

Genetic protection against arsenic

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Evolution has not only controlled human development over millions of years, it also has an impact on modern man. This is one of the conclusions of a study of Argentinian villagers in the Andes, where the water contains high levels of arsenic. A gene variant that produces efficient and less toxic metabolism of arsenic in the body was much more common among the villagers than among other indigenous groups in South or Central America. The study was a collaborative effort by Karin Broberg from Lund University and Carina Schlebusch and Mattias Jakobsson from Uppsala University in Sweden.

"We know that many bacteria and plants have genes that increase resistance to arsenic, a highly [toxic substance](#) that is found in soil and water in many parts of the world. There has been no previous research on whether the people in these regions also have protective genes against arsenic", says Karin Broberg.

High levels of arsenic in drinking water are linked to a range of health problems. Increased child morbidity and an increased risk of cancer, heart disease and diabetes are some examples.

In many places this is a relatively new problem, for example in Bangladesh, where it arose in connection with new drilled wells. In the Andes, however, people have lived with drinking water containing arsenic for thousands of years, owing partly to high levels of the toxic substance in the bedrock and partly to consequences of mining since the pre-colonial era. Even 7 000-year-old mummies from northern Chile have been found to have high levels of arsenic in their hair and [internal](#)

[organs](#). Occupational and environmental medicine researcher Karin Broberg has been studying the [health impact](#) of metals in the Andes for a long time.

"We found that the people up in the mountains in Argentina had unusually efficient metabolism of arsenic. This meant that the toxin left the body rapidly and less toxically instead of accumulating in tissue", she explains.

In the newly published study, the researchers have studied the genes of Atacameño Indian villagers in San Antonio de los Cobres in Argentina, who have lived in the area for multiple generations. Their genes were compared with those of various indigenous and Mestizo groups from Peru and indigenous groups from Colombia and Mexico. Over two thirds of the Argentinian villagers were found to carry a [gene variant](#) that accelerates the metabolism of [arsenic](#), compared with half of the Peruvian villagers and only 14 per cent of the other [indigenous groups](#).

There has been very little previous research on human evolutionary adaptation to environmental toxins. However, it is known that many of the genes that control the metabolism of poisons in the body have a large number of variants that occur with varying prevalence around the world. There may therefore be different adaptations among different populations, depending on what toxins they are exposed to in the local environment, according to Karin Broberg.

More information: The study has been published in the journal *Environmental Health Perspectives*, see ehp.niehs.nih.gov/2012/10/poss...haplotype-in-humans/

Provided by Lund University

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