Little Black Box' for Paraplegics

Surgeons Develop Bladder Control Device

By William Erwin

When Sidney White dived into Hamden's Pond eight years ago, he lost control of an organ he'd scarcely thought about before—his bladder.

White, then 17, broke his back when he hit a rock ledge hidden two feet beneath the pond's surface. Paralyzed from the waist down, he could no longer feel his bladder or make it contract. As a result, he suffered one kidney infection after another—each one potentially fatal.

Now a black box developed at Duke has helped White regain the bladder control he lost. When it's time to void, he presses a white button; his bladder empties automatically.

He doesn't need a tube to drain his urine any more; he can void whenever he wishes. So he can swim again without worry. He can drive his homemade three-wheel motorcycle on weekend outings.

Best of all, he can forget about infections.

The black box is a radio transmitter about the size of a paperback book. It allows a paraplegic (someone paralyzed from the waist down) to empty his bladder by remote control, much as he might signal a radio-controlled model airplane to do a loop.

Officially called the "spinal cord stimulator," the device was created over the past five years by Dr. Blaine S. Nashold, a professor of neurosurgery. He was helped by Dr. John H. Grimes, an associate professor of urologic surgery, and by a team of biomedical engineers.

The stimulator could benefit as many as 30 per cent of this country's 100,000 paraplegics, Nashold said. It is already being used successfully by 13 patients in the U.S. and France.

When he began his research, Nashold knew that 50 to 60 per cent of paraplegics have bladders that empty by themselves. When such a person's bladder is full, a reflex orginating in the lower spine makes it squeeze, just as a person's hand jerks away by reflex when it touches a hot stove. This occurs even though the paraplegic has no sensation below the waist.

Working first with animals, Nashold found that this bladder—emptying reflex can be triggered artificially. He planted a two-pronged electrode in the spinal cord at the point where the reflex was strongest. When he sent a weak electric current into the electrode, the animal's bladder emptied.

Nashold and Grimes then planted the electrode in humans. The operation takes three to four hours. Wires under the skin connect the electrode to a nickel-size receiver in the patient's side or abdomen.

When the patient wants to empty his bladder, he places the transmitter's plastic-cover antenna against the spot where the receiver is buried. Then he presses the white button.

A radio signal beams to the receiver, is carried to the electrode, and the bladder contracts.

A person who might benefit from the device, Nashold said:

—has a completely paralyzed bladder,

—has the tip of his spinal cord—the conus medullaris—intact, and

—has a spinal injury that occured at least a year before the electrode is put into place.

The one-year wait allows physicians to see whether the person's bladder will begin emptying on its own. If it does, the person wouldn't need the stimulator, the professor said.

"The whole idea," he said, "is to extend the life of the patient and improve his life-style by reducing problems with the kidneys."

More than half of all deaths among paraplegics are caused by recurrent kidney infections, he said. In one British hospital, kidney infections were blamed for three out of every four paraplegic deaths.

White, now 25 and manpower coordinator for Cheraw County, S.C., explained how the infections happen.

After his accident, his bladder was completely paralyzed. A tube called a catheter was inserted into his bladder to drain his urine into a plastic bag strapped around his leg. The bag, White quipped, "wasn't very conducive to romance."

The catheter also left a pool of urine in White's bladder and gave bacteria an easy entrance into his body.

"Urine is a perfect medium for bacteria," Nashold said. "It contains nutrients that bacteria can grow in."

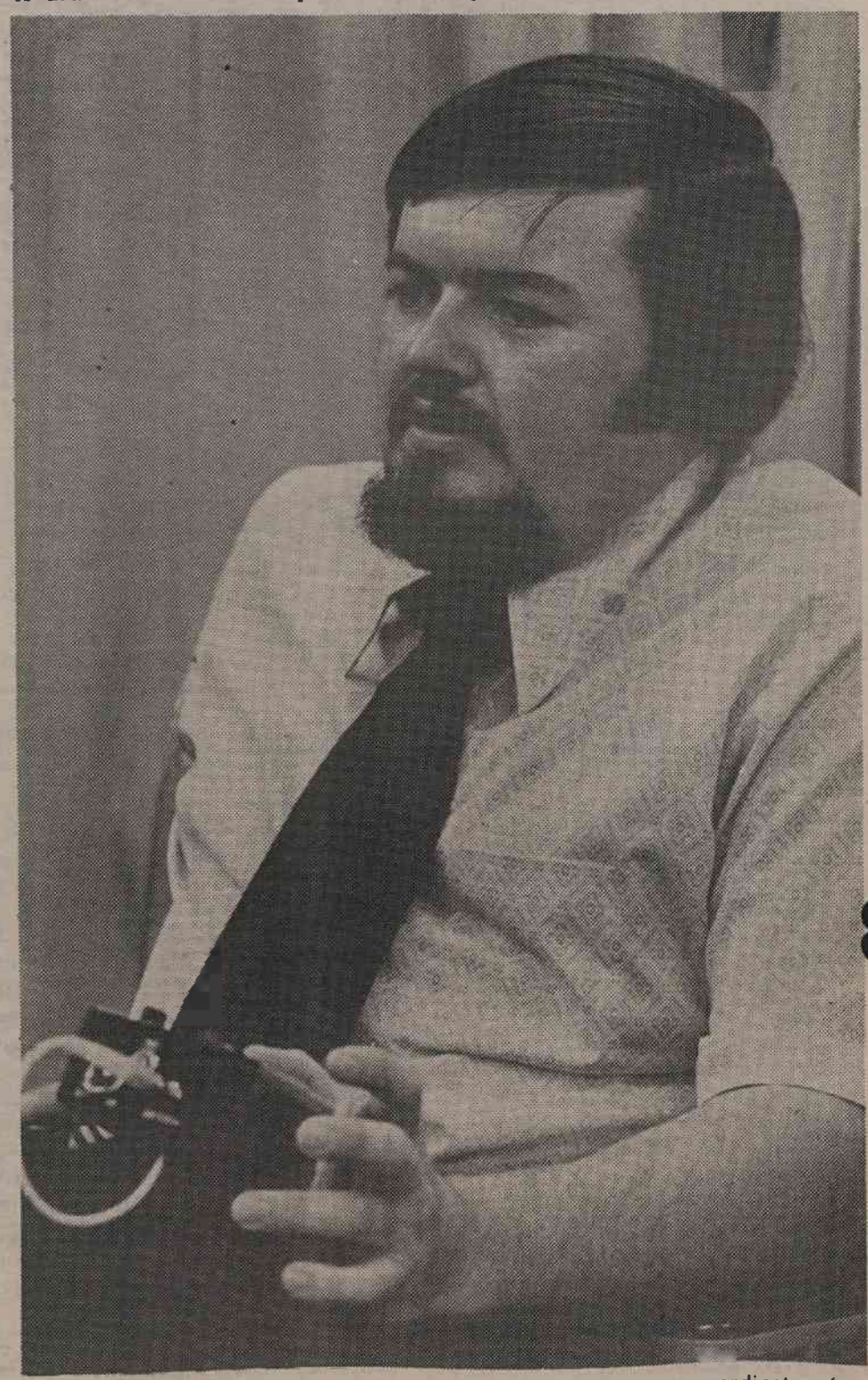
Infection starts in the bladder and travels up the ureters to the kidneys. That's when the going gets rough, White said.

"Your blood pressure rises, your pulse goes up, you feel grouchy," he said. "You have severe headaches, your eyes turn red and you're nauseated." If the infection goes unchecked, it can lead to kidney failure and death.

The stimulator holds back infection in two ways. It makes the catheter unecessary, so bacteria have a hard time getting in. And it empties the bladder so thoroughly that almost no urine is left to nurture the bacteria if they do get in.

Picking up a cup of water, White compared a paralyzed bladder to the cup.

"Without the stimulator, it fills up until it overflows. It never empties completely," he said. "But with the stimulator, it's like turning the cup upside down."



RADIO-CONTROLLED LIFESAVER—Sidney White, manpower coordinator for Cheraw County, S.C., explains how he uses the bladder-emptying prosthesis for paraplegics developed here by Dr. Blaine S. Nashold. The device reduces the kidney infections that account for more than half of all deaths among paraplegics. *(Photo by Jim Wallace)*

Aging Center To Sponsor Volunteer 'Class Reunion'

A very special "class reunion" will be held at the medical center next Wednesday afternoon, Sept. 17.

"These class members," noted Dorothy Heyman, executive secretary of the Center for the Study of Aging and Human Development, "volunteered 20 years ago to join a program organized by the center to investigate the ever-changing, often poorly understood processes of aging."

The class members made up what was called the First Longitudinal Study, "a joint venture with equally important contributions from both the volunteers and center investigators as they probed all aspects of growing older—physical, psychological and social," Mrs. Heyman said.

A reception honoring the volunteers is scheduled for Wednesday afternoon in the Hospital Cafeteria, followed by a presentation of a film about the center, "Adding Life to Years," in the Amphitheater.

It will mark the first time in the 20 years of the study that all of those involved have been invited to get together at one time in one place. There originally were 270 volunteers in the program.

"This will give all the participants and all the investigators a chance to meet and exchange experiences," Mrs. Heyman said.

Dr. George L. Maddox, center director, said that the program "has grown from an idea into a well-known and highly significant study, that would not have been possible without the generous cooperation, patience and energy of our subjects. We are enormously grateful to them.

"Some of these fine people have moved to other parts of the country, as far away as Rhode Island and Texas," Maddox said, "but they expect to be called to return for their regular annual examinations. Many of them continued to be very active in their communities and in leadership roles, leading busy, satisfying lives."

FEELING GOOD SHOW

Next week's program on the "Feeling Good" television series will concern COMING OF AGE: "Grow, Growing, Groan." The show will be aired on UNC-TV, channel 4, Wednesday, Sept. 17, at 8 p.m.

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