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### REVIEW

## The need for cross-border exchange of genetic data for criminal investigation purposes in Latin America: implementation challenges ☆



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#### KEYWORDS

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**Abstract** DNA databases for criminal investigation purposes, constitute a tool of indisputable utility in the investigation of criminal acts.

In the countries of Latin America, there is a progressive advance in the implementation of databases for forensic use. The existing legislation is limited, and it is also heterogeneous both with respect to the crimes included and the procedural situation of the individuals whose DNA is subject to registration. Most of them do not require the accreditation of the forensic laboratories under the ISO 17025 standard. Existing DNA databases currently lack a standard communication regime.

The establishment of a system of consultation and exchange of genetic data in support of national criminal systems and the prosecution of crimes at the international level, demands cooperation agreements, for which, those implemented in the European Union since 1992, perfected with the decision of Prüm, constitute a valuable reference.

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#### PALABRAS CLAVE

Bases de datos de ADN;  
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de ADN;  
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América Latina;

**La necesidad del intercambio transfronterizo de datos genéticos con fines de investigación criminal en América Latina: retos para su implementación**

**Resumen** Las bases de datos genéticas con fines de investigación criminal constituyen una herramienta de indiscutible utilidad en la investigación de hechos delictivos.

En América Latina existe un progresivo avance en la implementación de bases de datos para uso forense. La legislación existente es escasa, y heterogénea, tanto respecto de los delitos que se

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## Decisiones Prüm

incluyen, como de la situación de los individuos cuyo ADN es pasible de registro. La mayoría no exige la acreditación de los laboratorios forenses bajo la norma ISO 17025. Las bases de datos de ADN existentes carecen, actualmente, de un régimen normalizado de comunicación.

El establecimiento de un sistema de consulta e intercambio de datos genéticos en apoyo a los sistemas penales nacionales y a la persecución de delitos a nivel internacional, demanda acuerdos de cooperación, para lo cual, los implementados en la Unión Europea desde 1992, perfeccionados con la decisión de Prüm, constituyen un valioso referente.

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## Introduction

The efficacy of DNA analysis has been more than proven in the field of criminal investigation and the penal process. Thanks to its scientific rigour and extremely high degree of reliability, it is now an indisputably useful tool in the identification of individuals involved in criminal activity, or to exonerate innocent people who have been unjustly sentenced. In the United States alone, more than 370 acquittals have been documented that were based on DNA tests carried out after sentencing.<sup>1</sup>

Within the field of criminal investigation study centres on comparing the genetic profile of the DNA obtained from a sample of unknown origin (biological residues found at a crime scene or other objects and elements of interest for the investigation in question, or even cadaveric remains that have to be identified), with that of a known or reference sample. The latter may have been taken from the suspected author of the crime, or if applicable from the victim or third parties who may have been involved. Nevertheless, when an investigation has no indications of who may have deposited the genetic material analysed, or when there is no known sample for comparison, genetic databases (GDBs) have been shown to be of indispensable value and should therefore be consulted strategically by investigators. GDBs are also an effective tool in the identification of cadavers when no family members are available to establish compatible relationships. They are also useful in cases with multiple victims, and in situations when conventional techniques have failed due to the condition of the remains that were found.<sup>2</sup>

Using GDBs to identify individuals makes it possible to detect links between criminals, crime scenes, and different types of crime. They are therefore indisputably useful in resolving crimes more quickly and effectively. Furthermore, they are considered to be a means of preventing and discouraging crime, as being included in a genetic profile database leads criminals to feel that they are more supervised and liable to detection. This is even more so for those who have reoffended.<sup>3</sup>

On the other hand, the fact that the use of GDBs went beyond national criminal investigations decades ago has to be taken into account. Judicial cooperation agreements between states now make it possible to validly search for and exchange DNA profiles internationally. Thus, approved processes and suitable resources allow national and interconnectable GDBs to help prosecute crime at an

international level. They also make it possible to discover the identities of those involved in transnational and multinational crimes more quickly.

This current context of the international transmission and interweaving of genetic data for the purpose of criminal investigation will be examined in terms of the regional cooperation within the European Union (EU). This is an archetype of the implementation of regional judicial cooperation, and its structures and norms could be taken as guidelines for adaptation to American and most particularly Latin American laws, which is the aim of this work.

## Cross-border exchange of genetic information in Europe

### Legal background

The first instrument to refer to the cross-border exchange of information within Europe was Recommendation (92) 1, of 10 February 1992 and adopted by the Committee of Ministers, covering the use of deoxyribonucleic acid (DNA) analysis within the framework of the penal justice system.<sup>4</sup> Article 12 stated that the exchange of genetic data should be restricted to the analysis of non-coding DNA, and that the study of DNA and the communication of conclusions could only take place between States whose laboratories or institutions complied with the recommendations and principles set out in the Recommendation and in existing treaties, together with art. 12 of the Data Protection Agreement.

Subsequently, the Resolution of the European Union Council of 9 June 1997 urged member states to consider creating GDB according to shared norms.<sup>5</sup>

However, the key agreement for the exchange of genetic data for criminal investigation was the Treaty of Prüm. This covered deepening cross-border cooperation and most particularly the fight against terrorism, cross-border criminality, and illegal migration, based on crossing genetic data, fingerprints, and vehicle number plates.

The EU included the basic stipulations of the Agreement into its judicial framework through Decision 2008/615 JAI of the Council, of 23 June 2008. This was known as the “Prüm Decision”,<sup>6</sup> and it was then complemented by Decision 2008/616/JAI of the Council on 23 June 2008<sup>7</sup> with regulations governing administrative matters and technical details.

The “Prüm Decision” obliged member states to create and maintain national DNA analysis files for the purposes of

identification and crime prosecution, while guaranteeing data protection during processing and transmission under the terms of its general stipulations. The regulation stipulates that files had to have reference indexes composed of the genetic profiles obtained by analysis of the non-coding part of the DNA of individuals affected by the measure, with a reference number, and no other datum that would permit the direct identification of the same. If profiles were unidentified they had to be defined as such, i.e., without being attributed to any individual (art. 2).

In terms of the processes involved in cooperation, the Decision envisages the consultation of DNA profiles and their automated comparison. Consultation may take place from the contact point of an interested State for a specific case for the purposes of criminal prosecution, using online access to the reference indexes of the DNA analysis files of all the other member states. If a concordance is found, the reference index will be sent to the enquirer in automated format (art. 3). If the domestic law of the enquiring State expressly permits transmission of the data, anonymous DNA profiles may be compared with the entire contents of the national reference files. After comparison, if the transmitted DNA coincides with existing records then enquiring state will be supplied with the reference indexes through its contact point (art. 4). Likewise, if a concordance is detected by the consultation or comparison procedures, it stipulates that the transmission of personal data must take place according to the domestic legal precepts of the enquiring Member State (art. 5).

Therefore, and as the final point, it should be underlined that another important instrument for the exchange of genetic data is Framework Decision 2009/905/JAI of the Council, of 30 November 2009, on the accreditation of forensic service providers who undertake laboratory activities, so that the signatory States are required to guarantee that a national body accredits the laboratories which produce profiles according to Norm ISO/IEC 17025, so that the results obtained by a participating State will be recognised as reliable by the other states.<sup>8</sup>

### “Prüm” exchanges in practice

There is no single database within the context of the Prüm regime for automatic searches, as the national databases of each Member State must be available to all of the other signatory countries.

Although it is possible to exchange genetic information, national databases use different software systems for comparison (while the majority use CODIS, other countries such as Germany, Austria, Denmark, France, Luxembourg, and the United Kingdom, among others, use other systems). To take part in cross-border comparisons, States have to configure their databases according to the required technical and administrative data security and integrity conditions. They have to use the agreed minimum standard set of loci and comply with shared ISO 17025 quality standards for the production of profiles, among other demands.

The member States may:

a) undertake automated searches for DNA profiles in other States' databases,

b) consult and compare DNA profiles supplied by a member State with those stored in the database of another state, to determine their concordance.

In the first case, the search will use an online access procedure to consult the other national databases. To this end, each country creates a copy of its own national database using a standardised structure that can be accessed using the DNA comparison software used in each country.<sup>9</sup>

When DNA data are consulted and compared, the exchange between States is carried out through the TESTA II (Trans European Services for Telematics between Administrations) communications network and networks developed subsequently. An enquiring country will send the request for consultation through each national contact point (NCP), and the receptor country will reply with a report on whether or not concordances have been found. This firstly enables the technical exchange of genetic profiles (Step-1) and then, if positive, it permits the exchange of information associated with the exchanged profiles that have generated concordances (Step-2).<sup>10</sup>

Step-1 exchanges may be carried out for “stain profiles” and “personal profiles” (the *Stain* and *Persons* categories), but not for mixed profiles or stain profiles which have already given a positive concordance with an individual in the national database. The result of crossing data may or may not be genetic concordance (*hit/no hit*). In case of concordance and after notification the local nodes involved must validate the results, and if it of interest for them, they will initiate the Step-2 phase of data exchange for the information connected with the profiles that were compared.<sup>11</sup>

In this case, it should be pointed out that in 2019 24 EU member States had fully working cross-border Prüm regime data exchange systems, with different levels of connection between them. Thus, while in 2018, the Netherlands exchanges genetic data with 23 members, Denmark only did so with 5 of them. On the other hand, although little quantitative information is available for cost–benefit and profitability measurement of the databases, the Prüm agreement has been shown to be a useful cooperation tool that has helped resolve serious crimes within the EU.<sup>12</sup> This was especially so in the first stage of the exchange, when a considerable number of concordances were obtained, as well as during the first years that the databases were operational.<sup>13</sup>

The ENFSI survey on GDB in Europe 2020 that was published in September 2021<sup>14</sup> reported on the number of profiles stored by member states according to records produced from 2017 to 2020. This shows that 14 832 604 profiles correspond to the *Persons* category (convicts, suspects, and arrested individuals), and that 2 484 732 correspond to the *Stains* category, having obtained a total of 1 695 172 “Person-Stain” matches.

We therefore understand that as the Prüm-based cooperation system implemented in Europe, together with the resulting norms, makes it possible to consult and compare genetic profiles between different states online, it is better than previous mechanisms in terms of its rapidity. These previous systems include individual judicial or police requests for cooperation and the International Criminal

Police Organization I-24/7 system, and the Europol Information System.

## The situation of genetic databases in Latin America

Latin American countries have entered into several treaties and have implemented mechanisms for international, judicial, and police cooperation in penal matters, especially within the framework of the Organization of American States (OAS). This regional body within the United Nations has promoted the implementation of several agreements, including the MERCOSUR Treaty, the Inter-American Convention on Mutual Assistance in Criminal Matters, and the Central American Integration System (SICA), among others.<sup>15</sup> Nevertheless, it has to be pointed out that there is currently no specific, harmonious, and compatible regulation for the automated exchange of genetic data at international level.

The States in the region have not entered into a multilateral agreement to create national GDBs for the prosecution of criminal activities, nor have they convened standardised processes for the automated consultation or comparison of genetic information, unlike the situation in Europe.

Within this context, it has to be said that the development of national GDBs for forensic use in Latin America is relatively recent and gradual. There is little relevant or uniform legislation respecting the crimes to be included or the legal situation of individuals whose DNA can be filed. Nor is there a uniform criterion on the organisational status of existing databases, and although the majority of these were created within the jurisdiction of Executive Power, either the Ministry of Justice (Brazil, Argentina at national level, and Chile, etc.) or the Ministry of the Interior (Uruguay), other GDBs are under the jurisdiction of the Judiciary and the Public Ministry (Costa Rica and Panamá, respectively).<sup>16</sup>

Respecting the general situation of GDBs in Latin America, the Interpol Report *Global DNA Profiling Results 2019* provides information on this point. This was drawn up on the basis of a worldwide survey about the use of DNA profiles and GDBs in its member countries. It requested 194 National Central Offices to supply their DNA statistics for the end of 2018. According to this report, which was based on the combined results of the 2016 and 2019 surveys in the Latin American countries which answered the survey, 8 stated that they use DNA analysis in police investigations (Bolivia, Brazil, Chile, Costa Rica, Guatemala, Honduras, Nicaragua, and Panamá). Seven countries reported that they had some type of GDB (Bolivia, Brazil, Chile, Costa Rica, Guatemala, Honduras, and Panamá), of which Brazil, Chile, and Guatemala reported that they had a specialised database for searching for individuals. Regarding the number of genetic profiles recorded at this time, Brazil reported that it had 18 064; Chile 78 733, Panamá 9097, and Uruguay had 19 655.<sup>17</sup>

With regard to the computer system that supports the DNA profiles storage and comparison databases, the majority have implemented the CoDIS (*Combined DNA Index System*) of the FBI, which is widely used internationally.<sup>18</sup> Other programmes used in the region are M-FISys (*Mass Fatality Identification System*) software, in the Genetics Laboratory of the Forensic

Anthropology Foundation of Guatemala<sup>19</sup> and the Argentinian Department of Forensic Anthropology<sup>20</sup> for the identification of individuals who have disappeared and human remains. The national programme developed in Argentina, GENis, has been installed in local DNA databases, the National Genetic Data Bank and the National Registry of Genetic Data of this country, where it coexists with the CoDIS. GENis is an open code and customisable system that is able to include regional and/or national data, and it was designed following ENFSI and ISFG norms and regulations.<sup>21</sup> It was also recently installed in México City for the genetic database of sexual aggressors of the said capital city.<sup>22</sup>

On the other hand, the Databases Commission of the Latin American DNA Analysis Workgroup (GITAD) carried out a study on the development of GDBs in Latin America, based on a survey of the public institutions that are members of GITAD or work with it.<sup>16</sup> Fifteen countries replied, of which 13 reported that they had criminal and/or missing persons databases, while 11 said that they had some type of legal regulation. Some Latin American countries have therefore implemented their GDB without any previous legislation.

This study showed that the predominant legislation in the region governing national databases is associated with the identification of individuals who have disappeared and human remains (Colombia, Ecuador, Peru, Honduras, and Argentina; while the relevant law in Costa Rica, which also has a database for criminal investigations, originated in a regulation issued by the Supreme Court of Justice there). Collaterally, the crimes which permit inclusion in genetic databases largely centre on the profiles obtained while investigating sexual crimes, followed by violent crimes. The subjects who are affected by the measure and included in files may be said in general terms to be individuals who have been convicted or are suspects.

To summarise, the following countries have formally constituted national GDBs for the purposes of criminal investigation: Brazil (Law 12.654<sup>23</sup> recently modified by Law 13.964<sup>24</sup>); Chile (Law 19.970<sup>25</sup>); Uruguay (Law 18.849<sup>26</sup>); Guatemala (Decree 22-2017)<sup>27</sup>; Panamá (Law 80)<sup>28</sup>; Argentina (Law 26.879);<sup>29</sup> and Costa Rica (Circular 90-2011).<sup>30</sup>

Comparative analysis of the said GDBs, considering the law which governs how they work, the body which controls them, the computer system that is used to support the databases and the subjects whose genetic profiles may be included in files are shown in [Table 1](#).

Another aspect which emerged from the said study is that the law in the majority of countries does not require obligatory accreditation under the ISO 17025 norm of the laboratories which supply the database with profiles. Argentina and Chile require legal accreditation by a state body, although Colombia requires ISO/IEC 17.025 accreditation. On the other hand, the minimum number of markers accepted by countries for analysis varies from 8 to 20 markers, so that there is a wide margin of difference in this respect. Lastly, the said work mentions the fact that the majority of databases do not directly communicate with others. Nevertheless, those which do so at a national level are connected manually or by using CoDIS software, while at international level they do so through Interpol, although (as will be seen below) concordances may be found, this comparison strategy is not very successful.

**Table 1** Formally constituted DNA databases for the purposes of criminal investigations in Latin America.

Country	GDB name	Norm	Controlling body	Software <sup>a</sup>	Subjects affected <sup>b</sup>
Argentina	Nacional Registry of Genetic Data (RNDG)	Law 26.879 (2013)	Ministry of Justice and Human Rights	GENis CoDIS	Convicted for sexual crimes
Brazil	Nacional Bank of Genetic Profiles (BNPG) - Integrated Genetic Profile Bank Network (RIBPG)	Law 12.654 (2012) Decree 7950 (2013) Law 12.037 (2009) Law 13.964 (2019)	Ministry of Justice and Public Safety	CoDIS	Convicted for violent and fraudulent crimes against life or sexual freedom or for a sexual crime against a vulnerable individual
Costa Rica	DNA Database	Circular No. 90-2011 of the Supreme Court of Justice (Regulation)	The Judiciary (Department of Forensic Sciences of the Judicial Investigation Body)	CoDIS	Convicted criminals Suspects Volunteers Family members of individuals who have died or disappeared
Chile	Nacional System of DNA records	Law 19.970 (2004)	Ministry of Justice and Human Rights	CoDIS	Convicted criminals Suspects Victims Family members
Guatemala	Genetic Data Bank for Forensic Use	Decree 22-2017	Nacional Institute of Forensic Science (INACIF)	CoDIS M-FISys	Convicted criminals Suspects Volunteers
Panamá	Forensic Bank of DNA data	Law No. 80 (1998)	Public Ministry (Institute of Legal Medicine and Forensic Science)	CoDIS M-FISys	Convicted criminals Suspects
Uruguay	Nacional Registry of Genetic Fingerprints	Law 18.849 (2011)	Ministry of the Interior	CoDIS	Convicted criminals The accused Victims

This table shows that there is no uniform criterion for the governing body of GDB, the status of the individuals whose DNA can be included in the records or the crimes which it includes. The CoDIS system is used in all of the GDBs, either exclusively or together with another system.

<sup>a</sup> Software according to: Da Silva et al.<sup>16</sup>

<sup>b</sup> Subjects affected: according to the text of the said norms.

According to the GITAD study, the countries with the largest numbers of genetic profiles in their GDBs, using data obtained in 2020, are Brazil (82 000), Chile (78 000), and Uruguay (63 000). According to government statistics, the number in Brazil amounted to 141 062 profiles.<sup>31</sup>

In this context, the Latin American countries that wish to share profiles outside their borders may do so through Interpol within the framework of the Agreement with the OAS, as they are members of the same. Interpol has a contact mechanism which makes it possible to consult, search, and exchange genetic data between member States, through their National Central Bureaux [NCB]). These are able to communicate with each other and with the General Secretary using its own communication system: the I-24/7 (a restricted access internet portal). Respecting the efficacy of this method, it has to be said that the 2015 Annual Report by Interpol described a small number of positive results in that year: only 81 in a total of 10 934 searches that were carried out among 159 909 registries, while in 2010 and 2005, there were 54 and 49 positive results, respectively. However, although subsequent annual reports (in 2017, 2019, and 2020) do not mention the number of positive results obtained when genetic data were crossed, Interpol has announced that it has more than 247 000 profiles supplied by 84 member countries.<sup>32</sup>

Latin American countries therefore currently lack a flexible means of communication between their national databases that would make it possible to consult and compare DNA profiles internationally, like the system implemented between EU countries based on the Prüm Decision.

### The need to implement and normalise the international exchange of genetic data in Latin America

As we have seen, GDBs are a valuable investigation tool as they make it possible to link the subjects who are involved in crimes, as well as different crime scenes and types of crime, helping to resolve crimes more quickly and effectively.

Interconnected GDBs contribute to the prosecution of crimes at an international level and the fight against organised transnational crime as well as crimes committed in several different countries, based on judicial cooperation agreements between States. This is even more effective if they are linked in real time, as investigators will be able to know quickly and with certainty, thanks to the quality norms



adopted, whether the genetic profile they seek is or is not stored in the databases consulted.

Within this context, and considering the existing treaties in Latin America in the field of reciprocal judicial assistance in the fight against crime, and the gradual but growing development of DNA databases for forensic purposes in the region, systems to promote their implementation should be established. These systems require certain fundamental minimal conditions together with judicial mechanisms for international cooperation for consulting and comparing genetic data, to standardise the harmonious transmission of profiles. They could be guided by the history, regulations, and experience of the European system, as described above.

Parallel to this and as standards for the creation and working of national databases, the recommendations of the DNA workgroup of the ENFSI (European Network of Forensic Science Institutes)<sup>33</sup> could be followed, as well as those the Interpol Group of Experts for DNA monitoring.<sup>34</sup> These underline the need to have specific legislation on which to base new laws or to modify existing ones, establishing the criteria for data inclusion or cancellation. That is, determining which genetic profiles should be registered during an investigation, including those in the evidence collected at the scene and those of the subjects, individuals convicted of serious or violent crimes, crimes against property, and suspects or individuals under arrest. This would not exclude the additional possibility of including the genetic data of volunteers and data corresponding to individuals who have disappeared, or to unidentified cadavers.

Regarding the working and quality management of the databases, ENFSI and Interpol experts state that appropriate infrastructure must be provided, based on the installation of special software for the automated comparison of profiles. Although the CODIS system is the most widely used worldwide, other types of software are also being used efficiently. In Europe, this is the case in Denmark, France, Germany, Austria, Luxembourg, and the United Kingdom, among others. In Latin America, Argentina, Guatemala, and Panamá use the GENis and M-FISys systems, respectively, which coexist with CoDIS. The experts also state that the laboratories which supply profiles must offer international guarantees of the quality of their analysis, for which the ISO/IEC 17025 norm is universally accepted.

It is therefore necessary to point out that the implementation of GDBs in Latin America and the instrumentation used for cross-border exchange must not ignore the need for standardisation within a context of the need for a minimum level of quality. This is especially so when establishing technical procedures and protocols, together with standards for sample collection, storage, and the chain of custody. This has the aim of guaranteeing the reliability of genetic analysis and thereby ensuring that its results are accepted in an investigation or criminal trial in a country other than the one where the sample was collected, where the DNA was studied or for the purposes of consulting or comparing profiles in a database.<sup>37</sup>

For the above purposes, the input of the scientists and experts contained in the ENFSI recommendations for the management of GDBs are highly useful. This is also the case for the “*Guía para implantar un sistema de calidad en los laboratorios de genética forense*” of the Spanish and Portuguese Group of the International Society of Forensic

Genetics (GEP-ISFG),<sup>35</sup> the “Minimum Requirements for the collection, analysis, and interpretation of DNA” (MRD 2), a prepared by the International Forensic Strategic Alliance - IFSA),<sup>36</sup> as well as the technical recommendations issued by the Nacional Commission for the forensic use of DNA in Spain (CNUFDNA),<sup>37</sup> as scientific guidelines and instructions which have to be followed to produce reliable results.

## Conclusions

Given the current situation of the incipient development of GDBs in Latin American countries, we consider it to be an opportune moment to progress in implementing reciprocal international assistance mechanisms that are flexible, secure, and efficient. For this purpose, we understand it to be of key importance that standardised instruments be implemented, together with protocols for judicial cooperation in the region. The systems used in European countries based on the Prüm Decision are a valuable reference for this, more specifically those for the DNA test and the consultation and comparison of genetic data for cross-border exchange and data crossing, as well as the harmonisation of precepts based on a minimal elemental regulation how national DNA databases should be established and work. They are governed by strict quality rules, and they also form a superior data transmission network that is useful for crime prevention, investigation, detection, and resolution.

This level of efficacy makes it necessary to establish an operational organisational structure that permits a flexible and reliable response, based on the use of appropriate computerised comparison tools, all within the framework of a multinational cooperation agreement.

Likewise, it is an absolute priority to invest in quality management systems for the laboratories in the different countries where genetic analysis takes place for the identification of criminals. As ISO 17025 accreditation is applicable to the activities undertaken in forensic genetic laboratories, it is the most widely accepted at an international level. This need is justified by the demand for the reliability and rigour of genetic analysis to be guaranteed, together with everything deriving from the said analysis in terms of prosecution or exoneration in certain criminal cases.

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