A167 Body Fluid Identification by Mass Spectroscopy

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The goal of this presentation is to demonstrate the usefulness of mass spectroscopy for routine body fluid identification.

This presentation will impact the forensic science community by discussing how successful completion of this work will establish a fast, reliable, sensitive, and confirmatory test for body fluid identification in a single assay significantly improving forensic testing for body fluids.

It is proposed that body fluid specific peptide fingerprints can be used to simultaneously detect multiple body fluids from a mixed sample in a single confirmatory test with high sensitivity and discriminatory power.

The nature of biological forensic evidence is complex and challenging. This is particularly true for body fluids which are composed of both cellular and non-cellular components and are often present in mixtures of varying ratios and in small amounts. Conventional forensic methods used for body fluid identification are typically performed serially, are often labor-intensive, technologically diverse (requiring personnel skilled chemical, immunochemical and microscopic techniques), costly in terms of time and sample, and not always confirmatory. The goal of this work is to identify multiple, body fluid specific proteins from which to assemble unique peptide fingerprints that can be used in a single confirmatory tests for all body fluids present in a sample.

The five body fluids under investigation are: semen, saliva, blood, menstrual blood and vaginal fluid. The ideal peptide fingerprint would consist of three peptides from each of three proteins that are unique to or highly enriched in each body fluid. Positive body fluid identification would require the detection of all, or nearly all, fingerprints peptides. Methods for fingerprint identification include: protein extraction and separation by isoelectric focusing (IEF), peptide separation by liquid chromatography, and MALDI MS/MS peptide detection.

To date peptide fingerprints have been identified for blood, semen and saliva, and even without IEF protein separation these body fluids can be easily identified from 1 mg of body fluid protein which corresponds to approximately 0.003 ml of blood, 0.05 ml semen, and 0.2 ml of saliva, demonstrating the sensitivity of these markers. Six candidate marker proteins have been identified for both menstrual blood and vaginal fluid. Results of all body fluid markers will be presented.

Successful completion of this work will establish a fast, reliable, sensitive and confirmatory test for body fluid identification in a single assay.

Body Fluids, Proteins, Mass Spectroscopy

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