



B24 Development of an Automated Sperm Detection System for the Identification of Sperm on “Christmas Tree” Stained Slides

Luigi Armogida, BS, B&B Microscopes, Ltd., 535 Rochester Road, Pittsburgh, PA 15237; Dale L. Laux, MS, Attorney General Jim Petro's Office, Ohio Bureau of Criminal Identification, 4055 Highlander Parkway, Richfield, OH 44286; Erin Fetzer, MS, Attorney General Jim Petro's Office, Ohio Bureau of Criminal Identification, 1560 State Route 56 SW, London, OH 43140; and Gabriel Feltner, BS, Attorney General Jim Petro's Office, Ohio Bureau of Criminal Identification, 1616 East Wooster Street, Suite 18, Bowling Green, OH 43042*

After attending this presentation, attendees will learn that slides can be examined automatically at the microscopic level for the presence of spermatozoa.

This presentation will impact the forensic community and/or humanity by demonstrating that the identification of sperm has been and remains to this day the single, most confirmatory test for the determination of sexual activity. Unfortunately, the microscopic examination of slides is one of the most tedious and time-consuming activities in the forensic biology laboratory. A new product, KPICS Sperm Finder™, examines slides automatically, freeing the analyst for other forensic duties.

The system scans, photographs, processes, and maps features within the slides for confirmation later by an analyst. KPICS Sperm Finder™, developed by B&B Microscopes, Ltd, is currently being validated jointly by the Ohio Bureau of Criminal Identification and B&B Microscopes, Ltd for use in forensic laboratories. The system is designed to assist the analyst by automatically locating sperm and moving the sperm into view under the microscope. This design conforms to current protocols while dramatically decreasing the time an analyst spends searching for sperm.

KPICS (Keruechtrot-Picroindigocarmine Stained) Sperm Finder™ has been developed to scan multiple “Christmas Tree” stained slides, automatically focus, capture, and analyze mapped images. After processing, any cell, identified as a sperm, can be displayed on screen as well as under the microscope for confirmation by an analyst. The data is saved as a map that can be loaded for re-analysis of the slide at a later date. Each sperm has a stored location mapped to a file associated with the slide allowing the computer to consistently move to each location of a sperm.

Although analysts can easily identify sperm using the “Christmas Tree” stain, imaging systems of the past would not accurately identify the cells under typical conditions. B&B Microscopes, Ltd combined the latest technology available with custom modifications designed by B&B Microscopes, Ltd enabling the introduction of this new tool to the forensic community. Over 100 algorithms are applied within moments to allow the computer to identify sperm in a process similar to the human brain. Moreover, the system applies identical processing to each field in a repeatable manner that automatically adjusts to the nuances in the “Christmas Tree” stain. Although staining protocols must be strictly followed, KPICS Sperm Finder™ adjusts for normal variations. Overstaining, understaining, minimal cell number and additional debris are processed in a similar manner compared to the way the brain compensates for these variations.

The major advantage of the KPICS Sperm Finder™ is that the computer sorts through the mundane task of identifying the presence of sperm within a smear and then directs an analyst to those locations. As a rare event locator, the system also reduces eyestrain by bringing positive cells to the analyst via the motorized three-axis stage. The ergonomic advantages of reducing the repetitive motion of constant manual scanning and reducing the time needed to view through a microscope will be discussed in more detail during the presentation.

KPICS Sperm Finder™ has been developed both to recognize sperm heads lacking tails, a common finding encountered in casework, and sperm with tail still intact. In addition to analyzing thousands of fields automatically, the system can be used to document key locations of intact sperm in three-dimensional space (X, Y, Z coordinate system) for reports as well as automatically move to marked locations at a later time. Furthermore, the system can also be used as a standard microscope for color microscopic photo documentation in both manual and semi-automatic modes.

A demonstration of the versatility of KPICS Sperm Finder™ in automatic, semi-automatic, and manual modes will be available at the conference.

Automated, Sperm, Identification