A159 The Evaluation of Possible False Positives With Detergents When Performing Amylase Serological Testing on Clothing

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After attending this presentation, attendees will know that false positive detection of a-amylases is not possible when testing clothing laundered in detergents containing a-amylases to screen for the presumptive presence of saliva on evidentiary clothing.

This presentation will impact the forensic science community by increasing the understanding of presumptive saliva screening methods, and will clarify any misconceptions between the scientific and legal communities regarding the sensitivity and specificity limitations of the Phadebas® and RSID™-Saliva screening methods employed for the detection of α-amylase on evidentiary samples.

Amylase detection has become a very useful tool in the screening process for possible saliva stains on forensic evidence. In particular, α-amylase detection using commercially available tests such as RSID-Saliva or Phadebas® Amylase Test are two ways in which the forensic scientist is able to determine if saliva is presumptively present on an evidentiary sample.

The enzyme α-amylase is naturally occurring in many species of bacteria, fungi, plants, and animals. As a result, the presence of two α-amylase isoenzymes in humans has led to some difficulty in reporting the presence of salivary α-amylase versus pancreatic α-amylase in forensic casework. Moreover, there has been recent speculation from legal professionals that the α-amylases present in common household laundry detergents may be contributing to positive detection of α-amylase on evidentiary samples during forensic presumptive screening procedures.

For almost 40 years, detergent companies have been adding enzymes such as proteases, celluloses, and amylases to their products as a more effective method of breaking down tough stains created by polysaccharides and proteins. To determine whether or not α-amylase detection is possible following routine clothing laundering, unworn, unwashed fabrics of different compositions were laundered in a variety of detergents and stain removing agents. Two assays, RSID™-Saliva (Independent Forensics, Hillside, IL) and Phadebas® Amylase Test (Magle Life Sciences, Lund, Sweden), that use different methods of detecting α-amylase, were used to investigate whether detergent α-amylases in laundered clothing are detectable. RSID-Saliva detects human salivary α-amylase via anti-salivary amylase monoclonal antibodies whereas the Phadebas® assay takes advantage of the enzymatic properties of α-amylase present in a given sample. Thus, when using a screening method such as the Phadebas® Amylase Test, a positive amylase result is only suggestive, and not confirmatory, for the presence of human saliva.

Five fabric swatches were washed in a volume of laundry detergent pre-determined for a light load wash cycle, exceeding what would typically be required to launder five fabric swatches. This was employed in an attempt to maximize the retention of detergent and detergent additives in the laundered clothing. Nevertheless, all garments tested negative in response to alternate light source, Phadebas®, and RSID-Saliva. These findings suggest that at some point during the laundering cycle, the enzymes were damaged, degraded, or removed. The causes of a-amylase loss during laundering were not examined; however, the data support that detergent enzymes should not contribute to a misidentification of a saliva stain using a presumptive screening method.

Additionally, unlike laundered clothing, undiluted detergents do contain detectable levels of α-amylase, but these findings were only observed using the Phadebas® Amylase Test.

Amylase, Saliva Screening, Serology

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