Zika virus infection may harm adult brain
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Research using lab mice has shown for the first time that infection with the mosquito-borne Zika virus may damage adult brain cells, not just developing fetuses, said a study Thursday.

Adult cells involved in learning and memory can be destroyed by the viral infection, which is also blamed for a surge in the birth defect microcephaly, according to the findings in the journal Cell Stem Cell.

“Zika can clearly enter the brain of adults and can wreak havoc,” said co-author Sujan Shresta, a professor at the La Jolla Institute of Allergy and Immunology. Researchers know that Zika can be “catastrophic for early brain development,” she added, but often adults who are infected show no symptoms. Those who do feel sick may report rash, body pain, and red eyes.

“Its effect on the adult brain may be more subtle, and now we know what to look for,” said Shresta. Researchers focused on neural progenitor cells, which are the early forms of brain cells that go on to become neurons. Researchers describe them as the stem cells of the brain.

Zika can attack these neural progenitor cells in the developing fetuses, leading to microcephaly in babies, born with unusually small heads, brain damage and disabilities.
Adult brains retain some niches of these neural progenitor cells, which replenish neurons in parts of the brain linked to learning and memory. Using fluorescent biomarkers in mice, the researchers saw that adult neural progenitor cells that were engineered to be vulnerable to Zika infection were killed off by the virus. The study found that Zika infection was linked to a four- to 10-fold drop in the mice’s adult stem cell proliferation. Two parts of the brain, including the hippocampus, which is associated with memory, saw evidence of cell death and reduced generation of new neurons, said the study.

– ‘Dramatic’ results –

“Our results are pretty dramatic,” said co-author Joseph Gleeson, adjunct professor at The Rockefeller University. “In the parts of the brain that lit up, it was like a Christmas tree.” Just what effect Zika infection might have on the adult human brain over time remains unclear?

Researchers know from past brain studies that integrating new neurons into learning and memory circuits is key to the brain’s ability to adapt and change. Without this process, the brain slides into cognitive decline and other conditions, such as depression and Alzheimer’s disease, can arise.

“It was very clear that the virus wasn’t affecting the whole brain evenly, like people are seeing in the (human) fetus,” said Gleeson, referring to the mice research. “In the adult, it’s only these two populations that are very specific to the stem cells that are affected by virus. These cells are special, and somehow very susceptible to the infection.”

Until now, global health authorities have been primarily concerned with the danger Zika poses to pregnant women and their fetuses. Zika has also been linked to a disorder known as Guillain-Barre syndrome, which can lead to nervous system problems such as weakness and paralysis. Shresta said the emergence of Guillain-Barre, which usually develops after the Zika infection has cleared, could be linked to the infection of adult neural progenitor cells.
But more research is needed. The mice model of Zika infection may not reflect how the virus acts on humans. “In more subtle cases, the virus could theoretically impact long-term memory or risk of depression,” said Gleeson. “But tools do not exist to test the long-term effects of Zika on adult stem cell populations.”