B160 Recovering Biological Samples From Crime Scene Using FTA Paper

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Attendees will learn to recover biological specimens from crime scenes using a novel approach that could facilitate the future practical work in the future.

This is a practical approach to help in one of the main problems in crime scene investigation and in DNA labs: how to properly recover, store, and analyze biological samples.

Proper collection and preservation of biological evidences recovered from the scene of a crime is crucial to facilitate the analysis and interpretation of all analytical results, including DNA typing.

FTA® paper is a well-known and widely used media to collect and store biological materials for DNA or RNA analysis. Its uses are primarily focused on the generation of clinical and forensic databases, although it has also been used for preservation of other biological materials, such as plant, animal, and bacterial specimens.

One of the main advantages of FTA is its ability to preserve biological materials at room temperature. When specimens are spotted or applied to FTA cards, cell membranes and organelles are lysed, and the nucleic acids are released, causing both DNA and RNA to become entrapped in the fibers of the matrix. FTA cards rapidly inactivate organisms, including blood borne pathogens, and prevent the growth of bacteria and other microorganisms. Therefore, biological samples such as blood or saliva can be preserved at room temperature. It is also important to mention that archived samples are ready for analysis in less than 30 minutes.

Because of the above advantages, we are evaluating the utility of FTA paper as a reliable support to collect and store biological specimens that are usually found and collected at the scene of crime. For this study we have spotted blood samples (1, 5, and 10 microliters) on different surfaces (wood, cotton, tile, glass, and carpet); samples were collected after 3 different periods of time: one day, one week, and one month. Two different methods of recovery are being evaluated. The first method is moistening the FTA paper with sterile distilled water and then pressing the FTA paper on the stain; the second method is moistening the dried stain with sterile distilled water and then blotting it with the FTA paper.

DNA purification was performed following the recommendations from the manufacturer (Whatman Inc., Clifton, NJ), using FTA purification reagent and 1.2 mm punches. DNA analysis was performed using both PowerPlex16 (Promega), and Identifiler (Applied Biosystems). Results were visualized in a capillary electrophoresis system, model ABI-310 (Applied Biosystems).

Results show that FTA paper is an ideal medium to collect dry blood specimens from hard, non-abosrbent surfaces, such as glass, tile, and wood, where it has been possible to recover and amplify DNA from very small samples of blood, as small as 1 microliter. It's also a good media to collect samples from absorbent surfaces such as carpet and cotton, although the performance depends on the size of the stain (amount of microliters of blood spotted). The best approach in our hands is to first moisten the evidence, and then apply and press with FTA paper. We are currently evaluating the usefulness of FTA paper to recover saliva and semen samples from mock crime scenes, with positive preliminary results.

Considering the above mentioned results, FTA offers several advantages as a support for collecting and preserving biological samples recovered from the scene of crime. First, it is simple to recover samples from the crime scene since it is only necessary to wet and apply the FTA paper. Second, it is possible to transport and store samples at room temperature for a long time. Third, the original substrate (the place where the blood was deposited in the crime scene) is preserved, since there is only a transfer of cells from the substrate (i.e., the wood or the tile) onto the FTA matrix. Finally, a fourth advantage to consider is the use of a single method for collecting and storing different kind of samples that would be achieved by using FTA for crime scene collection.

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