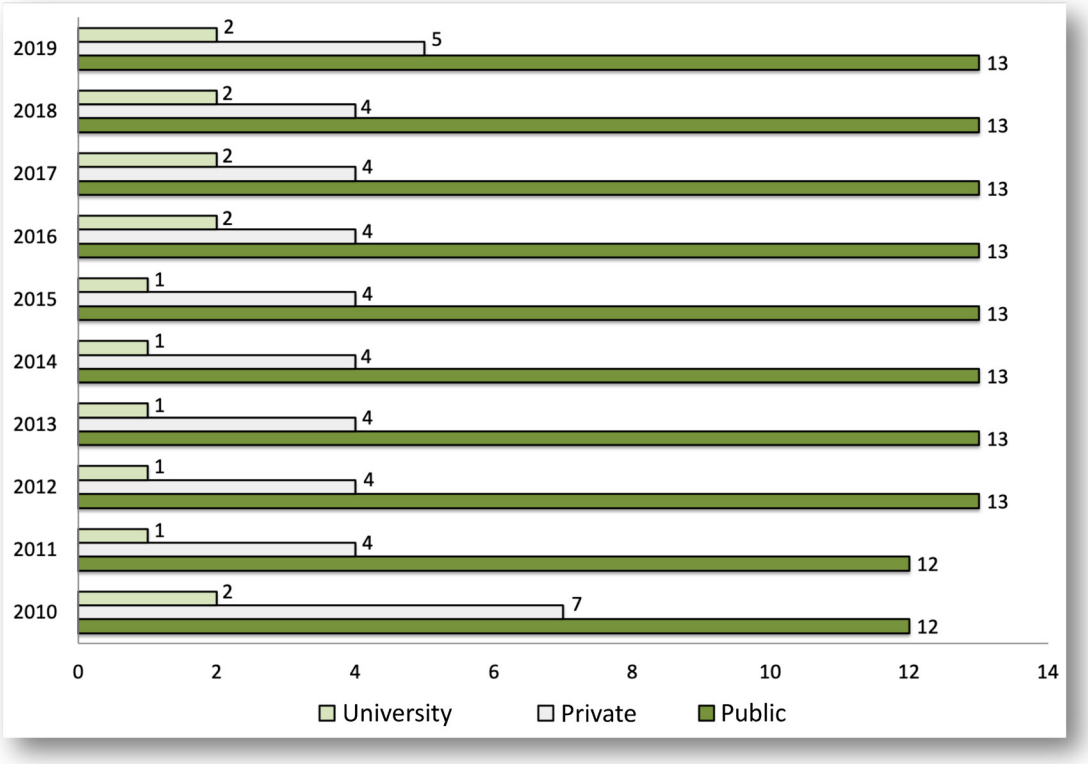
In 2018, the evaluation of the documentation in terms of quality and accreditation was received from 20 laboratories where the obtained results from the different laboratories in the external controls from GHEP-ISFG and GEDNAP from 2017, like the state of accreditation of the laboratories under ISO 17025, were analyzed. The evaluation from the 20 laboratories ended with the results regarding their accreditation status as set out in Annex I.

In 2019, the evaluation of the documentation received from 22 laboratories was done where the results obtained by in different external quality controls from GHEP-ISFG and GEDNAP of 2018, as well as the state of accreditation of the laboratories under ISO 17025, were analyzed. The evaluation from the 22 laboratories ended with the results regarding their accreditation status as set out in Annex II.

The accredited laboratories are divided into three principal types: public laboratories and officials that belong to Security Bodies and Forces and Institutions dependent on the Ministry of Justice, the second type; private laboratories, and from the university. The scope of activity of these laboratories is varied. Ranging from exclusive accreditation for paternity testing to other laboratories that include in their scope criminal investigation,

biological paternity research, investigation of missing persons, and inclusion of profiles in the national DNA database.

The laboratory evolution of accredited laboratories in Spain has maintained stability since 2012, although with few annual fluctuations as shown in the graph below.



Graph 1: Historical evolution (2010-2019) from Spanish accredited laboratories.

2.2.2 INFORMATION RELATED TO DIVERSE PROJECTS OF INTEREST IN THE FIELD OF FORENSIC GENETICS

During 2018, important information was debated with the members from CTP about different themes. Among them, the content from the document *The regulatory landscape of Forensic DNA Phenotyping (FDP) in Europe*, which includes an analysis of legal framework of FDP technology in the 8 European countries which belong to VISAGE consortium ((Visible Attributes Through Genomics) http://cordis.europa.eu/project/rcn/210214_es.html).

The document served to remember that although our country has already had different investigations of this type authorized by the courts (p.ej. Eva Blanco case and 11M case), it is necessary to modify the regulation because sometimes they resort to an analysis from the coding regions and markers of DNA

They also were informed to the CTP members of the international project DNASEQEX (*STR Massive Sequencing and International Exchange*) https://www.researchgate.net/project/DNASEQEX in which laboratories from different countries participated, Spain between them (INTCF). This work supposes an extraordinary advance inside the forensics genetic field and that promises to equip laboratories with genetic resources of great use to identify humans. One of the project results was the article: *Current state of the art of STR sequencing in forensic genetics,* debated in the CTP. This document includes updated information on commercial massively sequencing systems for STR analysis, the software tools developed for sequence analysis, as well as the various validation studies carried out to date. They include also the recommendations from the *International Society for Forensic Genetics* (ISFG) about nomenclatures, diverse international projects to guarantee standardization, and the implementation of technology in forensics.

In 2018 the Spanish version advanced of the document *Making Sense Of Forensic Genetics* http://senseaboutscience.org/activities/making-sense-of-forensic-genetics/ which was already published in its original version in English in 2017. The translation service of the Ministry of Justice as well as a group of experts in forensics genetics participated in the translation to the Spanish version. Proofreading, editing, and publication has been entirely subsidized by the ISFG.

2.2.3 DRAFTING OF THE RECOMMENDATIONS

In 2019, the CTP worked on the drafting of two important documents.

The first one *Recommendations on genetic identification studies of the Civil War victims* (Annex III), the principal objective is to contribute to ensuring the quality and credibility of the genetic identification studies of the victims of the Spanish Civil War. The coordination among the various laboratories in the Autonomous Communities that carry out these activities is fundamental and absolutely necessary.

The document approaches standardized criteria related to strictly technical aspects, among which are the procedures for the selection of samples to be analysed for the identification of exhumed victims (skeletal and dental remains) and samples of relatives of the missing persons, recommendations with regard to the use of DNA genetic markers, available technology, and criteria for the interpretation of results. The recommendations issued also mention technological needs that must be met to make the project fully operational, aimed at the creation and management of a national DNA database of historical memory.

Lastly, the biggest difficulty these analyses face is due to the high degradation state and the small number of DNA copies, which makes it particularly advisable that they be carried out by forensic genetics laboratories with validated procedures for the genetic analysis of bone and dental remains. It is recommended to the laboratories that are accredited under the standard EN ISO/IEC 17.025 by the National accreditation entity (ENAC), and it

becomes necessary to create a DNA laboratory network of Historical Memory that promotes the coordination of the forensic genetics laboratories of the different Autonomous Communities.

Latest advances in new technologies such as (*MPS, Massive Parallel Sequencing*) have given an additional boost to the field of forensic genetics which has increased the capabilities of genetic analysis for identification, enabling both ancestry and biogeographical studies, as well as to determine some phenotype characteristics (skin color, eye, and hair color) (phenotypic trait SNPs). A growing number of laboratories are starting to use these new technologies. For this reason, the CTP considered that it would be helpful to draft a document to include a *report and recommendations about new technologies of genetic analysis and new DNA markers of biogeographical and phenotypic external features* (Annex IV). In them, several different aspects are developed with some answers and reflections. These include the description of the molecular targets which are the focus of these studies (*single nucleotide polymorphism* —SNP—), as well as the technological tools employed (massive parallel sequencing) and how DNA enable us to see the ancestry of a genetic profile. The document also looks at the phenotypic characteristics that can be inferred with these new technologies, and with what limitations, how far one can go with this approach, and what can be achieved by using coding and non-coding regions in genetic analysis for forensic purposes. The document concludes with some recommendations that highlight the support by part of the international scientific community for the use of ancestry and phenotypes markers pointing out the need of the international laboratories that have started with this technology to comply with quality standards and authenticity of the results (method validation, laboratory accreditation to ISO 17025, and the participation in proficiency exercises). The recommendations conclude with a particularly important aspect: emphasising the need for legal regulation to ensure that this investigative tool is used in such a way a way that it protects individual rights.

3. THE BIOETHICAL AND LEGAL GROUP (GJB)

3.1 MEMBERS ASSISTING TO THE MEETINGS (2019)

The members of the Legal and Bioethics Group who attended the working meetings in 2019 (5 February, 12 March and 29 May) were as follows:

Permanent members:
Mr. Ignacio José Fernández Soto (Magistrate, coordinator)
Ms. Yolanda Gutiérrez García (Magistrate)
Ms. María Casado González (Bioethical expert)

Representants CNUFADN:
Mr. Antonio Alonso Alonso (National Institute of Toxicology, Secretary CNUFADN, and CTP)

Ms. Carmen Conejero Guillén (Forensic Doctor)
Mr. Juan Manuel Fernández Martínez (General Council of the Judiciary)
Mr. Rafael de Vega Irañeta (State Prosecutor's Office)
Ms. Susana Álvarez de Neyra (Advisor)
Mr. José Antonio Lorente Acosta (Expert, University Granada)
Mr. Joseba Urrutia Elourdui (Ertzaintza)
Mr. Jokin Alfageme García (Ertzaintza)
Mr. Óscar García Fernández (Ertzaintza)
Mr. José Juan Fernández Serrano (Guardia Civil)
Mr. Aquilino Serrano (Guardia Civil)
Mr. Javier García (Guardia Civil)
Mr. Juan José Martínez Sánchez (Guardia Civil)
Mr. Gema Barroso Villarreal (National Police)
Mr. Emilio García Poveda (National Police)
Ms. Elena Rivas San Martín (National Police)
Ms. Isabel Martínez de Córdova (National Police)
Mr. Javier Bueno Ocáriz (Foral Navarra Police)
Ms. Carlota Gómez Latre (Mossos d'Esquadra)

Advisors:
Mr. Juan Carlos Álvarez Merino
Ms. Susana Álvarez de Neyra

3.2 ACTIVITIES (2018-2019)

After the plenary meeting in September 2018, it was decided to resume the studies related to drawing up informed consent forms for the collection of DNA samples by the various security forces and the drafting of a guide for the forensic use of DNA intended primarily for judges and prosecutors, which was agreed by the plenary session of the National Commission on 25 July 2017. It was also agreed that the Legal and Bioethics Group would analyse the problems related to the new DNA markers and the needs arising from DNA analysis related to historical memory. In both cases to support the work of the Permanent Technical Commission.

Four working groups were set up to address these tasks. All the board members of the Commission were called to join the working groups of their choice, given that in addition to the officially appointed members of the Legal, and Bioethics Group (a senior judge, prosecutor, and bioethics expert), any members of the Commission may join the group. All those listed in section 3.1 participated in at least some of the meetings held in 2019, either as members, as collaborators with the institution, or external advisors.

The contacts were by email with proposals for works and exchange of information. The group of new markers held a meeting on 5 February 2019. On 12 March, a further

meeting was held to deal with the themes of the four working groups, and 29 May the group met to discuss the guide of the forensic use of DNA.

3.2.1 INFORMED CONSENT FORMS

In 2016 and 2017, the informed consent forms developed by the security forces for DNA sampling from crime victims were validated. It was not possible to reach a consensus on a single standard form to be used by all of the security forces.

The working group's purpose was to achieve uniform models in terms of content and differentiated by the format and specific references of each police force. To update the existing forms to the legislation in force and extend the work to the consent forms for defendants.

Firstly, all forms used by security forces were collected, including a document from the Ertzaintza (Autonomous Police Force in the Basque Country) that listed the differences between all the different forms. A document drafted in 2017 was used by the then coordinator of the legal-bioethical group, Carmen Rodríguez Medel, highlighting these differences:

The coordinator updated and consolidated these forms, previously validated by the Commission, to summarise the common elements, choose the functional format, delete redundancies or unnecessary material and update the citations of legislation. The documentation was distributed to the members of the working groups, who made appropriate suggestions. Finally, at the meeting on 12 March 2019, the content of the forms was intensely debated and contributions were made to said documents for their approval by the plenary session of the National Commission for the forensic use of DNA.

After the meeting, the need was identified for the Legal Medicine Institutes to have their own DNA sample collection consent forms, as it was not infrequent that sample collection from the victims or accused are done by the medical examiner in a criminal investigation that is already in progress. Those samples presented problems because, as there was no informed consent, this led to questions in the laboratories about the way the sample was going to be taken (with a court order) and the purposes for which they were taken, especially when it came to inputting the profiles in the police DNA database. For this purpose, the coordinator, based on the agreed standard forms, made the necessary amendments to the forms for use by the Institutes of forensic medicine.

These forms were submitted to the plenary session held on 24 October 2019, where, with the amendments made during the debate, they were approved, giving rise to the documents contained in the annexes to the report.

3.2.2 GUIDE FOR THE FORENSIC USE OF DNA

The development of a guide on the forensic use of DNA was an initiative of the Legal and Bioethical Group at its meeting on 27 June 2017 and was taken up by the 2017 Commission Plenary.

The first works were carried out in 2017 and during the first half of 2018, by the then Commission Secretary Mr. Antonio Alonso Alonso and the coordinator of the Bioethical-legal group Ms. Carmen Rodríguez Medel, which resulted in a draft with the structure of the future guide and some scientific sections that were well developed. After the plenary session of 2018, the work was again moved forward by creating a sub-working group with a system similar to the one adopted for developing the informed consent forms, starting with the sharing of the document and the receipt of suggestions on the content.

In 2019, the drafting of the scientific part of the guide was continued by Mr. Antonio Alonso Alonso. Ms. Yolanda Gutiérrez and Mr. Ignacio Fernández Soto drafted the legal part. Finally, there was a complete text without annexes and before giving it to the board members, it underwent an examination by the Legal and bioethical group on the 12 March, where proposals were made with regard to:

- The sequence of the chapters.
- The need to update it in line with Spanish and European legislation.
- The non-inclusion of the prosecutor's instructions in the regulations, but in a separate section, as they are not regulations as such.
- That the basic regulations could be included in annexes, to make the guide more useful without overloading the text.
- In a similar vein, the need to include relevant case law with a concise analysis, in addition to the reference, which could be moved to the annexes.

Also, there was a discussion about the length of the guide; it was decided that the explanatory core should be of an appropriate length to facilitate the overall understanding of what DNA forensics involves.

With these indications, the guide drafting work resumed and further suggestions were contributed with a view to their approval in a meeting scheduled for 29 May 2019.

On the meeting held on 29 May, it was decided to include a glossary of terms and the need was confirmed to draft an appendix with citations of case law. The proposed draft of the guide was then revised page by page, making numerous amendments to the content, terminology, paragraph orders, the title of some chapters, etc.

After the meeting, all of the approved suggestions were inserted and work started on drafting the case law annex, with an exhaustive search in the CENDOJ database, and case law from the Spanish Supreme Court, Provincial Courts, and National Court (National Audience Court). To carry out this task, the compilers relied on previous compilations from the State Attorney General's Office about DNA jurisprudence and they received assistance from several advisors in the Directorate General of Relations with the Department of Justice, under the direction of the Bioethical and Legal Group. Finally, two judgements of the European Court of Human Rights and the Constitutional Court were added.

The guide with the amendments was circulated again among the members of the working group. As a result of the different opinions and suggestions they proceeded, without changing the content approved on 29 May, to an exhaustive text review to make the style more consistent, so that the length of each section would be proportionate to the rest.

The resulting final text was sent to the Permanent Technical Commission for the technical review. The commission made several comments and suggestions that were incorporated into the text for its final approval by the Plenary Session of the National Commission.

The guide was approved in the plenary on 24 October, after a discussion regarding some content that resulted in several corrections. The coordinators were entrusted with the publishing and dissemination of the guide.

The purpose of the guide is to facilitate the knowledge of the forensic use of DNA for professionals at the Department of Justice, not only judges and prosecutors but also lawyers, pathologists and medical examiners, staff of the INTCF, and the security forces, offering an introduction to the legal precepts, scientific standards, and good practices through the different phases of the process. The guide features a preface, introduction, and list of the applicable regulations and then the chapters which follow a logical sequence. Chapter one deals with the problems of sample collection. This is followed by chapters on DNA analysis, DNA files, databases, and other DNA records, a section on the usefulness of DNA analysis as a means of evidence, and a final chapter on new technologies for genetic analysis. The guide ends with a glossary and annexes, which include the sample collection forms approved in the plenary in October 2019, those of relatives in multiple-victim incidents, and those for the collection of samples for genetic profiling about those affected by the abduction of newborns (Annex I); the recommendations of the legal and bioethics group on the use of the new DNA markers (Annex II) and relevant judicial pronouncements, including rulings of the European Court of Human Rights, the Spanish Constitutional Court, the Spanish Supreme Court (second chamber), and Provincial Courts (Annex III).

3.2.3 RECOMMENDATIONS ON NEW DNA MARKERS

The work on the recommendation on new markers started with the work prepared by the Permanent Technical Commission. At the meeting on 5 February 2019, the Secretary of the Commission reported on the content of the work, giving rise to a discussion about the investigation with new markers and genealogical databases.

The insufficient current legislation in this field is such that legal regulation is advisable that would take these conclusions into account:

1º The distinction between coding/non-coding DNA for investigation methods is not consistent with the current state of the technique. Coding DNA permits access to external

characteristics of the subject, and can be investigated because they do not affect the individual's right to privacy, but rather to external features.

2º A new regulation should deal more with the identification purposes rather than the type of DNA under analysis, looking only at the relevant markers for personal identification, their sex, physical features, and ancestry.

3º The investigation should be limited to cases where there have been no database hits and no evidence against certain persons, so there is no way to continue with the criminal investigation.

4º It should be limited to offenses of a certain severity and art. 3.1 a) of LO 10/2007 could be a criterion, or a more restrictive one.

5º A warrant or court order should be required to investigate these markers as a guarantee of all the interests at stake.

6º The legislation should determine the physical characteristics which can be investigated, excluding those that are sensitive, to prevent conduct that could incite hartred or discrimination. The warrant should be concrete, weighing which of these characteristics are to be analyzed in the specific case depending on the nature of the facts and the needs of the investigation.

7º The processing of phenotypic data obtained with these techniques should be prohibited and the deletion of the file should be regulated once the research purposes have been completed. It is not necessary to create a specific database. The use of the data should be limited to investigations in progress and confidentiality should be guaranteed, to prevent the dissemination raising suspicions about ethnic or family groups as a consequence of the profile characteristics of the suspect as a result of these techniques.

Their need was also discussed to regulate the protection of personal data from genealogical databases, access to such databases, and the possibility that police authorities could access it to investigate profiles. Under spanish law, police access to such databases is problematic and the way the sample was taken is dubious, especially when the individual in question did not consent to the sample being used for any purpose other than family tracing and ancestry analysis.

It was agreed that Ms. Susana Álvarez de Neyra should prepare the draft document. Developing the content of the recommendations in the Permanent Technical Commission report with the contributions done in the deliberations. The final document, with 13 concrete points, comprising the conclusions, was passed on to the Permanent Technical Commission for its appraisal and conclusions for its final approval.

The full recommendations document was included as Annex II to the guide to the forensic use of DNA.

3.2.4 RECOMMENDATIONS ON THE GENETIC IDENTIFICATION STUDIES OF SPANISH CIVIL WAR VICTIMS

In the meeting of the bioethical-legal group held on 12 March, Mr. Antonio Alonso, Secretary of the Commission, presented the content of the work in the Permanent Technical Commission having regard to the studies and genetic identification of the victims of the Spanish Civil War. The report was attached to the call which was originally made by the 2018 National Commission Plenary for the establishment of appropriate scientific standards and the development of a national DNA database. The CTP also prepared a draft informed consent form, which was submitted for approval.

The attendees agreed with the opinion of the Permanent Technical Commission on the creation of a national database which integrates the profiles incorporated separately, so far, by the Autonomous Communities, which would be accessible to the investigators in cases where evidence show that they could be those of Spanish Civil War victims. The problem of the impossibility of using CODIS because it is only authorised by the US authorities for criminal investigations was also raised.

After an exchange of information about the way to create a family record and the guiding principle of reparation that the process must follow, the discussion moved on to informed consent. It was proposed that the expression “person with modified legal capacity”, should be replaced by “disabled person”. There will be cases where there is no court decision but there is an obvious disability situation and a de facto legal guardian. It also was proposed that at the beginning of the document, where “FAMILY DATA” are mentioned, “DONOR FAMILY DETAILS” should be added.

The need was also noted for the form to include not only INTCF accredited laboratories but also laboratories in Spain’s Autonomous Communities that carry out analyses and that will be part of the network of laboratories involved.

In these terms, the form was considered fit for purpose.

They ended with a suggestion to improve the genealogical trees of the form, contributing to the ones used in Andalusia.

All the group suggestions were noted to be considered in the following meeting of the Permanent Technical Commission that will continue to work on this document.

ANNEX I: RELATION OF THE LABORATORIES THAT COMPLY WITH THE AGREEMENT OF THE NATIONAL COMMISSION FOR THE DNA FORENSIC USE (CNUFADN) ABOUT ACCREDITATION AND QUALITY CONTROL OF THE LABORATORIES (2018)

The Permanent Technical Commission (CTP) managed the ninth annual request of documentation in terms of quality and accreditation, giving compliance in the:

- Article 8 ROYAL DECREE 1977/2008 regulating the procedure for the evaluation of DNA analysis laboratories.
- The Agreement from the CNUFADN about accreditation and quality control of laboratories approved in the Plenary from the CNUFADN dated 21/07/2009.
- The FRAMEWORK DECISION 2009/905/JAI FROM THE EUROPEAN COUNSEL about the accreditation of forensic service providers carrying out laboratory activities.

In the annual survey, they solicited the laboratory identification data, the application areas, the official quality control certificates from 2017, and the accreditation state by ENAC to the genetic forensic laboratories which provide service in Spain in respect to the agreement of the CNUFADN about accreditation and quality control.

Documentation from 20 laboratories was received, evaluated by the CTP in a monographic meeting. All the obtained results by different laboratories in the quality controls external from 2017 as well as the accreditation state by ENAC to ISO 17025, were analyzed.

After the study of the documentation presented by the laboratories, the conclusion is that 19 laboratories comply with the CNUFADN agreement because in addition to participating at the official controls from GHEP or GEDNAP they have a valid ENAC accreditation certification.

This Permanent Technical Commission has decided to submit for approval to the Plenary of the National Commission for the forensic use of DNA, the annual relation of laboratories that comply with the Agreement of the CNUFADN about accreditation, quality control, and emit a certificate demonstrating the compliance to each of the 19 laboratories that appear in the following list:

Relation of laboratories that comply with the agreement of the CNUFADN about accreditation and quality control

- Laboratorio de ADN de la Comisaría General de Policía Científica (Madrid)
- Laboratorio Territorial de Biología / ADN de la Jefatura Superior de Policía de Andalucía Occidental (Sevilla)
- Laboratorio Territorial de Biología / ADN de la Jefatura Superior de Policía de Andalucía Oriental (Granada)

- Laboratorio Territorial de Biología / ADN de la Jefatura Superior de Policía de Cataluña (Barcelona)
- Laboratorio Territorial de ADN de la Jefatura Superior de Policía de la Comunidad Valenciana (Valencia)
- Laboratorio Territorial de ADN de la Jefatura Superior de Policía de Galicia (A Coruña)
- Servicio de Criminalística de la Guardia Civil. Departamento de Biología (Madrid)
- Laboratorio de Genética Forense. Unidad de Policía Científica de la Ertzaintza. (Erandio, Vizcaya)
- Laboratorio de Análisis de la División de Policía Científica. Mossos de Esquadra (Sabadell, Barcelona)
- Instituto Nacional de Toxicología y Ciencias Forenses. Servicio de Biología. Departamento de Madrid
- Instituto Nacional de Toxicología y Ciencias Forenses. Servicio de Biología. Departamento de Barcelona
- Instituto Nacional de Toxicología y Ciencias Forenses. Servicio de Biología. Departamento de Sevilla.
- Instituto Nacional de Toxicología y Ciencias Forenses. Sección de Biología. Delegación de La Laguna.
- Instituto Universitario de Medicina Legal. Servicio de Genética Forense. Universidad de Santiago de Compostela (A Coruña)
- Navarra de Servicios y Tecnologías, S.A. (NASERTIC) (Villaba, Navarra)
- Citogen S.L. (Zaragoza)
- Genomica S.A.U. (Madrid)
- Neodiagnostica S.L. (Lleida)
- Unidad de Secuenciación y Genotipado de la UPV/EHU

Against this resolution, an appeal may be lodged in one month to the State Secretary of Justice in accordance with article 8.4 from Royal Decree 1977/2008 from 28 November, regulating the composition and functions of the National Commission for the forensic use of DNA and article 114 and following to Law 30/1002, of 26 November from the Legal System of Public Administrations and Common Administrative Procedure.

Approved at Madrid by the National Commission for the Forensic Use of DNA held the 20 September 2018.

Mr. Antonio Alonso Alonso CTP Secretary and CNUFADN	Ms. Esmeralda Rasillo López CNUFADN President	Mr. Antonio Gómez García CTP President and CNUFADN Vice-president

ANNEX II: RELATION OF THE LABORATORIES THAT COMPLY WITH THE AGREEMENT OF THE NATIONAL COMMISSION FOR THE DNA FORENSIC USE (CNUFADN) ABOUT ACCREDITATION AND QUALITY CONTROL OF THE LABORATORIES (2019)

The Permanent Technical Commission (CTP) managed the tenth annual request of documentation in terms of quality and accreditation, giving compliance in the:

- Article 8 ROYAL DECREE 1977/2008 regulating the procedure for the evaluation of DNA analysis laboratories.
- The Agreement from the CNUFADN about accreditation and quality control of laboratories approved in the Plenary from the CNUFADN dated 21/07/2009.
- The FRAMEWORK DECISION 2009/905/JAI FROM THE EUROPEAN COUNSEL about accreditation of forensic service providers carrying out laboratory activities.

In the annual survey the laboratory identification data was solicited, the application areas, the participation certificates of official quality control from 2018, and the accreditation state by ENAC to the genetic forensic laboratories which provide service in all the Spanish territory in respect with the agreement of the CNUFADN about accreditation and quality control.

Documentation from 22 laboratories was received and was evaluated by the CTP in two monographic meetings where all the obtained results by the different laboratories in the quality controls from 2018, as well as the accreditation state by ENAC from laboratories to ISO 17025, were analyzed.

After the study of the presented documentation by the different laboratories, the conclusion is that there are existing 20 laboratories that comply this year with the CNUFADN Agreement since in addition to participating in the official controls from GHEP or GEDNAP they have a valid ENAC accreditation certification.

This Permanent Technical Commission has decided to submit for approval to the Plenary of the National Commission for the forensic use of DNA the annual relation of laboratories that comply with the Agreement of the CNUFADN about accreditation, quality control, and to emit a certificate demonstrating the compliance to each of the 20 laboratories that appear in the following list:

Relation of laboratories that comply with the agreement of the CNUFADN about accreditation and quality control

- Laboratorio de ADN de la Comisaría General de Policía Científica (Madrid)
- Laboratorio Territorial de Biología / ADN de la Jefatura Superior de Policía de Andalucía Occidental (Sevilla)

- Laboratorio Territorial de Biología / ADN de la Jefatura Superior de Policía de Andalucía Oriental (Granada)
- Laboratorio Territorial de Biología / ADN de la Jefatura Superior de Policía de Cataluña (Barcelona)
- Laboratorio Territorial de ADN de la Jefatura Superior de Policía de la Comunidad Valenciana (Valencia)
- Laboratorio Territorial de ADN de la Jefatura Superior de Policía de Galicia (A Coruña)
- Servicio de Criminalística de la Guardia Civil. Departamento de Biología (Madrid)
- Laboratorio de Genética Forense. Unidad de Policía Científica de la Ertzaintza. (Erandio, Vizcaya)
- Laboratorio de Análisis de la División de Policía Científica. Mossos de Esquadra (Sabadell, Barcelona)
- Instituto Nacional de Toxicología y Ciencias Forenses. Servicio de Biología. Departamento de Madrid
- Instituto Nacional de Toxicología y Ciencias Forenses. Servicio de Biología. Departamento de Barcelona
- Instituto Nacional de Toxicología y Ciencias Forenses. Servicio de Biología. Departamento de Sevilla.
- Instituto Nacional de Toxicología y Ciencias Forenses. . Sección de Biología. Delegación de La Laguna.
- Instituto Universitario de Medicina Legal. Servicio de Genética Forense. Universidad de Santiago de Compostela (A Coruña)
- Navarra de Servicios y Tecnologías, S.A. (NASERTIC) (Villaba, Navarra)
- Citogen S.L. (Zaragoza)
- Neodiagnostica S.L. (Lleida)
- Genómica SAU (Madrid)
- Unidad de Secuenciación y Genotipado de la UPV/EHU
- Fundación Tecnalia Research & Innovation, (Vitoria)

Against this resolution, an appeal may be lodged in one month to the State Secretary of Justice in accordance with article 8.4 from Royal Decree 1977/2008 from 28 November, regulating the composition and functions of the National Commission for the forensic use of DNA and article 114 and following to Law 30/1002, of 26 November from the Legal System of Public Administrations and Common Administrative Procedure.

Approved at Madrid by the National Commission for the Forensic Use of DNA held the 24 September 2019.

Mr. Manuel Crespillo Márquez Secretary of the CTP and CNUFADN	Ms. Esmeralda Rasillo López CNUFADN President	Mr. Antonio Alonso Alonso CTP President

ANNEX III: RECOMMENDATIONS ON GENETIC IDENTIFICATION STUDIES OF THE CIVIL WAR VICTIMS

The present document establishes general recommendations to assure the quality and credibility of the studies on Spanish Civil War identification victims. In the obtention of DNA profiles of exhumation remains as in the obtention of DNA family profiles like searches through DNA databases validated in the forensic field, the interpretation of the results, and the communication of the identifications.

For this purpose, it is essential to develop initiatives of coordination, at a national level, of the different genetic identification initiatives of the Spanish civil war victims developed by the different Autonomous Communities allowing the development of a forensic genetic laboratory network with homogeneous criteria (scientific standards of analysis and interpretation) and with a common DNA profile repository (DNA Databases on Historical Memory).

These recommendations will have a discussion about the scientific standards that must be accomplished and the necessary technology for the development of the different phases about the genetic identification process and concretely the following aspects:

- Selection and collection of reference samples from relatives of disappeared persons.
- Selection and collection of bone/dental samples from exhumed remains.
- Genetic analysis: DNA markers and technologies.
- Network of DNA laboratories: recommendations on accreditation and quality assurance.
- Creation of a national DNA database of historical memory.
- Criteria for Interpretation and Communication of Compatibilities.

1. Selection and obtention of samples from disappeared families

The obtention of the DNA samples and the selection from the most adequate families in each case will be done by qualified professionals in accordance to the following scientific recommendations:

Recomendaciones para la recogida y envío de muestras con fines de identificación genética. Portuguese and Spanish Speaking Group of the International Forensic Genetic Society (GHEP-ISFG). Madeira 02 june 2002 (https://ghep-isfg.org/working-commissions/history/sample-collection/).

Recomendaciones para la recogida y remisión de muestras con fines de identificación genética en grandes catástrofes. Portuguese and Spanish Speaking Group of the International Forensic Genetic Society (GHEP-ISFG). 20 July 2007 (https://ghep-isfg.org/working-commissions/history/sample-collection/)

Real Decreto 32/2009, 6 February 2009. Protocolo nacional de actuación Médico-forense y de Policía Científica en sucesos con víctimas múltiples. BOE 06/02/2009 (http://www.boe.es/boe/dias/2009/02/06/pdfs/BOE-A-2009-2029.pdf).

Personas desaparecidas, análisis forense de ADN e identificación de restos humanos. Guía sobre prácticas idóneas en caso de conflicto armado y de otras situaciones de violencia armada. Segunda edición, 2009. Comité Internacional de la Cruz Roja. (https://www.icrc.org/es/doc/assets/files/other/icrc_003_4010.pdf).

Guía de buenas prácticas para el uso de la genética forense en investigaciones sobre derechos humanos y derecho internacional humanitario. Ministerio de Relaciones exteriores y de culto. Republica Argentina. Comité Internacional de la Cruz Roja. (https://eoirs.cancilleria.gob.ar/userfiles/GENETICA%20FORENSE%20ESP..pdf).

The selection of the families for the DNA analysis must be always supervised by specialists that can select the most idoneous relatives according to the different types of inheritance (DNA markers on autosomal chromosomes, XY chromosomes, or mitochondrial DNA).

It is recommended to develop a sample *kit* (oral mucosa) which includes support for taking samples (Swab, FTA card, …) and a formulary including the identification data of the sample and the donor, the relationship with the disappeared, the custody chain, and the informed consent. (see Annex I).

The informed consent must have at least the following minimum content established by the National Commission for the forensic use of DNA: (1) the nature of DNA profiles, (2) use and transfer of the DNA profiles, (3) laboratory qualification to realize the analysis, (4) preservation of samples (5) cancellation rights, rectification, and access to the data.

It is recommended that the sample collection *kit* and forms can be agreed upon on a national level by the different Autonomous communities.

It is recommended to perform an electronic register, in such a way that each family group has a specific file number (that can have a variable number of affected persons). In said files, it will be documented and available to each of the family members all aspects of the investigation, including DNA analysis and genetic identification results if any.

2. Selection and obtention of bone samples/dental in exhumation remains

It is important to follow the following procedures about exhumation and concretely the exhumation protocol of victims of the Spanish Civil War and dictatorship.

Order PRE/2568/2011, 26 September, publishing the Agreement of the Council of Ministers of 23 September 2011, ordering the publication in the Official State of the Protocol for action in exhumations of victims of the civil war and dictatorship (https://www.boe.es/boe/dias/2011/09/27/pdfs/BOE-A-2011-15206.pdf).

It is recommended in any case an anthropological study of the bone remains, previous to the genetic analysis. The anthropology analysis of the remains can contribute in many cases to a more idoneous selection of the samples for the genetic analysis.

Following the majority of recommendations mentioned in point number 1, the obtention of bone/dental samples must be done in conditions assuring integrity, using protection measures adequate to minimize pollution possibilities.

From each body, if possible must be collected the following samples:

Two or more teeth without odontology interventions and caries, in the following order of preference: molar, premolar, canine, incisor.

A sample or portion of compact tissue bone from the diaphysis of a long bone.

In any case, the dental remains have to be conserved adequately to allow the realization of re-sampling depending on the preliminary results obtained in the forensic genetics laboratory.

Bone or dental samples for DNA analysis have to be documented on a post-mortem sample collection form including the sample description, sample identification codes, victim identification code, and chain-of-custody aspects. A sample form for unidentified post-mortem samples can be found in Annex VII.2 of the *Royal Decree 32/2009, 6 February 2009. National Protocol for Medical Forensic and Scientific Police Action in Multiple Victim Incidents.* BOE 06/02/2009 https://www.boe.es/buscar/doc.php?id=BOE-A-2009-2029

Packaging, sample, and formulary transport have to be done in conditions assuring the preservation, minimizing the possibility of contamination, and assuring the sample's integrity.

Each victim must have an electronic register, with a unique file identifier, which allows documenting electronically the different findings of the forensic investigation, including the DNA results.

3. DNA analysis: DNA markers and Technologies

In case of having reference samples of relatives from disappeared in the Spanish Civil War (mainly sons/ daughters or brothers/sisters), the genetic analysis will be based on autosomal STR ("*Short Tándem Repeats*") analysis and specifically on the STR markers included in the new EU standard. (Laid down in the Council of Europe Resolution of 30 November 2009 on the exchange of DNA analysis results (2009/C 296/01) and in the new CODIS standard of the US Department of Justice, as well as in other forensically validated STRs.

Depending on the reference family type, complementary analysis of additional autosomal STRs, Y-chromosomal STRs (Y-STRs), X-chromosomal STRs (X-STR), or mitochondrial DNA, will be necessary depending on each case.

In the case of male full siblings, autosomal STR, Y-STR, and mtDNA analysis will be performed.

In the case of maternal and paternal sisters, analysis of autosomal STRs, mtDNA will be performed. If necessary, X-STRs shall be performed.

In the case of reference samples from other relatives sharing the paternal or maternal line, Y-STR, or mtDNA analysis shall be performed, respectively, and where appropriate, autosomal STR, and X-STR analysis.

In the genetic analysis of bone exhumation remains, apart from typing autosomal STR markers, the use of mini-STRs, Y-STRs, and mtDNA markers (including short mtDNA amplicons) is recommended when deemed necessary due to the degradation status of the DNA obtained or the type of samples to compare. If necessary, other small size polymorphisms can be analyzed to check or exclude kinship (SNPs, Indels).

Most forensic DNA marker analysis is currently performed by PCR (*Polymerase Chain Reaction*) and the detection of DNA fragments by capillary electrophoresis techniques. Soon many laboratories will use the novel techniques of Massively Parallel Sequencing (MPS) with the consequent advantages that include, among others, the bigger capacity in the DNA markers that can be analyzed simultaneously, so a considerable increase of discriminatory power of genetic analysis.

4. DNA laboratories network recommendation about accreditation and quality assurance

These analyses have great difficulty due to the high degradation state and the low DNA copies that can recuperate from the exhumation victim´s remains from the Spanish Civil War. It is recommended that they have to go to the forensic genetic laboratories that dispose of validated procedures for the bone and dental genetic analysis.

Laboratories should participate in proficiency exercises daily and in consonance with the established by the National Commission for the forensic use of DNA in terms of accreditation and quality control of the laboratories (Agreement of the Plenary of the Commission dated 21/07/2009) and it is recommended that the laboratories are accredited to according to the EN ISO/IEC 17.025 standard by the National Accreditation Body (ENAC).

It is recommended to create a network of laboratories about DNA Historical Memory facilitating the coordination of the forensic genetic laboratories from the different autonomous communities. This way, they will work coordinately developing analysis protocols and DNA interpretations. They need meetings periodically.

5. Creation of a national DNA database about historical memory

It is necessary to consider developing a DNA National Database of Historical Memory that allows the coordination of the different initiatives developed by the the different autonomous communities having a common profile DNA repository.

It is recommended the use of informatics for the development of a search DNA database validated in the forensic field and that at least guarantee:

- Secure network exchange with diverse regional nodes and one statal node
- DNA profiles search through identity algorithms
- Family tree search and different types of inheritance (STR, Y-STR, and mitochondrial DNA)
- Simultaneous system for statistical analysis of matches, and compatibilities
- Matching and compatibility management and documentation system

Some examples of informatics systems validated in forensic genetic that need evaluation for the development of a national DNA database of Historical memory are:

CODIS System
https://www.fbi.gov/services/laboratory/biometric-analysis/codis

Bonaparte System
https://www.bonaparte-dvi.com

M-FISys System
https://www.genecodesforensics.com/software/

The database must comply in any case to what is established in the regulations of Protection of Personal Data and its implementing regulations. Ensuring that the files that integrate the DNA databases with human identification purposes have been declared to the General Data Protection Register of the Data Protection Agency and have a high-security level.

6. Interpretation Criteria and Compatibility Communication

The statistical evaluation of compatibilities will be done calculating paternity rates or kinship rates ("*Likelihood Ratio*", LR) according to the following recommendations established by the Paternity Testing Commission and the DNA Commission from ISFG, and of ENFSI DNA WG, and SWGDNAM recommendations:

ISFG: Recommendations on biostatistics in paternity testing
https://www.isfg.org/files/7e61d5197d8894216dfc00b97350196021a56484.fsigen_2007_isfg_pat_recomm.pdf

DNA Commission of the International Society for Forensic Genetics (ISFG): Recommendations regarding the role of forensic genetics for disaster victim identification (DVI)
https://www.isfg.org/files/726ff129fb1b493261d1ce8b306647a702995979_piis1872497306000032.pdf

ENFSI guideline for evaluative reporting in forensic science
https://enfsi.eu/wp-content/uploads/2016/09/m1_guideline.pdf

Interpretation Guidelines for Autosomal STR Typing by Forensic DNA Testing Laboratories
https://docs.wixstatic.com/ugd/4344b050e2749756a242528e6285a5bb478f4c.pdf

Following these recommendations, appropriate population databases will be used for both autosomal and haplotype markers and a minimum statistical threshold for the communication of family groups that are compatible.

In cases where only one direct family member is available, and given the possibility that chance matches may occur between genetically unrelated individuals, additional autosomal STR markers are recommended, as well as Y-STR, X-STR, or mtDNA analysis, as appropriate.

In the case of combined analyses of markers with different types of inheritance, an assessment of the plausibility indices shall be made. Depending on the number of reference relatives in the pedigree and the value of the indices obtained, the possibility of obtaining additional reference samples from other relatives shall be assessed.

The genetic identification reports must be done having in mind *Suggestions about the expert report and the results expressions about genetic forensics analyses* (https://www.mjusticia.gob.es/es/ElMinisterio/OrganismosMinisterio/Documents/1292428320825-Recomendaciones_sobre_el_informe_pericial_y_la_expresion_de_resultados_en_materia_de_analisis_genet.PDF) established by the National Commission for the forensic use of DNA.

In any case, the final identification of each victim must be done through a report where there is a joint evaluation with all the results from the diverse forensics specialties (anthropology, odontology, genetics,…).

ANNEX I: FORM FOR THE COLLECTION OF DNA SAMPLES FROM RELATIVES OF PERSONS WHO DISAPPEARED IN THE SPANISH CIVIL WAR

SAMPLE CODE	

FAMILY DATA

NAME AND SURNAMES: **AGE:**

DNI: **PHONE:** **EMAIL:**

ADRESS:

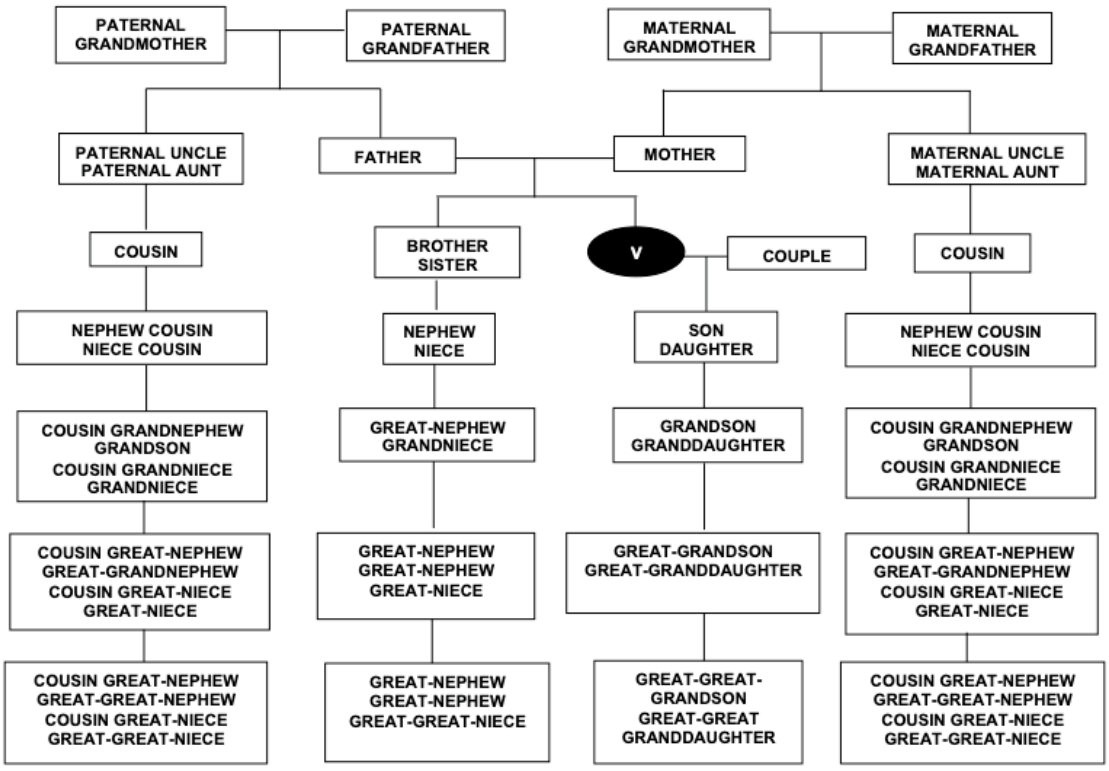
ZP: **CITY:** **PROVINCE:** **COUNTRY:**

TYPE OF SAMPLE COLLECTED:

KINSHIP RELATION:

OBSERVATIONS (Exclude transfusions, transplants or pathologies that may influence DNA analyses):

FAMILIAR RELATION **(Circle the person that gives the sample)**



DATA FROM THE VICTIM

NAME AND SURNAMES:

Sample hour and date: **Seal nº:**

Collected by: (Name, affiliation, and signature):

Consent clause

By filling the present form you consent to obtain biological samples (buccal mucosa swabs) to analyze DNA markers, with the proposal of investigating the coincidences or relevant compatibilities from which indications of biological family links can be inferred between your genetic profile and that of the human remains of persons who disappeared during the Spanish Civil War.

For this purpose DNA profiles can be incorporated in the future in a national file of family DNA profiles of disappeared persons during the Spanish Civil War.

With regard to the data related to your genetic profile and in accordance with the provisions of LO 10/2007, of 8 October and LO 3/2018, of 5 December, on the Protection of Personal Data and guarantee of digital rights, as well as EU Regulation 2016/679. We inform you of the following:

- Samples for which DNA analyses are to be carried out shall be sent to duly accredited laboratories.
- Only those DNA profiles that are revealing, exclusively identity and sex of the person, may be registered.
- The use and the possible transfer of data will be adjusted to the legislation of the files. In any case, data can only be used for investigation and genetic identification of human remains that disappeared during the Spanish Civil War. Data is conserved while it is necessary to end the procedures.
- That the affected person can exercise their right of access, rectification, deletion, and portability under the terms established in articles 13, 14, 15, and 17 of the LO 3/2018, of 5 December, on the Protection of Personal Data and guarantee of digital rights, as well as EU Regulation 2016/679. These rights may be exercised before the National Institute of Toxicology and Forensic Sciences. Calle José Echegaray, 4 (corner of Jacinto Benavente). Business Park 28232 Las Rozas. Madrid.

Having been informed of the above, expressly and freely GIVES CONSENT to the taking and analysis of biological samples.

SIGNATURE OF THE INTERESTED PERSON:

ANNEX IV: REPORT AND RECOMMENDATIONS ABOUT NEW TECHNOLOGIES OF GENETIC IDENTIFICATION AND NEW DNA MARKERS OF BIOGEOGRAPHIC ORIGIN AND EXTERNAL PHENOTYPIC FEATURES

Introduction

We are witnessing a new technology revolution inside the field of Forensic Genetics. It is about a growing implementation in laboratories (both public and privates) of the *Massive Parallel Sequencing* (MPS) methodology. [1-5]. There is a big number of public and private forensic genetic centers that are investigating and starting to implement this new technology for: (1) analysis of calssics DNA markers (this means, Short tandem repeat (STR) DNA and the mitochondrial DNA control region) used worldwide in forensic casework, as well as to study other DNA markers like S*ingle Nucleotide Polymorphism (SNP*), and also *INDEL* (*Insertion / Deletion* markers), which are small deletions and insertions of nucleotides.

The SNP / INDEL can be used for individual identification forensic studies (identity SNP), like in ancestry studies (ancestry SNP), also to determine some phenotypic characteristics (skin color, eye color, and hair color) (phenotypic SNP) [6]. The use of this new technology constitutes a useful tool in criminal investigations, in corpse identifications, and missing persons. One of the current European projects more ambitious inside forensics is the VISAGE project (http://www.visage-h2020.eu/), the objective is the development and validation of massively sequencing systems for the study of markers of biogeographical origin and phenotypic traits for use in the forensic field.

Many of these new DNA markers are located in regions that regulate genes (coding genome regions), in contrast to other DNA markers (STR, identity SNP, and the control region of the mitochondrial DNA) found in non-coding regions of the genome. This is a new challenge for its application inside the forensic field because in the majority of current European legislation this is not regulated, being normally laws (as in Spain) of databases.

Another difference between these new DNA markers (of ancestry and phenotypic characteristics) and the classic DNA markers (STR and identity SNP) in forensic genetics is that the former have only a predictive or inference value with probability values (70-90%) very far from those usually obtained when a match occurs in the comparative genetic analysis of STR and / or identity SNP. For this reason, they are currently used exclusively as a investigative tool.

In the present document, the DNA markers and the valid methods inside forensic genetics to make inference of biogeographic origin and phenotypic appearance are identified. A number of recommendations are listed regarding their future use in forensic casework in our country.

Single Nucleotide Polymorphisms (SNP): generalities

The technique most used in Forensic Genetics laboratories is the capillary electrophoresis to detect autosomal STRs, Y-chromosomal STRs, or sequencing of the control region of mitochondrial DNA. However, each day there are more used genetic markers known as SNPs (*single nucleotide polymorphisms*), which are substitutions, insertions, or deletions that have several advantages over the traditional STRs used since the 1990s.

- High abundance in the genome
- Low mutation rate (10^{-8} per nucleotide [7])
- Inheritance stability for parentage analysis
- Short amplicon size allowing a potentially high success rate in samples with degraded DNA
- Absence of stutter bands facilitating profile interpretation
- Ease of genotyping

Also, they exist different SNP types [8], which makes them a useful tool to be used in the forensic genetic field:

- Identity-informative SNPs (differentiation of individuals)
- Lineage informative SNPs (in both mitochondrial genome and sex chromosomes)
- Ancestry or biogeographic ancestry informative SNPs (estimation of ethnicity)
- Phenotype informative SNPs (predicting physical traits such as eye color, hair color, skin color, etc.)

Massively Parallel Sequencing in Forensic Genetics

There are different technologies with diverse methods for library constructions, sequencing chemistries, assembly, etc., which leads to the existence of different analysis platforms (see Annex 1).

The fundamental advantages of massively parallel sequencing are the following:

- It permits the simultaneous analysis of thousand of regions or DNA markers (mainly the genome) including any DNA forensic marker (STR, SNP, INDEL or for example, the complete mitochondrial DNA genome). This facilitates the integration of a unique workflow for different DNA markers of interest in Forensic Genetics. Soon will allow cost savings and not take that much time of conducting experiments.
- It permits obtaining a major discrimination power than the conventional electrophoresis by facilitating the analysis with a higher number of genetic markers and more information in the case of STR analysis (sequencing of the repeat unit, adjacent regions, etc.)
- Is a highly-sensitive technique (detecting limits in the range of picograms), it can be useful in the analysis of samples with very low DNA content.

- Permits the development of short amplicons. This technology is useful in the analysis of forensic samples with degraded DNA.
- Is a useful tool in the analyses of mixed profiles. This supposes an important advance in the approach to this type of profiles, which share an extraordinary complexity in the forensic genetics field.

All these advantages make a great interest in the international community of forensic geneticists in the development and implementation of this new technology in DNA analysis. There are diverse international projects for the validation, the development of standards, and population databases that allow for their application in the forensic field:

- DNASEQEX [9]
- SeqforSTRs - Sequencing of forensic STRs [10]
- STRSeq [11]
- Empowering forensic genetic DNA databases for the interpretation of next generation sequencing profiles (DNA.bases) [12]
- The VISible Attributes Through GEnomics (VISAGE)

VISAGE (http://www.visage-h2020.eu/) is one of the most actual European projects more ambitious in the forensic field, among their principal objectives:

- The development and validation of massively sequence systems for the study of markers of biogeographical origin and phenotypic traits for their use in forensic genetics.
- The design of an interpretation framework includes a software prototype for the combined statistical consideration of the markers.
- Suggestions for a future implementation having in mind the different social, ethical, and legal frameworks from the European countries.
- The contact with the leading companies in the forensic field to get commercial products for a future routine application of this type of markers and technology in the European Union member states.

DNA and ancestry

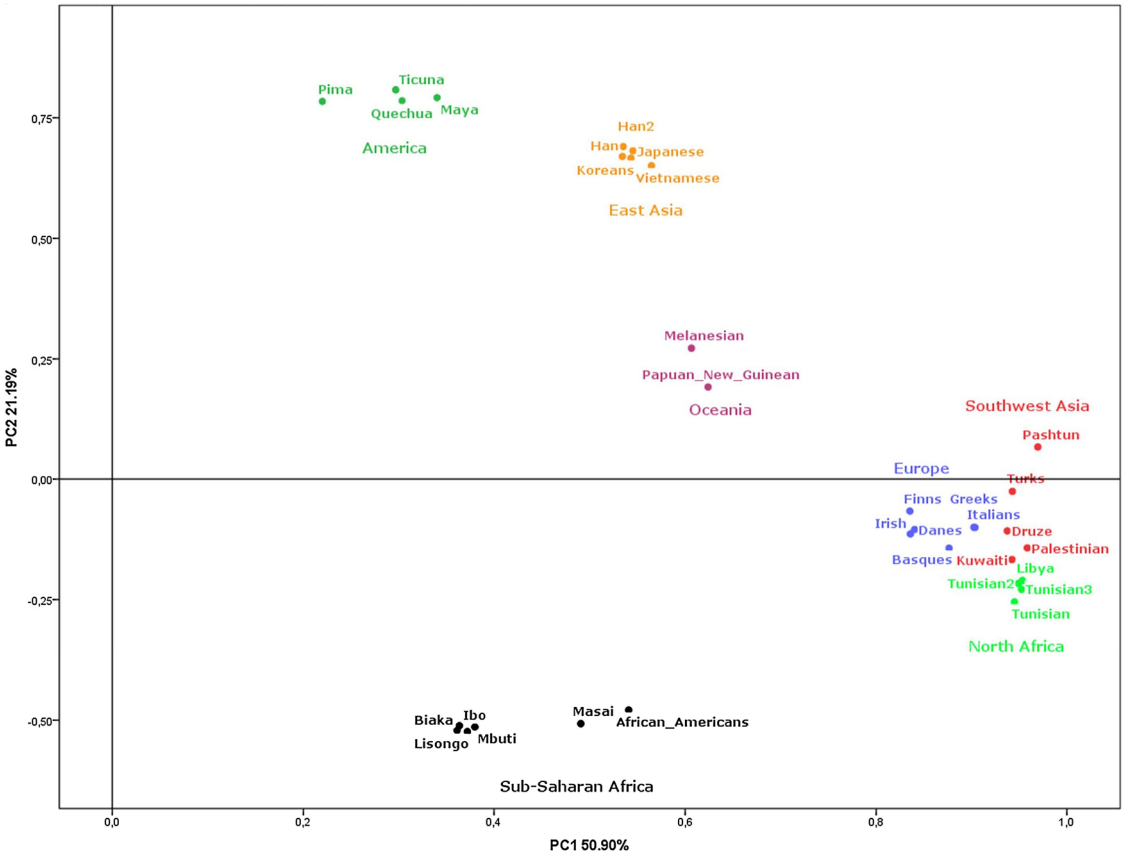
We can define the inference or biogeographic prediction of ancestry as the estimation of the geographic origin of a person's biological ancestors based on the analysis of DNA.

The inference tests of DNA ascendence have the basis on the knowledge of genetic variations between the populations that originated in different places in the world. In particular, there are certain genetic markers that are variable, said variables presenting a higher prevalence in some populations than others.

Until a few years ago, lineage markers offered us clues about the parental and maternal origin of a person. However, the inheritance of these markers (uniparental over many generations, except by mutation) makes it impossible to trace the full ancestry if it belongs

to a mixed population (with different ancestry components). To predict correctly the ancestry is necessary to use markers that capt the complete genealogy of a person, like the SNPs located in the nuclear autosomal DNA (looking at the inheritance of all individuals in the family tree, not just those who passed on the mitochondrial DNA, or the Y chromosome).

These systems allow us to estimate the origin or ancestry proportion (in persons with diverse ancestry contributions) based on the frequency distribution of the SNPs studied in various human populations (mainly Africa, America, Europe, Oceania, East Asia, South Asia, and Southwest Asia).



Graph taken from [39] from 32 populations and using the 165 SNPs from the Precision ID Ancestry panel (Thermofisher Scientific).

All these population groups can be refine, as we have higher population data and more knowledge of the genome. For example, there are already methods described to distinguish Japanese from the rest of Asia, using specific rare variants of each population [13].

We also have to mention the progressive commercialization of “genetic ancestry tests” by companies which offer to consumers reconstruct their family history and determine their geographic origins from their ancestors [14-15]:

- AncestryDNA https://www.ancestry.com/dna/
- 23andMe, https://www.23andme.com/dna-ancestry/)
- FamilyTreeDNA https://www.familytreedna.com/)
- MyHeritage https://www.myheritage.es/dna)

Many of these genetic tests are based on the study of hundreds of thousand of SNPs in all the genome, offering an enormous discrimination power in kinship studies.

Issues such as ethical aspects, genetic data privacy, the commercialization of genetic information, etc. are great issues that will not be treated in this document. We can manifest the big potentiality of these private databases as tools for the resolution of criminal investigations like the "*Golden State killer*" solved thanks to the web "*open-source*" GEDmatch (https://www.gedmatch.com/). Here usuaries of the commercial kits previously mentioned can dump the data to contact possible familiars, this has been the origin a new scientific discipline called "Forensic Genealogy" [16-17]. However, not all forensic samples are suitable for analysis by these methods, which require a certain amount of DNA that is not mixed with DNA from other individuals to be applicable.

DNA and phenotypic features (*Forensic DNA Phenotyping —FDP— of External Visible Characteristics —EVC—*)

Some DNA markers (SNPs and INDELs) located in the regulating or coding regions of the genome can determine the different gene expressions or produce amino acid substitutions, changing the functional properties of the translated protein, and then expressing in different phenotypes. Some of them are the visual characteristics of the person.

Diverse studies have already evaluated the existence of polymorphisms associated with skin color, hair color, eye color, male baldness patterns, type/shape of head hair, age, facial morphology, height, earlobe folding, greying of hair, etc.

We could define forensic DNA phenotyping as an investigative tool. We obtain phenotypic information of a person by studying the phenotypic traits mentioned above from biological evidence, usually left at the crime scene.

This information can be useful in the offense investigations with unidentified suspects, reducing the potential number of them thanks to the phenotypic information obtained.

As seen before, any of these tests have absolute precision. It is more a predictive analysis with probability values (70-90%), far from those usually obtained when a match is made in the comparative genetic analysis of STR profiles. As an example, the following table obtained from the 41 SNPs used in the HIRISPLEX-S system (modified from [6]) for the characterization of hair, skin, and eye color. (https://hirisplex.erasmusmc.nl/).

Estimation precision (maximum of 1) population level	
Blue eye color	0'94
Intermediate eye color	0'74
Brown eye color	0'95
Blond hair color	0'81
Brown hair color	0'74
Red hair color	0'93
Black hair color	0'86
Hair color shade	0'91
Very pale skin color	0'83
Pale skin color	0'76
Intermediate skin color	0'78
Dark skin color	0'98
Dark-black skin color	0'99

For this reason, it is only used as an investigative method to reduce the potential number of suspects in those cases where the group of suspects is ample, and other investigation methods have failed (for example, after having no coincidence after a search in the national forensic database). In other words, the prediction of physical characteristics from DNA will not be used as evidence in court, but as an aid for the police to guide their investigations.

To predict other visible external facial features to obtain a robot portrait will be more difficult and currently impossible. Although all have a genetic base, facial features have lots of genes that still are unknown. We also have to consider the possible influence of external facts (nutrition, life habits, processes occurring during gestation). Thus, It would be foolhardy to expect magic solutions from the field of genetics. Although we can expect to see a large increase in research into markers that determine visible physical characteristics.

Coding and no coding DNA regions

The DNA coding regions are described as the DNA parts that codify proteins that can proportionate information about a person's phenotype. In contrast, classical DNA markers (STRs) are generally in the non-coding regions of the genome.

There is the belief that information on the non-coding DNA does not provide information on the visible characteristics of a person, nor does it provide information on the possible individual or familial susceptibility to a genetically-based disease. Therefore its application could be considered less problematic from an ethical point of view. Recently, the development of predictive medicine (Alzheimer's, breast cancer, colon cancer, etc.) is gaining enormous importance, and it is based on SNPs, generally non-coding, obtained from genome-wide association studies (GWAS).

In some legislations, the distinction between coding and non-coding DNA is key in regulating the use of DNA for forensic purposes, which often limits legitimate DNA analysis to

non-coding regions. Thus, Spanish legislation (Organic Law 10/2007, of 8 October, regulating the police database on DNA-based identifiers [27]) cites in its preamble "*This regulation contains a very special safeguard, which is essential to eliminate any infringement of the right to privacy. As only those DNA profiles that are revealing the subject's identity can be registered - the same as that provided by a fingerprint, and sex. But in no case those of a coding nature that would reveal any other genetic data or characteristics". "Only identifiers obtained from DNA may be entered in the police database regulated by this Law, in the context of a criminal investigation, which provides, exclusively, genetic information revealing the identity of the person and his or her sex"* in Article 4.

However, the investigation carried out during the last decade has shown clearly that in the non-coding DNA, there are regions that allow activate and deactivate genes. They have great importance. Scientific evidence has demonstrated that a considerable portion of the variation in gene functions, may be within genes, near genes, or even distant from genes, and not just by protein-coding DNA variants within genes as had been assumed in the past.

There are also cases in which a specific non-coding genetic DNA marker can be near a specific gene, and the genetic analysis of this non-coding DNA marker can inform us about the coding region because the marker and the coding region are very close and are jointly inherited. Thus a specific STR or SNP variant in a non-coding region may be predictive of a pathological condition caused by a mutation in a linked gene (linkage disequilibrium).

For all the above, at present, there is not such a clear distinction between the coding DNA and non-coding DNA in terms of possible supplementary information (not related to the purpose of genetic identification) that can be obtained from their study. Therefore, both types of DNA markers need legal regulation in which the purposes, proportionality and limits of its use are established.

It is important to have in mind that part of the DNA coding gives actually information that does not invade people's privacy (eye, hair color, etc.), so this isn't sensitive genetic information that violates the fundamental rights of the individual when they are studied.

Recommendations for the use of new markers and new technologies for the DNA analysis

- The ancestry and phenotype markers are **predictive investigation tools supported by the international scientific community.** Its application into forensic casework has permitted to solve old forensic cases. For example, remind the sexual aggression and murder of Eva Blanco in Algete (Madrid) solved 18 years after thanks to the orientation to the case which supposed the use of ancestry DNA by the Institute of Forensic Sciences of the University of Santiago de Compostela.
- Each laboratory must proceed with the **internal validation studies** before the use of these DNA markers in forensic casework. It will be convenient that these analyses were

accredited to ISO 17.025, as it happens in our legislation with the genetic markers used daily in criminal investigations.

- It is recommended that organizers of DNA polymorphism proficiency testing exercises in the forensic field **develop specific proficiency testing exercises that include these DNA markers** so that laboratories can have a system for an intercomparison of results and allow to check the systems and strategies developed.
- **The necessity of new regulation.** These new DNA markers (ancestry and phenotypic SNPs) can be useful as a tool to investigate in criminal evidence always that all other investigation vias have been concluded. This investigation tool has to be used with the following warranties so that affectation is minimum:
  - It is just a tool for investigation, don't use it as a conclusive proof
  - It must be used in severe offenses
  - It is necessary a judicial order
  - It will be used for DNA evidences that have not given coincidence in the database and for cases where there aren't other ways to investigate
- The dissemination of these recommendations, as well as other scientific publications on the forensic application of new DNA markers and new analysis technologies among legal professionals (judges, prosecutors, lawyers, etc.), is recommended.

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ANNEX 1 Massively parallel sequencing platforms and different commercial kits for library generation for use in the forensic field

The biggest two platforms used in the Forensic Genetic field correspond to:

- Emulsion PCR sequencing [28] using semiconductor technology [29] (Ion Torrent PGM and Ion Torrent S5 from ThermoFisher Scientific)
- Sequencing by synthesis ("polony", polymerase colony) [30] with fluorescence base identification [31] (Illumina MiSeq)

We dispose different commercial kits or panels for these platforms to generate libraries for its use in the forensic field:

- ForenSeq™ DNA Signature Prep Kit (Illumina): 58 STRs (including 27 autosomal STRs, 7 X chromosome haplotype markers and 24 Y chromosome STRs), 94 identity informative SNPs, 56 ancestry informative SNPs and 22 phenotype informative SNPs (see, for example [32-35]).
- PowerSeq Auto/Mito/Y System (Promega Corporation): Different panel combinations including 23 Y chromosome STRs, 22 autosomal STRs and mitochondrial DNA control region (see for example [36-37]).
- Precision ID series (ThermoFisher Scientific). See for example [38-40]).
  - Identification panel: 90 autosomal SNPs and 34 Y chromosome SNPs.
  - Ancestry panel: 165 autosomal SNPs

– Mitochondrial DNA panel (control region and whole genome)
– GlobalFiler™ NGS STR Panel: 35 STR markers including 21 CODIS STRs, 9 additional STRs and 4 sex determination markers
– Phenotypic panel: 24 SNPs

From the different commercial kits previously mentioned related to ancestry, we highlight the system Precision ID Ancestry panel (ThermoFisher Scientific), which includes 165 autosomal SNPs that proportionate biogeographic information about ascendence. From these total markers, 55 of them have been selected based on Kenneth Kidd [41] and 123 based on Michael Seldin [42] (note that 13 SNPs are overlapping in both panels). We also have the ForenSeq™ DNA Signature Prep Kit (Illumina) system that includes the 55 SNPs described by Kenneth Kidd [41].

ANNEX V: FORMULARY OF BIOLOGICAL SAMPLE COLLECTION TO DEFENDANTS WITH INFORMED CONSENT IN CRIMINAL INVESTIGATION

1. ACTUATION DATA

Police diligences n.º: ..... Diligences date: .....

Instructor Unit: ..... Professional n.º: .....

Court proceedings n.º: ..... Court: .....

Criminal offense investigated: .....

2. DONOR DATA

Name and Surnames: .....

DNI/Passport: ..... Country: .....

Date and Birthplace: .....

Address: .....

Legal representative who authorized the take of the samples (in case of persons with judicially modified capacity)

Name and Surnames: .....

DNI/Passport: ..... Country: .....

Date and Birthplace: .....

Address: .....

DATA OF THE SAMPLING. CONSENT CLAUSE

In the dependencies of ..... located at ....., being ..... hours of the day ....., **consent** is requested to proceed to the **biological sample taking** of an undisputed nature, in the context of the criminal investigation in question, consisting of a buccal swab (BY [X] STERILE swabs) for the realization of a **DNA analysis** that proportionate exclusively genetic information that reveals the identity of the person and its sex, and the realization of **comparative studies** necessary for the police diligences or judicial before explained.

According to the law 10/2007, which regulates the DNA police databases, as well as the Organic law 3/2018, from 5 of December, Protection of Personal Data and guarantee of digital rights and the EU Regulation 2016/679, the following **information** is provided:

1.º The police and judiciary **purpose** to realize the samples and the analysis of the biological samples is to identify the perpetrator of a crime, its court ruling, the clarification of the offense, and that the judicial authority in the criminal procedure determines the responsibility or his innocence.

2.º The samples about the biological analysis **will be analyzed in the accredited laboratories** by the National Commission for the forensic use of DNA . It is for the judicial authority to decide on the further preservation of such samples or traces.

3.º The data and results obtained through the analysis **can be used for the genetic identification on merely identifying DNA**, in the current investigation or in others, followed by the commission of those offenses for which the current legislation authorises the regime and processing of DNA profiles, with this information being kept in police files for the commission of crimes.

4.º The **use and possible transfer** of data shall be adjusted to the applicable regulations and to the singular regulation of the files in which said information is recorded, by virtue of the provisions of Article 7 of Organic Law 10/2007, the data contained in the database covered by this Act may only be used by the Judicial Police Units of the State Security Forces and Corps, as well as by the Judicial and Prosecutorial Authorities. Likewise, the data contained in the database may be transferred to the judicial, prosecutorial or police authorities of third countries in accordance with the provisions of the international conventions ratified by Spain and which are in force, to the Autonomous Police with statutory competence for the protection of persons and property and for the maintenance of public security, for the investigation of the offenses listed in Article 3(1)(a) of this Act, as well as to the National Intelligence Centre, which may use the data for the fulfilment of its functions relating to the prevention of such offenses, in the manner provided for in Act 11/2002, of 6 May, regulating the National Intelligence Centre.

5.º The **cancelation** in the database of the identifiers obtained from the DNA will be carried out in accordance with the provisions of Article 9 of O.L. 10/2007 and will entail the removal of the DNA profile, personal data, and sample. The identifiers conservation obtained through DNA in the databases result of this Law will not exceed:

– the designated time in the law for the prescription of the offense

– the designated time in the law for the cancellation of the criminal records, if there is a guilty verdict due to the concurrence of exonerating causes for lack of imputability or guilt, except in the case of a judicial decision to the contrary.

In any case, it shall be cancelled when there is judgement of acquittal issued for reasons other than those mentioned in the previous section, once these decisions have become final.

6.º The affected person may exercise his/her right to **cancellation, rectification, deletion, limitation and portability** of the data, in the cases and in the manner provided for in articles 12 to 18 of Organic Law 3/2018, of 5 December, on the Protection of Personal Data and guarantee of digital rights and its implementing regulations.

The rights of access, rectification and cancellation of data may be exercised at the National Institute of Toxicology and Forensic Sciences, located at Calle José Echegaray 5, Las Rozas de Madrid, 28232.

7.º Whenever the investigated/defendant is detained, this consent shall be given with legal assistance.

Having been informed of the above, HEREBY GIVES THE EXPRESS CONSENT to:

☐ The collection of biological samples, their analysis and comparison in the judicial investigation, as well as their inclusion in the DNA database regulated in LO 10/2007.

Signed.: (person being sampled)	Signed.: Legal representative/minor

In union of:

Magistrate

Signed.: The Instructor	Signed.: Secretary

FINGERPRINTS	
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[1] The various institutions involved may also specify the address of their local Database Administrator.

ANNEX VI: FORM/ACT FOR TAKING BIOLOGICAL SAMPLES FROM VICTIMS WITH INFORMED CONSENT IN CRIMINAL INVESTIGATION

1. ACTUATION DATA

Police diligences n.º: ..... Diligences date: .....

Instructor Unit: ..... Professional n.º: .....

Court proceedings n.º: ..... Court: .....

Criminal offense investigated: .....

2. DONOR DATA

Name and Surnames: .....

DNI/Passport: ..... Country: .....

Date and Birthplace: .....

Address: .....

Legal representative who authorized the take of the samples (in case of persons with judicially modified capacity)

Name and Surnames: .....

DNI/Passport: ..... Country: .....

Date and Birthplace: .....

Address: .....

DATA OF THE SAMPLING. CONSENT CLAUSE

In the dependencies of ..... located at ....., being ..... hours of the day ....., **consent** is requested to proceed to the **biological sample taking** of an undisputed nature, in the context of the criminal investigation in question, consisting of a buccal swab (BY [X] STERILE swabs) for the realization of a **DNA analysis** that proportionate exclusively genetic information that reveals the identity of the person and its sex, and the realization of **comparative studies** necessary for the police diligences or judicial before explained.

According to the law 10/2007, which regulates the DNA police databases, as well as the Organic law 3/2018, from 5 of December, Protection of Personal Data and guarantee of digital rights and the EU Regulation 2016/679, the following **information** is provided:

1.º The police and judiciary **purpose** to realize the samples and the analysis of the biological samples is to identify the perpetrator of a crime, its court ruling, the clarification of the offense, and that the judicial authority in the criminal procedure determines the responsibility or his innocence.

2.º The samples about the biological analysis **will be analyzed in the accredited laboratories** by the National Commission for the forensic use of DNA. It is for the judicial authority to decide on the further preservation of such samples or traces.

3.º The data and results obtained through the realization of such analysis **can be used for the DNA genetic identification**, exclusively in the current investigation.

4.º The **use and possible transfer** of data shall be adjusted to the applicable regulations and to the singular regulation of the files in which said information is recorded, by virtue of the provisions of Article 7 of Organic Law 10/2007, such data contained in the database subject to this Act may only be used by the Judicial Police Units of the State Security Forces and Corps, as well as by the Judicial and Prosecutorial Authorities, in the investigation of the crime that has given rise to the investigation.

5.º The **deletion** of DNA identifiers from the database shall be carried out in accordance with the provisions of Article 9 of Organic Law 10/2007 and shall entail the deletion of the DNA profile, personal data, and sample.

6.º The affected can exercise their right to **cancel, delete, limitate the data,** in the cases and in the manner provided for in Articles 12 to 18 of Organic Law 3/2018, of 5 December, on the Protection of Personal Data, the guarantee of digital rights, and its implementing regulations.

The rights of access, rectification and cancellation of data can be exercised before the Ministry of Interior, Secretaría de Estado de Seguridad, calle Amador de los Ríos nº 2, 28071, Madrid. [1]

Having been informed of the above, HEREBY GIVES THE EXPRESS CONSENT to:

☐ The collection of biological samples, analysis and comparison in the police investigation in question.

Signed.: (person being sampled)	Signed: Legal representative (minor)

☐ Inclusion in the police database on identifiers obtained from DNA regulated in LO 10/2007 the use and transfer exclusively in the investigation for which the sample was taken.

Signed.: (person being sampled)	Signed: Legal representative (minor)

In union of:

Signed.: Instructor	Signed.: Secretary

(OPTIONAL)

FINGERPRINTS	
Right index	Left index

[1] The various institutions involved may also specify the address of their local Database Administrator.

ANNEX VII: FORM/ACT FOR TAKING BIOLOGICAL SAMPLES FROM THE INVESTIGATED/DEFENDANT WITH INFORMED CONSENT IN CRIMINAL INVESTIGATION (INSTITUTES OF FORENSIC MEDICINE)

DATOS GENERALES

Pre-trial proceedings/Summary n.º ..... Court: .....

Criminal offense investigated: .....

Magistrate: ..... Member n.º.....

Donor: .....

Legal representative who authorized the take of the samples (in case of persons with judicially modified capacity)

Name and Surnames: .....

DNI/Passport: ..... Country: .....

Date and Birthplace: .....

Address: .....

DATA OF THE SAMPLING. CONSENT CLAUSE

In the dependencies of ..... located at ....., being ..... hours of the day ....., **consent** is requested to proceed to the **biological sample taking** of an undisputed nature, in the context of the criminal investigation in question, consisting of a buccal swab (BY [X] STERILE HISOPES) for the realization of a **DNA analysis** that proportionate exclusively genetic information that reveals the identity of the person and its sex, and the realization of **comparative studies** necessary for the police diligences or judicial before explained.

According to the law 10/2007, which regulates the DNA police databases, as well as the Organic law 3/2018, from 5 of December, Protection of Personal Data and guarantee of digital rights and the EU Regulation 2016/679, the following **information** is provided:

1.º The police and judiciary **purpose** to realize the samples and the analysis of the biological samples is to identify the perpetrator of a crime, its court ruling, the clarification of the offense, and that the judicial authority in the criminal procedure determines the responsibility or his innocence.

2.º The samples about the biological analysis **will be analyzed in the accredited laboratories** by the National Commission for the forensic use of DNA. It is for the judicial authority to decide on the further preservation of such samples or traces.

3.º The data and results obtained after the analysis **can be used for the genetic identification on merely identifying DNA**, in the current investigation or in others, followed by the commission of those offenses for which the current legislation authorizes the regime and processing of DNA profiles, with this information being kept in police files for cases of criminal offenses.

4.º The **use and possible transfer** of data shall be adjusted to the applicable regulations and to the singular regulation of the files in which said information is recorded, by virtue of the provisions of Article 7 of Organic Law 10/2007, the data contained in the database covered by this Act may only be used by the Judicial Police Units of the State Security Forces and Corps, as well as by the Judicial and Prosecutorial Authorities. Likewise, the data contained in the database may be transferred to the judicial, prosecutorial or police authorities of third countries in accordance with the provisions of the international conventions ratified by Spain and which are in force, to the Autonomous Police with statutory competence for the protection of persons and property and for the maintenance of public security, for the investigation of the offenses listed in Article 3(1)(a) of this Act, as well as to the National Intelligence Centre, which may use the data for the fulfilment of its functions relating to the prevention of such offenses, in the manner provided for in Act 11/2002, of 6 May, regulating the National Intelligence Centre.

5.º The **cancelation** in the database of the identifiers obtained from the DNA will be carried out in accordance with the provisions of Article 9 of O.L. 10/2007 and will entail the removal of the DNA profile, personal data, and sample. The identifiers conservation obtained through DNA in the databases result of this Law will not exceed:

– the designated time in the law for the prescription of the offense

– the designated time in the law for the cancellation of the criminal records, if there is a guilty verdict due to the concurrence of exonerating causes for lack of imputability or guilt, except in the case of a judicial decision to the contrary.

In any case, once these decisions are final, it shall be canceled when a decision to dismiss or acquit has been issued for reasons other than those mentioned in the previous section.

6.º The affected can exercise their right to **cancel, delete, limitate the data**, in the cases and in the manner provided for in Articles 12 to 18 of Organic Law 3/2018, of 5 December, on the Protection of Personal Data, the guarantee of digital rights, and its implementing regulations.

The rights of access, rectification and cancellation of data can be exercised before the Ministry of Interior, Secretaría de Estado de Seguridad, calle Amador de los Ríos nº 2, 28071, Madrid. [1]

7.º Where the person under investigation/defendant is in custody, such consent shall be given with the assistance of a lawyer.

Having been informed of the above, HEREBY GIVES THE EXPRESS CONSENT to:

☐ The collection of biological samples, their analysis, and comparison in the judicial investigation, as well as their inclusion in the DNA database regulated in LO 10/2007.

Signed.: (person being sampled)	Signed.: Legal representative (minor)

In union of:

Signed.: Magistrate

Signed: Forensic Doctor

Signed.: Magistrate of the Court

ANNEX VIII: FORM/ACT FOR TAKING BIOLOGICAL SAMPLES FROM VICTIMS WITH INFORMED CONSENT IN CRIMINAL INVESTIGATION (FORENSIC MEDICINE INSTITUTES)

DATOS GENERALES

Pre-trial proceedings/Summary n.º ..... Court: .....

Criminal offense investigated: .....

Magistrate: ..... Member n.º.....

Donor: .....

Legal representative who authorized the take of the samples (in case of persons with judicially modified capacity)

Name and surname: .....

DNI/Passport: ..... Country: .....

Date and Birthplace: .....

Address: .....

DATA OF THE SAMPLING. CONSENT CLAUSE

In the dependencies of ..... located at ....., being ..... hours of the day ....., **consent** is requested to proceed to the **biological sample taking** of an undisputed nature, in the context of the criminal investigation in question, consisting of a buccal swab (BY [X] STERILE HISOPES) for the realization of a **DNA analysis** that proportionate exclusively genetic information that reveals the identity of the person and its sex, and the realization of **comparative studies** necessary for the police diligences or judicial before explained.

According to the law 10/2007, which regulates the DNA police databases, as well as the Organic law 3/2018, from 5 of December, Protection of Personal Data and guarantee of digital rights and the EU Regulation 2016/679, the following **information** is provided:

1.º The police and judiciary **purpose** to realize the samples and the analysis of the biological samples is to identify the perpetrator of a crime, its court ruling, the clarification of the offense, and that the judicial authority in the criminal procedure determines the responsibility or his innocence.

2.º The samples about the biological analysis **will be analyzed in the accredited laboratories** by the National Commission of forensic DNA use. It is for the judicial authority to decide on the further preservation of such samples or traces.

3.º The data and taken results after the realization of the analysis **may be used for the genetic identification of DNA**, exclusively for the current investigation.

4.º The **use and possible transfer of data** shall be by the applicable regulations and the singular regulation of the files in which such information is recorded, by the provisions of art. 7 of Organic Law 10/2007, so that the data contained in the database subject to this Act may only be used by the Judicial Police Units of the State Security Forces and Corps, also by the Judicial and Prosecutorial Authorities, in the crime investigation.

5.º The **cancelation** of the database of the identifications obtained by the DNA will be done following the stipulated in art 9. from L.O. 10/2007 and will result in the deletion of the DNA profile, personal data, and sample.

6.º The affected can exercise their right to **cancel, delete, limitate the data,** in the cases and in the manner provided for in Articles 12 to 18 of Organic Law 3/2018, of 5 December, on the Protection of Personal Data, the guarantee of digital rights, and its implementing regulations.

The rights of access, rectification and cancellation of data can be exercised before the Ministry of Interior, Secretaría de Estado de Seguridad, calle Amador de los Ríos nº 2, 28071, Madrid. [1]

Having been informed of the above, HEREBY GIVES THE EXPRESS CONSENT to:

☐ The obtention of the biological sample, the analysis and comparison in the reference police investigation.

Signed.: (person with the sample)	Signed: Legal representative (minor/)

☐ Inclusion in the police database on identifiers obtained from DNA regulated in LO 10/2007 and their use and transfer for use exclusively in the investigation for which the sample was taken.

Signed: (person with the sample)	Signed: Legal representative (minor/)

In association with:

Signed: Forensic Doctor	Signed: Magistrate from Justice Administration

GOBIERNO
DE ESPAÑA

MINISTERIO
DE JUSTICIA