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Common virus may contribute to obesity in some people, new study shows

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Scientists today reported new evidence that infection with a common virus may be a contributing factor to the obesity epidemic sweeping through the United States and other countries. In laboratory experiments they showed that infection with human adenovirus-36 (Ad-36), long recognized as a cause of respiratory and eye infections in humans, transforms adult stem cells obtained from fat tissue into fat cells. Stem cells not exposed to the virus, in contrast, were unchanged.

In addition, the study reported identification of a specific gene in the virus that appears to be involved in this obesity-promoting effect. The findings, which could lead to a vaccine or antiviral medication to help fight viral obesity in the future, were presented at the 234th national meeting of the American Chemical Society.

“We’re not saying that a virus is the only cause of obesity, but this study provides stronger evidence that some obesity cases may involve viral infections,” says study presenter Magdalena Pasarica, M.D., Ph.D., of the Pennington Biomedical Research Center, a campus of the Louisiana State University system.

“Not all infected people will develop obesity,” she notes. “We would ultimately like to identify the underlying factors that predispose some obese people to develop this virus and eventually find a way to treat it.”

Pasarica was part of the original research group which demonstrated that the Ad-36 virus was capable of causing animals infected with the virus

to accumulate fat. Led by Nikhil Dhurandhar, Ph.D., now an associate professor at Pennington Biomedical Research Center, the group also conducted a noted epidemiologic study — the first to associate a virus with human obesity — showing 30 percent of obese people were infected with the Ad-36 virus in comparison to 11 percent of lean individuals. But evidence that the virus could actually cause fat levels to increase in human cells was lacking until now, Pasarica says.

In the current study, Pasarica and her associates obtained adult stem cells from fatty tissue from a broad cross-section of patients who had undergone liposuction. Half of the stem cells were exposed to Ad-36 and the other half were not exposed to the virus.

After about a week of growth in tissue culture, most of the virus-infected adult stem cells developed into fat cells, whereas the non-infected stem cells did not, the researchers say.

Funded by the National Institutes of Health (NIH), Dr. Dhurandhar's group recently identified a gene in the Ad-36 virus that appears to be involved in causing fat accumulation observed in infected animals. That gene, called E4Orf1, is now emerging as a promising target for future human therapies, such as vaccines and anti-viral medicines, aimed at preventing or inhibiting the obesity virus, she says.

The exact mechanism by which the virus might cause obesity in people is currently unknown, says Pasarica, who does not rule out the possibility that other human viruses may also contribute to obesity. Researchers also do not know how long the virus remains in the body of obese individuals nor how long its fat-enhancing effect lasts once the virus is gone. However, Pasarica notes a recent study demonstrated that animals that developed the virus remained obese up to six months after their infection was gone. More studies are needed, especially in humans, she adds.

Pasarica and her associates are now in the process of trying to identify the factors that predispose some people with the virus to develop obesity while others do not, but results of this investigation are not yet available, they say.

About 97 million adults in the United States are overweight or obese, according to NIH, and face an increased risk of Type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, and other health disorders. Obesity has many established causes that include over-eating, eating high-fat foods, lack of exercise, a genetic predisposition and certain medications.

Source: American Chemical Society