# Social links may counter health risks

Certain health patterns in the United States stand out clearly. Death rates rise sharply among people age 65 and older, for instance, and hypertension plagues many black adults.

These trends have been attributed to populationwide factors such as the greater susceptibility to physical illness among elderly people and the poverty and discrimination that disproportionately afflict blacks. Now, two studies find that, on closer inspection, death and high blood pressure take their greatest toll on those elderly and black people, respectively, who maintain few social contacts.

Both investigations appear in the September EPIDEMIOLOGY.

"These papers give us a better picture of how social relationships help to maintain the health of people who in other ways may experience disadvantage," writes Lisa F. Berkman of the Harvard University School of Public Health in Boston in an accompanying comment.

In the first study, elderly men and women who reported having consistently interacted with two or fewer people over a 3-year span died at a much higher rate over the next 8 years than those who had operated in a larger social network. Moreover, the small number of older adults who managed to go from few to many social contacts in the initial 3 years died at the same rate as those who had sustained numerous relationships throughout that time.

Older people whose numerous social ties unraveled dramatically during the same 3-year period did not experience elevated death rates, after statistically accounting for age and preexisting health problems, report James R. Cerhan and Robert B. Wallace, both of the University of Iowa College of Medicine in Iowa City.

"Continued social isolation may be a more important determinant of mortality risk than recent changes in social ties," they suggest.

Their study consisted of 2,575 adults age 65 to 102 living in two primarily rural Iowa counties. In surveys conducted in 1982 and 1985, each participant described his or her social ties, including marital status, number of close friends and relatives, church attendance, and membership in clubs or other social groups.

Deaths in the sample were then tracked through 1993.

Volunteers who cited persistent social isolation died at a substantially higher rate than the others, taking into account age, education, history of cigarette smoking, symptoms of depression, and changes in physical health, the researchers note.

Biological paths by which a lack of social ties might prove deadly to older people remain unknown, Cerhan and Wallace add. Further work needs to address whether separate factors, such as an introverted or hostile personality, lie at the root of prolonged social isolation, they say.

In the second study, black adults reporting few social contacts and lives dominated by worry and aggravation over largely uncontrollable circumstances exhibited significantly higher blood pressure readings, whether or not they suffered from hypertension.

Chronic mental stress and social isolation may trigger hormonal responses that produce narrower blood vessels and an increase in blood volume. These changes, in turn, raise blood pressure, proposes a research team headed by David S. Strogatz of the University at Albany (N.Y.) School of Public Health.

Strogatz and his coworkers collected data in 1988 from a representative sample of 1,750 black adults age 25 to 50 living in Pitt County, North Carolina, a region noted for high mortality from stroke. Family incomes for participants ranged from the poverty level to relative affluence.

Blood pressure readings were obtained in each volunteer's home. Social support and stress surveys focused on immediate concerns, such as the likelihood of getting help from others on simple house repairs or advice from friends on personal problems and the extent of daily worrying about money and personal safety.

Blood pressure was higher in volunteers who had either little contact with others or lots of worries, but it rose even further in those who reported both, the researchers report. The results held for both sexes.

This potentially deadly duo of social isolation and mental stress appeared most often in men and women from poor households. In addition, the findings applied whether volunteers' blood pressure was in the normal range, in the hypertensive range, or being treated with medication. *—B. Bower*

# Freeze! Insect proteins halt ice growth

In cold climates, cars often need an infusion of antifreeze to survive the winter. Many fish, insects, and plants are no different, but they produce their own protection—proteins that prevent their insides from turning to ice.

Scientists have studied fish antifreeze since the 1960s, but now researchers from Queen's University in Kingston, Ontario, have isolated and analyzed antifreeze proteins from insects. Virginia K. Walker, Peter L. Davies, and their colleagues collected the proteins from the spruce budworm, which is a moth larva, and from the common mealworm, a pest that feeds on grain.

The budworm protein is up to 30 times more potent than fish proteins, and the mealworm protein is up to 100 times stronger, the group reports in the September NATURE BIOTECHNOLOGY and the Aug. 21 NATURE, respectively.

"These are some of the most active antifreezes we have encountered so far," says Choy L. Hew, a biochemist at the University of Toronto who studies fish antifreeze proteins. Collecting enough protein from larvae was quite a feat, he adds.

If put in frozen foods, fish antifreeze proteins could help prevent ice from recrystallizing, as it does, for example, in ice cream left in the freezer too long. Scientists are also exploring the use of antifreeze proteins in preserving organs and tissues for transplants (SN: 3/21/92, p. 189). The greater potency of the insect proteins suggests that they could be used in lower concentrations, says Laurie A. Graham, a coauthor of the NATURE study.

Unlike conventional antifreezes, such as the ethylene glycol commonly used in cars, the proteins create a phenomenon called thermal hysteresis: They lower the freezing point of water below 0°C without changing the temperature at which ice melts as it is heated. The insect proteins lower the freezing point a maximum of 5.5°C.

No one knows exactly how the insect antifreeze proteins work, but they seem to bind to the surface of tiny ice crystals and inhibit their growth, Graham says (SN: 11/26/86, p. 330). The proteins contain many repeated sequences of the amino acids serine, threonine, glycine, and cysteine. The arrangement of these hydrophilic, or water-loving, amino acids may match well the arrangement of water molecules in ice.

Determining the three-dimensional structure of the proteins will provide more clues to how they work, says Hew. "We have solved the structure for fish antifreeze, so we know how it binds to ice, but it doesn't mean that the insect ones will bind in the same manner."

The Queen's University group does know that the insect proteins affect the growth of ice crystals differently than fish proteins do, says Daniel Doucet, a coauthor of the NATURE BIOTECHNOLOGY study. Ice crystals grown in the presence of the fish protein form pointy spicules with sharp edges. Grown with the budworm protein, however, the ice crystals look like smooth, hexagonal disks, which would cause less damage to cells preserved with antifreeze, he suggests. *—C. Wu*