

Risks for women: Passive smoke and obesity

For a quarter of a century, more than 120,000 registered nurses have been assisting physicians in a very personal way. As participants in an ongoing study, they've bared details of their own medical and life histories to flesh out a better understanding of health risks faced by U.S. women generally.

The two latest analyses from the nurses' survey, both published this week, quantify the health fallout of two of the most important lifestyle hazards confronting women—breathing the cigarette smoke of others, which can foster heart disease, and obesity, which increases the risk of stroke.

New estimates of both risks are appreciably higher than earlier reports had indicated.

To study the effects of secondhand smoke, Ichiro Kawachi and his colleagues at Harvard Medical School in Boston focused on a subset made up of 32,000 nurses who, as of 1982, had never smoked or exhibited signs of heart disease. At that time, the researchers asked the 36- to 61-year-old women how often they encountered smoke at home and at work. They also tallied how many years each woman had shared her home with a smoker. Overall, 80 percent of the women reported breathing secondhand smoke.

In the May 20 *CIRCULATION*, the Harvard team reports that over the succeeding decade, 135 women (0.52 percent) who had reported occasional or regular exposure experienced a heart attack, compared to only 17 (0.28 percent) who said they had never encountered secondhand smoke.

Though a number of studies have linked heart disease to passive smoking, Kawachi says, "there has been a persistent criticism that these studies had not controlled for many things that otherwise might explain the association," such as poor diet or a family history of high blood pressure. "So we tried to address everything we could think of," he says, "and still we found that regular passive smokers were at about twice the risk of heart attack as those not exposed."

Even women reporting only occasional exposure to cigarette smoke had a 60 percent higher risk than those who reported no exposure. Earlier studies suggested that regular secondhand smoke might elevate heart attack incidence in nonsmokers by only 30 or 40 percent.

Controlling for so many dietary, health, and other factors makes the new study "quite strong," notes epidemiologist Genevieve Matanoski of the Johns Hopkins University School of Public Health in Baltimore. She says the new risk estimates could be "a little exagger-

ated," however, if the nurses with other predisposing risks for heart disease unwittingly overestimated how much smoke they were exposed to.

Moyses Szklo, also of Johns Hopkins, says the nurses' data "are consistent with our own—that people exposed to environmental tobacco smoke are more likely to have atherosclerosis, the pathological process underlying heart attacks." Exposure to secondhand smoke causes a premature atherosclerotic thickening of the wall of the carotid artery, he's found.

Though the Surgeon General has estimated that 3,000 passive smokers in the United States die from lung cancer each year, deaths due to secondhand smoke may climb another 30,000 if the new heart attack risk figures hold up, Kawachi says.

The good news is that the already increasing limits on public smoking should be bringing about a decline in atherosclerotic risks for passive smokers.

For the study linking strokes and obesity, researchers began collecting data on 116,759 of the nurses in 1976, when the women were 30 to 55 years old. Through 1992, the team tracked general health, lifestyle, weight changes since age 18, and incidence of stroke.

Obesity appeared to increase a woman's chances of having an ischemic stroke, a loss of blood flow to part of the brain. Though seldom fatal, these strokes can prove debilitating. A woman 5 feet 6 inches tall who had gained more than 22 pounds since age 18 was nearly twice as likely to have a stroke as a woman who had kept her weight down, says study leader Kathryn M. Rexrode of Brigham and Women's Hospital in Boston. When compared to the leanest women, those who were most obese faced 2.5 times the risk of ischemic stroke, the researchers report in the May 21 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION*.

All cigarette smokers faced a heightened risk of ischemic stroke, regardless of their weight.

Obesity's link to the more dangerous, hemorrhagic strokes, in which a burst blood vessel causes bleeding in the brain, was inconclusive.

Differentiating between these types of strokes marks a departure from past studies. Earlier studies that focused simply on deaths caused by any stroke over-represented hemorrhagic strokes—thereby largely missing obesity's role in ischemic ones, the authors say.

Also unusual for a stroke study, this one included women with high blood pressure or diabetes, pathways by which obesity can cause harm. Indeed, Rexrode says, "the way obesity is causing strokes is through higher blood pressure and other metabolic effects."

— J. Raloff and N. Seppa

Sound conveyor belt for delaying photons

To store or process information encoded as light signals, it's often necessary to slow down or temporarily hold up strings of photons. Light travels so quickly, however, that such delays demand unusual efforts.

One approach already in use shunts signals into a kilometer or more of optical fiber, where photons can circulate until needed. Now, a team of researchers has developed a considerably more compact method of accomplishing this goal. In effect, the signal is converted from a wave that travels at the speed of light into one that travels at the speed of sound in a semiconducting material, then back into a speed-of-light wave.

Carsten Rocke, Achim Wixforth, and their colleagues at the University of Munich describe the technique in the May 26 *PHYSICAL REVIEW LETTERS*.

The device constructed by the group consists of an extremely thin film of indium gallium arsenide, 10 nanometers across, sandwiched between layers of gallium arsenide. The film serves as a quantum well, confining mobile electrons to motion in two dimensions.

The researchers can produce high-frequency acoustic pulses—physical vibrations—that travel across the surface of the quantum well from one end of the sample to the other. Shining laser light onto the quantum well displaces electrons, leaving behind holes. Such holes can be thought of as the positively charged counterparts of electrons in a semiconductor, and like electrons, they can move from place to place in a crystal.

Normally, electrons and holes recombine almost immediately, releasing energy in the form of photons. However, the propagating sound wave induces varying electric fields in the material, and these trap electrons and holes in separate phases of the pulse.

The separated electrons and holes are like objects interspersed on a conveyor belt, with adjacent positive and negative charges 1.5 micrometers apart, Wixforth says. They move along with the acoustic wave at the speed of sound.

Finally, electrons and holes can be brought together by adjusting the sound wave, and light is emitted. In effect, the photon conveyor belt extends the life of an electron-hole pair from mere nanoseconds to microseconds.

The researchers performed their experiments at 4.2 kelvins. "We hope to introduce a new, room-temperature version of our device in the very near future," Rocke says. Eventually, the researchers want to incorporate methods for processing the "stored light." — I. Peterson