Making painkillers . . . naturally

Three Johns Hopkins University neuroscientists have identified the human enzymes responsible for the manufacture of so-called enkephalins, the brain's own morphine-like hormones. The discovery raises the possibility of a new and more efficient class of psychoactive drugs for appetite control and for the treatment of shock victims.

Psychiatrist and biochemist Solomon H. Snyder, speaking at a recent seminar at the Johns Hopkins Medical Institutions in Baltimore, said that he and Lloyd D. Fricker, a student, have succeeded in isolating "enkephalin convertase," one of the two bodily chemicals necessary for the creation of the body's naturally occurring opiates. In addition, Snyder told SCIENCE NEWS, he and another student, Steve Strittmater, have recently identified a second, unnamed enzyme that works in tandem with enkephalin convertase to complete the manufacturing process.

Snyder was a co-discoverer of the enkephalins, neurotransmitters that act in the brain by binding to specific opiate receptors, which Snyder also discovered. Although drugs have been created that block the effects of enkephalins by blocking the receptors, little has been known about the actual formation of these chemical messengers. Enkephalins, which are chains of five amino acids, are trapped in massive "precursor" molecules of 300 to 500 amino acids. In order to become biologically active they must be chemically extracted from the precursor. The recently identified enzymes do the extracting and, according to Snyder, they seem to work exclusively on the enkephalins.

Snyder and his students identified the enzymes by synthesizing a chemical similar enough to the enkephalin precursor to attract and activate specific enzymes, thus mimicking the natural process. They found that two enzymes were required to free the tiny enkephalin molecule—one to sever it on each end from the amino acid chain. The first of these, enkephalin convertase, appears to be specifically designed for this job, Snyder says; the second requires more study.

These findings point to the possibility of a new class of drugs that, by inhibiting the enzymes, could lower the amount of active enkephalins manufactured in the brain. And in fact, Snyder says, Fricker has already found several chemicals that are "very potent and specific" inhibitors of enkephalin convertase. Should these chemicals lead to the development of new drugs, their most obvious applications would be those for which receptor blockers are currently used; naloxone, for example, has been used in animals and humans as an appetite depressant and — because it raises blood pressure — as a treatment for severe shock.

According to psychiatrist Steven M. Paul of the National Institute of Mental Health, a drug that controls the actual production of a neurotransmitter should be a more efficient and more natural drug than one that blocks transmission. When brain receptors are blocked, he says, they often compensate by becoming supersensitive, and in the case of another neurotransmitter system—the dopamine system—such receptor sensitivity has been implicated in the side-effect called tardive dyskinesia, an involuntary movement disorder.

—W. Herbert

Speedier licensing for nuclear power plants

If a nuclear power plant is operating "at an acceptable level of risk," utilities may not be required to make changes to increase the safety of the plant. This recommendation is one of five changes suggested in a Department of Energy task force report on nuclear licensing and regulatory reform. The report, released last week, is a preview of legislation the Reagan administration plans to submit to Congress early next year to help revitalize the nuclear power industry.

The report says that the existing regulatory process "has not produced regulatory stability nor has it kept pace with the evolution of nuclear power as an energy source.... The present process does not offer predictable criteria for siting, designing, constructing and operating nuclear plants, and it does not lead to predictable schedules." The aim is to make it possible to plan and build nuclear plants in six to eight years rather than the 10 to 14 years now required.

The task force proposes:

- The Nuclear Regulatory Commission should provide centralized review and approval of all proposals for changes in nuclear plants to increase safety. Decisions on whether a utility should make alterations in a particular plant would depend on the increase in overall risk from a potential safety concern.
- Hearings that provide for cross-examination of witnesses should be "reserved for genuine contested issues of material fact."
- Instead of the current two-step licensing process, under which a construction permit and an operating license must be obtained separately, utilities would have the option of getting both licenses in one step.
- The NRC could approve sites as suitable for prospective nuclear plants in advance of a utility's desire to apply for permission to construct.
- Utilities could choose to build a plant based on NRC-approved generic designs.

Marcus A. Rowden, former chairman of the Nuclear Regulatory Commission, says he supports the task force recommendations although he doesn't agree with every detail. "It addresses the major points that need treatment through legislation," Rowden says.

Robert Pollard, a nuclear safety engineer with the Union of Concerned Scientists, argues, "It's the same old thing that's been coming in since 1978. A lot of their proposals could be accomplished right now under NRC's regulations." He adds, "A lot of these proposals, at least on the surface, are things we recommended in 1978. The difficulty is when you look at the details of how they want to accomplish them."

Rowden says, "The basic underlying concepts have a broad area of acceptance. I'm hopeful that with the appropriate level of political support, we can move this forward during the next Congress and get legislation enacted, and at the same time have the NRC move forward on a parallel path with administrative reforms."

A spokesman for the Atomic Industrial Forum, a group representing nuclear power companies, says, "The industry is mainly interested in the idea of certainty in licensing. Regulatory reform is one of several things that have to happen if there are going to be any more nuclear power plants."

Still to come is the report of an NRC nuclear regulatory reform task force. Rowden expects that the NRC recommendations will roughly parallel those in the DOE task force report. *—I. Peterson*

Anorexia nervosa: A brain shrinker?

Anorexia nervosa, self-imposed starvation to achieve a sense of thinness, is a widespread problem among young women in Western countries. Now a team of German neuroradiologists and psychiatrists has found that anorexics can experience brain abnormalities coupled with impaired mental performance. However, the abnormalities and impaired performance are largely reversible provided anorexics return to a normal weight. These results were reported last week at the 12th International Symposium on Neuroradiology in Washington, D.C., by the team's chief investigator — Knut Kohlmeyer of the Central Institute of Mental Health in Mannheim, West Germany.

There have been several recent reports in the medical literature of computerized axial tomography (CT) brain scans revealing reversible brain abnormalities in anorexic patients. Scientists have also reported that severe malnutrition can lead to impaired mental performance. But Kohlmeyer and his colleagues appear to be the first to have combined CT brain