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NEWS LATIN AMERICA

What is a ‘Mexican’? Huge genetic database untangles a complex history

Two new major studies could improve medicine, answer questions about ancestry

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Mexican people, like these walking through an evening market in Coyoacán, in Mexico City, have a diverse mix of ancestries in their genome. LIGHTWORKS MEDIA/ALAMY

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In 2000, Mexico’s health authority asked more than 40,000 rural and urban residents to donate blood as part of a massive, ongoing effort to create a nationally representative health database. For the first time that year, the survey also asked people for consent for their data to be used in future genetic studies.

Now, more than 20 years later, that effort is paying off. Researchers have used these data to create what they’re calling the [Mexico Biobank](#) (MXB). The repository, described today in *Nature*, represents the [most diverse collection of genetic information in the Global South](#).

A second paper, also published today in *Nature*, describes findings from a project called the [Mexico City Prospective Study](#) (MCPS). Here, researchers combed through samples from more than 140,000 individuals from Mexico City [to discover genetic variants associated with their ancestry](#) and health, making it the largest such database of genetic data of people from Latin America.

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Together, the studies provide new clues about the genetic composition of people from Mexico, such as the extent of Indigenous and European ancestries within each region of the population, and how this makeup might influence their health. The projects also show the value of studying different populations in genetic and health research, says Elizabeth Atkinson, a statistical geneticist at Baylor College of Medicine and member of the Latin American Genomics Consortium.

“It’s just fantastic to have such a big resource available for understudied individuals,” says Atkinson, who was not involved with either of the studies. The new results, she says, will also potentially improve health care for Hispanic people, who [experience health disparities that are exacerbated by lack of research](#).

People from Latin America are severely underrepresented in large-scale genomic databases, which [have been dominated by individuals with European ancestry](#). In 2015, for example, Hispanic people [represented a mere 7% of participants in U.S. biobanks](#), despite constituting 18% of the country’s population. That disparity extends to research, where Hispanic people [only represent 0.33% of participants in genomewide association studies worldwide](#), despite making up more than 8% of the world’s population. Genetic variants mostly present in Indigenous Americans, for example, are [tightly associated with type 2 diabetes](#), yet treatments specific for this population are lacking.

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An attempt to rectify this disparity is what led Andrés Moreno Estrada, a population geneticist at Mexico’s National Laboratory of Genomics for Biodiversity, to compile the MXB. Mexico’s complex and unique history, involving pre-Hispanic civilizations, Spanish colonizers, enslaved Africans, and more recent immigrants from Asia, means Mexicans have several different ancestries represented in their genome. In contrast to working with databases with more homogenous populations, he says, working with samples from the MXB means “you have to take your genetic scalpel and separate each individual by their ancestry.”

Moreno Estrada and his colleagues used genetic markers specific to each of these ancestries to reconstruct the genetic makeup and size of each subpopulation going back 200 generations—or about 5000 years. The analysis revealed, for example, that the genetic makeup of people from the Yucatán Peninsula, where the Maya people have been living for more than 4000 years, is very distinct and more distinguishable than that of people living in central and northern Mexico. That’s likely because the peninsula is geographically isolated by mountains and rainforest from the rest of the country, which saw a bigger influx of migrants and colonizers. Genetically, Moreno Estrada says, “it’s not the same being Mexican from the Yucatán region as being Mexican from Sonora.”

The team also found that certain genetic characteristics were associated with some health traits. For instance, having fewer genomic variations, which occurs often in segments of DNA of those with Mexican Indigenous genetic ancestry, was correlated with a lower body mass index, as well as lower levels of blood glucose and triglycerides—markers of cardiovascular and metabolic health.

It took 20 years to develop the statistical and computing power to analyze these complex populations, Moreno Estrada says. “It’s much more complex because there are lots of genetic interactions.”

The second paper, from researchers at the Regeneron Genetics Center, the University of Oxford, and various Mexican institutions, similarly outlined the genetic profiles of Mexicans based on samples collected between 1998 and 2004. The scientists found that across the samples, 66% of the ancestry was Indigenous, most of which came from central Mexico. When they sequenced the genomes of a subset of the study’s participants, they identified 31.5 million genetic variants, most of them rare, that had not been found in other data sets.

“If you don’t look in other populations, you miss things that could really matter,” says MCPS team member Jason Torres, a genetic epidemiologist at Oxford’s Nuffield Department of Population Health.

Both studies will allow researchers to investigate everything from disease-causing rare mutations to gene variants that could influence how people react to drugs, says Claudia Gonzaga Jáuregui, a genomicist at the National Autonomous University of Mexico who is now using the MCPS data for her own research. The results of these genetics studies will also have takeaways for people of Mexican descent in other countries. “The population genomics of Latin America is also the genomics of the United States.”

Moreno Estrada is now traveling to regions he knows were part of the MXB study to communicate the results. Just last week, he visited the Yucatán, where he explained the advances of the MXB to local communities. “The commitment to return results is something that we always try to include in all the studies,” he says. Although many hope for immediate benefits, the majority understands that participating in a study is a contribution toward “a better understanding of their origins.”

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ABOUT THE AUTHOR



Rodrigo Pérez Ortega

Author

Rodrigo Pérez Ortega is a science journalist covering life sciences, medicine, health, and academia.

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