Article explores possible link between obesity and viral infections

October 23 2007

Experts don't dispute the important role that diet and activity play in maintaining a healthy weight. But can poor eating habits and a less active lifestyle fully explain the prevalence of obesity in the United States today? That question has led some researchers to ask whether there might be other causes for this serious problem. In the October issue of Mayo Clinic Proceedings, researcher Richard Atkinson, M.D., asserts that there is a growing body of evidence demonstrating that viruses may play a role in causing obesity in humans.

"The cause of obesity is not a secret -- if you consume more calories than you burn in daily activity, you gain weight. What is interesting is that much of the obesity epidemic cannot be explained just by Americans eating more and exercising less. There are other factors at play, and viruses causing obesity may be one of them," say Dr. Atkinson.

Dr. Atkinson, director of Obetech Obesity Research Center in Richmond, Va., reviewed multiple published articles that demonstrate a connection between viral infections and obesity. His article in Mayo Clinic Proceedings discusses five animal viruses and three human viruses that have been shown to cause obesity in laboratory studies.

According to Dr. Atkinson, several studies offer ample evidence that animals infected with certain human viruses experience excess weight gain and fat storage. When researchers infected animal subjects with a human virus known as Human Ad-36, they reported measurable increases in the infected animals' body fat and the visceral fat that

surrounds the organs deep within the belly. In addition, studies also demonstrated that infection with Ad-36 and the resulting weight gain could be transmitted from infected animals to uninfected animals.

Information on virus-induced obesity in human subjects is much more limited. Citing his own study conducted in 2005, Dr. Atkinson also showed a connection between obesity and exposure to the Ad-36 virus in humans. Dr. Atkinson's study screened for antibodies to Ad-36 (a sign of exposure to this virus) in 502 people of varying body weights, both obese and non-obese, from three cities in the United States. Ad-36 antibodies were found in 30 percent of obese individuals and 11 percent of lean individuals. Study results also showed highly significant differences in body mass index (BMI) between antibody-positive and antibody-negative individuals.

Dr. Atkinson also highlighted a study that looked at 89 sets of American adult twins and screened them for Ad-36. Because twins tend to be similar in many characteristics, including body weight, the researchers looked at twin pairs where one twin tested positively for Ad-36 and the other did not.

"Antibody-positive twins were slightly, but significantly, heavier and fatter than their antibody negative co-twins," says Dr. Atkinson. "The infected twins had a higher BMI and a greater percent of body fat than the uninfected co-twins."

In the mid-1970s, a virus called SMAM-1 was believed responsible for an increased death rate among commercially raised chickens in India. SMAM-1 is associated with decreased immune function and an increased accumulation of body fat in infected chickens. Dr. Atkinson reports that one study tested 52 obese humans for antibodies to SMAM-1. About 20 percent had SMAM-1 antibodies, indicating exposure to this virus. The study participants who had these antibodies

were heavier and had a higher body mass index compared with the antibody-negative group.

Dr. Atkinson's article also explores what current research has to say about the possible mechanisms underlying virus-induced obesity. Some research suggests that viral infections have a direct effect on adipocytes, cells that manufacture and store fat, turning on the enzymes of fat accumulation and recruitment of new adipocytes.

What's the next step for this research? According to Dr. Atkinson, "the body of evidence linking adenoviruses to obesity in humans is now sufficient to think about the next step. Ideally, we could prevent infection and virus-induced obesity with a vaccine for the obesity viruses. Development of a human vaccine will take several years."

Source: Mayo Clinic