

ICMP DNA REPORTS GUIDE

Distribution:
General
Sarajevo, 04th September 2006
ICMP.FSD.DNA.50.1.doc

GUIDE TO ICMP DNA REPORTS

1. Purpose of This Document

1. The International Commission on Missing Persons (ICMP) endeavors to secure the political and technical co-operation of governments and other authorities in locating and identifying persons missing as a result of armed conflicts. As part of its technical assistance to governments, ICMP provides a population-based, DNA led identification system capable of producing DNA identifications of large numbers of missing persons. This Guide to ICMP DNA Reports is intended for recipients of ICMP DNA Reports, to assist in understanding and interpreting the reports.

2. Background Information

2. Generally, the genetic information reported as a DNA profile is presented numerically in tables which contain characteristics of a person's DNA at a series of different genetic loci (singular, "locus"). A locus is a location on a person's DNA, e.g. segments of chromosomes such as D3S1358; D8S1179; D21S11; D18S51 and D5S818 in the example below (Exhibit 1). The more loci that are tested, the higher the statistical surety of a DNA based identification. The ICMP normally targets 16 genetic loci, including 13 that are standard for use in the United States, plus an additional three to provide additional individual discrimination or family matching. One of the 16 loci tested determines if the individual is male or female, while the remainders are "autosomal STR" loci that vary highly among individuals. STR means "short tandem repeat" and the characteristics of a locus can be defined as the number of repeated elements (usually in groups of four) that are present at that locus. For every STR locus tested by the ICMP, a person has two different copies (or "alleles"), one inherited from the mother, and one from the father. In Exhibit 1, locus D3S1358 has one copy (allele) with 15 repeat units and another copy (allele) with 18 repeat units. The inheritance pattern of these variable elements permits DNA typing to be very useful for identification of related persons.

Exhibit 1: Genetic Profile Sample

Loci	D3S1358	D8S1179	D21S11	D18S51	D5S818
Genotype	15, 18	12, 13	29, 31	12, 13	11, 13

3. The DNA Report

3. DNA match reports are issued by the ICMP when the genetic evidence for relatedness between the questioned sample and family reference sample(s) meets or exceeds a certain very high threshold. The DNA profile from the questioned sample is compared to profiles from family members of the missing, often from a large population database of reference families. If DNA is consistent with a relationship, statistical calculations are performed based on "genetic kinship analysis" to determine the strength of the evidence supporting the relationship. The strength of this evidence by DNA alone then needs to be considered in relation to other information, known in statistical terms as the "prior odds." In the ICMP match report we designate the prior odds based on the number of missing persons from a particular area, conflict, or event. By scaling the strength of the DNA evidence by the prior odds, we can arrive at a statement of the probability of relatedness between the questioned remains and the family members. Generally, the ICMP will issue a match report only if the probability of relatedness exceeds 99.95%. However, in a great majority of the cases the surety will be much higher than that. Based on the above considerations, the match report contains a written summary conclusion of the following form:

“The DNA results obtained from the bone sample XXXXX-125 are 1.25e12 times more likely if the bone sample originated from an individual related to the blood references in a manner as described on this report, than if the bone sample originated from another unrelated individual in the general population. The probability of relatedness as described in this report is greater than 99.999 % when using prior odds of 1/7000.”

4. When DNA is transmitted between generations, usually an exact copy is transmitted from parent to child. Sometimes, however, a “mutation” occurs so that the copy received by the child differs from that of the parent. The frequency and character of these mutations in the STR loci have been extensively studied, and the ICMP statistical calculations takes into account and evaluates the possibility that a mutation has occurred in a particular family. In such unusual cases, the match report contains a written summary conclusion of the following form:

“The observed inconsistency on loci D13S317 between the alleged son (00XXXX) and father (91XXX) appears to represent a mutational event. It is well established that such mutational events can occasionally occur, and the positive match statistics reported here have taken into account the probability of a mutational event.”

5. The ICMP DNA reports provide a listing of the genetic profiles on which a match is reported (although for reasons of genetics privacy, these profiles are generally released in coded form, as explained below under Data Protection). Comparison of the profile patterns between parents and offspring permit the genetic relatedness to be apparent by inspection of the profiles, matching the profile of an offspring to the alleles inherited from each parent (See Exhibit 1 below). However, it is generally not possible to visually recognize relationships between siblings based on genetic profiles; this is accomplished mathematically by the ICMP genetic kinship analysis.
6. The ICMP DNA report contains a heading (see Exhibit 1) listing the “Possible Identity” of the questioned sample as a particular named individual. This individual will have been reported missing, and the reference samples in the report will have been provided for this individual. However, DNA cannot distinguish among full siblings of the same sex. If, for example, multiple brothers are missing, all their names will then be included in the Possible Identity heading. It is also important to understand that if there are additional family members, say full brothers, that are missing, but NOT in the ICMP database as reported missing, then the DNA profile could be that of an unreported missing sibling even though his name is not listed on the report. For reasons such as these, it is imperative that the DNA Report be evaluated in the context of all available information in the case.
7. ICMP DNA reports need not necessarily list the genotypes of all relatives from which genetic reference samples have been collected. Usually, ICMP seeks to collect four preference samples per case, plus any number of auxiliary samples that ICMP may be able to obtain. Genotypes from auxiliary samples will be listed in DNA reports only if specific genetic events so require (e.g. mutations in the genotypes of preference samples).

4. Data Protection

8. ICMP treats as confidential genetic information that it holds in its databases. Generally, genetic information is not released to anyone but authorized ICMP personnel; or, in specified cases of formal agreement, uncoded genetic data may be shared with other agencies or institutions also involved in the identification process. Information may also be released in certain cases with the properly informed consent of the person represented by the genetic information or, if that person is deceased, with the consent of her/his relatives.
9. Unless a DNA report specifies otherwise, any genetic data included therein is encrypted to protect the genetic privacy of the individuals involved. Both the allele designations and the loci are encrypted so

that the information is protected from third party use, but the profiles can nevertheless be compared for purposes of evaluating the pattern of inheritance among the individuals.

10. Encryption also means that confirmation of ICMP DNA reports through third party testing, as may become relevant for purposes of prosecutions, requires decryption of the genetic information. ICMP performs decryption usually subject to the consent of the person represented by the genetic information or, if that persons is deceased, with the consent of her/his relatives. ICMP performs decryption using the Protocol Number and Public Key that are printed in the upper right and lower right corners of its DNA reports.

Possible Identity. Although there is a very high degree of confidence of identity the Pathologist vets this match

Case No. Is supplied by local authorities during recovery to identify the origins of the sample Barcode. Is generated by the I.C.D. which provides a unique, blinded ID for each sample sent for DNA analysis

Blood donors. Immediate family profiles are used as reference samples to find a matching bone/tooth sample

Evidence Photo. To preserve a forensic chain of custody a photo of the sample is taken thus ensuring accuracy

Location/Pathologist. This information is used during the review process and helps to ensure accuracy

Protocol No. Is a unique number used to describe the DNA Matching reports and revision history

Locus titles. The name of the physical location of a gene on a chromosome

Alleles values. Occur in pairs having a specific range of values combined with all Locus provide a "DNA Profile"

Recovered sample i.e. Bone or Tooth

Family Blood sample donors

Note. Statements of donors relationship to the "Sample" and statistical confidences are recorded here

Signature block. Qualified ICMP staff review each report and if they are satisfied sign and date the report

icmp International Commission on Missing Persons

DNA Report

Possible Identity:
Name: Joe (Tom) Locke

Protocol No.: 265363

Protocol Key: 754128137.0

Bone Analysis:

Loci	ICMP 1	ICMP 2	ICMP 3	ICMP 4	ICMP 5	ICMP 6	ICMP 7	ICMP 8	ICMP 9	ICMP 10	ICMP 11	ICMP 12	ICMP 13	ICMP 14	ICMP 15	ICMP 16																					
(X-No.413 9103036)	Allele 1	Allele 2	Allele 1	Allele 2	Allele 1	Allele 2	Allele 1	Allele 2	Allele 1	Allele 2	Allele 1	Allele 2	Allele 1	Allele 2	Allele 1	Allele 2																					
Genotype	12.9	13.7	04.6	06.1	23.5	23.5	10.6	12.2	09.9	13.7	09.9	09.9	09.1	09.9	06.1	07.6	07.6	08.4	09.1	09.1	08.4	07.6	08.4	07.6	09.9	07.6	07.6	X	Y	12.2	12.9	09.9	10.6	06.1	08.4	16.7	17.5
Search by loci	locus 1		locus 2		locus 3		locus 4		locus 5		locus 6		locus 7		locus 8		locus 9		locus 10		locus 11		locus 12		locus 13		locus 14		locus 15		locus 16						

Blood Analysis:

Wife	Suzi (Kirk) Locke																															
Genotype	10.6	12.2	05.3	06.1	23.7	25.2	09.9	10.6	08.4	08.4	06.8	10.6	09.1	09.1	08.4	09.1	07.6	08.4	07.6	09.9	07.6	07.6	X	X	10.6	11.4	09.9	10.6	07.6	08.4	16.7	17.5
Daughter	Emily (Joe) Locke																															
Genotype	10.6	13.7	05.3	06.1	23.5	23.7	10.6	10.6	08.4	09.9	09.9	10.6	09.1	09.9	06.1	09.1	07.6	08.4	07.6	09.1	07.6	08.4	X	X	11.4	12.2	09.9	10.6	08.4	08.4	16.7	17.5
Daughter	Anna (Joe) Locke																															
Genotype	12.2	12.9	04.6	06.1	23.5	23.7	09.9	10.6	08.4	09.9	09.9	10.6	09.1	09.9	06.1	09.1	07.6	07.6	07.6	09.1	07.6	08.4	X	X	10.6	12.2	09.9	09.9	06.1	08.4	16.7	17.5

Contact:
Daughter: Anna Locke, Main Str., 1000 Town, Country



Conclusion:

DNA profiles were obtained from the listed bone (X-No.413) and family reference blood samples. The DNA results obtained from the bone sample are 17.1e9 times more likely if the bone sample originated from an individual related to the blood references in a manner as described on this report, than to another unrelated individual in the general population. The probability of relatedness as described on this report is 99.99 % when using prior odds of 1/3000.

Site - Location:

Name	<u>Nevesinje</u>
Reference number	<u>22/33</u>

Pathologist:

Name	<u>Dr Petrovic</u>
Jurisdiction / Court	<u>District x</u>

Final Release Review (signature/date): _____