C13 The Role and Challenges of the Microscope in a Mobile Analytical Setting

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After attending this presentation, attendees will have an awareness of the advantages and shortcomings of the microscope in a mobile lab, especially in the context of the analysis of chemical and biological warfare agents.

This presentation will impact the forensic science community by illustrating how various complementary techniques can be used to make an identification of an unknown substance in the most challenging circumstances.

The microscope is an intrinsic component of any forensic, environmental, or analytical laboratory, and as such it plays a significant role in the mobile analytical lab setting. A microscopical visual examination of an unknown substance will often yield enough information for an identification to be made, or conversely, it could provide an indication of the absence of certain hazardous materials. One particular mobile lab setting where the microscope plays such a role is

used by the National Guard's Weapons of Mass Destruction – Civil Support Teams (WMD-CSTs). These analysts provide support to civil authorities as first responders during incidents that may involve weapons of mass destruction. Each state and U.S. territory has at least one WMD- CST and a mobile lab equipped with a polarized light microscope capable of epifluorescence microscopy and infrared microspectroscopy. These tools are used in order to establish the presence or absence of chemical and biological agents. Because these analysts are working with potentially life-threatening substances, certain precautionary measures must be taken before, during, and after an examination with the sample. These procedures include the use of sealed slides or permanent mounting media, preparing samples in a contained glove box, and decontamination steps. Such methods, though necessary for the protection of the analyst, are not always conducive to microscopical analyses. As such, there are some challenges and limitations to the capabilities of the microscope in these settings.

This presentation will discuss the use of the polarized light microscope, fluorescence microscopy, and infrared microspectroscopy in the detection of chemical and biological substances. These various techniques frequently complement each other and together may form the basis for the identification of an unknown substance. Special attention will be given to the important role of the microscope, which includes its advantages as well as its shortcomings in the mobile analytical lab. **Microscopy, Mobile Laboratory, CBRNE**

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