Biomedicine

A new way across the channel

Sometimes the heart does things we don't want it to do. One source of malfeasance on the physiological level is the tiny pores that let calcium in and out of the heart muscle cells, thereby controlling contractions. Drugs introduced in the past decade that blockade these channels are immensely useful in treating angina and arrhythmias. Their success has prompted a search for agents that keep the channels open, which would be useful for diseased hearts that need stimulation. At the recent American Heart Association Science Writers Forum, Richard Tsien of Yale University in New Haven, Conn., discussed the discovery in his laboratory of a new mode of action for the pore, one that explains just how calcium channel stimulators work.

Open calcium channels allow the ions to flow into heart muscle cells, generally resulting in muscle contraction. Previously, two modes of action, which Tsien compares to gears, were known. In mode 0, which is like neutral, the pores are closed and the cell isn't contracting. In mode 1, which is like first gear, the channels open for brief periods. Tsien and his colleagues looked at how drugs known to control the flow work. They found that the inhibitors move the channels into neutral and stimulators move the channels into a previously unknown mode in which they are almost always open. The researchers also found that drug-free cells occasionally wind up in this third gear.

But while the discovery explains how the stimulators work, no such drug is likely to be on the market soon, Tsien says, since, unlike the calcium channel blockers, no drug specific for heart cells has yet been found. They made their observations using a tiny clamp developed in West Germany that sits astride a single calcium channel. Measuring the activity of a single channel among some 20,000 heart muscle cells is like picking out one fan's voice in a Super Bowl crowd, Tsien says.

There may be a second type of calcium channel in heart muscle cells, one that doesn't respond to the current crop of calcium antagonists. If so, Tsien notes, it would open up another way to control the channel and the heart.

Galling stones: Fill 'er up

Methyl tert-butyl ether (MTBE), a chemical included in gasoline to prevent engine knocking, has been used to dissolve gallstones in six people at the Mayo Clinic in Rochester, Minn. The liquid, which dissolves the cholesterol deposits that compose eight out of every 10 gallstones, was infused through a tube into the gallbladder for an average of six to 12 hours.

Gallstones cause acute pain under the ribs on the right side of the body and in rare cases can be fatal. About 500,000 U.S. patients have their gallstone-forming gallbladders removed each year. While surgery is "safe and very effective," notes Gerald R. May of the Mayo Clinic, it carries with it expense and a two- to four-week convalescence. "We're hoping that the [MTBE] procedure will be cheaper, and that people will be out of the hospital in two days," he says. But first, he notes, further evaluation is necessary to see if MTBE gets into and harms other parts of the body and if stones recur. Toxicity determinations in animal studies gave researchers enough confidence in MTBE's safety to begin testing in humans—where, so far, no side effects have been seen.

Medicine capsules

- The Food and Drug Administration last month approved a testicle-cooling device to aid men whose infertility is due to high testicle temperature. A small pump worn at the waist keeps the testicles damp by circulating cool water through tubes in a jockstrap-like garment.
- A recently completed World Health Organization study conducted in Hungary and South Korea found no evidence of a reduced ability to conceive in women who have had abortions.

Computers

Funding a faster supercomputer

Getting a group of people to work together efficiently is a demanding task that often requires a skilled manager. Computer designers and programmers are now looking for the electronic equivalent of such a manager to cope with "multiprocessor" computers. Each of the many processors built into this type of computer can independently retrieve data from memory locations, do arithmetic operations like addition or perform other simple operations. Yet the computer must quickly come up with a "consensus" — a single, correct answer. Last week, the Department of Energy (DOE) and the National Science Foundation awarded grants totaling $9 million to the University of Illinois at Urbana-Champaign to pursue this problem.

David Kuck, director of the university's new Center for Supercomputing Research, and his colleagues plan to build an experimental supercomputer, called the "Cedar" system, to test their ideas. The problem is to connect the computer hardware and software in such a way that all the multiprocessing occurs in an organized, productive and fast way, says Kuck. This project is unusual because, to achieve high speeds, it relies on clever ways of linking the processors and then writing computer programs that take advantage of these arrangements rather than on advances in computer chip technology.

DOE also helps fund two other large supercomputing research programs. At the California Institute of Technology in Pasadena, Charles L. Seitz, Geoffrey Fox and their colleagues aim to build a computer that fits on a desktop but still has 50 times the power of a Cray-1 supercomputer at a fraction of the Cray's current price. The researchers already have one experimental machine, completed last October and dubbed "The Cosmic Cube," in which 64 identical microprocessors are connected in a communications network based on a six-dimensional cube.

At New York University's Courant Institute of Mathematical Sciences in New York City, researchers are working on the "ULTRAcomputer" project. In this "dataflow" computer, hundreds of thousands of processors share one massive memory, communicating with it through a switching network that keeps the processors synchronized. Instead of searching the memory for the data needed to do a certain computation, each processor patiently waits until the essential bits of data arrive so that it can do its job (SN: 6/16/84, p. 378).

How to beat a chess champion

A good knowledge of the way computers play chess can help a human player, especially when the opponent is the present World Computer Chess champion, CRAY BLITZ (SN: 10/29/83, p. 276). Computer chess programs don't yet have the ability to create the type of chess position in which they play best, says David Levy of Intelligent Software Ltd. in London, England. In the current issue of ABACUS (Vol. 2, No. 2), Levy describes the strategy that led to his 4-0 victory over CRAY BLITZ last year. In his four games, conducted by telephone between London and Minneapolis, Levy tried to achieve positions that human analysis may have labeled inferior but that the program found hard to "understand."

As a result of his victory, Levy's longstanding bet that no computer can beat him still stands (SN: 11/5/83, p. 303). "The day is not yet here when I must finally admit that the world's best computer program can beat me," writes Levy, "and I think that I can probably survive another two or three years before paying out the prize money."

Meanwhile, CRAY BLITZ, after being installed on a new, faster Cray X-MP supercomputer, last fall successfully defended its North American computer chess title. Now, CRAY BLITZ's principal author, Robert Hyatt of the University of Southern Mississippi in Hattiesburg, is "cleaning up" the program to prepare it for next summer's U.S. open chess championship.