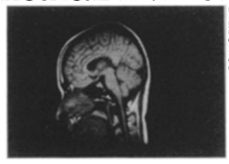
Biomedicine

NMR approved for medical market


Diasonics

Imaging devices that rely on the power of magnets instead of ionizing radiation to create detailed pictures of the body's soft internal organs moved from laboratory to marketplace last week. The Food and Drug Administration gave the go-ahead to two firms, Technicare Corp. of Cleveland and Diasonics Inc. of Milpitas, Calif., to begin marketing their nuclear magnetic imaging devices. The machines, each priced at $1.5 million or more, are designed for imaging only, both companies told SCIENCE NEWS, and generate insufficient magnetic field strength for biochemical studies.

Estrogen best for curbing bone loss?

Estrogen's link to uterine cancer has tainted the hormone's clear benefit in warding off the painful fractures associated with aging bones (SN: 8/27/83, p. 140). But a panel of specialists convened by the National Institutes of Health in Bethesda, Md., last week announced that, despite the possible risks, estrogen replacement therapy is still the "most effective" method of curbing bone loss, and should be considered in treating many postmenopausal women.

It's not that the risks of cancer have been overemphasized in the past, says panel chairman William Peck of the Washington University School of Medicine in St. Louis. "But I do think that the benefit/risk ratio has been underemphasized," he says. Studies reviewed by the panel indicate that the incidence of uterine cancer increases from one in 1,000 per year to four in 1,000 per year in women who take oral estrogen to replace the circulating hormone they lose at menopause. However, "estrogen-associated endometrial cancer is usually manifested at an early stage and is rarely fatal when managed appropriately," the panel reports. On the plus side, the panel found a 60 percent reduction of fractures of the hip and wrist, and a drop in vertebral fractures when estrogen replacement was begun within a few years of menopause. Timing is important. "There is no convincing evidence that initiating estrogen therapy in elderly women will prevent osteoporosis," the panel reports. Up to 25 percent of women aged 60 to 75 have moderate to severe bone loss, and the incidence increases with every decade of life.

As many as 20 million U.S. residents, predominantly elderly, slightly built, white women, suffer some degree of osteoporosis, a debilitating reduction in bone strength. Theories about the mechanisms of the disease are still conjectural, and treatments the panel endorses focus on prevention rather than cure. In addition to estrogen therapy, increased calcium intake—up to a total of 1,000 to 1,500 milligrams (mg) each day — seems to retard bone breaks, at least in the post-menopausal and elderly white women who have been studied. The typical American consumes 450 to 550 mg of calcium daily, roughly the equivalent of that found in two eight-ounce glasses of milk. When taken with sufficient fluid to avoid kidney stones, calcium tablets can be an effective alternative for patients who can't stomach dairy products, the panel reports. Members cautioned tablet consumers to check product labels because calcium compounds vary widely in the amount of the mineral they contain.

The Health Research Group, a Washington, D.C.-based consumer organization, says they support the panel's recommendations regarding calcium and moderate exercise, but urge "the strongest possible warnings against routine use of estrogens," and suggest the hormone be used only "where a combination of risk factors calls for their use in individual cases." Both the panel and consumer group agreed that all women receiving estrogen therapy should be fully informed of the risks and carefully monitored for side effects.

Behavior

Bruce Bower reports from Washington, D.C., at an Alcohol, Drug Abuse and Mental Health Administration seminar

Infiltrating the opiate fighters

Scientists report they have found a peptide in animal brains that reduces the effects of morphine and the brain's naturally occurring opiates. These "anti-opiate" peptides are released when opiates are administered and may play an important role in the development of morphine tolerance.

Psychobiologist Hsiu-Ying Yang and colleagues at the National Institute of Mental Health partially purified the anti-opiate chemical from a cow brain, after first studying a related chemical found in clams. When injected into rats treated with the natural brain opiate endorphin, it counteracted a substantial part of the opiate's effects.

At a recent seminar, Yang also reported that a drug used in Italy to treat ulcers reduces both the anti-opiate peptide and acute morphine tolerance in rats. The drug, proglumide, is not approved for clinical use in the United States.

The researchers are now attempting to determine the chemical structure of the anti-opiate peptide. Once this is achieved, said Yang, it may be possible to find more effective drugs to reduce tolerance among humans receiving medication for chronic pain.

Cocaine's dangerous rewards

Although cocaine does not produce physical dependence, animal research suggests that it activates the same reward mechanism in the brain that is affected by heroin and can produce harmful effects.

The critical factor in the abuse of heroin and cocaine is their rewarding action, said psychologist Roy A. Wise of Concordia University in Montreal last week at a press seminar. By injecting drugs directly into different brain regions of rats, Wise and his co-workers confirmed that cocaine and heroin activate the same brain circuit that produces the sensation of reward.

Brain cells that normally take incoming information from the chemical messenger dopamine receive increased signals when heroin, an opiate, or cocaine, a stimulant, is given to rats. Cocaine activates dopamine cells in a brain region called the nucleus accumbens; heroin works at another site, the ventral tegmental area. The two regions are connected by the dopamine-sensitive cells.

When rats are injected with morphine, an opiate closely related to heroin, in the ventral tegmental area, they press a lever 25 times per hour for further injections. When morphine is injected in other brain areas, they press a lever 10 times per hour to receive more of the drug. This behavior, says Wise, indicates that reward mechanisms are located in the ventral tegmental area. Similar reward activity occurs when cocaine is injected in the nucleus accumbens.

Heroin's rewarding action is independent of its physical addictiveness, Wise notes. Injections into a brain region unconnected to the ventral tegmental area produce physical dependence but not reward behavior.

"We see side effects of cocaine not shared with heroin that are even greater liabilities (than heroin's physical addictiveness)," he explains. Rats given unlimited access to intravenous heroin maintain reasonably good health for months. They take the drug regularly but not in extreme doses. Rats given unlimited access to cocaine, on the other hand, lose up to 40 percent of their body weight within a week or two. Sleep and grooming problems appear, and the animals usually die from drug-induced convulsions or viral infections within two or three weeks.

Because cocaine is illegal, expensive and often impure, few people use it enough to cause death, says Wise.

But, cautions the investigator, "Based on our research into the ability of both cocaine and heroin to activate the common brain reward mechanism, it is difficult to say which is the more dangerous drug."