BIOLOGY

Roberta Navickis reports from the annual meeting in Atlantic City of the Federation of American Societies For Experimental Biology

Finer control of paralyzed muscles

With today's technology, paralyzed muscles can be given a "go" or a "no go" message. For example, the many muscles of a paralyzed hand can be stimulated so that either the fist is tight or the hand is limp, but there is none of the in-between so important in holding a glass or tuning a T.V.

Moshe Solomonow and John Lyman of the University of California at Los Angeles Biotechnology Laboratory report that they and their colleagues have developed a more sophisticated technique that allows a finer, more measured control of a paralyzed muscle.

They knew that they could place an electrode on a nerve leading to a muscle and signal it to contract the muscle completely. What they found, working with cats, is that they could implant a second electrode downstream from the first, and modulate the orders from the first electrode and regulate how much the muscle contracted. By varying the time and amount they stimulated the second electrode, they could manipulate the muscle to contract anywhere from 4 to 100 percent.

Any coordinated muscle movement involves many muscles and many nerves. Advances in microsurgery and a better understanding of how all the nerves are "orchestrated" for a smooth movement must be forthcoming before this discovery has any clinical applications. But the possibility that this method might restore some normal muscle control to paralyzed persons is there.

Alcohol alters liver microtubules

Alcohol abuse usually results in liver damage. One of the earliest signs is an enlarged liver. Fat accumulates and proteins that the liver usually secretes back up. This protein overflow may result from mayhem in the skeletal structure of the cells, reports Yoshiro Matsuda and his colleagues at the Alcohol Research Center of the Bronx Veterans Adminstration Hospital.

They found that the liver cells' microtubules in rats receiving 36 percent of their calories from alcohol for four to six weeks were shrunken and thickened and greatly reduced in number. (Microtubules are tiny tubes that usually course smoothly through cells, and are thought to participate in a long list of cell functions such as maintenance of cell shape and transport of materials within the cells.) The major protein component of the tubules, tubulin, was also greatly decreased. They also observed that if rats had imbibed alcohol before, the damage to their microtubules was greatly exaggerated after a single dose of alcohol, compared with rats who were receiving their first shot. Baboons, an animal model in which the entire spectrum of alcoholic liver disease has been reproduced, also showed marked and persistent decreases in liver cell microtubules after being fed alcohol-containing diets for several years.

In *in vitro* studies on rat liver cells, damage to the microtubules appeared to be linked to the oxidation of alcohol and its metabolites.

Drugs deplete vitamin A

That aspirin or Tylenol may be getting rid of more than your headache. Phyllis B. Acosta of Emory University in Atlanta reports that acetaminophen (Tylenol), acetylsalicylic acid (aspirin), chlorpheniramine maleate (an antihistamine) and phenylpropanolamine HCl (a drug that dilates the bronchial tubes) all decreased vitamin A levels in experimental rats. She hypothesizes that the drugs may be either damaging cells involved in the synthesis of a blood transporting substance for the vitamin or preventing the vitamin from being absorbed into the bloodstream.

BEHAVIOR

Treating hallucinations with a paradox

A University of Chicago researcher reports success in treating schizophrenia hallucinations with a method somewhat akin to prescribing stimulants for hyperactivity (a controversial but moderately successful practice). The drug, apomorphine, theoretically should worsen hallucinations, according to Carol Tamminga, assistant professor in the department of psychiatry. However, the drug has triggered improvements, some marked, in a group of chronic schizophrenic patients, she reports.

The results are puzzling because apomorphine is known to augment and parallel the activity of dopamine, a chemical transmitter which, when overactivated or overproduced, is believed to cause schizophrenic symptoms. But Tamminga believes that apomorphine and other dopamine "agonists" (augmenters) may in fact act on presynaptic nerve receptors to "turn off" further dopamine production and release. Presynaptic receptors, she notes, have been shown to be sensitive to low doses of apomorphine.

Also paradoxically, apomorphine appears to improve tardive dyskinesia as well. The condition, characterized by various body and facial jerking movements, can be a side-effect of antipsychotic drug use.

Good or bad, pot seems permanent

The paraquat controversy notwithstanding (SN: 4/8/78, p. 212), it appears that marijuana use is here to stay, possibly as much as that of alcohol or tobacco cigarettes. Results of a continuing study of 17,000 high school seniors across the United States indicate that pot is now being used more by young people than ever and that fewer such users disapprove of its use or consider it detrimental.

In addition, "the findings demonstrate that marijuana use has been rising in the past several years without a corresponding rise in the use of other illicit drugs," say the directors of the University of Michigan study, Lloyd Johnston, Jerald Bachman and Patrick O'Malley.

The latest results, based on data from 1975, 1976 and 1977, show that by last year, 56 percent of high school seniors had at least tried marijuana, an increase of about 9 percent over the past three years. One in 11 are daily or near-daily users.

But more important, say the researchers at the university's Institute for Social Research, is the finding that the overall use of other illicit drugs "did not increase over the comparable time interval." This "appears to refute the argument that an increase in marijuana consumption will necessarily lead to an increase in the use of other drugs," they say.

Slightly more than one-third of the seniors say they have used a drug other than marijuana without medical supervision — principally amphetamines, followed by tranquilizers, sedatives, hallucinogens, inhalants and cocaine. One in 50 has tried heroin. While overall use of drugs has remained constant over the last three years, the popularity of cocaine and the hallucinogen PCP has risen while the popularity of LSD and peyote has declined.

The study reports that daily alcohol consumption remains at about 6 percent among seniors, primarily males. Regular cigarette smoking has increased among females, and now about 20 percent of both sexes say they are active daily smokers by the end of high school. More than half the seniors, however, still feel that smoking carries a great risk, and more than 40 percent think smoking in public places should be prohibited by law.

In contrast, fewer than 10 percent of the students believe that experimenting with marijuana is very risky. Slightly more than one-third think that regular marijuana use involves much risk.