Cigarette smoke could alter shape of heart

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Prolonged exposure to cigarette smoke can increase levels of the stress hormone norepinephrine and enzymes in the heart that have the potential to reshape the left ventricle, according to new research at the University of Illinois at Chicago.

In a study using rats as as animal model, five weeks exposure to cigarette smoke was associated with the activation of enzymes called mitogen-activated protein kinases that govern cell growth and survival in heart muscle. Activation of these enzymes may be a key event in cigarette smoke-induced heart injury, says Mariann Piano, professor of biobehavioral health science in the UIC College of Nursing and lead researcher of the study.

Heart disease probably develops as a result of complex interactions among many elements in cigarette smoke, she said.

"Cigarette smoke contains more than 4,000 different chemicals, one of which is nicotine," Piano said. "However, the effect of nicotine on the initiation and progression of cigarette smoke-mediated cardiovascular events remains controversial."

To date, small clinical trials of nicotine replacement therapies have not shown increased cardiovascular risk, even in patients with cardiovascular disease, Piano said. This suggested the need to study cigarette smoke as a whole.

In the new study, published in the November issue of the *European*

Journal of Heart Failure, rats were exposed either to cigarette smoke or to normal room air. After five weeks, the animals were examined by echocardiography. Heart tissue was examined under the microscope and by Western blot analysis, used to detect specific proteins in tissue samples.

The results showed exposure to cigarette smoke was associated with significant changes in the shape of the left ventricle, the heart's main pumping chamber, and an increase in the levels of the activated forms of the enzymes in the heart muscle. Researchers also found increased levels of norepinephrine, a hormone released when a stressful event causes any of a host of physiological changes, in urine samples taken from the animals.

Piano said this is the first study to demonstrate that cigarette smoke-induced ventricular remodeling is linked to the activation of mitogen-activated protein kinases. She received the American Heart Association's 2008 Katharine A. Lembright Award for excellence in cardiovascular research at the association's annual meeting in New Orleans on Nov. 9.

Source: University of Illinois at Chicago