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Perspective

Touch DNA and its Importance in Forensic Investigations and Uses

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DESCRIPTION

Forensic science is a multidisciplinary field of research that assists in the investigation of a crime in order to connect a suspect to the crime. The best approach to apprehend a criminal is to analyze the DNA sample collected from the crime scene and comparing it with the suspect's reference sample. Analysis of DNA samples is important because when a criminal gets in contact with the crime scene items; there is indeed a transfer of genetic material (DNA) or fingerprints that occurs during the course of criminal activity. Residues of the criminal (DNA) on the surface with which he interacts is the place from where sample can be collected for identification purposes. This DNA collected from the crime scene is classified as contact touch DNA.

Even though Touch DNA is not apparent to the unaided eye and is normally recovered in lesser quantities comparing with the DNA obtained from body fluids such as blood, semen or saliva stains however, importance of such type of evidence can never be underestimated particularly in scenarios where above mentioned stains are not readily available. Recent advancements in technology have offered sophisticated tools and alternative methods to search for the probative touch stains from variety of surfaces. This review highlights the significance of touch DNA, challenges and recent developments to improve the existing methods of touch DNA analysis in order to generate concrete DNA profiles thus assisting the Criminal Justice System.

With the technical advances in the field of forensic DNA and the reduced quantity of biological material needed to generate a full DNA profile, it has become standard procedure to collect the minute quantities of biological material accumulated on inert surfaces. The initial analysis by van Oorschot and Jones showing the potential to generate DNA profiles from touched objects illuminated the incidence of secondary transfer through touch of identifiable DNA quantities. Trace DNA analysis seems to be an important component of the forensic laboratory and a vital tool for detectives. Therefore, substantial research has been conducted out to explore the attributes of trace DNA and the effective way for enhancing its aggregation, amplification.

Touch DNA also known as Contact Trace DNA or low Copy Number (LCN) DNA is typically considered to be the outcome of DNA collected from shed skin cells transmitted during physical interaction from the donor to an object or individual and is based upon the Locard's exchange theory, any contact leaves a trace. Every day, humans shed tens of thousands of skin cells with an average of around 400,000 cells expelled by an individual per day. These cells are deposited to surfaces that come in contact with our skin. When a crime happens, an adequate number of skin cells may be found deposited on an object or surface that is touched by the offender at the scene of crime. Touch DNA analysis can connect the suspect to the crime scene if the touched object is gathered as a potential evidence source.

Contact DNA is often referred to as Epithelial DNA. Same conventional techniques are used to process the touch DNA samples as for other body fluid stains, but the examination is on the residual epithelial cells. Epithelial cells are frequently left behind when a person touches or comes in contact with an object. The sources of human DNA in a contact sample have not been unequivocally illustrated, however several recent studies have suggested that shed coenocytes nucleated endogenous or transferred epithelial cells fragmented cells and nuclei and cell-free DNA are likely to be included. Sweat includes extracellular DNA that could lead to the profiles of DNA derived from the surfaces which are touched.

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