B19 Evaluation of Zeolite as a Substrate for Collection and Storage of DNA

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After attending this presentation, attendees will have learned about the chemical composition of zeolites, the value of zeolite in collection and storage of blood, the results of DNA extraction from blood stored on zeolite over time, and the results of DNA extraction from other biological fluids collected with zeolite.

This presentation will impact the forensic community and/or humanity by demonstrating a new method of recovering blood at crime scenes for later analysis which would reduce the possibility of exposure to blood borne pathogens by crime scene and law enforcement personnel. This type of recovery of DNA from the used bandages synthesized with zeolite may also be useful for military investigations.

There has been a development in the area of battlefield medicine, consisting of a hemostatic agent made of unique materials. This is the QuikClot® hemostatic agent, made of zeolite, a silicate made from equal parts silicon tetroxide (SiO_4) and aluminum tetroxide (AlO_4). To acquire hemostasis, zeolite in the QuikClot® absorbs liquid in the blood, which is an exothermic reaction. The positive results from this bandage have been so promising that QuikClot® has already been deployed to armed forces and law enforcement agencies.

This study has been initiated to determine the efficacy of recovery of DNA from blood bound in the zeolite. There are four areas of interest in this study: 1. Recovery of DNA after introducing it to the zeolite; 2. Recovery of DNA from blood samples (whole blood) immediately following deposition onto the zeolite; 3. Recovery of DNA following storage of blood mixed with the zeolite at -20°C freezer for periods of 1 week to 4 years and; 4. Recovery of DNA following storage of blood mixed with the zeolite at room temperature for periods of 1 week to 4 years (beginning in June 2006 and ending in June 2010). These last two areas of interest are to determine the efficacy of using such materials for storage of blood samples for DNA recovery that may be useful for DNA databases. Preliminary tests resulted in successful extraction of the DNA sample. Analysis of saliva, sweat, and semen will also be tested using the same substrate.

It is felt that the application of this study has potential for demonstrating a new method of recovering blood at crime scenes for later analysis which would reduce the possibility of exposure to blood borne pathogens by crime scene and law enforcement personnel. Additionally, there is the potential of using this agent as a means for obtaining DNA samples of suspects, who might use such products in an attempt to self-treat wounds received in violent encounters with law enforcement officers in order to avoid situations where the suspects put themselves at risk for detection and arrest, i.e., arriving at a hospital emergency room, seeking treatment for gunshot wounds. Furthermore, recovery of DNA from the used bandages may be useful for military investigations, as QuikClot® has already been deployed to U.S. armed forces.

Zeolite, DNA Extraction, Storage

 ** Presenting Author*