SUBSTRATE CONTROLS – A SIMPLE STORY

Lynette Johns B.S., Pravat Boonlayangoor Ph.D., Karl A. Reich Ph.D., Independent Forensics

The use of controls in any type of testing or analysis is of course one of the most important aspects of any scientific experiment. There are a number of different types of controls including positive controls (*i.e.,* a sample with a known result), negative controls (*i.e.,* a sample which should be null in the test or analysis) and process controls (*i.e.,* controls to verify that the relevant procedures and techniques are working as expected). Forensic analysis and testing are equally dependent on the use of controls; in fact, the use of controls is mandated by QA standards that provide the framework for current forensic DNA analysis. Here we show the utility of the less-widely used substrate control (*i.e.,* a sample from an unstained area of the evidence item) in the analysis of an exhibit that was purported to have seminal fluid/sperm.

Two feminine hygiene napkins allegedly from the same individual were submitted for semen analysis using RSID™ - Semen and possible subsequent DNA analysis. The results of the semen analysis from visibly stained areas were unambiguous; however, the results from one of the substrate controls that appeared unstained were in fact positive by RSID-Semen™. The evident stain and its companion substrate control were both examined microscopically for the presence of sperm cells. Sperm were easily identified in both the questioned stain and the substrate control using SPERM HY-LITER™, thus supporting both the positive RSID-Semen™ result of the observed stain, and the unexpected positive result from the substrate control.

In this example, the use of a substrate control demonstrated that: (i) seminal fluid was much more widely distributed on the item of evidence than could be observed visually, (ii) the RSID-Semen™ test result was reliable, (iii) visual inspection even with ALS is not sufficient to identify deposited body fluids, and (iv) the use of substrate controls is required to properly interpret body fluid identification from evidentiary items.