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A SIDE BY SIDE COMPARISON OF DNA COLLECTION TECHNIQUES IN ORDER TO RECOVER SHED DNA

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The United States Army Criminal Investigation Laboratory (USACIL) has been instrumental in supporting the Army Criminal Investigation Division (CID) since the early 1940's. The USACIL is often tasked with determining the wearer of an article of clothing. The collection technique is critically important because the first collection yields the greatest chance to recover the most DNA from a garment. In our study, three collection techniques were examined: swabbing, taping, and cutting. In order to determine which region of a shirt might yield the most DNA, five different areas were subjected to each collection technique.

Two brand new T-shirts were given to seven volunteers to wear while sleeping. Each shirt was to be worn only once on separate nights. A questionnaire was given to the participants for each T-shirt and each T-shirt was to be kept separate from each other. No limitations were placed on the participants concerning sleeping partners other than to note it on the questionnaire. DNA was collected from the inside areas of the collar, underarm, sleeve cuff, front, and back. One of the two shirts was divided in half and each of the five areas was swabbed separately. The remaining half of the shirt was taped in the same areas and the tape was then swabbed. The remaining shirt was treated the same way as the first, except one half was swabbed and the other half had four small cuttings taken from each region. The samples were organically extracted, quantified with Quantifiler®, and amplified using the Identifiler® amplification kits. The amount of DNA recovered and the quality of the profiles generated were compared.

The results indicate that taping and swabbing are comparable when it comes to recovering the shed DNA from the T-shirt. Both techniques yielded enough DNA (≥ 250 pg) to amplify and generate the majority of the profile for most of the samples collected. The cutting technique resulted in most of the samples yielding too little DNA (< 250 pg) to amplify. Some mixtures were obtained, but the wearer was the major donor in each case except for one in which a 50/50 mixture was observed. When comparing the DNA yield from the five regions of the shirt with one another, the front and back seemed to give slightly better results than the other three. This may be because these regions had the largest surface areas, not necessarily because DNA gets transferred to them easier.

The results from this experiment lead us to recommend either taping or swabbing when trying to recover shed DNA from clothing.

The views of the author do not purport to reflect the position of the department of the army or the department of defense.