BEHAVIOR

Treating Lesch-Nyan children

Children with Lesch-Nyan disease, a neurological disorder, exhibit one of the most bizarre self-injurious behaviors known to psychiatrists. Caused by a defect in the synthesis of an enzyme (hypoxanthine phosphoribosyltransferase), the disease affects two-year-olds with compulsive finger and lip biting so severe that those afflicted must wear physical restraints to prevent serious harm.

"Aversion stimulation" has been the most successful method used to control other self-injurious behaviors, but a team of researchers from the New York University Medical School found that punishing Lesch-Nyan children for their behavior was ineffective. Testing five males from age 3 to 13, the team found that an electric finger shock administered to subjects exhibiting hand-to-mouth contact (an attempt to bite their fingers), actually promoted the behavior.

Instead, a combined use of positive reinforcement and "time out from reinforcement" was found to significantly decrease the frequency of self-injury. Positive reinforcement consisted of interceding to prevent self-injury and making reassuring statements to the child. In the "time out" treatment, all attention was withdrawn from the child after each attempt at self-injury. In the Feb. 3 NATURE, Lowell Anderson, Joseph Dancis, Murray Alpert and Lenora Herrmann suggest that the childrens' inability to learn from aversion stimulation might be related to an identifiable gene.

Lithium and morphine euphoria

Lithium salts have been very successful in treating patients with acute manic symptoms. The fact that lithium can reduce the intensity of manic-depressive attacks and that lithium can cancel the effects of amphetamines has led some scientists to believe that lithium could block all drug-induced euphoric behavior.

Now that hypothesis has faltered. In the Feb. 11 SCIENCE, Donald Jasinski, John Nutt, Charles Haertzen and John Griffith of the National Institute on Drug Abuse and William Bunney of the National Institute of Mental Health report that lithium was unable to counteract the euphoria induced by morphine. The research team administered 900 milligrams of lithium along with a placebo in a double-blind test to eight drug-free opiate addicts. The subjects complained of drowsiness, nausea and irritability for the 20 days of the test and reported that the subjective effects of the lithium closely resembled those of chlorpromazine. But when lithium was administered with 7.5 milligrams of morphine, the subjects reported no change in their subjective response to the morphine. Since lithium was ineffective in reducing the subjects' euphoric response, the researchers now believe that no single common mechanism exists for the feeling of euphoria.

The social status of alcohol users

Heavy boozers and teetotalers are out of style on college campuses. The social acceptability of alcohol and drug users was surveyed by Harrison Trice of Cornell University and Janice Beyer of the State University of New York at Buffalo. They asked a total of 874 Cornell students in 1972 and 1975 to rate all drug and alcohol users on an acceptability scale. Heavy and moderate users of drugs like marijuana, cocaine and heroin scored lower than abstainers. Trice and Beyer suggest in the January JOURNAL OF STUDIES ON ALCOHOL that alcohol-prevention planners use such social acceptability data to determine the sociological aspects of drinking which, they say, have received only scattered attention.

PHYSICAL SCIENCES

From our reporter at the meeting of the American Physical Society in Chicago

Neutrons like it inside the nucleus

For a long time now conventional opinion among theorists of atomic nuclei has had it that nuclei with many more neutrons than protons had a "neutron skin," a preponderance of neutrons in their outer layers. This seemed the best way to satisfy the expectations of nuclear force and structure theories. Experiments reported by H. deVries of the University of Massachusetts and the Instituut voor Kernphysisch Onderzoek in Amsterdam seem to indicate that this is not so.

The experiments concerned the magnetic structure of nuclei. Unlike studies of electric charge distribution in the nucleus, which concern only the distributuion of protons, magnetic studies include neutrons, which, although they are electrically neutral overall, do have magnetic fields. Another difference between electric-charge and magnetic studies is that electric studies concern the whole volume of the nucleus, but magnetic studies measure mainly the outer reaches of the nucleus, because the magnetic fields of neutrons and protons in the inside tend to cancel each other out.

The probes used in the measurement are electrons. Interaction between the nucleus's magnetic field and the electrons can reverse the direction of the electrons' spin. Examination of the spin-flipped electrons yields evidence of the nuclear magnetic field. Early experiments, says deVries, dealt with simple fields like dipoles and octopoles. Now the technique can go to much higher multipoles, for example, the 512-pole fields of bismuth 209 and niobium 93. One of the main results, deVries says, is that neutron-rich nuclei seem to lack the expected neutron skin or neutron excess in the outer layers. The neutrons seem instead to be distributed throughout the volume.

Radio astronomy and breast cancer

Breast cancer is a disease particularly feared by many women. Its diagnosis often requires techniques of X-ray mammography that expose those organs to high dosages for appreciable lengths of time.

Now, according to Alan H. Barrett of the Massachusetts Institute of Technology, a new technique is under experiment that may eventually reduce the necessity for X-ray exposure in some cases. It uses microwave radio signals from inside the woman's body and detection equipment developed for radio astronomy. One of the ways of finding tumorous or suspicious tissue is to measure temperature differences between it and healthy tissue nearby. Warmth generates faint microwave signals, and these can be detected by scanning the breast with sensors developed by radio astronomers to measure temperatures of celestial objects from their microwave emissions. "It's no more harmful than taking your pulse," Barrett says.

The resulting data give information on the average temperature along a line several centimeters deep into the breast. The technique can thus become a complement to infrared mammography, which gives a more surficial reading, because human tissue is less transparent to infrared than to microwaves.

Barrett and Philip C. Myers, also an MIT professor, are working at Faulkner Hospital in Boston under the direction of chief radiologist, Norman L. Sadowsky. They are measuring the internal breast temperatures of 30 or 40 women a week, using body emissions at frequencies of 1.3 and 3.3 gigaherz. At the moment they are trying to find the best frequency to use, and to determine what, in detail, the temperature measurements tell about conditions inside the breast. Clinical use remains in the future.