

Viruses that make us smarter? Not really

[“Our Viral Inheritance May Make Us Smarter”](#) cries the headline of a news story reporting on a new research study from Lund University in Sweden. “Junk DNA’ from million-year-old viruses actually plays vital role in human intelligence: study” claims another, about the same study. The headlines are provocative indeed, suggesting viral gene fragments that are embedded in our genome are linked to intelligence.

But is that what the study really claims? Not really, as it turns out.

Before we go into the study, let me cover a little bit of the background. Mammals and viruses share a long and storied complex genetic history together. As viruses infected mammals again and again over millions of years, they [transferred](#) many thousands of viral gene fragments into the genome. Research stemming from the human genome project [showed](#) that there are at least 100,000 known viral fragments that are part of the human genome which makes up more than 8 percent of our genetic material. While these sequences were initially thought to be non-functional remnants of infection, we now know that many viral genes and proteins have evolved to become part of [normal](#) cellular functions and even serve to regulate the expression of other genes.

The most common of these fragments are known as [endogenous retroviruses](#) because they are very similar to a class of viruses known as retroviruses. Retroviruses themselves derive their name because of their ability to RNA back into DNA inside a host cell, reversing the traditional transcription process of converting DNA to RNA and then protein. The reverse transcribed DNA is then integrated into the host genome with the help of a specific viral enzyme known as an integrase and while this helps the virus replicate in the host cell.

The Lund University [study](#) sheds light on how some endogenous retroviruses may play a key role in brain function. The research group led by biologist Johan Jakobsson looked at the role of a protein called TRIM28 which had been previously shown by other groups to hold back the expression of endogenous retroviral elements. In a previous study, the same group found that when the TRIM28 gene was deleted in neurons of mice, they showed behavioral changes, particularly a vulnerability to stress. So in this study, Prof Jakobsson and his team wondered whether deleting TRIM28 might have a role to play in how neurons function by affecting expression of endogenous retroviruses.

To test this, the researchers took neuronal progenitor cells (stem-like cells that are on their way to becoming neurons) from mice that had the TRIM28 gene deleted and cultured them in the laboratory. They found that deleting TRIM28 in neuronal progenitor cells led to an increased expression of endogenous retroviruses which then altered the expression of nearby genes on the mouse genome.

There is an exciting finding showing that there might be a mechanism of genetic regulation in the brain that we do not yet know about, one that is controlled by endogenous retroviruses. However, nowhere in the TRIM28 study do the researchers claim that TRIM28, endogenous retroviruses and intelligence are somehow connected. And appropriately so, considering that the study was conducted only on cultured

cells and will need a lot more work to relate the finding to an effect on intelligence.

So where did the erroneous claims in the news come from? From the [press release](#) as it turns out, which had the headline – “*Do viruses make us smarter?*” Even though the body of the press release itself makes no reference to intelligence, the provocative headline is catching the eyes of reporters. Unfortunately, it is also having the consequence of spreading an idea that has no scientific backing.

Media coverage of this study is reminiscent of [reports](#) that appeared late last year about a virus that was linked to decline in cognitive performance in humans. While the ‘*stupidity virus*’ as it was dubbed made a splash, the reports were misleading and the results were inconclusive at best as Faye Flam [wrote](#) in *Forbes*

Purdue University virologist David Sanders said he would need to see this replicated before he’d believe the claim. One possible problem is the possibility that samples from the patients might have been contaminated with the algae virus.

He also raised questions about the peer review behind the paper. The journal, PNAS, allows authors to choose their own reviewers in some cases. “Something is wrong here...I don’t know how the experiments happened,” he said. “This is a whole bunch of random data stitched together with little real basis for making any conclusions.”

It’s provocative, and perhaps worth a follow up study, but unlikely to have implications for human stupidity.

She also points out that the hype generated had no legitimate source,

What’s misleading here is the story never reveals who is being quoted saying “makes us more stupid.” The implication is that it’s the scientists or someone in authority. But there’s no such phrase in the paper or the press release from Johns Hopkins University, nor does the story seem to include an interview.

I couldn’t find the word “stupid” in any form, and the only time I could find the word “intelligence” was when the researchers admitted that infected and uninfected scored the same on a test called the Wechsler Adult Intelligence Scale.

Interestingly, most of the media reports about the TRIM28 study do not refer to intelligence or smartness anywhere else apart from the headline, suggesting that they are following the lead of the press release. This is not uncommon as a recent [study](#) of misinformation in health news reporting found out.

All this is not to say that the study does not have importance. In fact it opens up a lot more of the genome to study as Jakobbson points out in the [press release](#)

“We have been able to observe that these viruses are activated specifically in the brain cells and have an important regulatory role. We believe that the role of retroviruses can contribute to explaining why brain cells in particular are so dynamic and multifaceted in their function.”

“I believe that this can lead to new, exciting studies on the diseases of the brain. Currently, when we look for genetic factors linked to various diseases, we usually look for the genes we are familiar with, which make up a mere two per cent of the genome. Now we are opening up the possibility of looking at a much larger part of the genetic material which was previously considered unimportant.”

But for now, while we are beginning to figure out the role that viruses (or their remnants) may play in human brain function, we are nowhere close to knowing whether they make us smarter or dumber.

Arvind Suresh is a science communicator and a former laboratory biologist. Follow him [@suresh_arvind](#)

Additional Resources

- [DNA v environment: Can viruses affect your thinking ability?](#) Genetic Literacy Project
- [Virus found in algae might cause cognitive deficits in humans](#), Virology