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SUCCESSFUL NEW FOCUS ON CP:
A CASE HISTORY (SEE BACK PAGE)



Implantable neurostimulators (left) are helping to resolve refractory motor disorders and pain. Staff can externally adjust the stimulator's schedule and dose settings. Patients activate the devices with a hand-held unit, to deliver stimulation.

C O N T E M P O R A R Y

NEUROSURGERY

NEWS FROM JEFFERSON

Implants Aid More Patients With Neuromotor Problems or Chronic Pain

Millions of Americans suffer from long-term motor dysfunction or pain resulting from injury or illness. Yet, a large portion of these patients fail to respond to medications or counseling; to nerve blocks and other techniques of anesthesiology; or to physical therapy and other efforts of rehabilitation medicine. Physicians often wonder about recourse for such patients. In whose domain do they fall? More and more, as neurostimulator and other nervous system implant procedures have matured, they are becoming the successful charges of the neurosurgeon.

Jefferson's Neuroimplant Program makes use of neurostimulator and drug-infusion-pump implants. "Many of our implant patients realize a significant improvement in their condition," says neurosurgeon Giancarlo Barolat, M.D., director of the program and of Jeff's division of functional neurosurgery. Physicians and therapists from around the country refer patients to the service.

The staff works with Jeff's Pain Center (see *Contemporary Pain Treatment*, or call 1-800-JEFF NOW) to help chronic pain patients, who make up a large portion of the 400 patients who have undergone implants in the program to date. Roughly one third of the patients who undergo implantation, however, come to the program having other medical problems, most often neuromotor problems. These patients may benefit most dramatically from implant procedures (see case study, reverse side).

Generally, neuromotor problems take the form of spasticity (manifested as hyperactive stretch reflexes or clonus) and spasms (defined as involuntary muscle contractions). Traditional treatment for intractable cases calls for the neurosurgeon to section nerves. While working in Italy, Barolat helped pioneer certain rhizotomies and

other ablative techniques now widely used in this country.

"We take these steps only as a last resort, though," he notes. Complications are a danger and, unlike implants, these surgical procedures are not reversible.

CHRONIC DISORDER	FUNCTIONAL NEUROSURGERY TREATMENT		
	NEURO-STIMULATION IMPLANT	INTRATHECAL INFUSION PUMP	NERVE SECTIONING SURGERY
pain (resulting from cancer, multiple low-back injuries and other severe spine problems, nerve injury, RDS, vascular disease, and stroke)	X (spinal, brain, or peripheral)	X (morphine)	X (rhizotomy)
spasticity and paralysis (resulting from stroke, MS, cerebral palsy, spinal cord injuries, and head injuries)	X (spinal, investigational peripheral)	X (investigational baclofen)	X (rhizotomy or myelotomy)
epileptic seizures	X (vagus nerves)	—	—
neurogenic bladder or bowel incontinence	X (spinal or investigational sacral)	—	X (sacral rhizotomy)

Table shows major condition and treatment categories addressed by Jefferson's division of functional neurosurgery and its Neuroimplant Program, an uncommon clinical service. Implants are effective, nondestructive, and fully reversible.

More patients now opt for implantation and avoid the more invasive surgical procedures. Jefferson's expertise in this area is, in part, an extension of its activities with the Regional Spinal Cord Injury Center of the Delaware Valley, a partnership between Jefferson and Magee Rehabilitation Hospital. SCI patients comprise a large percentage of neuromotor implant patients. Collaborating as part of a multidisciplinary team, Barolat, et al, have implanted SCI patients epidurally at all levels from C1 to L1.

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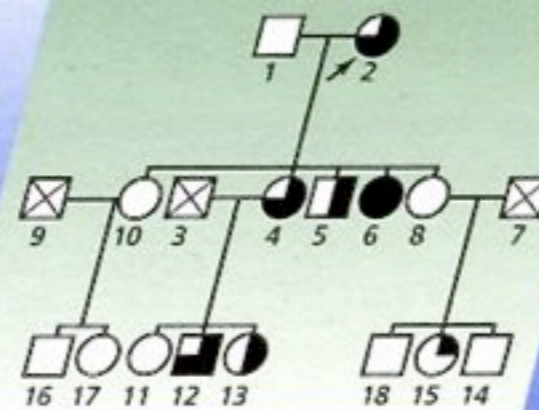
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Contemporary Neurosurgery is one in a series of newsletters published by Thomas Jefferson University Hospital to bring physicians, and other health-care professionals, information useful to them in helping their patients.

TO REFER A PATIENT OR DISCUSS A CASE, CALL
215-955-2364
FOR MORE INFORMATION, CALL
1-800-JEFF NOW

**OSTEOPOROSIS
EVALUATION
AT JEFFERSON.
SEE PAGE 2.**



Family pedigrees from a recent Jefferson study have provided new evidence about the inheritability of bone mineral density in families with histories of osteoporosis. At left, solid areas within symbols indicate Z scores in individuals with clinically reduced bone mass in a family. This study is the first to describe bone mineral status in extended kindred.

NEWS FROM JEFFERSON

contemporary OSTEOPOROSIS

Genetic Findings, DEXA Scanners, New Drugs Combat Osteoporosis

With 39 million baby boomers currently heading toward menopause, osteoporosis is likely to become a greater health problem during the next decade. Improved bone scanning techniques and new genetic findings should make diagnosis of osteoporosis easier. Simultaneously, the medical community is racing to determine which bisphosphonate drug will become the preferred medication for treating osteoporosis.

Genetic Research

Researchers at the Jefferson Institute of Molecular Medicine, Darwin J. Prockop, MD, PhD, Loretta D. Spotila, PhD, and Koichiro Shimoya, MD, PhD, recently studied seven families that appeared to have a history of osteoporosis. The results suggest that in each of these families, a small number of genes may be dictating the low bone density trait. Transmission appears to be Mendelian (from affected parent to child), suggesting a dominant inheritance mode. The study is the first to assess bone mineral density (BMD) and osteoporosis in families of a suitable size and structure to provide a basis for genetic linkage analysis.

In the study, 37 of 139 subjects were found to be clinically osteoporotic as defined by radiographic evidence or by BMD measurements of at least two standard deviations below the age, gender and weight-adjusted mean. In general, a decrease of just one standard deviation has been associated with a 1.5 to 3-fold increase in the relative risk of fracture. Questions about dietary habits, lifestyle and exercise did not identify any major environmental factors in these families. Men and women were affected almost equally, indicating that hormonal factors and X-linked inheritance do not explain the patterns.

Further computer simulations of the genetic profiles of the families might reveal the chromosomal loci involved in low BMD. "The results support BMD screening for relatives of patients with a family history of osteoporosis," says Dr. Spotila, Jefferson research assistant professor of biochemistry and molecular biology and chief author of the study.

DEXA for Early Diagnosis

Central to Jefferson's research and clinical care is advanced bone-scanning technology. Previously, clinicians had no reliable way to diagnose osteoporosis in its early stages, when it is most treatable.

Available at Jefferson's Osteoporosis Prevention and Treatment Center, a dual-energy X-ray absorptiometer (DEXA) scanner measures BMD at a variety of body sites, including the femur and the lumbar spine. DEXA is noninvasive, requires no imaging agent and exposes the patient to minimal amounts of radiation – about 1/10 the amount of a chest X-ray. It also provides lateral views of such structures as the vertebrae, in addition to the standard anterior-posterior view. DEXA results correlate very highly with disease state. A scan takes less than 12 minutes and provides digital pictures that accurately depict the amount of demineralization. (See Figure On Back.)

Searching for the Right Bisphosphonate

Estrogen replacement therapy, as well as calcitonin, can prevent postmenopausal bone loss and osteoporosis – even slightly reversing the process. But convincing

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Jefferson Osteoporosis Prevention and Treatment Center

Jefferson's Osteoporosis Prevention and Treatment Center takes advantage of a full array of modern diagnostics – including DEXA scanning. The staff is skilled in risk-factor analysis, counseling and in exercise, nutritional and medical therapy.

Evaluation Criteria

Any postmenopausal individual with signs of, or risk factors for, osteoporosis.

Referral

To refer a patient, consult a specialist or for more information, please call 215-578-3433. The center is located at Jefferson's Ford Road Campus, near I-76 and City Line Avenue in Philadelphia.

Follow Up

The center places special emphasis on keeping referring physicians well informed through prompt evaluation reports and therapy recommendations. Patients return to their referring physicians for long-term management.



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Contemporary Osteoporosis is one in a series of newsletters published by Thomas Jefferson University Hospital to bring physicians, and other healthcare professionals, information useful to them in helping their patients.

**FOR ACCESS TO JEFFERSON'S HEALTH SERVICES, CALL
1-800-JEFF-NOW.**



Maintenance exercise programs at home for adolescent athletes prove key in preventing sports injuries from recurring. Jeff orthopaedists use the Theraband, a hand-held, rubberband device available in different strengths, to rehabilitate hand and arm muscles after a fracture.

Contemporary

ORTHOPAEDICS

News From Jefferson

Special Orthopaedic Care Helps Impaired Children, Adolescent Athletes Meet Challenges

Children with congenital orthopaedic deformities, or injuries sustained after birth that result in a permanent disability, are often discouraged from pursuing sports activity. Athletic personnel, school nurses, physicians, or parents may fear that the child will overuse impaired limbs, for example. With proper clinical guidance and supervision, however, many of these youngsters can participate in competitive sports.

"Even children born with lower extremity paralysis can function in an athletic setting," says Peter Pizzutillo, M.D., chief of the division of pediatric orthopaedic surgery at Jefferson. "We see children with amputations, spina bifida, cerebral palsy, and other conditions who are functionally challenged by their disabilities but who actively participate in athletics."

Matching Limitations with Sports Activities

Clinicians helping to manage such cases need to carefully evaluate a patient's orthopaedic limitations to determine the proper sports for the child. "Children with congenital orthopaedic problems such as avascular necrosis or a deformity of the hip joints should be directed away from high-impact movement, such as running or jumping," says Pizzutillo. "But these patients can actively participate in sports such as swimming or bicycling. Both of these activities place less strain on the leg muscles and joints."

Other children with less restrictive deformities, such as scoliosis or Perthes' disease, an abnormal blood supply to the hip, are often held back from competition. "We really haven't seen any evidence, however, that athletic activities have an adverse effect on these problems," says Pizzutillo.

Patient evaluation for sports activity can also include psychological counseling. "Children can become very competitive, and those with disabilities need to understand their limitations," says Pizzutillo.

"Physicians and therapists should encourage such children to adapt to their environments by helping them explore new opportunities," says Debra Bleakney, L.P.T., director of physical therapy in the Sports Medicine Program at the Alfred I. duPont Institute Children's Hospital, a Jefferson affiliate (*see "At Jeff..."*). "For example, we recently worked with a quadriplegic child who liked bowling. Obviously, he could not use his hands or legs, so we fashioned him a special head stick so that he can now bowl by pushing the ball with a stick from a wheelchair bowling ramp. As a result, this child can participate in a sports activity."

With proper clinical guidance and care, many orthopaedically impaired children and adolescents can enjoy select athletic activities without fear of further injury.

Although orthopaedic researchers are still looking for explanations for the cause of orthopaedic deformities, clinicians have, nevertheless, developed rehabilitative techniques for patients with such conditions. "We also see mild forms of foot pain or heel pain that can be treated successfully with rehabilitative exercise," says Pizzutillo.

Rehab Techniques Returning Athletes to the Field

While sports medicine specialists at Jeff and the duPont Institute are dedicated to helping impaired children participate in sports activities, they also help unimpaired adolescent

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