Secondhand smoke exposure can cause cell damage in 30 minutes

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Exposure to secondhand smoke even for a brief period is injurious to health, a new study by researchers at the University of California, San Francisco has found.

According to the study, a 30-minute exposure to the level of secondhand smoke that one might normally inhale in an average bar setting was enough to result in blood vessel injury in young and otherwise healthy lifelong nonsmokers. Compounding the injury to the blood vessels themselves, the exposure to smoke impedes the function of the body's natural repair mechanisms that are activated in the face of the blood vessels' injury, the researchers report. Many of these effects persisted 24 hours later.

Study findings are reported in the online edition of the *Journal of the American College of Cardiology,* and will appear in the Journal's May 6 print issue.

The results showed that brief exposure to real-world levels of passive smoke have strong and persistent consequences on the body's vascular system, the researchers conclude.

For the study, subjects were exposed to carefully controlled levels of secondhand smoke in a research setting. The smoke was equivalent to being in a bar where smoking is allowed--as it still is for 51 percent of the US population and in other countries, such as Germany--for 30 minutes. As a control, the same subjects were exposed to clean air on a

different day.

In both settings, the researchers evaluated the subjects' blood vessel health through ultrasound to measure blood flow and analysis of blood samples. In the exposure environment, this was done before exposure to establish baseline measures, immediately after exposure, and then 1 hour, 2.5 hours, and 24 hours after exposure. The study involved 10 young adult subjects between the ages of 29 and 31.

The study is the first of its kind to link injury to blood vessels with the decreased efficacy of the body's own repair mechanism, namely the endothelial progenitor cells (EPCs). EPCs are circulating stem cells in the blood that play a key role in the repair mechanism of injured blood vessels.

The researchers examined three effects of secondhand smoke exposure:

-- the effect of smoke on the mechanical function of blood vessels
-- whether they could detect particles in the blood that are known to be increased in the blood due to blood vessel injury
-- whether there was any effect on the stem cells (EPCs) that comprise the body's blood vessel repair mechanisms

"We wanted to study whether even a brief 30 minutes of exposure to second hand smoke in otherwise healthy subjects would result in blood vessel injury and how the body's own repair mechanisms—the EPCs—would be affected by such an exposure," says Yerem Yeghiazarians, MD, director of the Translational Cardiac Stem Cell Program at UCSF.

The secondhand smoke's effect on all measures was profound, he says. "Even brief secondhand smoke exposure not only resulted in blood vessel injury, but it also interfered with the body's ability to repair itself

by making the EPCs dysfunctional. It is quite amazing that only 30 minutes of exposure could cause such demonstrable effects." The study also showed that the deleterious effects of the exposure remain in the body for at least 24 hours, much longer than previously thought.

Study results showed that smoke exposure made EPCs less functional. "So it's a double hit: not only does a person develop blood vessel injury, but the cells that are supposed to help repair this damage are themselves also dysfunctional, compounding the injury," he says.

The public health implications of the study findings are significant, according to Yeghiazarians. "Our study helps explain why there is about a 20 percent drop in hospital admissions for heart attacks when cities and states pass laws mandating smokefree workplaces, restaurants and bars."

The study suggests that there is no safe level of exposure to secondhand smoke, he says.

Source: University of California - San Francisco