

# Wide genetic diversity in South American indigenous groups highlights diversity gap in genomics research

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Amazonians are as genetically different from Andeans as Europeans are from East Asians when it comes to genetic variants that affect the

response to certain drugs, according to a commentary [published](#) August 8 in the journal *Cell*.

These genetic variations can affect what side effects an individual experiences and influence drug dosage recommendations. Taking the genetic diversity within indigenous groups as an example, the scientists highlight the need to address the diversity gap in genomics research.

Historically, Native American populations have been viewed as a homogeneous group, a bias and oversimplification that researchers argue persists to this day. But the reality is much more complicated. Factors like environment, history, and culture have led to important [genetic differences](#) between populations living in the South American Andes and Amazon forests, which are only 150 to 200 miles apart.

"A low-oxygen and dry, high-altitude environment characterizes the Andean region, while the Amazon region is a low-altitude tropical forest. These vastly different environmental stressors can drive genetic changes and biological adaptations," says corresponding author Eduardo Tarazona-Santos of Universidade Federal de Minas Gerais, Brazil.

"The Andeans and Amazonians also developed distinct languages, [social structures](#), and agricultural practices, which can further contribute to their differentiation through natural selection over time."

The researchers analyzed the genomic diversity of 294 individuals from 17 indigenous Peruvian groups in the Andes and Amazon regions. They found that certain genetic variations make the Amazonians and Andeans respond to medicine differently.

For example, a higher percentage of Amazonians have a variation that makes them respond better to rosuvastatin therapy, often prescribed to lower [cholesterol levels](#) and prevent cardiovascular events, but also gives

them higher risks of side effects.

Based on clinical guidelines, only 2% of indigenous Andeans require a lower initial dose of rosuvastatin to prevent side effects, compared with 16% of indigenous Amazonians. The findings underscore the need to incorporate genomics research to ensure the effective application of precision medicine.

When it comes to warfarin, a medicine that treats blood clots, dosage is key. Too little warfarin renders the therapy ineffective, while too much can put patients at risk for heavy bleeding. Based on the genetic variations, 69% of indigenous people from the southern Andes region need a lowered warfarin dosage, compared with 93% of indigenous Amazonians.

"These pharmacology-affecting genetic differences observed in the Andeans and Amazonians are even larger than those seen between Europeans and Asians," says Tarazona-Santos.

While there are alternative drugs to warfarin that do not need critical control of dosage, they are ten times more expensive—out of reach for many people in developing countries. Understanding the [genetic factors](#) that influence drug dosing is crucial for ensuring the safe and effective use of affordable medicine in resource-limited settings.

Learning from the [genetic diversity](#) within [indigenous populations](#), the commentary cautions against conceiving of ethnic groups as a single entity in human genomics study. It also calls for inclusive genomics research that encompasses diverse populations to ensure equitable health care outcomes worldwide.

Tarazona-Santos concludes that including people from diverse socioeconomic and ethnic backgrounds in research groups is very

important for human genomics studies like this one. "It makes research and community engagement easier, offering transparency and confidence," he says. "It makes people more comfortable seeing familiar faces from the same community."

**More information:** The need to diversify genomic studies: insights from Andean highlanders and Amazonians, *Cell* (2024). [DOI: 10.1016/j.cell.2024.07.009](https://doi.org/10.1016/j.cell.2024.07.009).  
[www.cell.com/cell/fulltext/S0092-8674\(24\)00769-4](https://www.cell.com/cell/fulltext/S0092-8674(24)00769-4)

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