EVALUATION OF MICROCAPILLARY DEVICES FOR GENETIC IDENTITY TESTING

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Many human identification problems concerned with mass disaster events require the rapid analysis of tissues, or body parts, involving unmixed samples and possibly the ability to deploy the means of analysis into the field. The availability of compact microcapillary electrophoresis devices such as the Agilent 2100 Bioanalyzer and the BioRad Experion has introduced the possibility of bringing the lab to the vicinity of the disaster site.

In this study the accuracy and reproducibility of the Experion and BioAnalyzer devices coupled with different approaches to human identity testing were evaluated. The Experion 1K DNA kit was used to run and size a 10bp ladder and a 25bp ladder (Invitrogen). The resolution of the system for 4bp difference was also evaluated by using CTT Allelic Ladder Mix (Promega). It was concluded that although the good accuracy (%RE) and reproducibility (%RSD) which were represented by the Experion, the system does not possess a sufficiently accurate size determination required for forensically important DNA fragments. The results illustrate that the system is unable to provide the desired resolution for STR typing and shows an insufficient ability to resolve the 4bp difference required for forensic DNA typing. Therefore an alternative candidate locus was used, the D1S8 minisatellites where the products MVR-PCR [1] were analysed by the Experion. The Experion was able to resolve the 29bp difference required for discrimination. The Experion and Bioanalyzer instruments were compared.

In conclusion, although the conventional STR analysis is unlikely to be superseded by the MVR-PCR due to the effort expended on the expansion of the national databases, the analysis of the MVR-PCR products by the microcapillary devices would allow the rapid triaging of samples in mass disaster or 'close-set' situation and as a screening technique before samples were sent for further testing.

Reference:
[1] Jeffreys, MacLeod, Tamaki, Neil and Monckton Minisatellite repeat coding as a digital approach to DNA typing. Nature (1991) 354:204-209