



Short population report

Frequencies and significance of HLA genes in Amerindians from Chile
Cañete MapucheAntonio Arnaiz-Villena*, Ignacio Juarez, Adrian Lopez-Nares, José Palacio-Grüber,
Christian Vaquero, Alvaro Callado, Alejandro H-Sevilla, Diego Rey, José Manuel Martin-Villa

Department of Immunology, University Complutense, School of Medicine, The Madrid Regional Blood Center, 28040 Madrid, Spain

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ABSTRACT

Mapuche Amerindians live now widespread in Central South Chile and Argentina and speak “Mapudungun”, an unclassified language. A group of Chilean Mapuche was studied for HLA genes using standard techniques. Typical Amerindian HLA genes and haplotypes are found in the population, like HLA-DRB1*14:02, –08:02 and class II haplotype DRB1*08:02-DQB1*04:02. However, these and other genes are also common in Pacific Islanders. Thus, relatedness of First America Inhabitants with some Pacific Islanders is stressed. Evidences of Pacific and Atlantic cultural and genetic exchange, probably in both directions, and California Man settlements found since 130,000 years ago makes it necessary a revision of Americas peopling. This study may be also useful for medical Mapuche use in Transplantation and HLA and disease Epidemiology.

Peopling of Americas is nowadays considered a process which involved a possible bidirectional gene (people) exchange among Americas and continental Asia [1], Pacific Islands [2,3] and Atlantic Europeans [4,5] or even Atlantic Africans (“Luzia”, Brasil, [6]). On the other hand, Mapuche Amerindians have been living in South West South America, both in Chilean and Argentinean territory which is separated by Mt. Andes. Northern Mapuche were included into Inca Empire by Spanish Conquerors who could not trespass South of Bio-Bio River for a long time, where Mapuches established their new territory [7]. Land owned by Mapuche at Spaniards arrival (after 1492 CE) consisted of an area from Aconcagua Valley (100 km/62.13 miles North present day Santiago, Chile) down to around Puerto Montt City and Chiloe Is. (Chile), 1228 km/763 miles South Santiago City. Present day Mapuche population is established in widespread scattered communities in Los Lagos and Los Rios Provinces (Chile) and at the other side of Andean Spine in Argentina (Chubut, Neuquén and Rio Negro Provinces). They were also named “Araucanos” and they were only reduced by Chile and Argentina troops in the 19th century, when their territory diminished and started living in “communities”. They still maintain conflict with both Chile

and Argentina authorities because of land claims (<https://en.wikipedia.org/wiki/Mapuche>; last consulted March 21st, 2019). They speak Mapuche or Mapudungun, which is a language of unknown affiliation [7].

In the present study, 66 Mapuches blood donors living in Cañete community (635 km/400 miles South Santiago, Chile, 37.8° South-73.3° West; Fig. 1, Supplementary Material) volunteered to participate in the present work. HLA-A, -B,-DRB1 and DQB1 alleles were obtained by PCR-SSOP-Luminex technique [8] (Luminex Corporation, Austin, TX, USA), DNA direct automatic sequencing was only done when standard Luminex DNA typing yielded ambiguous results [2,9]. Statistical analysis was performed with Arlequin V.3. [10]. 17 different HLA-A alleles and 30 different HLA-B alleles have been found in Mapuche. Also, 20 HLA-DRB1 and 10 HLA-DQB1 alleles are detected in the population (Table 1, Supplementary Material). DRB1*14:02 is found in high frequency and it is also a typical high frequency Amerindian allele particularly in North America Zuni, Tlingit and in South America Kogui and Nukak [2,7,11] and also in North American Eskimo, Athabaskans, Yupik, and Central America Tarahumara, Mixe, Mixtecos, Zapotecas, Mayas and also in South American Lamas, Uros, Aymaras, Quechuas,

* Corresponding author at: Departamento de Inmunología, Facultad de Medicina, Universidad Complutense, Pabellón 5, planta 4. Avd. Complutense s/n, 28040, Spain.

E-mail addresses: aarnaiz@med.ucm.es, arnaizantonio@gmail.com (A. Arnaiz-Villena).

URL: <http://chopo.pntic.mec.es/biolmol/> (A. Arnaiz-Villena).

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Toba Pilaga, Eastern Toba and Mataco Wichis. It is also present in Pacific Islanders from Papua-New Guinea and in Siberians Ulchi and Negidal [2,7,11]. DRB1*08:02 is also frequent in Mapuche [Table 1, Supplementary Material]. This allele is found in Pacific Islanders: Easter Island, singular Japanese Ainu, Siberian Negidal; North America Aleuts, Yupik and Athabaskans; Central America Tarahumara, Mixe, Mixtecos, Zapotecans, Mayans, South America: Lamas, Uros, Aymaras, Quechuas, Toba Pilaga, Eastern Toba and Mataco Wichi [2]. The most frequent HLA-A, -B, -DRB1, -DQB1 extended haplotypes have been also found in other Amerindian populations (Table 2, Supplementary Material). Class II haplotype DRB*1 08:02 –DQB*1 04:02 is one of the most frequent in Mapuche and is also found in Pacific Islanders: Easter Island, Japanese Ainu and throughout America, including Aleuts, Athabaskan, Eskimo and most Amerindians groups [2].

Therefore, Mapuches HLA genes study also confirms that typical Amerindian alleles are shared with other groups, particularly with Pacific Islanders and another considered First America Inhabitants, like Athabaskans from present day North West Canada that were once thought to be a second American population wave, because together with Apache and Navajo from Southern United States spoke a non-Amerindian language (Dene-Caucasian, which also includes Basque European and Chinese Mandarin) However, few HLA and other genetic markers differences are detected between Amerindian and Dene speaking groups (Athabaskan, Navajo, Apache) [1]. It occurs likewise with another even most recent proposed Americas immigrants: Eskimo and Aleuts (both of them speaking different languages that also differed to that of other first America inhabitants, [12]). Also, the Amerindian and Pacific Islanders genetic and cultural relatedness is stressed [2,3]. Europeans [4,5] and even Africans (“Luzia” skull found in Brasil, [6]) may have reached America and vice versa. Finally, previous dating for America peopling is discordant with the fact that a 130,000 years old archaeological site in California shows already presence of humans [13]. In conclusion, Americas peopling needs a full revision according to more recent evidences.

All genotype data included in this paper are held in www.allelefrequencies.net and identifier number is 3614 [14].

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.humimm.2019.04.015>.

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