Social ties and length of life

Friends, relations and acquaintances not only add spice to life but may also add length. A nine-year study of 7,000 randomly selected adult residents of Alameda County, Calif., finds that persons with the most social contacts were the least likely to die during the study period. When the data were adjusted to take into account age differences, a solid network of friends, relatives and acquaintances decreased the probability of dying by a factor of 2.3 among the men and 2.8 among the women.

The underlying reasons for this strong link still evade scientists, Lisa F. Berkman of Yale University School of Medicine told the meeting in New York on The Healing Brain. "We don't know what is critical about social networks," she says. "The pathways from network to illness are relatively unexplored." But analyses of the Alameda County data have ruled out a variety of proposed explanations.

Berkman has calculated a "social contact index," a value that takes into account whether a person is married, has close contacts with friends and relatives, belongs to a religious group and has other organizational affiliations. The effects of the various contacts appear to be cumulative, Berkman says. People with only one category of social contacts have an elevated risk of dying, no matter into what category the contact falls.

The data also support the idea of trade-offs and substitutions, Berkman says. A married person with no close friends or relatives can have the same mortality risk as an unmarried person with close contacts. And friends have the same effect on mortality risk as do relatives.

The social network effect is not limited to a specific disease, Berkman finds. She divided the 682 deaths among the sample during the nine-year period into four categories: heart disease, cancer, vascular and circulatory disease and other causes of death. The correlation between social network and mortality risk appears in each of the four categories. "Social networks can predict mortality from many causes," Berkman concludes.

A variety of explanations have been examined for the social network effect. One is that people who are ill, and thus more likely to die, have fewer social contacts. But this explanation is refuted, Berkman says, by considering the state of health reported by participants at the start of the study and the distribution of deaths during the study period.

Health practices were also examined as a possible factor in the social network-mortality connection. People who are socially isolated tend to have such poor health habits as smoking, drinking alcoholic beverages, getting little exercise and neglecting medical and dental preventative care. However, among people with similar health practices, those with few social contacts still had the higher mortality risk.

Another explanation suggests a person's psychological state could be both a cause of social isolation and a predictor of mortality. But Berkman finds that most psychological variables measured by the initial survey have little effect on mortality. Similarly, socio-economic status and geographic and job mobility do not contribute to the social network-mortality connection.

Berkman takes a broad view of the social network's role. Whereas social networks have been considered to have a beneficial "buffer" effect on events in a person's life, Berkman points out the fact that the networks themselves may provide important events and that events such as moving can change the social network.

In addition to the emotional support that networks can supply, Berkman suggests they provide a person with important information (such as what jobs are available and how to obtain medical care) and pragmatic help (goods, money and services). The strong effect of social networks on mortality leads her to propose an extension of the meeting's topic. She says that for good health "we not only need a healing brain, but we need a healing healthy society." □

Court ruling could limit nuisance suits

Federal regulators are viewing a Dec. 15 ruling by the Supreme Court as a major triumph of their independence. The Court decided that an industry could not sue a regulatory agency challenging its charges in court until that agency has completed its administration action. The precedent could call a halt to many "nuisance suits" filed to delay action — such as the development of new regulations — until federal regulators have finished any fact-finding actions.

The Court case involved a complaint issued by the Federal Trade Commission to eight major oil companies. FTC charged they had "maintained and reinforced a noncompetitive market structure in the refining of crude oil into petroleum products," had "exercised monopoly power in the refining of petroleum products" and had aided the needs and goals of each other in the oil industry. One of the eight firms, Standard Oil Co. of California (Socal), brought suit in Federal District Court claiming FTC lacked "reason to believe" that Socal had violated FTC law. But the high court found that FTC's action was interim in nature. (The original FTC action is still pending after seven years of investigation.) And the Court said that only final agency actions are open to judicial review prior to conclusion of their adjudication.□

Sleep: Do it at the right temperature

Throw the alarm clock out the window and see how long you sleep. Most people would guess that the tireder they are or the longer they have been awake, the longer they will sleep. Not so, according to experiments reported in the Dec. 12 SCIENCE, which conclude that natural body rhythms and especially body temperature determine the length of human sleep. It turns out that the warmer you go to bed the longer you'll sleep.

Previous studies had confounded sleep researchers. So-called "recovery" sleep after even 10 days of total sleep deprivation rarely exceeded 11 to 16 hours, while both longer and shorter sleep times were seen in subjects not deprived of sleep who lived on a self-scheduled routine. Such wide variation led some to characterize sleep duration as random and irregular. "We now report that such variations in sleep duration occur in a consistent and predictable manner which depends on when subjects went to sleep, rather than how long they have been awake beforehand," say the researchers: Charles A. Czeisler of the Laboratory of Human Chronophysiology at Montefiore Hospital in the Bronx, N.Y., and the Sleep Research Center at Stanford University School of Medicine; Elliot D. Weitzman of Montefiore and the Albert Einstein College of Medicine in the Bronx; Martin C. Moore-Ede of Harvard Medical School in Boston; and Janet C. Zimmerman and Richard S. Knauer of Montefiore.

Twelve male subjects lived separately for up to six months in an environment free of time cues — no windows, clocks, radios, etc. Each subject developed free-running, non-24-hour sleep-wake, body temperature and hormone-level cycles. Researchers monitored these circadian, or daily, rhythms and found that body temperature at the time of going to sleep is the best indicator of how long a person will sleep.

Human body temperature varies on a regular daily cycle. The researchers report that if subjects go to sleep when the body temperature is at its lowest they sleep an average of 7.8 hours and wake on the rising phase of the temperature cycle. If subjects go to sleep at or after the peak of the temperature cycle they sleep almost twice as long — 14.4 hours. They sleep through both the high temperature phase and the low temperature phase and wake up during the next upslope of the temperature curve. "No significant correlation ... was observed in these experiments between sleep duration and the length of prior wakefulness, provided that the subjects had been awake for at least 14 hours," say the researchers.

The internal structure of sleep was also found to vary with the phase of the tem-

perature cycle. The first 50 minutes of REM (rapid eye movement) sleep were accumulated an average of two hours earlier when sleep began just after the low point of the temperature cycle as compared with sleep beginning just after the temperature cycle maximum.

Supporting evidence for the link between body temperature, sleep duration and REM sleep was found in a reanalysis of published data from other sleep laboratories. "Although not previously recognized, other subjects studied in free-running conditions, whether in caves or in isolation facilities, have shown the same dependence of reported sleep duration on circadian temperature phase ...," say the researchers.

These findings may explain what happens on a free-running schedule, but what do they mean to those of us who are unwilling to throw our alarm clocks out the window? The researchers say, "These findings have major implications for understanding the timing of human sleep and may also help explain the sleep-wake patterns in shift workers and in certain clinical sleep disorders." Czeisler explains, for instance, "It's not enough to allot eight hours of sleep if those eight hours are at the wrong phase of the body temperature cycle....These results," he concludes, "allow us to begin applying the principles of circadian physiology to sleep processes in man. Understanding how these internal clocks work will enable us to develop rational shift-work schedules and methods to minimize jet lag." □