Safety gets short shrift on long night shift

New studies of the human "biological clock" and its interactions with the chemistry of sleep deprivation have important implications for night-shift workers – and for anybody depending on their services. The research shows that workers who regularly put in unusually long hours, especially when those hours stretch through the night and into dawn, are significantly less attentive, think and remember less clearly and have more accidents and near-accidents during working hours than do co-workers on regular day or afternoon/evening shifts.

These findings have direct relevance to the 20 million to 30 million U.S. workers who have nontraditional work schedules – including medical interns and residents – and appear to contradict a recent report in the NEW ENGLAND JOURNAL OF MEDICINE that found no decrease in performance among sleep-deprived medical interns (SN: 10/1/88, p.218).

Charles Czeisler of Brigham and Women's Hospital in Boston studied some of the behavioral effects of innate human biological rhythms by giving a battery of tests to people living in a sealed, "time-free" laboratory. He also interviewed thousands of rotating-shift workers about their work habits. He got an eye-opening view of what happens when you combine the generalized fatigue that comes with daytime sleeping with workforce-enforced wakefulness during the hours when the brain's pacemaker most wants you to go to sleep. "The safety implications for this kind of disruption of the circadian timing system have not really been fully recognized in our society," he said this week in San Francisco at the annual meeting of the American Association for the Advancement of Science.

More than half of the interviewed rotating-shift workers – including truck drivers and nuclear power plant operators – reported nodding off or falling asleep at least once a week while at work. Mean alertness ratings of workers on night shifts were about half the value reported by workers on afternoon/evening shifts – the time when workers report being most alert.

In a pilot study of 28 medical interns, Czeisler says he was surprised to find that during the past year more than one-quarter of them had fallen asleep while talking on the telephone. Thirty-four percent reported at least one actual or near-miss automobile accident during the year because of sleepiness – more than triple the percentage they reported in the year before their internship.

Laboratory research suggests that cyclic changes in performance, including a slump typically experienced by workers in the hours before dawn, are programmed by the biological clock – a small nucleus of nerves embedded deep within the brain. Scientists have found no quick and easy way to eliminate that early-morning slump or otherwise alter the human clock's basic 24-hour rhythm by more than about one hour. So for now, Czeisler says, the way to make shift work safer is to accommodate the body's natural rhythms by allowing sufficient sleep, stabilizing work schedules and – when shifts must be rotated – doing so in a clockwise direction from day to evening to night.

But new research by Czeisler, involving scheduled exposures to bright light and darkness, suggests "the human circadian pacemaker is more sensitive to resetting by . . . simulated sunlight and darkness than has previously been recognized," he says. He declines to discuss the unpublished work. However, he hints that the use of bright lights may someday serve to reset the human clock in the elderly – whose biological clocks tend to "speed up" with age – or in physicians and other workers who must toil through the night.

– R. Weiss

Fate of Arctic ozone remains up in the air

Using two instrument-laden airplanes flying from a base in Stavenger, Norway, a team of 150 U.S. and European scientists is surveying the dubious health of stratospheric ozone over the Arctic. The six-week project, which will continue through Feb. 15, is aimed at determining how human-made chemicals called chlorofluorocarbons are harming the protective layer of ozone in the North.

Despite earlier projections that the Arctic stratosphere might be too warm this year for certain parts of the project, weather has cooperated with the experimenters, says Michael Kurylo, program manager of NASA's Upper Atmosphere Research Program in Washington, D.C. "The low temperatures are there and the PSCs [polar stratospheric clouds] are there," he told SCIENCE NEWS in a telephone interview from Norway.

Polar stratospheric clouds are composed of frozen water and nitric acid crystals that form when stratospheric temperatures drop below about 85°C. In past studies of the dramatic ozone losses over Antarctica, scientists have learned that PSCs help chlorine destroy ozone by fostering certain chemical reactions (SN: 10/15/88, p.249).

Sponsored principally by NASA, the present Arctic project reunites many scientists and instruments from a similar airborne campaign over the Antarctic last year. Both studies rely on a high-altitude ER-2 and a medium-altitude, long-range DC-8. The ER-2 can fly into the stratosphere to take direct measurements and samples, while the DC-8 carries an airborne laboratory of remote-sensing instruments that probe the stratosphere from beneath.

Researchers say there is no Arctic ozone "hole" comparable to the one detected over the Antarctic each September and October since the late 1970s. Warm temperatures and strong weather variations in the North do not create the same kind of conditions that allow the Antarctic-scale destruction of ozone molecules.

Long-term records, however, show that ozone levels in the high northern latitudes have dropped roughly 5 percent over the last 17 years, says Kurylo. This trend concerns scientists because, while the Antarctic remains virtually unpopulated, people do live in the northern areas that appear to be suffering ozone loss. Stratospheric ozone protects humans and other life forms by absorbing ultraviolet radiation from the sun.

Last year, researchers stationed in Thule, Greenland, measured elevated levels of reactive chlorine compounds – an indication that chlorine is destroying ozone in the region, although the severity of this process is still unclear. Scientists say they need to detail what is taking place in the Arctic in order to create realistic models forecasting how quickly ozone levels will drop in the future.

– R. Monastersky

AIDS and attitude

Ongoing studies continue to suggest that AIDS patients can provide critical assistance to their virus-invaded immune systems by talking about their feelings, venting their anger and being assertive, researchers reported this week. But it remains to be seen whether the improved immune status will translate into significantly longer survival times.

Researchers attending the annual meeting of the American Association for the Advancement of Science in San Francisco presented updates on three studies assessing the effects of different coping behaviors on the immune status of HIV-infected patients. In many cases, those effects "are statistically significant," says Janice K. Kiecolt-Glaser of the Ohio State University College of Medicine in Columbus. "But often the magnitude is relatively small."

Confirming preliminary results (SN: 8/20/88, p.116), the studies indicate that HIV-infected men who express their emotions and cope well with anxiety and depression score higher on tests for immune-system competence, and may progress more slowly from asymptomatic status to full-blown cases of AIDS. □