Opioids moonlighting in cell growth?

Discovered in normal nerve tissue more than a decade ago, substances called endorphins, with their morphine-like effects, are popular subjects of both scientific research and public attention. These compounds, along with the rest of the general class of pain relievers called opioids, have been studied for their "feel-good" role. But recent reports suggest they also may help regulate both normal and malignant cell growth.

By slowing cell division, naturally occurring opioids apparently exert an inhibitory control over brain tissue development in young mice, scientists reported at last week's meeting of the Federation of American Societies for Experimental Biology in Washington, D.C.

According to Ian S. Zagon of Pennsylvania State University's Milton S. Hershey Medical Center in Hershey, if a compound that blocks opioid receptors is injected prior to examination of the brain — thus making the body's opioids ineffective — there is a greater-than-normal proliferation of brain cells. He told SCIENCE NEWS that an abnormal increase in cell growth is seen at times when the opioid receptors are blocked, whether the blockade is continuous during the test period or intermittent.

However, when the blockade is intermittent, the overall cell growth rate is decreased to 25 percent below normal at times when the blockade is off. Zagon attributes this to overstimulation of receptor production by the cells, in an attempt to compensate for opioid deficiency caused by the blockade. The ultimate result of the blockade by opioid-like substances results in mice that appear older than their untreated counterparts, says Zagon. For example, a nine-day-old mouse may resemble another that is two weeks old, based on appearance and behavior. But when opioid-binding in brain tissue is blocked intermittently, smaller-than-normal mice result.

These growth differences disappear by 21 days after birth, an observation consistent with other studies showing that opioid receptors in certain areas of the brain disappear as the animal matures. According to Barbara H. Herman of the Brain Research Center at Children's Hospital in Washington, D.C., the level of opioids in humans drops three-fold after the first 24 hours of life.

Herman, who presented her work on opioid levels in autistic children at last fall's meeting of the Society for Neuroscience, told SCIENCE NEWS that the Pennsylvania results may help explain the link between studies suggesting abnormal opioid system development as a possible cause of autism, and her preliminary success in treating autistic children with opioid antagonists.

In other experiments, Zagon and his co-workers have expanded their earlier studies of opioid receptors on cancer cells. They had found that opioids appear to suppress the growth of neuroblastoma, a nervous system tumor. Now they have found these receptors on cells from a wide variety of human and animal tumors, says Zagon. Although it is unclear whether this opioid system is the same as that seen in the growth-regulation experiments, the Hershey scientists say they have data suggesting that opioids can inhibit growth of these cancer cells in laboratory animals. Zagon says this inhibition is blocked by opioid antagonists.

"Maybe opioids have no function at all [in cancer]. . . but they seem to be related to growth," says Zagon. He points out that the body's response to opioids is "extremely complex," making it difficult to determine exactly which mechanisms might be at work in growth regulation.

— D.D. Edwards

Space station: Cut back to go ahead

Ever since they were introduced by President Reagan in his 1984 State of the Union message, plans for a U.S. space station have had both strong advocates and equally fervent opponents, not only within NASA, but also in Congress, the Defense Department, the scientific community and almost any other group that stands to be touched by the huge project's development. A factor long cited by those on the negative side has been its cost, around which opposition has focused even more strongly since a review completed in January by NASA itself showed the projected bill to be almost twice the original estimate.

Last week, Reagan approved a revised version of the plan, cut back from the civilian space agency's previous "baseline configuration" and aimed for completion in 1996, representing a two-year slowdown. It is also cut back in cost — cut back, that is, to a level that is more than 50 percent above the originally projected price.

When Reagan first broached the idea, "directing NASA to develop a permanently manned space station, and to do it within a decade," the cited cost was about $8 billion. NASA's cost review this year yielded a sum of about $14.5 billion (in 1984 dollars, not the shrunken ones of 1987), and sources both inside and outside the agency were soon acknowledging that $15 billion to as much as $16 billion might be more likely.

The revised baseline now carries a NASA-estimated price tag of about $12.2 billion, including $10.9 billion for the station itself and about $1.3 billion for support activities at the agency's various field centers. As part of getting the project started, NASA announced on the same day that negotiations are under way to lease 110,000 square feet of property in Reston, Va., for office space and other facilities as the station's development center on earth. *— J. Eberhart*

Tumor promoters halt cell-cell 'talk'

A new test for monitoring the ability of living, touching cells to chemically "communicate" may ultimately find use as a screening test to identify chemicals involved in causing cancer. Developed by scientists at Michigan State University in East Lansing, it uses a laser-fluorescence microscope system to peer inside cells growing in culture.

At the American Chemical Society's spring national meeting in Denver this week, John Holland, a developer of the laser microscope system, described his instrument and its use in demonstrating the ability of some 100 known cancer-promoting agents — including phorbol esters (plant hormones), DDT, PCBs and saccharin — to shut down the transfer of chemical signals between adjacent cells. According to Holland, this signal shutdown may help explain why cancers are characterized by unregulated cell proliferation.

Carcinogenesis is believed to be a multistage process, initiated when exposure to some toxic agent triggers long-lived changes in a cell. The process is advanced by the cell's subsequent exposure to a promoting agent, which may not be carcinogenic by itself.

Ordinarily, healthy cells grow rapidly only until they begin touching. Then some mechanism triggers the cells suddenly to stop growing. Holland says it may be that chemical communications between touching cells serve as a stop-growth cue. If so, when these signals are blocked — as by tumor promoters — affected cells could become deaf to the "stop proliferating" message.

The new test measures cell-to-cell communications by showing the movement of a fluorescing dye. Starting as an electrically neutral molecule, the dye can pass through cell membranes. Inside cells, however, enzymes cleave the dye into charged ions that can no longer pass through intact cell membranes. The only way for this dye signal to pass to another cell is through a pore-like "gap junction" that naturally forms to bridge touching cells.

Using the microscope, the researchers focus a laser beam on a 1/25,000-inch