

ABSTRACT

Nowadays intensive research is conducted for application of genetic polymorphisms for degraded samples analysis, identification and kinship determination. Another area of research in forensic genetics is biogeographical and phenotypic traits (eye, hair and skin color) determination.

First part of presented work dealt with population study on the Czech population using Investigator DIPplex (QIAGEN, Germany) marker set containing 30 autosomal insertion-deletion polymorphisms. Power of Discrimination (PD), which is the probability of random selection of two persons with different genotypes, was 99.999999999% for the whole marker set. This part of study concluded that analyzed marker set is suitable as an additional marker panel for identification and kinship determination in the Czech Republic.

Second part of the presented study was devoted to population research of Central Croatia using Mentype Argus X-8 kit (QIAGEN, Germany) containing 8 short tandem repeat polymorphisms located on X chromosomes (X-STR) divided into 4 linkage groups. PD for the whole kit reached 99.9999% and 99.99999999% for males and females, respectively. This kit could be used in Central Croatian population for kinship analysis and for identification as an additional marker panel.

The next part of the presented study was the population research on the Czech population using Decaplex X-STR kit containing 10 X-STR evenly spread across X chromosome (except for DXS6809-DXS6789 pair). PD for the whole marker set reached 99.999% for males and 99.9999999% for females. According to the results of the study, Decaplex X-STR is robust kit suitable for forensic identification and kinship analysis in the Czech Republic.

The last part of the presented study concerns the selection of marker for biogeographical ancestry and eye color determination. The population study and statistical modeling resulted in the selection of 5 single nucleotide polymorphisms: rs16891982, rs1426654, rs7495174, rs12913832, rs916977. Accuracy of the selected model for eye color and biogeographical ancestry was 98.4% and 100%, respectively.

Key words: INDEL, X-STR, SNP, forensic genetics, phenotypic traits, population study