



### A21 A Systematic Approach to the Analysis of DNA From Earrings in Varying Conditions

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The goal of this presentation is to demonstrate the possibility of generating a usable DNA profile from samples collected from stud earrings, to investigate whether or not the raw material used to construct the stud earrings can influence the quantity of DNA recovered from the jewelry surface, and to examine the effects of outdoor environmental conditions on both DNA quality and quantity.

This presentation will impact the forensic science community by investigating a DNA-bearing source that could produce a DNA profile when more commonly used sources, such as body fluids or tissue, are not left at the crime scene, or are not in an analyzable condition.

A variety of evidence can be collected from crime scenes and includes items such as hair, fingerprints, bodily fluids, personal effects, and weapons. From these materials, investigators attempt to isolate information pertinent to both victim and perpetrator identification. Although new research is constantly being conducted to maximize the amount of trace DNA that can be collected from evidence and to incorporate new DNA-bearing sources, it is still lacking in several areas. Specifically, there are no discovered studies, to date, that systematically investigate the potential for jewelry and other personal effects commonly found at crime scenes to be acknowledged as options of items bearing viable DNA. Because earrings are commonly worn by both sexes in our society, they represent good potential sources for the collection of DNA samples when more commonly analyzed sources are not available. Personal effects found in association with the crime scene may serve as circumstantial evidence to link a victim or suspect to that location. DNA collected from such items may also be useful when known comparison samples are available to assist in identifying missing persons or other unknown decedents. This presentation will benefit the forensic community by investigating a DNA-bearing source that could produce a DNA profile when more commonly used sources, such as body fluids or tissue, are not left at the crime scene, or are not in an analyzable condition. For example, jewelry can be accidentally removed from the body during a struggle, or taken by a perpetrator as a trophy during a robbery or assault. The ability to link a potential suspect or victim to an area where an assault previously occurred would be beneficial to crime scene investigators. In addition, a body may be discovered in a condition that is not conducive to positive identification via more traditional means such as fingerprint, dental, or DNA typing of the body itself. In such a situation, the ability to generate a DNA profile from associated personal effects would be valuable to the investigation.

The goal of this project is to determine whether amplifiable DNA can be collected from epithelial cells deposited on earrings composed of three common metals: gold, silver, and surgical steel, and whether environmental exposure could compromise the ability to generate a DNA profile. The gold, silver, and surgical steel studs were worn by participants for varying amounts of time ranging from one to five hours. The earrings were then removed from the participants' ears and immediately swabbed along the posts and earring backs with sterile cotton swabs. The earrings were returned to the participants and worn again for at least one hour. The studs were once again removed from the participants' ears, placed in mesh containers, and positioned in an outside location where they were exposed to the ambient environment. The earrings remained outside for four days and were exposed to rainstorms, high winds, and ultraviolet radiation from the sun. The studs were removed from the mesh containers and swabbed once again on the posts and earring backer.

The DNA collected from the swabs was extracted using a common commercial kit and all samples were quantified using real-time PCR. All earring materials yielded quantifiable DNA of varying amounts suggesting earrings made from gold, silver, and surgical steel are potentially valuable personal effects for the generation of a DNA profile. In addition, DNA typing of the samples suggests that forensically significant profiles can be generated from earrings made of common metals, even when exposed to adverse weather conditions.

#### **DNA, Suboptimal, Earrings**