BIOMEDICINE

A substitute for saccharin?

During the early 1960s, Robert Horowitz and Bruno Gentili of the U.S. Department of Agriculture studied the taste and chemistry of flavonoid derivatives found in citrus fruit peels. They discovered that one of these derivatives, naringin, had potential as an artificial sweetener. In 1969, when the artificial sweeteners cyclamates were removed from the American market, scientists at the Weizmann Institute of Science in Rehovot, Israel—Dan Amar and Yehuda Mazur—started helping the Jaf-Ora Co. in Rehovot gear up to produce the sweetener commercially.

Amar and Mazur reworked the chemistry of naringin into a chemical called Neo-DHC (neohesperidin dehydrochalcone), which is 6 times sweeter than saccharin and 2,000 times sweeter than sugar, and designed a process for its manufacture. Jaf-Ora has now built a pilot plant in Rehovot capable of producing Neo-DHC.

Toxicology tests on Neo-DHC, which have been underway since 1969, have turned up no harmful effects whatsoever. Now that the U.S. government has banned saccharin, Neo-DHC may be the best immediately available substitute for it. Neo-DHC awaits clearance from the FDA.

The dangers of gin and tonics

While Americans ward off the heat of summer with gin and tonics or other alcohol mixed with sweet beverages, research reported in the June 18 LANCET shows that the ingestion of such drinks on an empty stomach may alter mood and behavior.

The occurrence of hypoglycemia (low blood sugar) in people who drink pure glucose solutions on an empty stomach has been recognized for many years. Although only a few such victims experience mood and behavioral changes, the incidence of such symptoms rises as the size of glucose intake increases. And there is only one situation in which persons ingest lots of glucose on an empty stomach—when alcohol is consumed with sweet beverages. So Stephen J.D. O'Keefe and Vincent Marks of St. Luke's Hospital, Guildford, England, investigated the effects of mixed drinks on blood sugar, mood and behavior.

Ten healthy young subjects drank gin and tonics on two occasions and tonic alone on a third. Their blood sugar and mental and behavioral states were monitored for five hours after each imbibing period. Gin and tonics provoked a sharp rise in blood sugar and cheerfulness one hour after drinking. During the next two hours, however, they led to a sharp decrease in blood sugar, and in some of the subjects, to depression, sleepiness and even grief reactions. While tonic alone did not produce the pleasant inebriation of gin and tonics, it did not trigger severe hypoglycemia nor the negative moods.

Bacteria prime T cells

T cells, some of the body's major immune fighters, can become immunized against tumor cells in the test tube. Because close antigenic relationships between bacteria and some tumor cells have been shown, Brahma Sharma of The Children's Hospital in Denver and his colleagues decided to see whether bacterial antigens could immunize T cells in the test tube against some tumor cells.

As they report in the June 30 NATURE, such immunization is not only possible, but the immune potency of T cells sensitized in this manner is sometimes even greater than when T cells are primed by tumor cells. They thus speculate that injecting such bacteria into cancer patients might immunize their T cells against tumors. In fact, bacillus Calmette-Guérin (BCG), the tuberculosis-causing bacterium used for tuberculosis vaccination, has already been injected into cancer patients and has brought about some cancer remissions.

BIOLOGY

Julie Ann Miller reports on the Neuroscience Research Program's Intensive Study Program in Boulder, Colo.

Fine tuning for developing behavior

Newborns come equipped with all the nerve cells they will have in life, but the system needs fine tuning after birth for complex behaviors. Arnold B. Scheibel of the University of California Medical Center in Los Angeles believes that the bundling of nerve-cell branches into tangles called neuropil, sites of much information exchange, is an intricate part of that tuning. The neuropil may both cause and react to the evolving spectrum of behavior, Scheibel says.

Scheibel has studied the appearance and deterioration of nerve-fiber bundles in kittens and humans. In upper spinal cord, which controls forelimb motions associated with suckling, bundles of nerve-cell branches are already present at birth. In contrast, groups of branches do not begin to form in the lower part of the cat spinal cord, which controls leg activity, until 12 days after birth, about the time the kittens first attempt to stand. Similarly branches of the human brain cells that control muscle tone in the legs begin to form bundles 18 to 24 months after birth. Scheibel has observed loss of these branches in older people. "Maybe it's hard for old people to run and jump because they are always fighting muscle tone," Scheibel suggests.

Rapid recycling at nerve endings

Recycling of packaging material is basic to the economy of a nerve cell. Microscopic packets of chemicals stock the nerve endings, and when one cell passes a signal to the next, the surfaces of packets fuse with the cell membrane, releasing the contents outside. On the basis of electron microscopic studies, John Heuser of the University of California Medical Center in San Francisco proposed a mechanism with several steps for retrieving packet, or vesicle, membrane from the nerve-cell membrane (SN: 12/4/76, p. 363). That multistep process takes about 10 minutes. Now Heuser finds that a fast recycling process gets vesicles back in action in about a second.

In his recent experiments Heuser floods the junction between a nerve cell and muscle with a suspension of fine particles that can be detected in an electron microscope. Heuser observes the dense material entering pits in the cell membrane. These pockets pinch off from the membrane, and vesicles containing the dense material appear inside the cell.

In the short period that the packet membrane is a patch on the cell surface, large particles characteristic of vesicles diffuse into the cell membrane. Heuser proposes that the slower retrieval method, rather than being the major membrane recycling process, is a means of scavenging specific parts, such as those large particles.

A new type of nerve cell

A new component has to be added to one of the most extensively analyzed portions of the nervous system. For almost a hundred years researchers have recognized five types of nerve cells in retinas. But John E. Dowling and co-workers at Harvard University have recently discovered a sixth type, a cell that carries signals backwards across the retina from the second region of cell interaction (called a plexiform layer) to the first. The researchers believe the new interplexiform cell may modulate inhibitory effects of the retinal cells that sharpen visual images.

Interplexiform cells were detected microscopically in fish and New World monkeys because the cells took up a fluorescent variant of dopamine, the chemical the cells use as a transmitter. Dowling and co-workers think that this type of nerve cell occurs in all retinas, although in other animals, where it has not been identified, a different chemical may be the transmitter.