

SCIENCE & TECHNOLOGY

*Computers for
The Injured*

"Helping Paraplegics Walk: Looking beyond the Media Blitz" by Howard Jay Chizeck, in *Technology Review* (July 1985), Massachusetts Institute of Technology, Bldg. 10, Cambridge, Mass. 02139.

Medical technology for victims of spinal injuries falls into two camps: what is available today, and what is on the drawing board.

Unfortunately, the media have blurred that distinction, offering information to some but false hopes to others, argues Chizeck, who teaches biomedical engineering at Case Western Reserve University. The future is bright, he says. But the relevant technology is still young.

The special problem with spinal injuries (which may affect as many as 500,000 people in the United States) is that spinal nerves do not repair themselves in the same manner that peripheral nerves in muscles and skin do. Once the spinal cord has been cut, brain signals normally routed through it go nowhere. Limbs below the injury lie paralyzed.

The most sophisticated research to date involves "neural prosthetics," or devices that can take over the damaged spine's role. The task here is to coordinate the thousands of neuromuscular signals that are necessary just to take a few steps. So far, the greatest gains have been made in "functional neuromuscular stimulation" (FNS), says Chizeck. FNS systems use minicomputers to activate paralyzed limbs with electrical signals, which are piped into major muscles through electrodes.

During the 1970s, paraplegics in California, Virginia, and Yugoslavia were able to stand and walk using FNS technology. This year, researchers at Case Western helped one paraplegic walk 700 feet, even up and down stairs. In fact, 10 quadriplegics have been able to eat, type, write, drink, and smoke in early experiments. But the equipment is still cumbersome and difficult to operate.

Chizeck believes that the FNS system's high costs (as much as \$30,000) will drop, but "they will probably be at least as expensive as an automobile." Nevertheless, he adds, "by replacing some of the nursing care quadriplegics require, such devices could save millions of dollars in health-care costs . . . [and enable] some quadriplegics to regain useful employment."

*Frozen Human
Embryos*

"Frozen Embryos: Policy Issues (Special Report)" by Clifford Grobstein, Michael Flower, and John Mendeloff, in *The New England Journal of Medicine* (June 13, 1985), 10 Shattuck St., Boston, Mass. 02115.

Since 1978, when the laboratory (in vitro) fertilization of a human embryo in England led to the birth of a healthy child, controversy over the ethics of human embryo research has grown.

In 1979, an Ethics Advisory Board within the U.S. Department of