

Biomedicine

Kathy A. Fackelmann reports from New Orleans at the American Heart Association's scientific sessions

Diet restores youth to aging vessels

To maintain normal blood pressure, blood vessels must dilate and constrict. Receptors on the vessel walls appear to control these crucial functions, and scientists have postulated that hypertension results when the receptors controlling constriction work well but the dilation receptors fail to relax the vessel. As people age, their vessels lose some dilating ability. But new findings indicate a low-salt diet can restore lost vessel dilation in older people, possibly lowering their risk of hypertension.

Ross D. Feldman and Christine Sinkey of the University of Iowa in Iowa City studied 10 people aged 48 to 72 and eight others aged 20 to 31, all of whom had normal blood pressure. Volunteers ate a high-salt diet for four days. On the fifth day, scientists injected each subject with a localized microdose of a substance that causes vessel constriction, followed by a small dose of isoproterenol, an adrenaline-like substance that causes dilation. They found that blood vessels in older subjects dilated only half as much as those in younger subjects.

After the researchers gave the group a low-salt diet for four days, the blood vessels of older subjects dilated as much as those of young subjects. These results suggest older people can stave off an age-associated malfunction in their blood vessel receptors—and reduce their risk of hypertension—by reducing dietary salt, says Feldman, now at the University of Western Ontario in London, Ontario.

Lifestyle contributes to a healthy heart

Although Seventh-Day Adventists generally refrain from drinking alcohol or smoking, diet and exercise apparently contribute the most to their healthy cardiovascular profile, scientists say.

Daniel O. Ullmann of the Oregon Health Sciences University in Portland and colleagues obtained alumni information on 4,342 male physicians graduated from Loma Linda (Calif.) University, most of whom were Seventh-Day Adventists, and compared them with 2,832 male physicians graduated from the University of Southern California, most of whom were not Adventists. The team looked at deaths from 1910 to 1980, finding Adventist physicians had the same risk of fatal cancer but half the risk of fatal stroke or heart disease compared with their non-Adventist peers.

Ullmann and colleagues attribute the differences in heart disease death rates to contrasting lifestyles: When the scientists conducted a random telephone interview of 450 graduates, they found 39 percent of Adventist physicians ate meat less than once a week or not at all and all non-Adventist physicians reported eating meat more than once a week. In addition, Loma Linda graduates ate more fresh fruits and legumes and exercised more vigorously than the non-Adventist physicians surveyed.

In a related report, Dean M. Ornish of the University of California, San Francisco, and colleagues continue to show that people with coronary artery disease who adopt major lifestyle changes can reduce some of the plaque that blocks their arteries (SN: 11/26/88, p.348). In a final report on 41 people with severe coronary artery disease, the researchers found 19 out of 22 people assigned to a lifestyle-change group (86 percent) showed overall regression of their atherosclerosis after one year. Scientists asked lifestyle participants to eat a vegetarian diet, exercise regularly and reduce stress by meditating. In contrast, 10 of 19 people in the care-as-usual group (53 percent) showed more narrowing of their arteries after one year.

People who stuck with the demanding regimen of diet, meditation and exercise fared the best. "The more lifestyle changes they made, the more improvement they showed in their arteries," Ornish comments.

Earth Sciences

Good news for greenhouse worriers

In the 1970s, consumers in the United States and other countries unwittingly took a major step toward reducing the threat of future global warming.

Fear of another environmental catastrophe — a vanishing ozone layer — drove many people to stop using aerosol spray cans containing chlorofluorocarbons (CFCs). Yet aside from harming ozone, CFCs act as "greenhouse gases" that warm the Earth by absorbing infrared radiation. If consumers had continued to spray with abandon, CFCs would have surpassed carbon dioxide by now in terms of current human contributions to the greenhouse effect, according to James Hansen, Andrew Lacis and Michael Prather at NASA's Goddard Institute for Space Studies in New York City.

In the Nov. 20 *JOURNAL OF GEOPHYSICAL RESEARCH*, the NASA scientists report that CFCs now constitute 25 percent of the annual human additions to the greenhouse effect. Reflecting industrial emissions and the continued sale of CFC-containing aerosol sprays in many countries, this percentage represents an increase over the past — but without the 1970s cutbacks, it would have been much greater, Hansen says. In comparison, carbon dioxide today accounts for 57 percent, methane for 12 percent and nitrous oxide for 6 percent.

Many policy experts believe it will be easier to eliminate CFCs than to drastically cut emissions of carbon dioxide, and most countries are currently reducing their use of CFCs as part of an international agreement (SN 6/10/89, p.367). "We can make an enormous contribution toward decreasing the current contributions by phasing out the CFC part," Hansen says. He warns, however, that while proposed substitute chemicals should not harm the ozone layer as much as CFCs do, several of them would contribute to the greenhouse effect.

Hansen says the NASA study shows that moderate CFC decreases that slow an exponential increase in emissions can make a big difference after a while. "This is an example which I think provides some optimism about the possibility of influencing what's going to happen," he says.

Resonance implicated in Nimitz tragedy

Seismologic studies following October's earthquake in northern California suggest vibrational resonance played a role in the collapse of the double-decked Nimitz Freeway in Oakland. Mud sediments beneath the structure amplified specific vibrations that matched the inherent resonant frequencies of the highway, report seismologists from the Lamont-Doherty Geological Observatory in Palisades, N.Y., and from the U.S. Geological Survey.

Within 72 hours after the main shock, the investigators had stationed seismometers at locations around the collapsed section of the highway. This portion of the Nimitz rests on fine-grained sediments washed in with mud from the San Francisco Bay, while other, uncollapsed sections sit on alluvium deposits that better resist shaking. Measurements of the different areas showed that the fine-grained sediments amplified the shaking more than the alluvium, which explains why so many nearby chimneys fell, says Lamont-Doherty's Robert W. Busby.

But why was this highway section hit harder than most other structures on *mud* sediments? To address that question, many engineers have focused on design flaws in the freeway supports. The seismologic studies, however, point to resonance as a contributing factor. Measurements, including some made on the highway itself, show that the mud sediments amplified frequencies of around 2 cycles per second, which are close to the highway's natural frequency. Like a child who pumps her legs to swing higher, the highway experienced resonating vibrations that caused it to shake more violently than surrounding structures, say Busby and his colleagues.