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EUROPEAN JOURNAL  
OF  
MEDICAL GENETICS

European Journal of Medical Genetics 49 (2006) 169–185

[www.elsevier.com/locate/ejmg](http://www.elsevier.com/locate/ejmg)

Original article

## Origin of Bolivian Quechua Amerindians: their relationship with other American Indians and Asians according to HLA genes

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Available online 11 May 2005

### Abstract

The Incas were Quechua-speaking people who settled down near Cuzco (Peru). They had an empire ranging from Ecuador to Chile, when Spanish conquerors seized their kingdom around 1532 AD. Nowadays, Quechua-speaking people inhabits Colombia, Ecuador, Bolivia, Peru and Argentina; however, Quechua language was imposed by both Incas and Spaniards to many non-Quechua speaking communities. We have taken a sample of Quechuan Bolivian blood donors from La Paz (Titicaca Lake region) where Inca-Quechuas themselves believed that came from. This group was compared with 6892 individuals from 68 different world populations regarding HLA/DNA allele frequencies distribution. Genetic distances, dendrograms and correspondence analyses were carried out in order to establish relationships among populations. The main conclusions are: (1) DRB1 and -DQB1 haplotypes shared with Asians are found in Quechuas and are not observed in other (Mesoamerican) Amerindians. (2) Aymara-speaking people from the same Titicaca Lake (La Paz) area shows close genetic distances with Quechuas in one dimension results (genetic distances); however, their HLA gene frequency distribution differs according to Neighbor-Joining (NJ) trees and correspondence analysis (multidimensional and more reliable analyses). Also, the common high fre-

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quency Asian and Athabascan HLA-DRB1\*0901 allele is found in Quechuas in a significant frequency. Quechuas are clearly included within the Amerindian group.

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*Keywords:* Amerindians; Aymara; Eskimos; HLA; Na-Dene; Quechua

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## 1. Introduction

The First Native Americans are believed to have populated America coming from Asia through the Bering land bridge between 30,000 and 12,000 years before present (BP). These conclusions have been based on cultural, morphological and genetic similarities between American and Asian populations [15]. Both Siberia [15] and Mongolia [39,49] have been put forward as the most approximate places of Amerindians origin in Asia.

Greenberg et al. [30] postulated the triple migration theory for explaining the Americas peopling on linguistic bases: Amerindians (most North and South American Indians; 12,000 BP), Na-Dene (Athabascans, Navajo, Apache; 8000 BP) and Eskimo-Aleuts (6000 BP). Studies on Y chromosome showed that more than one paternal founder haplotype arrived in America during different migrations [37], probably from Siberia [62]. DNA nuclear studies have also been carried out to ascertain the origin of First Native Americans (Alu insertions, [56]): three identifiable clusters of people are postulated, reflecting the geographical distribution with only one wave of immigration. Also, East Asian HLA genes have been found in the Azores Islands [10]; this is concordant with recent evidence showing the spread of Chinese fleet around the world in 1421 [48]. Also, the presence of South East Asian populations anthropological features in ancient American remains suggests a more complex view of First Native American ancestry [15,28]. A trans-Pacific route of American peopling from Asia or Polynesia has been suggested because HTLV-1 virus strain shared identical sequences in Japan and in the northern coast of South America [43] and some HLA alleles may have been introduced by the same Trans-Pacific route [12].

On the other hand, the northern Andean cultural area has been settled by men since at least 20,000 year BC (Ayacucho Valley, [16,67]). Groups of isolated people developed different cultures and certain cities (like Caral city, 200 km North of Lima) were flowering at the same time than Egyptian cities (4600 years ago). Different cultures have been listed according to different handcraft and building (including pyramids) characteristics [16]: Valdivia pottering, agriculture and buildings (near Guayaquil, Ecuador) is 5000-year-old and is similar to the much older Japanese Jomon culture [38,67]. Particular civilizations have been identified North of Lima [16]: Cerro Sechin (before 1000 years BC), Chavin (800 years BC) with apparent Chinese influences [1] (these Japanese and Chinese influences are not mentioned by Wilson in Ref. [67]), Moche pyramids and Sipan refined burials (70 AD).

Other civilizations have been identified South Lima: Paracas (1000 BC) and Nazca (200 BC) among others [1,38,67]. Human gatherers are found both North and South of Lima as early as 8000 BC. Most important mountain civilizations were Kotosh (2000 BC), Tiahuanaco (Titicaca Lake)—Huari (Ayacucho) 700 AD, Collas—Sillustani (Titicaca Lake, 1100 AD) and finally Inca culture 1532 (AD) [1,38,67]. All these cultures had influences in the Inca culture, including the apparently autochthonous Titicaca Lake (Aymara-speaking)

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