Air pollution damages more than lungs: Heart and blood vessels suffer too

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As athletes from around the world compete in the Beijing Olympics, many are on alert for respiratory problems caused by air pollution. They should also be concerned about its toxic effects on the heart and cardiovascular system, mounting research shows.

According to an article published in the August 26, 2008, issue of the *Journal of the American College of Cardiology* (*JACC*), air pollution has both short- and long-term toxic effects that injure the heart and blood vessels, increase rates of hospitalization for cardiac illness, and can even cause death.

"We used to think air pollution was a problem that primarily affects the lungs. We now know it is also bad for the heart," said Robert A. Kloner, M.D., Ph.D., director of research at the Heart Institute of the Good Samaritan Hospital, and a professor of medicine at the Keck School of Medicine, University of Southern California, both in Los Angeles.

When pollutants are inhaled, they trigger an increase in "reactive oxygen species"—superoxiding molecules that damage cells, cause inflammation in the lungs, and spark the cascade of harmful effects in the heart and cardiovascular system. Recent research suggests that ultrafine air pollutants, such as those coming from car exhaust, may pass into the blood stream and damage the heart and blood vessels directly. Hearts directly exposed to ultrafine air pollutants show an immediate decrease in both coronary blood flow and the heart's pumping function, as well as a tendency to develop arrhythmias, according to studies conducted at the

Heart Institute.

"There doesn't have to be an environmental catastrophe for air pollution to cause injury," said Boris Z. Simkhovich, M.D., Ph.D, a senior research associate at the Heart Institute of the Good Samaritan Hospital, and an assistant professor of research medicine at the Keck School of Medicine, University of Southern California. "We're talking about very modest increases. Air pollution can be dangerous at levels that are within the accepted air quality standards."

Studies in both humans and animals have shown that exposure to air pollution can affect heart rate, blood pressure, blood vessel function, blood clotting, and heart rate variability (a factor in developing heart rhythm disturbances), and speed the progression of atherosclerosis.

Researchers who study large populations of people over time have found that increased levels of air pollution are linked to emergency hospital admissions for heart attack, chest pain, and congestive heart failure and even to death from heart disease, arrhythmias, heart failure and cardiac arrest.

The elderly and patients who have already been diagnosed with heart disease or diabetes (which damages the blood vessels) are particularly vulnerable to the cardiovascular effects of air pollution.

"Patients with cardiovascular disease shouldn't exercise outside on days with increased air pollution levels. On very polluted days, they should consider staying inside, and during the winter, they should limit exposure to fireplace smoke," Dr. Kloner said. "Of course, the real solution is to reduce air pollution."

Alfred Bove, M.D., Ph.D., agreed. "The review by Dr. Simkhovich and his fellow authors make it quite clear that air pollution is linked to

cardiovascular disease," said Dr. Bove, ACC's president-elect and cardiology section chief at Temple University School of Medicine in Philadelphia. "They suggest that this is another compelling reason to campaign for improved air quality, while at the same time studying therapies to minimize the risk of exposures."

Source: American College of Cardiology