



### **B161 A Comparison of the Performance of Commercial Y-STR Kits for Operational Use With Challenging Samples: Extended Interval Post-Coital Samples, Mixtures and Environmental Insults**

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The goal of this presentation is to inform the forensic community of the performance of commercial Y-STR kits using a variety of challenging samples.

This presentation will impact the forensic community and/or humanity by demonstrating aiding in facilitating the transfer of Y-STR technology to the crime laboratory, by way of a performance comparison between commercial products from three commercial vendors and two in-house Y-STR multiplexes.

Although it is routine for most forensic laboratories to obtain an auto-somal STR profile of an individual from DNA recovered from a crime scene, a more limited number of laboratories have the capability of performing Y-STR analysis. In order to aid in facilitating the transfer of Y-STR technology to the crime laboratory, a performance comparison between commercial products from three commercial vendors (Promega, Realigned, and Applied Biosystems) and two in-house Y-STR multiplexes (MPI and MPB) was conducted. The main focus of the study was to ascertain whether commercial Y-STR kits were able to obtain a male profile from challenging samples to the same extent that in-house Y-STR systems were capable thereof. Specifically the relative performance characteristics of the Y-STR systems with respect to their ability to determine the numbers of semen donors in admixed samples, the identification of the genetic profile of the male component in a male/female mixture, the identification of the genetic profile of the male component in extended interval post-coital samples and with environmentally challenged samples is reported.

Initially an in depth evaluation of each Y-STR system's sensitivity limits was carried out including going beyond the limits established by the manufacturer. The results indicated that one in house kit and one commercial kit were able to obtain reproducible male profiles at 30 picograms of single source male input DNA. An evaluation of the Y-STR systems' ability to obtain a genetic profile of the male component in a male/female mixture used two different approaches. The first included analyzing one nanogram of male DNA in the presence of an increasing quantity of female DNA whereas the second required the input of a total of 300 nanograms of mixed DNA (containing male DNA in different proportions) to the PCR reaction. The results for the first approach identified one commercial kit that was able to obtain a genetic male profile at a 1:4000 male/female ratio. The results for the second approach demonstrated that one in house kit was able to obtain reproducible male profiles at a 1:16,000 ratio whereas one commercial kit was able to obtain reproducible male profiles at 1:10,000.

Challenging samples representative of those found in casework were prepared for evaluation. Post-coital samples were obtained from the cervix of two females in monogamous relationships with a five day abstinence period before each sample was obtained. The samples obtained were collected individually at zero hours, twelve hours, one day, two days, three days and continued to a seven day collection. The samples were extracted using both a differential and non-differential extraction. Three male body fluids (blood, semen, and saliva) were exposed to different environmental conditions. The first condition was heat and humidity, second condition was heat, humidity, sunlight and rain, and the third condition was heat, humidity and rain. The samples ranged from one day exposure to 6 months exposure. This study was used to determine the longevity of a stain under environmental insults.

Detailed results of the performance characteristics of the Y-STR kits using these challenging samples will be presented in detail.

**Y-STR's, Commercial Y-STR Systems, Extended Interval Post-Coital Swabs**