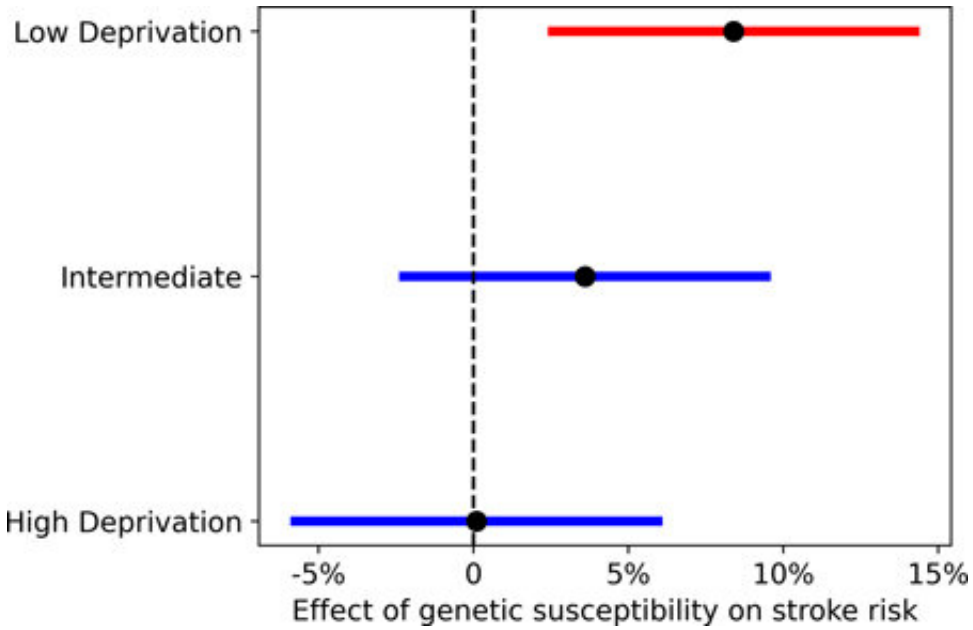
Genes, neighborhoods and a surprising finding on stroke risk

February 6 2023, by Michael Merschel



Credit: *Stroke* (2023). DOI: 10.1161/str.54.suppl_1.32

A genetic score may be able to identify higher stroke risk—but only for people living in the most privileged neighborhoods, according to new research that highlights inequities related to wealth and health.

Researchers looked at acute ischemic stroke, the most common type of stroke. It is caused by a clot blocking blood flow to the brain. Genetic factors are known to influence stroke risk, and previous research shows the risk also can be affected by poverty, low education or lack of health

insurance, factors known as social determinants of health.

But lead author Dr. Cyprien Rivier, a postdoctoral research fellow at Yale School of Medicine in New Haven, Connecticut, said most genetic analyses ignore social factors, while studies on social factors rarely look at genetics. "So we were interested in combining both."

Researchers used data from more than 147,000 people and 787 neighborhoods in their analysis, which will be presented Feb. 8 at the American Stroke Association's International Stroke Conference in Dallas. It has also been published in the journal *Stroke*.

The study participants were part of the National Institutes of Health's All of Us research program, which emphasizes groups underrepresented in medical research, such as people with low incomes and those living in rural areas. Among them, 3,201 had strokes.

To assess the participants' genetic risk, the researchers used a polygenic risk score for stroke. The score was based on 530 genetic variants related to blood pressure, cholesterol, blood glucose, body mass index, diet, physical activity and the likelihood of smoking.

To assess neighborhoods, researchers used the Census Bureau's American Community Survey, which has data on income, education, poverty level and more, broken down by ZIP code. The researchers split those ZIP codes into three categories: low, intermediate or high deprivation.

Independently, both community deprivation and the polygenic risk score were associated with stroke risk.

When genetics and neighborhoods were analyzed together, the link between the polygenic risk score and stroke risk was significant in the

least-deprived neighborhoods. There, a higher genetic risk score can increase a person's stroke risk by about 10%.

But in a surprise to researchers, the increased risk from a higher genetic risk score was statistically insignificant for the middle group of neighborhoods. And it vanished in the most-deprived neighborhoods.

"The polygenic risk score has basically no effect on the risk of ischemic stroke for the people living in these highly deprived neighborhoods," Rivier said.

The findings suggest that genetic risk can be modulated by where you live, Rivier said. But the study was not designed to explain why.

"This is the big question," he said, "and this is also where we should be careful not to make conclusions based on these results," which he said are narrowly focused on ischemic stroke.

It's possible, he said, that burdens on people who live in deprived areas overshadow their risk from genetics. In other words, if you face a lot of adverse health factors, then your genes might not matter as much, Rivier said. "But we cannot say for sure."

Social epidemiologist Anusha M. Vable, an assistant professor at the University of California, San Francisco, called the results "surprising and really interesting."

Vable, who was not involved in the study, agreed that the research does not show cause and effect. But it suggests, she said, that in the highest deprivation neighborhoods, the baseline level of risk was so high that those who are not genetically susceptible to acute ischemic stroke had the same risk as those who were genetically susceptible and that "there's a baseline level of risk that's really high in the deprived neighborhoods."

She would have expected that higher levels of genetic risk would compound the risks from deprivation. But what the researchers found "is that everyone who's deprived is at high risk."

To her, that suggests social determinants of health matter more than genetic susceptibility for having an acute ischemic stroke. "And I think that's actually really good news," she said, because social determinants of health can be improved by strengthening social safety net policies. There is no such fix for genes.

Rivier said further work could look at other combinations of genetic and environmental factors as well as other cardiovascular conditions.

Vable agreed on the need for more studies. Meanwhile, she said, "These results contribute to a larger body of evidence that shows, I think really convincingly, that the social determinants of health produce health inequities."

More information: Cyprien Rivier et al, Abstract 32: Neighborhood Deprivation And Polygenic Contribution To Acute Ischemic Stroke: Results From The All Of Us Research Program, *Stroke* (2023). DOI: 10.1161/str.54.suppl_1.32

Provided by American Heart Association

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