

Putting STR Megaplexes to the Test: Casework, Felon Databanking and Population Genetics

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The Bode Technology Group decided in 1993 that Short Tandem Repeat (STR) analysis was the appropriate follow on to restriction fragment length polymorphism (RFLP) testing. STR testing clearly retained the statistical strengths of RFLP testing, added the strength of polymerase chain reaction (PCR) based methods, and removed the RFLP drawbacks of time and large sample size. In 1993, there were no commercially available fluorescent primers, and a few silver stain markers. Since 1993, fluorescence and multiplexing have become standard procedure and currently our laboratories have 12 markers validated and online in both casework and databanking. In addition, we are currently validating an additional 8 STR markers that include both 4 and 5 base pair repeats.

The real test of any technology however, is how it performs under daily lab conditions that demand high throughput as well as sensitive results. Our laboratory is processing over 50,000 samples per year on databank contracts, as well as performing forensic casework. Samples are being processed using Promega’s PowerPlex™, and FFFL quadriplexes, with analysis being performed on a Hitachi FMBIO II®. On any given day, 12 to 20 gels are run and analyzed with as many as 30 samples per gel. Using a pool size of 10,000 samples, approximately 1% of the samples contain a microvariant at one of the genetic loci and approximately 7% of the samples processed are rerun as a result of some mechanical or biological failure. On casework samples, on average we observe incidence probabilities of over 1 billion and have been able to achieve results on very old and degraded samples.