RAPID DNA ANALYSIS BASED ON INTERROGATION OF 27 STR LOCI

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The sizes of regional, national, and international DNA databases have increased, as has the desire to share STR profile data across borders. The role of DNA profiling has also expanded to include familial searching of databases, and kinship analysis is being employed in refugee, asylee, and immigration applications. Both database search compatibility and kinship analysis will benefit from increasing the number of STR loci that can be analyzed simultaneously. Many of these applications will have their greatest utility if they are performed outside the laboratory, and Rapid DNA Analysis offers the potential for a field-forward DNA analysis solution.

We have developed a fully-integrated Rapid DNA Analysis system based on Promega Fusion6C chemistry as incorporated into the DNAscan/ANDE system. The PCR assay has been adapted for Rapid DNA by 1) modifying primer concentrations to allow an ~20 minute amplification and 2) freeze drying the assay to achieve greater than 6 month stability at room temperature. The stabilized reaction is incorporated into a single use BioChipSet consumables designed for high DNA content samples (e.g. buccal swabs, blood, fresh tissue) and low DNA content samples (e.g. touch samples, blood splatter stains, aged or degraded tissues secondary to mass disasters). Following sample loading into the BioChipSet, the automated run requires less than 90 minutes for sample processing and data analysis by the onboard Expert System.

The multiplexed assay interrogates 27 loci, modeled after Fusion 6C with 1) the addition of two additional Y-STR loci (DYS570 and DYS576) and 2) the substitution of PentaD with D6S1043, an important STR marker used in law enforcement in China. The 27plex Rapid DNA assay has been utilized on a wide variety of samples ranging from buccal to bone, and results will be presented for many sample types and compared to and shown to be concordant with conventional results. Species specificity, sensitivity, reproducibility and related measures will also be presented. Taken together, the data will show that the 27plex Rapid DNA system represents a major new tool in the armamentarium for human identification internationally, both inside and outside the laboratory.