
Liver Fat More Important Than Apple or Pear Shape in Heart Woes

For years, pear-shaped people who carry weight in the thighs and backside have been told they are at lower risk for high blood pressure and heart disease than apple-shaped people who carry fat in the abdomen. But new findings from nutrition researchers at Washington University School of Medicine in St. Louis suggest body-shape comparisons don't completely explain risk.

In two studies, they report excess liver fat appears to be the real key to insulin resistance, cholesterol abnormalities and other problems that contribute to diabetes and cardiovascular disease. Having too much fat stored in the liver is known as nonalcoholic fatty liver disease.

"Since obesity is so much more common now, both in adults and in children, we are seeing a corresponding increase in the incidence of nonalcoholic fatty liver disease," says senior investigator Samuel Klein, M.D., the Danforth Professor of Medicine and Nutritional Science. "That can lead to serious liver disorders such as cirrhosis in extreme cases, but more often it tends to have metabolic consequences."

Klein, who heads the Division of Geriatrics and Nutritional Science and runs Washington University's Center for Human Nutrition, studied obese adolescents. They were divided into two groups: obese with excessive liver fat and those with no evidence of fatty liver disease. The groups were matched by age, sex, body mass index, body fat percentage and degree of obesity.

The researchers determined that children with fatty liver disease also had abnormalities in glucose and fat metabolism, including lower levels of HDL cholesterol, the so-called good cholesterol. Those without a fatty liver did not have markers of metabolic problems. Whether shaped like pears or apples, it was fat in the liver that influenced metabolic risk.

"Abdominal fat is not the best marker for risk," says Klein, who also directs the Nutrition Support Service at Barnes-Jewish Hospital. "It appears liver fat is the real marker. Abdominal fat probably has been cited in the past because it tends to track so closely with liver fat. But if you look at people where the two don't correspond - with excess fat in the liver but not in the abdomen and vice versa - the only thing that consistently predicts metabolic derangements is fat in the liver."

In a second study, Klein's team found nonalcoholic fatty liver disease was related to the release of larger amounts of fatty acids into the bloodstream that were, in turn, linked to elevated triglycerides and to insulin resistance, a key precursor to type 2 diabetes.

"Multiple organ systems become resistant to insulin in these adolescent children with fatty liver disease," he says. "The liver becomes resistant to insulin and muscle tissue does, too. This tells us fat in the liver is a marker for metabolic problems throughout the entire system."

The findings indicate that children and adults with fatty liver disease should be targeted for intensive interventions, according to Klein. Those who are obese but don't have fatty liver disease still should be encouraged to lose weight, but those with evidence of fatty liver are at particularly high risk for heart disease and diabetes. They need to be treated aggressively with therapies to help them lose weight because weight loss can make a big difference.

"Fatty liver disease is completely reversible," he says. "If you lose weight, you quickly eliminate fat in your liver. As little as two days of calorie restriction can improve the situation dramatically, and as fat in the liver is reduced, insulin sensitivity and metabolic problems improve."

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Fabbrini E, deHaseth D, Deivanayagam S, Mohammed BS, Vitola BE, Klein S. Alterations in fatty acid kinetics in obese adolescents with increased intrahepatic triglyceride content. *Obesity* (2008), published online Oct. 2008. doi:10.1038/oby.2008.494

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