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DNA research in sexual offences: experience in Ecuador

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Abstract. To assess the technical and judicial consequences resulting from the practical application of *DNA testing* in forensic research in the numerous sex crimes in Ecuador. Twenty-six sex offence cases were studied using the DNA technique and were analysed in the Genetics Department of the Ecuadorian Red Cross. For the tissue mixtures, we performed differential extraction using one separation solution for the female fraction and another for the male fraction, in accordance with our protocols. An ABI 310 sequencer was used for typing. The fragment size was determined and the allelic designation of the different loci made by comparing them with the PowerPlex 16 kit allelic ladders; the software package Grape 1.1 was used for analysis of the mixtures and for DNA fingerprinting, Statistical Evaluation. Only 15% of all cases reach the stage of Public Investigation, and the sentence is incriminating in only 12.5% of these cases. © 2003 Published by Elsevier B.V.

Keywords: Ecuador; STR; Criminality; Sex offences; PCR; Justice

1. Introduction

The DNA analysis technique has not been in use for many years in Ecuador and filiation and paternity studies have been carried out more than any other kind so far [1,2]. However, in the sphere of criminality the application of this technique is still at the early stages, despite an increase since the establishment of the new Criminal Procedural Code [3]. Furthermore, there is a high rate of reports, which, together with the absence of a legal, social and family response, contribute to establishing impunity and covering-up as the norm [4]. In the year 2002, the National System of Legal Medicine and Forensic Science was created in Ecuador [5,6].

2. Material and methods

Samples: Twenty-six cases of sexual offences were studied by means of the DNA technique and analysed in the Molecular Genetics Department between July 2002 and

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Table 1
Legal situation of sexual offences tried by the public prosecution nationally between July 2001 and December 2002

Type of offence	Prior investigation	Rejection	Public Prosecutor's examination	Conversion	Acquittal	Accusation
Indecent assault	732	46 (6.2%)	166 (22.7%)	0	38 (5.2%)	106 (14.5%)
Rape	2239	161 (7.2%)	416 (18.6%)	3	165 (7.4%)	430 (19.2%)
Rape of a minor	205	11 (5.4%)	51 (24.9%)	0	12 (5.9%)	33 (16%)
Procurement and corruption of minors	133	3 (2.3%)	16 (12%)	0	3 (2.3%)	5 (3.8%)
Abduction	1574	38 (2.4%)	90 (5.7%)	0	32 (2%)	38 (2.4%)
Total	4883	259 (5.3%)	739 (15.1%)	3 (0.06%)	250 (5.1%)	612 (12.5%)

August 2003 [7]. *DNA extraction*: Phenol–Cloroform–Isoamilic Alcohol, and proteinase K was used for the remains. For the unquestioned samples, we used the Wizard Genomic DNA Purification Kit System© method. The DNA was quantified by means of UV absorbance. For the tissue mixtures, we made a differential extraction using a separation solution for the female fraction Tris/EDTA/NaCl 400 μl, sarkosyl 25 μl, proteinase k (20 mg/ml), and for the male fraction Tris/EDTA/NaCl 150 μl, sarkosyl at 20%, proteinase k (20 mg/ml) and DTT 0.39 M, in accordance with our protocols. *PCR*: Amplification was carried out in a Genius© thermocycler. We used an ABI 310 sequencer. The fragment size and the allelic designation of the different loci were established by comparison with the allelic ladders of the PowerPlex 16 kit (Promega) and they were subsequently interpreted with the Gene Scan Analysis Software® programme. We followed the recommendations of the *DNA Commission of the International Society of Forensic Genetics* for STR analysis. *Analysis of data*: The Grape 1.1 software, for DNA fingerprinting, Statistical Evaluation was used for analysis of the mixtures.

3. Results and discussion

DNA analyses have mainly been useful for the exclusion of suspects and to clarify the role of each person involved in a sexual offence. An interesting fact is that a high percentage of the victims are under the age of 18, and the fact that there is a considerable number of boys among these. In all inclusion cases, the Likelihood Ratio was over one million. The criteria we used in the interpretation of the mixture profiles were: firstly, to

Table 2
DNA studies carried out by type of offence and legal proceedings

Legal procedure		Type of offence	
Prior investigation	5 (0.19)	Sexual offence	20 (0.76)
Public prosecutor's examination	14 (0.54)	Sexual offence plus theft	1 (0.04)
Criminal magistrate	1 (0.04)	Sexual offence plus homicide	4 (0.16)
Juvenile magistrate	2 (0.08)	Sexual offence plus abduction	1 (0.04)
Officers of court	4 (0.15)	Total	26
Total	26		

Table 3
Origin of samples for DNA analysis in the 26 cases analysed and individuals analysed

Origin of the samples	Number of samples	Individuals contrasted	Number
Vaginal swabs on slides	9 (0.31)	Victim plus suspect	13 (0.50)
Victim's underwear	7 (0.24)	Victim and two or more suspects	5 (0.19)
Articles of victim and/or aggressor's clothing	9 (0.31)	Two victims and two or more suspects	3 (0.12)
Foetal remains or placenta (following abortion)	1 (0.034)	Suspect plus exhibit	4 (0.15)
Sanitary pad	1 (0.034)	Exhibit with exhibit	1 (0.04)
Condoms	1 (0.034)	Total 26	
Unquestioned blood from family members	1 (0.034)		
Total	29		

identify the presence of a mixture profile; secondly, to identify the possible number of contributions to the mixture; thirdly, to estimate the relative proportion of the individuals that comprise the mixture and the combinations of possible genotypes; fourthly, to compare with genetic profiles obtained in the reference samples and, fifthly, to assess the results obtained and make statistical calculations where relevant (Tables 1–3).

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