



A81 Development of a Forensic Screening Tool Using STR DNA Analysis

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After attending this presentation, attendees will understand the utility and performance of STR screening kits in forensic DNA typing and sample screening applications.

This presentation will impact the forensic community by introducing the concept of STR DNA analysis used as a screening tool to increase efficiency in Forensic DNA Laboratories.

Multiplexed Short Tandem Repeat (STR) analysis has become the dominant technology in DNA-based human identification. As the number of samples typed per case increases, especially in complex homicide or sexual assault cases, the need for less expensive methods for screening these multiple samples becomes apparent. By using a simple yet extremely sensitive STR system, the forensic DNA laboratory can quickly discriminate between the limited number of donors present in a given case. In addition, large populations of potential donors can be mass-screened inexpensively at a level of discrimination sufficient to identify only a very small number of possible matches. Following this, the laboratory can then select the most probative DNA samples to continue with a full complement of STR testing.

An STR screening kit has been developed for the co-amplification and two-color-detection of 4 STR loci: (D18S51, D8S1179, TH01 and FGA) and amelogenin. The amplicon lengths of the largest loci have been significantly shortened so that all amplicons are less than 260bp. The robust and careful design of this screening kit provides maximum sensitivity with low quantities of DNA (less than or equal to 50pg). This makes the system ideal for use with low copy numbers samples including touch samples. The reduced number of loci in the screening kit provides sufficient data for screening purposes at an economical price point. Based on U.S. Caucasian population frequency estimates, this STR screening kit has a power of discrimination (PD) of approximately 1.9×10^5 .

In this multiplex, one of the two primers for amelogenin, D18S51 and D8S1179 are labelled with fluorescein and one of the two primers for TH01 and FGA are labelled with 6'-carboxy-4',5'-dichloro-2',7'-dimethoxy-fluorescein (JOE). Sizing of amplicons is provided by an internal size standard labelled with carboxy-X-rhodamine (CXR). In addition, this screening kit contains *Taq* enzyme and hot-start PCR technology as part of the system.

Sensitivity testing and inhibitor testing data will be shown providing a comparison of this kit with other STR kits. Discussions of laboratory efficiency gains from screening DNA samples with a small STR multiplex will also be included.

Screening, Forensic DNA, STR