

Multiplexing of Y Chromosome Specific STRs by Infrared Fluorescence Detection

Reena Roy, Ph.D.¹ and Mechthild Prinz, Ph.D.²

¹ Kansas Bureau of Investigation, Topeka, Kansas 66612

² Office of the Chief Medical Examiner, New York, NY 10022



The human Y chromosome is male specific and normal human males have one Y chromosome and normal females do not. The Y chromosome is paternally inherited and haploid, and is of potential use in forensic and paternity studies since the majority of the violent crimes against person are committed by males. In evidence samples where the body fluids of male and female donors are mixed, a situation commonly encountered in sexual assault cases, Y chromosome markers can yield specific information about the perpetrator. In paternity cases where the child is a male, comparison of the Y-chromosomes can be useful to exclude an alleged father.

The current research was undertaken to detect Y-specific polymorphic STR loci from various forensic samples using an infrared labeled primers. The first set of four loci, DYS19, DYS389I, DYS389II and DYS390 was amplified in one single reaction. The second set consisting of DYS391, DYS392, DYS393 and DYS19 was amplified in a second single reaction. IR-labeled amplification products were generated from human genomic DNA using oligonucleotide primers, which were covalently linked to an infrared fluorescent dye (IRD700 or IRD800) at the 5' end.

The Y chromosome loci were amplified using PCR technology, and the alleles were separated by gel electrophoresis and then detected using an infrared Dual Dye Automated DNA sequencer. This system combines IR fluorescence chemistry and laser technology, thus eliminating the need for post-electrophoretic gel handling for the detection of the alleles. Alleles are displayed as autoradiogram-like images during the run and can be computer analyzed. This research utilizes an on-line real time automated detection system to detect the alleles and can be used for forensic casework as well as paternity analysis.