



Doing Life Intentionally Together

### **Mild Exercise Protects Mature Mice From Flu Death**

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Researchers report that four consecutive days of moderate exercise in mice after they were infected with influenza protects them from dying, compared with mice that didn't exercise. This protective effect was more evident in mice greater than 16 weeks of age, an age at which they are immunologically more mature. The takeaway message: exercise regularly because you never know when you'll be exposed!

#### **From American Physiological Society :**

#### **After Flu Exposure, Mild Exercise Protects Mature Mice From Dying, But Not From Developing Symptoms**

Takeaway message: Exercise regularly to stay healthy



University of Illinois researchers report that four consecutive days of moderate exercise in mice after they were infected with influenza protects them from dying, compared with mice that didn't exercise. This protective effect was more evident in mice greater than 16 weeks of age, an age at which they are immunologically more mature. The takeaway message: exercise regularly because you never know when you'll be exposed!

Jeffrey A. Woods, PhD., and graduate student Tom Lowder at the Physical Fitness Laboratory, Department of Kinesiology, University of Illinois, Urbana, said their lab has a long-time interest in exercise and its influence on the immune system. (See "Exercise delays allogeneic tumor growth and reduces intratumoral inflammation and vascularization," by Mark R. Zielinski et al., *Journal of Applied Physiology*, June 2004, published by the American Physiological Society.)

"We had completed a lot of in vitro studies, but we wanted to study now how exercise affected animals against a real infectious challenge," Woods said. The question they addressed in their study, "Protective effect of exercise on mortality due to influenza in mice," was "can exercise protect against morbidity and mortality?" While exercise protected mice from mortality, it didn't seem to have any affect on gross measures of sickness behavior like food intake and cage activity.

Editors note: Woods and Lowder are reporting their findings at the American Physiological Society's 2004 Intersociety Meeting, "The Integrative Biology of Exercise," Oct. 6-9 in Austin. The meeting schedule can be found at (<http://www.the-aps.org/meetings/aps/austin/tentative.pdf>). The complete program, including abstracts, for the entire meeting is available upon request to members of the media.

Arrangements for on-site interviews, or telephone interviews during the meeting can be arranged through APS Communications Officer Mayer Resnick (cell: 301.332.4402, [mresnick@the-aps.org](mailto:mresnick@the-aps.org)) or through Stacy Brooks, APS Communications Specialist,

301.634.7253. From Oct. 6 (2p.m.) - Oct. 9, the onsite phone number is 512.482.8000,

room 602, or 512.681.2950.

Daily exercise until symptoms are present

Male mice 11-20 weeks old were infected with influenza virus and then randomly assigned to exercise (EX) or home cage control (HCC). The EX mice were exercised for 20 to 30 minutes for four days and multiple subjective and standard measurements were recorded.

"The animals did very moderate exercise while they were mounting an immune response," Woods noted. As soon as symptoms appeared, exercise was stopped, to mirror how most people react once they come down with flu-like symptoms. The mice were naïve, that is, they previously hadn't been exercising on a regular basis.

Results both striking and surprising; human flu vaccine reaction study underway

20-week-old mice that had exercised had significantly ( $p=0.008$ ) higher survival rates (18 of 22) versus HCC of the same age (10 of 22). However, 11- to 16-week-old mice didn't show a significantly higher survival rate. When all EX mice (47) were compared with all HCC mice (48), EX had twice the survival rate, 59% vs. 29.4% ( $p=0.003$ ). None of the variables (food/water intake, random activity or symptom severity) proved to be reliable at predicting mortality. However, severe lethargy was apparent one to two days prior to death. And while there was a "marked, age-dependent effect on mortality, there was no effect at all on morbidity, which was somewhat surprising," Woods said.

The Illinois researchers plan on doing followup studies with animals that had been exercising regularly, as well as studies that to try and uncover the overall protective effect and its mechanisms. Areas that they'll be studying include: lung histopathology, cytokine gene and protein expression in the lung, and possible development of flu-specific immune cells.

At the moment, the laboratory also has a large NIH-funded human clinical trial underway examining whether or not moderate exercise training can improve immunological vigor -- including responses to influenza vaccine -- in older adults.

*This information is not intended to replace medical care. This information is not intended to diagnose, treat or cure.*