International Congress Series 1239 (2003) 243–244

Population data from Chile using PowerPlex-16

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Short tandem repeat (STR) loci are routinely used for paternity and forensic identity testing. Furthermore, STR loci are useful components of national DNA databanks, such as those in the United Kingdom and the United States. The typing of STR loci is facilitated by the ability to amplify several loci simultaneously in a multiplex polymerase chain reaction (PCR). The 16 STR loci D3S1358, TH011, D21S11, D18S51, PentaE, D5S818, D13S317, D7S820, D16S539, CSF1PO, PentaD, vWA, D8S1179, TPOX, FGA and the locus amelogenin can be amplified simultaneously using the PowerPlex16 kit (Promega, Madison, WI, USA).

This paper presents allele distribution data in the general Chilean population. The data demonstrate that these loci can be useful for providing estimates of the frequency of a DNA profile in forensic identity testing and that a multiple locus profile is extremely rare in all the population.

Whole blood was obtained in EDTA vacutainer tubes by venipuncture from unrelated individuals ($N = 323$) residing in Chile. Extracted DNA samples were amplified at the 16 loci using the PowerPlex16 kit (Promega). Samples were analyzed using the ABI Prism™ 310 Genetic Analyzer (PE Biosystems, Foster City, CA) according to the manufacturer's recommended protocol.

All 15 loci are highly polymorphic in the Chilean sample population with the locus TPOX (67.3%) having the lowest observed heterozygosity, and the locus PentaE (92.9%) displaying the highest heterozygosity. The most discriminating loci were PentaE (PD = 0.983) and FGA (PD = 0.966). The combined probability of exclusion for the 15 STR loci is 0.99999961. There was little evidence for departures from Hardy–Weinberg expectations (HWE) in this sample population. Based on the exact test, the locus that departed significantly from HWE was D16S539 ($p = 0.002$). After employing the Bonferroni correction for the number of loci analyzed, this observation is not likely to

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PII: S0531-5131(02)00820-8

Table 1
PD and PE values for the 15 loci tested

Locus	PD (Obs)	PD (Exp)	PE
1 D3S1358	0.88405873	0.88089494	0.49149762
2 THO1	0.89212828	0.90310794	0.53570855
3 D21S11	0.95387339	0.95629693	0.68708958
4 D18S51	0.96501458	0.96831543	0.73361811
5 PentaE	0.98328821	0.98654943	0.82803091
6 D5S818	0.89582466	0.90205337	0.53715336
7 D13S317	0.95340483	0.95562899	0.68325371
8 D7S820	0.90733028	0.90882529	0.55156953
9 D16S539	0.91795085	0.92152643	0.58126074
10 CSF1PO	0.86344232	0.86806648	0.46526042
11 PentaD	0.95168680	0.95664959	0.68774901
12 vWA	0.90207205	0.91023088	0.55517793
13 D8S1179	0.93419409	0.93968115	0.63224998
14 TPOX	0.83756768	0.83824361	0.42261732
15 FGA	0.96647230	0.96878723	0.73539573
Total	>0.99999999	>0.99999999	0.99999961

be significant. An inter-class correlation test analysis was performed to detect any correlations between alleles at any of the pair-wise comparisons of the 15 loci. A summary of the PD and PE values is shown in Table 1.

In conclusion, a Chilean database has been established for the loci. All loci are highly polymorphic. The allelic frequencies of these PCR-based loci can be used to estimate the frequency of a multiple locus DNA profile in the Chilean population.