APPLICATION OF MASSIVE PARALLEL SEQUENCING IN FORENSIC PSHYCHIATRY AND BEHAVIORAL SCIENCE USING CUSTOM PANELS INCLUDING MARKERS POTENTIALLY LINKED TO HUMAN BEHAVIORAL TRAITS

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Massive parallel sequencing (MPS) is a promising technology that provides an opportunity to analyze a large number of markers simultaneously. A custom primer panel can be comprehensively designed in order to include markers (located in genes of receptors, transporters, or metabolic enzymes) targeted for specific biochemical pathways. While this technology has previously been applied to human identification, ancestry, genetic diseases and cancer, this study aims to use MPS to determine possible associations between single nucleotide polymorphisms (SNPs) and behavior. Levels of oxytocin (OXT) and serotonin (5-HT) are known to correlate with social behavior. Furthermore, some specific SNP alleles may be related to the regulation of these neurotransmitters. Previous studies have shown that various SNPs located within genes associated with OT, 5-HT and their receptors, transporters, and related metabolic enzymes correlate with specific behavioral traits. Understanding the influence of OXT and 5-HT on behavior may help explain the etiology of social behaviors including aggressive and antisocial behavior. This study analyzed two SNPs located within the intron region of the OXT gene (rs877172 and rs4813625) and three SNPs located within the serotonin transporter gene (5-HTT) (rs25531, rs6314 exonic, and rs6311) using single base extension (SBE) and MPS with a custom designed panel of SNPs linked or related to genes of neurotransmitters. A student sample set (N=100) was genotyped and individuals participated in a survey designed to assess behavioral traits. Two SNPs linked to OXT (rs877172 and rs4813625) were analyzed using SBE and MPS in order to compare both methods. It was found that for all samples, the alleles called were 100% concordant indicating MPS with this custom panel was comparable to the robust conventional SBE method. Furthermore, these results indicate that a custom panel may be used to asses a large panel of behavioral markers at once. It was also found that OXT and 5-HTT may have an impact on social behavior. Statistically significant associations were found between two SNPs (rs25531 and rs877172) and behavioral traits including antisocial behavior, drug use/distribution, and property crimes.