



DNA MONITORING EXPERT GROUP

Best Practice Principles:

Recommendations on the Use of DNA for the Identification of Missing Persons and Unidentified Human Remains

This document was written by the INTERPOL DNA Monitoring Expert Group and is designed to convey key considerations and recommendations for INTERPOL member countries wishing to use DNA for the identification of missing persons and unidentified human remains in police investigations.

The intended audience for this document is:

- Heads of forensic laboratories
- Heads of law enforcement agencies
- Legal and policy-making authorities
- Other criminal justice authorities.

Summary

The following document provides recommendations and policies to be addressed, for use by countries establishing or using a missing persons programme for the DNA-assisted identification of missing persons and unidentified human remains according to international standards. Countries are strongly encouraged to ensure that samples are correctly taken and analysed in accordance with established best practices, for the effective comparison of DNA profiles at an international level.

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Purpose of a missing persons DNA programme

When a person is reported missing or when human remains are found, national mechanisms need to be in place to enable the collected information to be centralized and compared. A vital component in the identification process is the comparison of DNA from the unidentified human remains and the missing person.

Despite the significant efforts made so far in DNA standards and preparedness for disaster victim identification (DVI), the DNA processes required for missing persons investigations on a routine basis remain largely unaddressed.

A number of countries have established national missing persons DNA programmes; however, the coordination for international casework needs to be adequately considered in conjunction with the necessary standards to enable routine and efficient identification.

International cooperation in missing persons investigations is highly advised in light of the following considerations:

- The ease of international travel for private and business purposes;
- Increased global migration;
- The consequences of growing international crime, including human trafficking;
- Vulnerability of migrants and refugees and their high risk of being a victim of a criminal act;
- Families of a missing person suffer from not knowing where their loved one is and cannot be issued a death certificate, which can have financial implications;
- Families have the fundamental right to know, and the right to justice, when a missing person has died because of a criminal act.

Recommendation

The INTERPOL DNA Monitoring Expert Group encourages all member countries to implement a missing persons programme according to the international recommended standards presented in this report. It is emphasized that identification efforts shall apply equally to all and shall not take into account a person's wealth, ethnicity or the circumstances of disappearance.

Countries need to acknowledge the importance of identifying the missing and deceased, and provide for adequate resources for these cases, in addition to those intended for standard casework. Although this recommendation deals only with DNA, it does not suggest that DNA be the only focus for a missing persons identification programme. All the generally accepted primary identifiers – dental, fingerprint and DNA – should be integrated and considered along with other information, such as medical data, physical characteristics, tattoos and property.

Additional guidance is provided in existing documents for disaster victim identification, such as the INTERPOL DVI Guide, as well as the guidelines of the International Society of Forensic Genetics, and the Scientific Working Group on DNA Analysis Methods (SWGDM) for missing persons casework (see References).

Collection of information on missing persons

Data collection shall, wherever possible, include direct samples from the person reported missing and reference samples from closely related biological family members (familial samples).

Good sources for direct samples are listed in Table 1. Direct samples are best used for comparison with DNA profiles from unidentified bodies. However, experience has shown that sometimes the material available for comparison (e.g. toothbrush) had been used by a different person. It is therefore highly recommended to use familial samples to support the authenticity of the direct sample(s). A reliable source of a direct sample may be medical samples, such as those obtained for newborn testing or biopsies.

Table 1: Guide to missing person DNA reference samples

Biological relatives	<ul style="list-style-type: none"> • Take samples from close biological relatives like parents, children and siblings. If possible, try to get samples from two or more relatives. • Good profiles will be obtained from buccal swabs and blood samples placed on FTA papers.
Self samples	<ul style="list-style-type: none"> • Good self-DNA profiles can be obtained from: <ul style="list-style-type: none"> - Extracted baby teeth or extracted third molars (wisdom teeth) - Samples from national bio-banks, bone-marrow donor programmes - Blood droplets obtained during neonatal screening for PKU (phenylketoneuria) - Other clinical blood or serum samples - Criminal police databanks, paternity-testing laboratories, reference samples from military services members - Samples from sperm banks - Dried umbilical cord - Pathology preparations embedded in paraffin
Personal objects	<ul style="list-style-type: none"> • Examples of belongings from which it is possible to extract DNA: <ul style="list-style-type: none"> - Toothbrushes - Razor blades/razors - Hair brushes and combs - Lipstick dispensers, deodorant rollers - Used cups and glasses - Used underwear - Cigarette butts and pipes - Motorcycle and other sports helmets, caps and hats - Ear plugs, headphones - Eyeglasses - Jewellery - Wristwatches

Taken from the INTERPOL DVI Guide 2014

Quality management

Collection of familial samples should include numerous samples (preferably at least two) from the missing person's closest relatives, along with a correct description of their biological relationship. The existing recommendations cited in the References provide good guidance.

The collection of reference samples shall be done after obtaining informed and written consent acknowledging the intended use of the samples and profiles, and the associated risks. The consent form shall also specify the possibility of international data sharing, where appropriate.

In some circumstances, cooperation with non-governmental organizations may be a good opportunity to have access to information concerning the missing person. These organizations may have additional requirements in order to provide information.

Collection of information from unidentified persons or unidentified human remains

Protocols for the collection of samples from unidentified persons or from unidentified human remains shall be established. These protocols should conform to the accepted standards, as detailed in the reference documents listed at the end of this report.

A DNA sample should be taken from those persons unable to identify themselves, such as infants, young children or persons suffering from certain medical conditions (e.g. amnesia). Buccal swabs or blood samples should be collected and preserved according to established best practices.

For unidentified human remains, Table 2 lists the recommended samples to take depending on the condition of the body. It is advisable to collect more than one sample to provide a range of testing options.

Table 2: Collection of samples from unidentified human remains

Condition of body	Recommended sample
Complete, non-decomposed corpse	<ul style="list-style-type: none"> Blood (on FTA paper or swab), and saliva (buccal, oral) smears
Mutilated, non-decomposed corpse	<ul style="list-style-type: none"> If available: blood and deep-seated red muscle tissue (~1.0g)
Complete, decomposed corpse or mutilated remains	<ul style="list-style-type: none"> Sample from long, compact bones (4-6 cm sections, window section, without shaft separation), or Healthy teeth (preferably molars), or Any other available bone (~10g, if possible; preferably cortical bones with dense tissue)
Severely burned corpses	<ul style="list-style-type: none"> All samples listed above and impacted teeth or tooth roots if present, or Smears from the bladder

Taken from the INTERPOL DVI Guide 2014

Handling and analysis of samples

Throughout transport and storage, the integrity of samples shall be ensured and maintained. Each sample shall be given a unique identifier in order to have a documented chain of evidence.

DNA analysis of the samples should include short tandem repeat (STR) typing with all markers available in the most advanced kits used in the different regions worldwide. Generally speaking, a combination of the European Standard Set (ESS) of loci, the U.S. Combined DNA Index System (CODIS) recommended markers, as well as D6S1043, will ensure a highly informative profile.

Appropriate protocols for the analysis of difficult samples (e.g. bones, teeth, paraffin-embedded tissue) should be established.

Samples should be retained to allow for additional testing (e.g. non-autosomal DNA markers, following the guidelines of the International Society of Forensic Genetics; see References), especially when incomplete STR results are obtained or when lineage markers need to be analysed. The retention of samples will also assist international searching and allow a confirmative analysis to be performed if the results are challenged.

Laboratories carrying out the analyses should be accredited according to ISO 17025 or an equivalent national standard.

Data handling and comparisons

All data handling must ensure the integrity of the data and protection against unauthorized access. Policies for retention and disclosure should be in place.

Electronic data processing should be compatible with international DNA data exchange formats, ideally those described in ISO/IEC.

A database should be established that allows both direct and familial comparisons to be made.

The possibility of comparing DNA profiles of unidentified human remains across other indexes, such as known offenders and crime stains, should be evaluated.

Minimum requirements to report the significance of potential identifications should be put in place.

Comparisons and reporting should make provisions for cases of non-relatedness of family members.

International data comparison

For international searching, the most effective strategy for countries is to send, wherever possible, the confirmed DNA profile of the reported missing person to INTERPOL. When a direct sample from the missing person is not available, the DNA profiles of closely related family members can be sent to INTERPOL with their consent.

Countries are encouraged to implement their national missing persons programme according to established principles for international searching. They are also urged to use the existing opportunities for international DNA sharing of missing persons and unidentified human remains, such as INTERPOL's Yellow and Black Notices, and the INTERPOL DNA Database.

References

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