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Study of 16 Y-STRs in the population of Calabria using AmpF*l*STR Y-filer kit

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Abstract. Y-STRs are very useful for forensic laboratories to identify, segregate, and analyze male DNA from evidence-containing mixtures of male and female DNA (for example in case of sexual assault), in difficult paternity analysis or for reconstruction of male lineage or application in kinship analysis. AmpF*l*STR® Y-filer™ PCR Amplification kit is the last commercial kit for the analysis in a single PCR reaction, of 16 Y-chromosome STRs. In the present study, we analysed the distribution of the Y-STRs above in 3 populations from Calabria (South of Italy): Reggio Calabria, Catanzaro and Cosenza.

Keywords: Y-STRs; Frequencies; Calabria

1. Introduction

Since the Y-chromosome is passed down from father to son without any recombination, some forensic cases as sexual assault, kinship testing, anthropological studies, can benefit from the analysis of specific Y-STRs markers.

The male-specific part of the Y-chromosome can be optimally explored using a set of highly variable STRs markers approved by the forensic community.

In the present study, we analyzed allelic and genotypic distribution of STRs loci in 3 populations from Southern Italy (Calabria): Reggio Calabria, Catanzaro, Cosenza using the AmpF*l*STR® Y-filer™ (Applied Biosystems) that is a forensic kit that coamplifies the repeat regions of 16 Y-STRs loci: DYS456, DYS389I, DYS390, DYS389II, DYS458,

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DYS19, DYS385, DYS393, DYS391, DYS439, DYS635, DYS392, DYGATAH4, DYS437, DYS438, DYS448.

2. Materials and methods

In order to minimize the possibility of contamination, all extractions were set up in a flow cabinet in a dedicated laboratory. DNA was extracted, by "Instant Gene Matrix" (Biorad) treatment, from blood samples of male unrelated healthy donors (around 100 per area), belonging to the population examined since 2 generations at least [1,2].

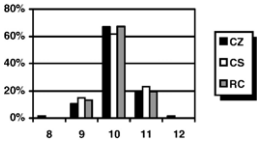

Fig. 1. Locus DYS391.

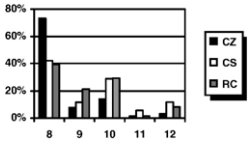

Fig. 2. Locus DYS438.

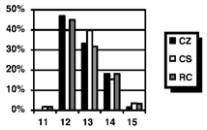

Fig. 3. Locus DYS393.

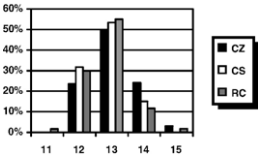

Fig. 4. Locus DYS389I.

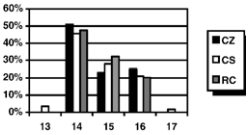

Fig. 5. Locus DYS437.

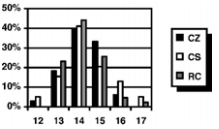

Fig. 6. Locus DYS19.

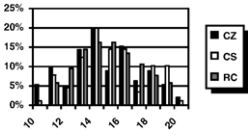

Fig. 7. Locus DYS385.

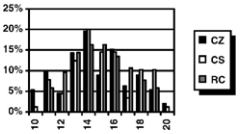

Fig. 8. Locus DYS389II.

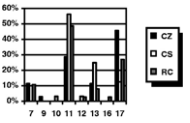

Fig. 9. Locus DYS439.

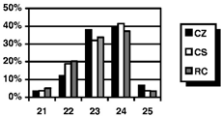

Fig. 10. Locus DYS390.

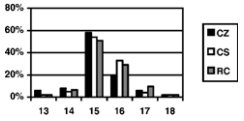

Fig. 11. Locus DYS456.

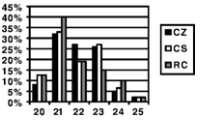

Fig. 12. Locus DYGATAH4.

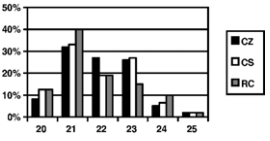

Fig. 13. Locus DYS635.

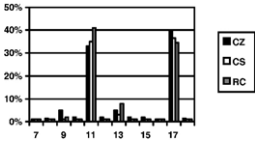

Fig. 14. Locus DYS392.

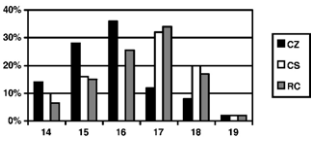

Fig. 15. Locus DYS458.

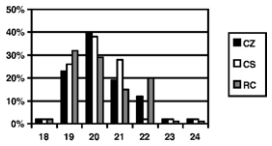

Fig. 16. Locus DYS448.

DNA extracted from samples above were quantified by the Quantifiler™ Y-Human Male DNA Quantification Kit using a 7300 Real Time System kit following the manufacturer's protocol [3]. Amplification was carried out in a laboratory different from the one dedicated to the extraction, so that amplified products never entered the extraction laboratory. STRs amplification was carried out according to the Y-filer™ kit protocol using GeneAmp PCR Systems 9600, 9700, 2400, 2720 thermal cyclers [4].

Female and male positive controls and negative controls were used during all amplification steps. Amplified products were analyzed by capillary electrophoresis by an ABI PRISM 310 and by an ABI PRISM 3130 Genetic Analyzers employing Genotyper and GeneMapper 3.2 software. For fragment length determination of the products, the internal lane DNA standard LIZ 500 (Applied Biosystems) was used for calibration.

3. Results

The distribution of allelic frequencies in the 3 Calabrian populations mentioned, Catanzaro (CZ), Cosenza (CS) and Reggio Calabria (RC), is shown per locus in Figs. 1–16.

4. Conclusion

Y-STRs haplotyping is particularly important in case of sexual assault for the rapid and sensitive typing of male DNA in mixed stains without any separation between male/female DNA. Moreover, Y-chromosomal profiling can trace back paternal lineages into the past and has thus been proven a useful tool in genealogical and kinship testing.

Since the utility of Y-STRs, our results confirm the importance of the generation of databases for Y-STRs when these markers are being currently used in forensic casework and provide useful information about the allele frequencies of 3 populations from South of Italy (Calabria region) using the 16 Y-STRs markers, available in the AmpF*l*STR® Y-filer™ PCR Amplification kit.

References

[1] Instant gene Matrix Manual (Biorad).
[2] P.S. Walsh, D.A. Metzger, R. Higuchi, Chelex 100 as a medium for simple extraction of DNA for PCR-based typing from forensic material, BioTechniques 10 (1991) 506.
[3] Quantifiler™ Y Human Male DNA Quantification kit. User's Manual, Applied Biosystems (2004).
[4] AmpF*l*STR® Yfiler™ PCR Amplification kit – User's Manual, Applied Biosystems (2005).