Murim Choi · Jun Hwan Kim · Dong Hoon Lee Seung Hwan Lee · Hyune Mo Rho

# Frequency data on four tetrameric STR loci D18S1270, D14S608, D16S3253 and D21S1437 in a Korean population

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**Abstract** We present the results of a population study in Korea for four new tetrameric short tandem repeat (STR) loci employing multiplex PCR amplification, polyacryl-amide gel electrophoresis of the PCR products and silver staining, which allow single base pair resolution and rapid typing. The loci tested were D18S1270, D14S608, D16S3253 and D21S1437 and all loci showed no significant deviations from Hardy-Weinberg equilibrium in more than 100 unrelated Koreans. This allelic frequency data can be used in forensic analyses and paternity tests to estimate the frequency of a multiplex PCR based DNA profile in the Korean population.

**Key words** Quadruplex  $\cdot$  Short tandem repeat  $\cdot$  DNA typing  $\cdot$  Korean population

M. Choi · J. H. Kim · D. H. Lee · H. M. Rho (⊠) Department of Molecular Biology, and Research Center for Cell Differentiation, Seoul National University, Seoul 151-742, Korea Tel. +82-2-8806688, Fax +82-2-8887784

S. H. Lee Laboratory of DNA Analysis, Supreme Public Prosecutor's Office, Seoul 137-756, Korea

Table 1	Characteristics	of STR	markers	used	in this	study

#### Introduction

The short sequences and high degree of polymorphism make the STR loci attractive for forensic and paternity analyses and amenable to amplification by the PCR (Edwards et al. 1991; Jeffreys et al. 1992; Lygo et al. 1994). In this paper, we report the allele frequency data and suitability for forensic markers for the four autosomal loci D18S1270, D14S608, D16S3235 and D21S1437 in a Korean population sample using a multiplex PCR technique.

### **Materials and methods**

DNA preparation and amplification were performed as described previously (Park et al. 1997; Lee et al. 1998). The primer concentrations for each locus were 2.15  $\mu$ M for D18S1270, 0.3  $\mu$ M for D14S608, 0.3  $\mu$ M for D16S3235, and 0.25  $\mu$ M for D21S1437 (Table 1). The construction of allelic ladders, separation of amplified products and statistical calculations were performed as described previously (Park et al. 1997; Lee et al. 1998).

## **Results and discussion**

All 106 unrelated Korean blood samples were typed successfully for the four STR loci D18S1270 (GenBank

Locus	Chromosome location	Repeat sequence	Number of alleles <sup>a</sup>	Fragment <sup>a</sup> length (bp)	Sequence of primers
D18S1270	18q21	TCTA	8	268–296	U:5' - TTCACCATTGTCAATTATAAAACA - 3' L:5' - TCCAGACTGCCTTCAGACTC - 3'
D14S608	14q11.2	ТСТА	8	200–228	U:5' - TAAAGGTTTATCCATGCTGTAGC - 3' L:5' - ACGTGGTACAGGTAGATAAATGG - 3'
D16S3253	16q11.2	TAGA	8	167–195	U:5′ - GTTCAAGCATGGGTGGATAG - 3′ L:5′ - TTGTGTGGGGAATATAGTGATGC - 3′
D21S1437	21q11.1	GGAA	8	115–143	U:5' - ATGTACATGTGTCTGGGAAGG - 3' L:5' - TTCTCTACATATTTACTGCCAACA - 3'

<sup>a</sup>Our study in a Korean population

Allele	D18S1270 ( <i>n</i> = 106)	D14S608 ( <i>n</i> = 106)	D16S3253 ( <i>n</i> = 106)	D21S1437 ( <i>n</i> = 106)
6			11.79	
7			0.94	
8	0.47	6.60	14.15	
9	4.72	15.57	5.66	
10	5.66	2.83	30.66	12.74
11	16.04	10.38	31.13	14.62
12	31.13	23.11	3.30	1.42
13	18.40	27.36	2.36	8.49
14	22.17	10.38		44.81
15	1.42	3.77		12.74
16				4.25
17				0.94

 Table 3
 Forensic values for the four STR loci under study (PIC polymorphism information content, PD power of discrimination)

Locus	Observed heterozygosity (%)	$\chi^2$ test p value	PIC	PD
D18S1270	84.91	0.796	0.955	0.924
D14S608	82.08	0.718	0.967	0.944
D16S3253	77.36	0.243	0.947	0.913
D21S1437	72.64	0.922	0.930	0.902

# G07989), D14S608 (GenBank # G09052), D16S3253 (GenBank # G07926) and D21S1437 (GenBank # G08082). All four loci showed 8 different alleles in Korean population (Table 2), and showed no significant deviations from Hardy-Weinberg equilibrium based on  $\chi^2$  test (Table 3). In conclusion, the data in this study demonstrate that the four loci have enough usefulness for use as forensic markers in Korean population.

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## References

- Edwards A, Civitello A, Hammond HA, Caskey CT (1991) DNA typing and genetic mapping with trimeric and tetrameric tandem repeats. Am J Hum Genet 49:746–756
- Jeffreys AJ, Allen MJ, Hagelberg E, Sonnberg A (1992) Identification of the skeletal remains of Josef Mengele by DNA analysis. Forensic Sci Int 56:65–76
- Lee DH, Han JS, Lee WG, Lee SW, Rho HM (1998) Quadruplex amplification of polymorphic STR loci in a Korean population. Int J Legal Med 111:320–322
- Lygo JE, Johnson PE, Holdaway DJ, Woodroffe S, Whitaker JP, Clayton TM, Kimpton CP, Gill P (1994) The validation of short tandem repeat (STR) loci for use in forensic casework. Int J Legal Med 107:77–89
- Park SJ, Lee WG, Lee SW, Kim SH, Koo BS, Budowle B, Rho HM (1997) Genetic variations at four tetrameric tandem repeat loci in Korean population. J Forensic Sci 42:125–129