

'Smart genes' account for 20% of intelligence: study

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A depiction of the double helical structure of DNA. Its four coding units (A, T, C, G) are color-coded in pink, orange, purple and yellow. Credit: NHGRI

Scientists on Monday announced the discovery of 52 genes linked to human intelligence, 40 of which have been identified as such for the first time.

The findings also turned up a surprising connection between intelligence and autism that could one day help shed light on the condition's origins.

Taken together, the new batch of "smart genes" accounted for 20 percent of the discrepancies in IQ test results among tens of thousands of people examined, the researchers reported in the journal *Nature Genetics*.

"For the first time, we were able to detect a substantial amount of genetic effects in IQ," said Danielle Posthuma, a researcher at the Center for Neurogenomics and Cognitive Research in Amsterdam, and the main architect of the study.

"Our findings provide insight into the biological underpinnings of intelligence," she told AFP.

Most of the newly discovered gene variants linked to elevated IQ play a role in regulating cell development in the brain, especially neuron differentiation and the formation of neural information gateways called synapses.

An international team of 30 scientists combed through 13 earlier studies in which detailed genetic profiles and intelligence evaluations—based on IQ tests—had been compiled for 78,000 people, all of European descent.

Links with autism

Increasingly powerful computers have made it possible to scan and compare hundreds of thousands of genomes, matching tiny variations in DNA with diseases, body types or, in this case, native smarts.

The human genome has some 25,000 genes composed of more than three billion pairing of building-block molecules.

Many of the genetic variations linked with high IQ also correlated with other attributes: more years spent in school, bigger head size in infancy, tallness, and even success in kicking the tobacco habit.

One of the strongest—and most surprising—links was with autism, noted Posthuma.

"Gene variants associated with high IQ are also associated with higher risk of autism spectrum disorder," she said in an interview.

One gene in particular—SHANK3—"is a very good candidate for explaining that," she added.

Conversely, the absence of certain high-IQ genes was more common in people suffering from schizophrenia or obesity.

A genetic IQ test?

To challenge their own results, the researchers separately checked the 13 databases they drew from—each had used slightly different IQ tests—against the 52 gene variants to see if the combined match-up between intelligence and genetic profile held up. It did.

They also scanned a very large database that had not been part of their study. Once again, the link held up, though—as expected—with a smaller percentage overlap between with IQ.

Scientists would have to scan millions of genomes to find them all, and the raw data and computing power for doing so is still out of reach, Posthuma explained.

"For intelligence, there are thousands of genes," she said. "We have detected the 52 most important ones, but there will be a lot more."

Experts agree that genes probably account for up to half of measured intelligence. But even if scientists could map all the genetic quirks that contribute to being brainy, that might not be enough to predict IQ, much less success in life.

"We are looking at all these genetic effects in isolation," said Posthuma. "Maybe it's a certain pattern of genetic variants"—and not just their sheer number—"that makes you more intelligent."

The other major ingredient for achievement, she added, is exercising one's quotient of grey matter, however big or small it might be.

If someone with a big genetic endowment "chooses not to put any effort into learning, then that will definitely diminish their chances for achievement," Posthuma said.

More information: Suzanne Sniekers et al, Genome-wide association meta-analysis of 78,308 individuals identifies new loci and genes influencing human intelligence, *Nature Genetics* (2017). [DOI: 10.1038/ng.3869](https://doi.org/10.1038/ng.3869)

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