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Sub:- DNA Profiling – Reg.

Concept

DNA profiling (also called **DNA testing, DNA typing, or genetic fingerprinting**) is a technique employed by forensic scientists to assist in the identification of individuals on the basis of their respective DNA profiles. **DNA profiles** are encrypted sets of numbers that reflect a person's DNA makeup. Every strand of DNA has sequences, called Variable Number Tandem Repeats (VNTRs). A given person's VNTRs patterns come from the genetic information donated by his or her parents; he or she could have patterns inherited from his or her mother or father, or a combination. But a person can never have a pattern which either of his/her parents does not have.

Usage in investigation

Because a person inherits his or her VNTRs from parents, patterns can be used to **establish paternity and maternity**. The patterns are so specific that a **parental pattern can be reconstructed** even if only the children's patterns are known.

DNA isolated from blood, hair, skin cells, or other genetic evidence left at the scene of a crime can be compared, through patterns, with the DNA of a criminal suspect to **determine guilt or innocence**. VNTR patterns are also useful in **establishing the identity of a homicide victim**, either from DNA found as evidence or from the body itself.

Reference for DNA Profiling

A State-of-the-art DNA Profiling Lab has been set up in the State Forensic Science Laboratory.

While referring Cases for DNA Profiling it should be noted that recurring expenditure for conducting these tests are very high compared to other forensic examinations. Therefore, it is impractical to do DNA analysis in all Cases. It is also to be remembered that DNA typing is a very highly sensitive examination requiring uncontaminated samples. Any contamination may adversely affect the results and consequent wastage of costly chemicals used in the examination. The contamination can occur due to incorrect procedures followed while collecting the samples. Therefore, it is to be noted that DNA Profiling is not a substitute for thorough investigation and this technique should be resorted to only in cases where it is absolutely essential.

In this regard it is instructed that the Investigating Officers should obtain the approval of the concerned Range IGsP/IGP (Crimes) before proceeding to forward a Case for DNA analysis in the Forensic Science Laboratory.

In order to ensure proper collection of samples, detailed procedures for collection are given below for information and faultless compliance.

Procedure for Sample Collection

Now, the state Forensic Science Laboratory is accepting and examining cases involving DNA typing and it is very important to observe proper procedures in collection and forwarding of samples for DNA typing. The following guidelines may be referred to for this.

I. Samples for Paternity/Maternity cases

Sl No.	Sample	Method of collection
1.	The concerned individuals to be brought to laboratory	Blood can be collected directly from the persons concerned viz. the child, mother/alleged mother and father/alleged father, by finger prick in the laboratory itself by the concerned expert so that the sample can be received afresh. For collecting the samples, the individuals are to be brought to the laboratory after prior approval of date from the Director, Forensic Science Laboratory. Samples will be collected in the laboratory in the presence of witnesses with informed consent of the person in writing and after proper identification. Photograph of the person is also taken. Sample formats for identification, consent, declaration etc are also enclosed.

II. Samples for crime cases

Identification of unidentified bodies as well as the identification of the assailant from the available Biological samples like bone, stains of blood, saliva and semen, tissues, hair etc received in connection with various crimes will be examined. These samples are to be forwarded to the laboratory through the concerned courts for developing the DNA profile. Once the laboratory succeeds in extracting DNA and developing the profile, the sample sources for comparison – the parents/siblings/spouse of the unknown- are to be brought to the laboratory after prior sanction from the Director of FSL.

The procedure for collecting and forwarding of samples are given in the table.

Sl. No.	Sample	Method of collection
1.	Liquid blood	Liquid blood from the scene of crime may be collected in sterile cotton gauze without any kind of contact and contamination from other sources. Dry at room temperature, pack in clean paper or paper envelope.

Sl. No.	Sample	Method of collection
2.	Blood Stains	Collect the stained portion (dry at room temperature if not dried properly) pack in clean paper or paper envelope
3.	Tissue	Collect about 100 gms. of muscle tissue in a clean container and freeze immediately or keep in chilled saline protected with ice or keep the tissue in crystal salt and forward to the laboratory at the earliest. **Never preserve the tissue in formalin.**
4.	Fresh Bones with attached tissues	Preserve the **femur bone (if femur is not available, other long bones are preferred**) in a clean sterile bottle with crystal salt.
5.	Bones after the full loss of tissues	Pack the dry **femur bone (if femur is not available, other long bones are preferred)** in clean paper and forward to the laboratory. Completely burnt bones are not suitable for DNA typing.
6.	Teeth	Pack 2 to 3 the molar teeth (if molar teeth are not available, premolar, canine or incisors can be used) in paper.
7.	Hair with root and root sheath	Pack in a sterile bottle or envelope
8.	Vaginal swabs and smears	Vaginal swabs should be dried completely before packing. Well dried swabs and smears can be packed in clean paper or in dried sterile bottle.
9.	Cloth items stained with Saliva, semen, blood or other body fluids	The cloth items which are suspected to be stained with semen, saliva, blood etc. are to be dried at room temperature **(never in sunlight)** and each item should be packed separately in clean paper without contaminating the stained portions.
10.	Unidentified body, left out fetuses etc.	1. If not putrefied, preserve the femur and muscle tissue in crystal salt or keep frozen till it reaches the lab 2. If putrefied, preserve the femur in crystal salt or keep frozen till it reaches the lab
11.	Uterine tissue and/with fetus/embryo	1. Keep the tissue samples frozen till it reaches lab 2. Preserved in chilled saline kept in ice till it reaches laboratory **Never preserve the tissue in formalin.**

Note:

1. The number of Samples forwarding for DNA typing should be limited to absolute minimum.

2. For all kind of examinations, the samples should be forwarded with a dully filled up forwarding note bearing necessary certificate of authorization countersigned by the forwarding authority.

III. Question to be asked when DNA Samples are forwarded to the laboratory.

1. For paternity cases it may be asked for conducting DNA Typing to find out Paternity/Maternity of the child.

2. For comparison of DNA from various samples in crime cases, with DNA of the victim or accused specific questions should be asked as to which of the samples among the various items forwarded to the laboratory should be subjected to DNA typing for comparison.

IV. Precautions to be taken while collecting samples for DNA Analysis

1. Wear gloves when samples are collected
2. Do not touch sample with bare hands
3. Avoid contamination between samples
4. Never pack wet samples- Always dry stained items before packing.
5. Avoid bottles and containers as far as possible when packing stained items. Always prefer clean paper.
6. Never preserve samples in formalin
7. Never pack more than one item in one packet
8. Bring samples to the lab at the earliest.
9. Contact Scientist in DNA Division for any clarifications

DIRECTOR GENERAL OF POLICE