SAMPLE-TO-SEQUENCE ANALYZER FOR HUMAN ID APPLICATIONS

M. Nuffer, M. Sandahl, U. Yi, M. Takvorian, A. Eckhardt, M. Pollack and D. Cohen
Advanced Liquid Logic, Inc., 615 Davis Drive, Suite 800, Research Triangle Park, NC 27709, USA

The Department of Homeland Security (DHS) has identified an operational need for rapid and low-cost DNA testing as a biometric capability for individual identification and to validate family relationships. Although the science of DNA testing for biometric purposes is well established, these techniques are currently performed exclusively in specialized laboratories by highly trained individuals. The analysis is time-consuming and labor intensive resulting in a high cost per test and a lengthy time-to-result. There are currently no commercially available systems which can meet DHS's cost and speed requirements. Advanced Liquid Logic has implemented a low-cost, high-performance micro-liquid-handling technology called "digital microfluidics" to create a prototype sample-to-answer system for DHS. The system employs a direct pyrosequencing-based approach for characterization of STR loci in place of traditional capillary electrophoresis. This approach is more flexible, more robust to variant alleles and potentially faster. The instrument is low-cost yet suitable for field-forward operations. The prototype version of the cartridge can accept up to 250 µL of liquid input. From that sample input the system automatically performs DNA purification, amplification, template preparation and simultaneous analysis of 4 STR loci. Future versions of the cartridge (no change to the instrument) will be capable of analyzing 12 – 24 loci in parallel. Sample-in/sequence-out operational data will be presented for the prototype system. ⌘