

CHEMISTRY

Undoing future shock: A jet lag pill

Flying long distances across time zones can upset one's "internal clock." Like other organisms, humans have natural circadian (daily) rhythms of body temperature, waking and sleeping, food intake, etc., that can be disturbed by the unnatural phenomenon of rapid air travel and changing daylight patterns. An age of jets and jet lag should certainly have a pill to prevent the disruption of circadian rhythms, right? Yes, say three biologists, and it soon may be feasible.

Charles F. Ehret and Kenneth W. Dobra of Argonne National Laboratory and Van R. Potter of the University of Wisconsin report experiments with internal clock resetting drugs in the June 20 *SCIENCE*. Previous research has shown that internal clocks can be reset by giving the system a shock, either with light (in the case of insects) or chemicals, administered at a sensitive time during the daily cycle. Using laboratory rats, the Ehret team first "set" the animals' circadian rhythms with rigid regimes of light and food. Then, after observing and recording the sensitive points in the cycles (manifested by changes in deep body temperature) they administered clock-resetting drugs. Theophylline, a stimulant, could cause an 18-hour forward phase shift if administered at a time of peak sensitivity, and phenobarbital, a depressant, could cause a 12-hour backshift.

If sensitive points in human circadian rhythms can be pinpointed and exact drug dosages determined, it may be feasible to write drug prescriptions for jet travelers or workers changing shifts, the team states.

Petition for polyvinyl packaging ban

The discovery last year that exposure to vinyl chloride gas could cause human liver cancer was like a stone dropped into a pond. Reverberations from that disturbing fact have rippled across the scientific, industrial and consumer communities. Plastics are ubiquitous in modern industrial societies. That a component of the second most widely used plastic can cause cancer is not a good sign at all. Regulations have been clapped on worker exposure to vinyl chloride. Studies on polyvinyl chloride and other plastics have been initiated. Consumers groups are getting anxious about the safety of plastics in the home environment.

Evidence that vinyl chloride can leach into foods from polyvinyl chloride packaging has led one consumer group to petition the U.S. Food and Drug Administration for a ban on that type of packaging. In their petition this week, Ralph Nader's Health Research Group cites plastics industry research showing that measurable amounts of vinyl chloride can leach from polyvinyl chloride bottles into vegetable oils, vinegar, apple cider, medicines and mouthwashes and from wrappings into meat. A leaching problem has already resulted in a ban on polyvinyl chloride liquor bottles. Although the vinyl chloride workers who contracted liver cancer inhaled the chemical, the Health Research Group cites evidence that rats fed vinyl chloride residues also develop liver cancers.

FDA's Bureau of Drugs will recommend an upper limit of 50 parts per billion in foods, a spokesman says.

Wrapping up nuclear fuel theft?

A Sandia Laboratories researcher is studying a plastic film that may someday wrap up the nuclear fuel theft problem. Glen Kepler told a St. Paul, Minn., meeting of the American Chemical Society that polyvinylidene fluoride generates a voltage with small temperature or pressure changes and could perhaps be used to coat surfaces in nuclear storage facilities and detect thieves. He is now studying the plastic's aging characteristics.

BIOMEDICINE

Biofeedback in childbirth and stroke

Using the mind to control involuntary actions of the body is nothing new to yogis. But only during the past several years have physicians encouraged controlling the mind with the help of biofeedback machines.

For example, physicians have found that biofeedback can help relieve muscular tension (SN: 2/16/74, p. 104). Now Robert H. Gregg, an obstetrician at Loma Linda University, has found that biofeedback can help women through childbirth. And J. V. Basmajian and his rehabilitation group at Emory University have found that biofeedback can help stroke patients.

Gregg first explored the value of biofeedback in labor when a patient whose husband makes biofeedback monitors asked whether she could use biofeedback to help her prepare for labor. Gregg agreed; the results were impressive. Gregg has since helped 30 patients use biofeedback in learning how to relax for childbirth. More than half of them required no medication at all during the first part of labor.

Basmajian's group had 10 stroke patients suffering from chronic foot-drop exercise for five weeks, and 10 others exercise and use biofeedback training. The latter group regained twice as much motion with their feet as did the first group. Three of them are now able to walk without the use of braces.

Heart attacks and anticoagulant therapy

The use of anticoagulant therapy in treating acute heart attacks is one of the most controversial issues of medical treatment. Most investigators agree that complications are fewer with such therapy, but many remain unconvinced that it reduces deaths.

Now a nationwide survey conducted in Israel and reported in the June 26 *NEW ENGLAND JOURNAL OF MEDICINE* shows that anticoagulant therapy can indeed save lives.

Baruch Modan of Chaim Sheba Medical Center, Tel Hashomer, and his group studied all 2,330 patients hospitalized for a first heart attack during a one-year period. They found that there was a significantly lower 21-day death rate among patients treated by anticoagulants than among those who were not—8.3 percent versus 27.3 percent.

Magnets and red cells

A technique for easily separating red blood cells from blood plasma would benefit both clinical and experimental medicine. A physics-hematology team at the University of Southampton, England, headed by D. Melville, has now developed such a technique. It consists of passing blood through a magnetic field.

Scientists have known for a long time that hemoglobin, the pigment that gives red blood cells their color, has magnetic properties. This is because hemoglobin contains iron atoms. Melville and his colleagues reasoned that a magnetic field with a high field gradient might be used to separate red blood cells from blood plasma.

They placed a column between the pole-pieces of an electromagnet and passed blood through the column. Seventy percent of the red blood cells in the blood were attracted by the magnetic field and remained in the column. Scanning electron microscope studies of the red blood cells retained in the column indicated that a small proportion of them had slight structural abnormalities. Melville and his co-workers have yet to determine whether such defects affect the viability of the cells. They hope not.

"The successful outcome of this preliminary experiment," they report in the June 26 *NATURE*, "indicates that high-gradient magnetic separators may be used to produce either blood plasma with a low red cell population, or a suspension of red cells free from other blood contents."