A26 Protein Based Identification of Epithelial Cell Types in Forensic Samples

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After attending this presentation, attendees will be aware of the proteomic studies being undertaken to identify a biomarker that will specifically identify vaginal cells from buccal cells.

This presentation will impact the forensic science community by advising on epithelial cell identification.

The use of DNA technology to identify people associated with a crime scene has been one of the most important weapons in the arsenal of the forensic scientist. However, research in forensic biology is now moving towards questions that cannot be answered using DNA analysis alone. Although the value of DNA profiles is indisputable, there is increasing importance in also identifying the cellular source of the DNA, as evidence regarding the cellular source from which the DNA profile originates increases the evidential value of the sample. One example where the cellular origin of a DNA profile is important is in sexual assault investigations where it is alleged that an object, such as a bottle, is used

in the assault. Neither side disputes that the complainant's DNA is on the bottle, but the defence may suggest she had simply handled, or drank, from the bottle, while the prosecution claim she was sexually assaulted with it.

Epithelial cells are of particular interest, as samples such as oral or vaginal cells are indistinguishable by other methods. Previous work has resulted in the development of a histological staining method that has application in the identification of vaginal epithelial cells. However, during validation studies it was shown that this method was best applied to samples that contained a high concentration of a single type of cell, and was less effective for identifying the components of cell mixtures. A method that is based on the presence, or absence, of a particular marker that is specific to an epithelial cell type would greatly assist in the identification of, and subsequent selection of, cells from cell mixtures. After the identification of protein specific markers for vaginal and buccal epithelial cells, we propose to use an immunohistochemical method to label cells containing the cell specific protein marker from mixed cell samples commonly encountered in forensic casework. One of the benefits of a cellular identification test based on immunohistochemistry is that it is compatible with laser microdissection analysis. Laser microdissection allows removal of selected cells from a slide sample of mixed cells, from whence a DNA profile can then be isolated.

Several candidate protein markers, known to be present in various types of epithelial cells, and have investigated whether or not any of these proteins have potential for use as cell specific markers for buccal or vaginal epithelial cells were selected. Western analysis was used to initially test the specificity of these putative biomarkers. Any proteins that show differential expression after western analysis are then progressed to the next phase of specificity testing by undertaking immunohistochemical analysis of intact cells on microscope slides.

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