MASSIVE PARALLEL SEQUENCING OF INDIVIDUALS FROM THE ARABIAN GULF COUNTRIES USING THE ION PGM™ SYSTEM FOR HUMAN IDENTIFICATION PURPOSES

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One of the most important techniques in forensic science used to identify individuals is DNA analysis by identifying the short tandem repeat (STR) profiles. Massive parallel sequencing (MPS), also known as next generation sequencing (NGS) of DNA molecules, is a new and emerging technology with a great deal of promise for forensic laboratories.

This study uses Ion PGM™ System platform to sequence forensic DNA samples with single nucleotide polymorphism (SNP) panels designed for these applications. Currently, the HID-Ion AmpliSeq™ Identity and Ancestry Panels are two of the commercially available panels for human identification purposes. In highly degraded or low template DNA samples SNP panels yield more information than STR. Since the Identity Panel is comprised of shorter 124 SNP amplicons, it was designed to provide higher discrimination for identifying individuals. The Ancestry Panel consists of 165 SNPs and can provide biogeographic ancestry information. This investigative lead can be useful in forensic cases where no reference sample is available.

Population data from different ethnic groups of human population is essential in forensic science. The population from the Arabian Gulf area has not been intensively studied. In this research, buccal swabs were obtained from 90 unrelated individuals from three Arabian Gulf countries; United Arab Emirates (UAE), Sultanate of Oman, and Kingdom of Saudi Arabia (KSA). The goal was to use this system to determine the random match probability by using the Identity Panel.

Results of these individual genotypes were compared with the STR data generated with GlobalFiler™ PCR Amplification Kit and PowerPlex® Y23 System. Comparison of admixture structures was conducted within and between populations of the three countries. In addition, sensitivity study was performed on both panels. Moreover, a lineage study was performed on seven male individuals who represent three generations of the same family to determine the discrimination power of the Identity Panel in paternally related individuals.