

# Pollutants from incense smoke cause human lung-cell inflammation

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Burning incense, a popular cultural practice in Arabian Gulf countries and elsewhere, generates indoor air pollutants that may cause inflammation in human lung cells, say researchers in the Gillings School of Global Public Health at the University of North Carolina at Chapel Hill.

"Hazard assessment of United Arab Emirates (UAE) incense smoke" appears in the August 2013 issue of *Science of the Total Environment*. Rebecca Cohen, master's student in environmental sciences and engineering (ESE); her adviser, Kenneth G. Sexton, now retired ESE research assistant professor; and Karin B. Yeatts, research assistant professor of epidemiology, co-authored the study.

Previous studies, some by Yeatts and other UNC colleagues, have associated incense smoke with a number of health problems, including eye, nose, throat and skin irritation; respiratory symptoms, including asthma; headaches; exacerbation of cardiovascular disease; and changes in lung-cell structure.

Indoor air pollution is an international health concern. The World Health Organization estimates that more than 1 million people a year die from chronic obstructive respiratory disease (COPD), primarily a result of exposure to pollutants from cook stoves and open hearths. Burning incense releases similar pollutants, including carbon monoxide.

In the current study, the authors identified and measured the particles

and gases emitted from two kinds of incense typically used in UAE homes. The testing was done over three hours, the typical timeframe during which incense is burned, in a specially designed indoor environmental chamber with a concentration of smoke that might be present in a typical UAE living room.

The researchers analyzed both particulate concentrations and levels of gases such as carbon monoxide, sulfur dioxide, oxides of nitrogen and formaldehyde.

Human [lung cells](#) were placed in the chamber to expose them to the smoke, then incubated for 24 hours to allow particulates to settle and the cells to respond. The resulting inflammatory response, a hallmark of asthma and other respiratory problems, was similar to that of lung cells exposed to cigarette smoke.

Incense is burned weekly in about 94 percent of households in the UAE as a cultural practice to perfume clothing and air and to remove cooking odors. Since people there spend more than 90 percent of their time indoors, researchers said, [indoor air pollution](#) has become a source of increasing concern.

Adding to the concern is that charcoal briquettes frequently are used to ignite and burn the incense. That adds significantly to potentially harmful levels of carbon monoxide and other pollutants, they noted.

Two types of incense (Oudh and Bahkoor) are most often used. Both are made with agarwood, which is taken from trees that develop an aromatic smell in response to fungal infection. Bahkoor has a number of additives, including sandalwood tree resin, essential oils and other substances.

Researchers found that both types of incense emitted significant amounts of particles, carbon monoxide, formaldehyde, and oxides of

nitrogen, resulting in the cellular inflammatory response.

The authors recommended implementing better ventilation in UAE homes when incense is burned, such as opening a door or window to improve air flow. They also suggested using alternatives to charcoal, including electric combustion devices.

Future studies, they proposed, should measure additional compounds caused by incense burning and offer a more in-depth analysis of inflammatory markers.

Provided by University of North Carolina at Chapel Hill

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