U of I study: exercise to avoid gallstones

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A new University of Illinois study shows that exercise-trained mice get far fewer gallstones than sedentary mice and identifies potential mechanisms to explain why this occurs.

The study, recently published in the *Journal of Applied Physiology*, can be viewed online at: http://jap.physiology.org/cgi/reprint/01292.2007v1 .

“For the first time, we have direct evidence that physical activity reduces gallstone formation, adding to the ever-increasing number of reasons that people should get more exercise," said Kenneth Wilund, a faculty member in the U of I Division of Nutritional Sciences and an Assistant Professor in Kinesiology and Community Health.

Gallbladder disease affects 10 to 25 percent of adults in the United States, although some persons who are affected may not have symptoms. It has the second highest cost of any digestive disease at $5.8 billion annually and results in over 800,000 hospitalizations each year.

Gallstones form when bile cholesterol levels become high enough to precipitate, fall out of solution, and solidify, Wilund said.

In the study, 50 mice from a gallstone-susceptible strain were fed a high-fat diet containing cholic acid, which helps increase cholesterol absorption. They were then divided into two groups. One group of mice ran on treadmills 45 minutes per day five days a week; the other group did not exercise.

After 12 weeks, the scientists removed the animals gallbladders, pooling the stones from each group and weighing them. The gallstones in the sedentary group weighed two and a half times more than the stones in the exercised group.

“You could see through the gallbladders in the exercise-trained group, whereas the gallbladders in the sedentary group were full of stones," Wilund said.

To understand more about why this happened, the scientists then measured the expression of selected genes in the liver and intestine that are involved in cholesterol absorption and may affect gallstone development.

“In the exercised mice, we saw an increase in the expression of two genes (LDLr and SRB1) that help bring cholesterol into the liver to 'clear' it from the circulation. But we also found that a protein called Cyp27 was upregulated about two a half times; this resulted in there being more bile acids to solubilize the increased cholesterol so it didn’t turn into gallstones.

“Taken together, the differences in gene expression between the exercised and sedentary mice in this study show how exercise training could simultaneously improve cholesterol levels while also inhibiting gallstone formation," he said.

Previous observational studies have suggested that people who are physically fit have fewer gallstones and lower cholesterol, but laboratory studies had not confirmed the link.

Wilund said these mice are a useful model because humans have a similar set of genes that regulate liver and bile cholesterol metabolism. He also said that human studies would be difficult to perform because of

the number of years it takes for people to develop gallstones.

“We certainly found the changes in gene expression in the exercised animals very intriguing,?he said. “The results add to a body of evidence that supports the importance of physical activity for good health.

Co-authors of the study are Laura A. Feeney, Emily J. Tomayko, and Hae R. Chung of the University of Illinois and Kijin Kim of Keimyung University in Daegu, Korea. Funding was provided by the University of Illinois Research Board.

Source: University of Illinois at Urbana-Champaign