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SHORT COMMUNICATION

SERUM CHOLINESTERASE POLYMORPHISM (*CHE1* AND *CHE2* LOCI) IN INDIANS FROM THE AMAZON REGION OF BRAZIL: URUBU-KAAPOR AND ASSURINI TRIBES

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ABSTRACT

The frequencies of the atypical and C5+ variants of serum cholinesterase were estimated in 210 Urubu-Kaapor and 162 Assurini Indians from the Amazon Region of Brazil. The *CHE1*A* allele was not found in either population, and the C5+ phenotype was present only in the Urubu-Kaapor tribe, with the high frequency of 26.2%. .

INTRODUCTION

The atypical serum cholinesterase is an enzyme which degrades the short-action relaxant suxamethonium at a slow rate, causing prolonged muscle paralysis and apnea when this drug is used. Among the variant alleles conditioned by the *CHE1* locus, the atypical one (*CHE1*A*) is the most commonly found in Caucasian populations, but is rarely found or absent in the majority of the Indian populations studied so far (for reviews, see Guerreiro *et al.*, 1985 and Primo-Parmo *et al.*, 1986). However, high frequencies were reported in some Amerindian groups. Arends *et al.* (1970)

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detected a 3.1% frequency for *CHE1*A* among Makiritare Indians from Venezuela, and Vergnes and Quilici (1970) detected a 3.8% frequency in a sample of the Mayan population from Mexico.

The other locus of serum cholinesterase (*CHE2*) determines a variant called C5+ which increases total enzyme activity by about 30%. This variant is detected by various electrophoretic techniques. In previous studies of Brazilian Indian populations the frequencies of the C5+ phenotype ranged from zero to 24.6% (Table I).

The present study aimed at characterizing serum cholinesterase polymorphisms (*CHE1* and *CHE2* loci) in the Urubu-Kaapor and Assurini tribes from the Amazon Region of Brazil, and to compare the results with those reported for other Amerindian populations.

MATERIAL AND METHODS

Serum samples were collected from 210 Urubu-Kaapor Indians, 1 to 70 years old (119 males and 91 females), and 162 Assurini Indians, 1 to 80 years old (78 males and 84 females). The sera were stored at -20°C for a short period of time until shipment to the Human Genetics Laboratory of the Federal University of Pará, Belém, where they were kept at -70°C.

The Urubu-Kaapor Indians belong to the Tupi-Guarani linguistic group, and live in the north-west area of the State of Maranhão (2°18'S; 46°18'W). The Assurini Indians also belong to the Tupi-Guarani linguistic group, and reside in the State of Pará on two reservations (Trocará and Kuatinemo) separated by approximately 320 km. The Trocará reservation is located on the left margin of the lower Tocantins river (3°32'S; 49°42'W), near the township of Tucurui; the Kuatinemo reservation is located on the right margin of the Xingu river (4°15'S; 52°25'W), south of Altamira (Figure 1).

The serum cholinesterase phenotype (*CHE1* locus) was typed by the method of Morrow and Motulsky (1968), and the C5+ phenotype was detected by the agar gel electrophoresis technique as described by Van Ros and Vervoort (1973), and modified by Boman and Habib (1983). We used Bacteriological Technical agar (Difco) which yielded a better separation of the C5 band.

RESULTS AND DISCUSSION

The serum samples showed 82% to 96% inhibition by Ro2-0683, excluding the presence of the atypical variant. This result is similar to those reported for most Indian populations investigated, and emphasizes the rarity of the atypical allele among Amerindians. According to Lisker *et al.* (1967), the findings in Amerindians could be interpreted as due to a strong selection against the carriers of the allele or, more likely,

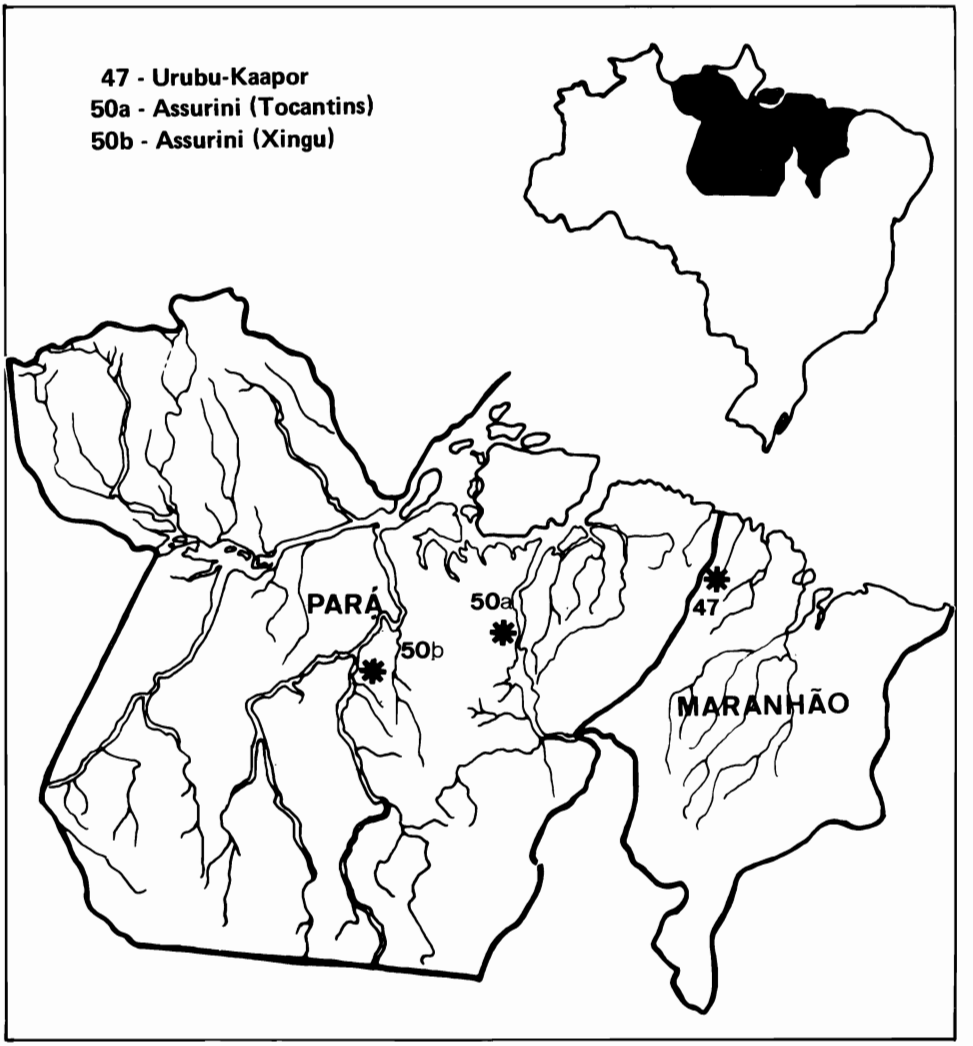

Figure 1 - Locations of the Indian tribes studied. Numeration according to the map of the "Conselho Indigenista Missionário" (CIMI, 1985).

to the fact that the atypical allele was either absent or was present at very low frequency among the ancestors of these populations. Thus, it seems reasonable to suggest that the high frequency reported for the atypical gene in the Maya of Yucatan and Makiritare of Venezuela may be attributed to genetic drift.

The C5+ phenotype was not found among Assurini Indians, but of the 210 Urubu-Kaapor Indians studied, 55 (26.2%) showed the C5+ phenotype.

The high frequency found in the Urubu-Kaapor group emphasizes the hetero-

geneous distribution of the C5+ variant among Amerindians. The reason for this heterogeneity is obscure and could be attributed to the action of mechanisms such as genetic drift or founder effect. Since the function of serum cholinesterase is still unknown and no difference in adaptative values has been obtained between the two phenotypes (C5+ and C5-), selection cannot be raised as a probable cause of this heterogeneous distribution. Comparison of the distribution of the C5+ phenotype among the Urubu-Kaapor Indians with those reported for other South American Indians (Table I) reveals that the frequency of the C5+ phenotype in the Urubu-Kaapor is significantly higher than those observed for most South American Indians, but that it does not differ significantly from those observed among the Kaingang ($\chi^2_1 = 0.62; P > 0.80$) and Tenharim ($\chi^2_1 = 3.43; P > 0.05$) However, considering that the sample of Tenharim Indians consisted of only 23 individuals, the interpretation of this comparison is obviously impaired.

Table I - Incidence of the C5+ phenotype in South American Indian populations.

Population	Place	N	Frequency (%)	Author
Makiritare	Venezuela	418	11.5	Arends *et al.* (1970)
Motilon	Venezuela	70	1.4	Arends *et al.* (1967)
Warrau	Venezuela	131	0.0	Arends *et al.* (1967)
Sirionó	Bolivia	65	0.0	Vergnes *et al.* (1976)
Wayana-Apalai	Brazil	127	7.9	Guerreiro *et al.* (1985)
Mura	Brazil	112	1.8	Primo-Parmo *et al.* (1986)
Tenharim	Brazil	23	8.7	Primo-Parmo *et al.* (1986)
Sateré-Mawé	Brazil	188	0.0	Primo-Parmo *et al.* (1986)
Pacaás-Novos	Brazil	219	15.1	Primo-Parmo *et al.* (1986)
Krahó	Brazil	94	8.5	Primo-Parmo *et al.* (1986)
Kaingang and Guarani	Brazil	27	0.0	Primo-Parmo *et al.* (1986)
Kaingang	Brazil	57	24.6	Primo-Parmo *et al.* (1986)
Munduruku	Brazil	194	11.3	Guerreiro and Santos (1987)
Parakanã	Brazil	123	0.0	Guerreiro and Santos (1987)
Urubu-Kaapor	Brazil	210	2o.2	Present study
Assurini	Brazil	162	0.0	Present study

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RESUMO

Freqüencias das variantes atípica e C5+ da colinesterase do soro foram estimadas em 210 índios Urubu-Kaapor e 162 índios Assurini, da Amazônia brasileira. O alelo *CHE1*A* não foi detectado nas duas tribos, e o fenótipo C5+ foi encontrado apenas no grupo Urubu-Kaapor, com a elevada freqüência de 26,2%.

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