



B14 Effect of Cyanoacrylate on DNA Typing of Human Fingerprints

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After attending this presentation, attendees will learn the best method for recovery of human DNA from superglue fuming fingerprints.

This presentation will impact the forensic community and/or humanity by describing the best method for recovery DNA from fingerprints.

The purpose of this experiment is to know the effect of superglue fuming on the object to enhance fingerprints but still allow for recovery of DNA from the person.

Cyanoacrylate or superglue is one of the most well-known methods for detection of latent fingerprints in forensic analysis. It works well on non-absorbent surfaces. Fingerprints are composed of many complex chemical components such as amino acids, fatty acids, hydrocarbons, and proteins. The epithelial cells can be found on the print residue by sloughing off the skin surface through rubbing of the skin or through direct contact with a substrate. In some cases, the detection of fingerprints at the crime scene is useless because of smudging of the prints or many fingerprints appear on the object at the same point so detection of DNA from the fingerprints may be more useful. The use of Polymerase Chain Reaction (PCR) analysis has allowed small quantities of DNA to be detected.

The recovery of human DNA from soda cans that have been previously treated with cyanoacrylate or superglue to enhance latent fingerprints is possible. For these experiments, The QiaAmp (Qiagen, Valencia, CA, USA) extraction kit was used extract DNA by using a tissue extraction method and elution buffer of 30 μ L per one sample. The DNA samples were amplified with AmpF/STR® Cofiler™ kit (Applied Biosystems, Inc. Foster City, CA USA). In the experiments, two types of chambers were used. The first one was a portable plastic chamber and superglue wand that can be used in routine forensic laboratories or at crime scenes. The second one was a CYANOSAFE™ Filtered Cyanoacrylate Fuming Chamber (Sirchie® Fingerprints Laboratory, Inc. Youngsville, NC, USA) which is the automatic superglue fuming chamber. It needs only a small amount of superglue and some water put in a small cup and preset the time. Both chambers provide good results of superglue enhancement on the fingerprints and a DNA profile. The profiles from superglue fuming in the plastic chamber with the superglue wand for 30 minutes gave good fingerprint patterns. Fingerprints can be seen clearly and can be swabbed by using a cotton bud soaked with acetone. The use of acetone to recover the DNA from a fingerprint sample is not a standard practice in most forensic laboratories that use water, a saline solution, or scraping for recovery. DNA can be extracted from fingerprints fumed with superglue from 20- 40 minutes. The best results came from fuming for 20-30 minutes. The more superglue used, the worse the DNA profile results. The DNA results were both full and partial profiles depending on the quality of the fingerprints. From these experiments, It was determined that fingerprints on dry surfaces gave better DNA profiles than from wet surfaces. Although a wet surface gives partial profiles, it displayed variable results for recovery from experiment to experiment. From some experiments, DNA can be extracted from a single fingerprint but it was often a partial profile. The more fingerprints combined together into one sample, the better the DNA profile results suggesting recovery of DNA is from very few cells (low copy number approach). The negative control untreated fingerprints provided better DNA profiles than the superglue fuming fingerprints showing it is the fuming process and sample recovery technique that affects the DNA test.

Cyanoacrylate or superglue affected the extraction of DNA by decreasing the quantity of DNA. However, using acetone and by combining fingerprints, DNA can be extracted and results obtained from the superglue fuming fingerprints.

Cyanoacrylate, Fingerprints, DNA