

Rehabilitation

A publication from the Kessler Institute for Rehabilitation



Musculoskeletal ultrasound puts instant imaging in doctors' hands

► Gerard A. Malanga, M.D.

Recent advances in ultrasound technology now allow physicians to do something they could never do before: view images of musculoskeletal tissue in motion in real time. Doctors can now visualize a patient's muscles and joints right in the office or at the bedside, without ordering a magnetic resonance imaging (MRI) study. What makes this possible is an exciting new refinement to an older technology—ultrasonography. Equipment and software advances have dramatically improved its resolution.

Ultrasound is most useful for imaging ligament and muscle abnormalities and for diagnosing tears, swelling and inflammation. It

can also be used to help judge the severity of an injury to these structures. Because ultrasound—unlike MRI—can provide dynamic, real-time images of tissues, the change has major implications for physicians' offices, outpatient clinics and hospitals. In these settings, the new technology means quicker, on-the-spot diagnoses. It also offers potential savings compared with MRI and, in some cases, better images.

The use of ultrasound to diagnose musculoskeletal conditions is evolving rapidly. Patients who are likely to benefit from the new modality include those with tendon or bursa injuries, rotator cuff injuries, muscle tears or tendonitis.

continued on page 7

INSIDE ▼

2 Editor's Letter

Social responsibility and good corporate citizenship, says **Bruce M. Gans, M.D.**, are indispensable keys to a rehabilitation hospital's success.

3 Hi-tech prostheses for today's active amputees

Technology now permits many lower-extremity amputees to return to the vigorous sports and hobbies and demanding careers of their pre-injury days, reports **Shailesh S. Parikh, M.D.**

4 Why a doctor volunteers time for patient groups

Busman's holiday? No, a camp for people with Huntington's disease is a source of perspective, says **Kathleen Francis, M.D.**—and so are the other groups to which she lends a hand.

5 Evaluating outpatient programs for brain injury

In measuring the effectiveness of treatment regimens for brain-injury patients, says **George J. Carnevale, Ph.D.**, standard neuropsych tests are only part of the answer.

6 Public Policy View: Care versus cure?

Stem cell research promises wonders for the future, says **Bruce M. Gans, M.D.**—but it also highlights a clash of perspectives in rehabilitation.

8 Clinical Pearls: How a new therapy helps stroke patients walk again

Daniel C. Fechtner, M.D., reports on a study of body weight-supported treadmill training for individuals who are recovering from stroke.

Focus on

RehabilitationEDITOR-IN-CHIEF**Bruce M. Gans, M.D.***Chief Medical Officer**Kessler Institute for Rehabilitation*MANAGING EDITOR**Gail Mallor Solomon***Director, Corporate Communications**Kessler Institute for Rehabilitation*EDITORIAL ADVISORY BOARD**Robert Krotenberg, M.D.***Senior Medical Officer**Kessler Institute for Rehabilitation***Allison Averill, M.D.***Associate Medical Director**Kessler Institute for Rehabilitation***Samuel Grissom, M.D.***Associate Medical Director**Kessler Institute for Rehabilitation***Steven Kirshblum, M.D.***Associate Medical Director and Director
of Spinal Cord Injury Service**Kessler Institute for Rehabilitation***Bruce A. Pomeranz, M.D.***Associate Medical Director**Kessler Institute for Rehabilitation*MISSION STATEMENT

Focus on Rehabilitation is published quarterly as a service to the medical community by Kessler Institute for Rehabilitation to bring current issues and advances to the attention of practicing physicians.

Kessler**INSTITUTE FOR REHABILITATION***a Select Medical company*

VOLUME 3 • ISSUE 1

Contents of this newsletter may not be reproduced without the express written consent of Kessler Institute for Rehabilitation.

**Good corporate citizenship deserves renewed focus**► *Bruce M. Gans, M.D.*

Just a few years ago, I used to hear a lot about the need for companies, including hospitals, to be good corporate citizens. But that discussion seems to have gone out of vogue. Instead, headlines point to the ways companies have plundered, not promoted, the public trust. Even hospitals have been too busy fighting for their financial lives to talk of much besides the bottom line.

I think it's time we revive the dialogue on corporate responsibility. Rehab hospitals are part of a health care industry that accounts for almost 15 percent of our gross domestic product. Some analysts see that fact as evidence of health care's drain on our economy. But another way to view it is to recognize that health care is a major source of employment and an astonishing engine for economic growth. In providing care, we safeguard not only our patients' well-being but the financial health of our communities as well.

We also fulfill our corporate responsibilities by furnishing uncompensated care. Hospitals in the United States provide as much as \$22 billion a year in charity care, and rehabilitation facilities are no exception. Both for-profit and nonprofit rehab hospitals serve as safety-net providers for patients with catastrophic illnesses or injuries. That support goes far beyond what we can measure in dollars. We provide not just medical care, but also emotional and social resources for patients and their families. Those efforts have a profound impact on patients' quality of life.

To provide that support, rehabilitation hospitals open our doors to groups that promote better health and function: volunteer organizations, patient education classes, support groups for patients with chronic conditions, counseling sessions. We support or sponsor promotional activities and educational events that increase our communities' health care resources.

We provide support for the universities and research facilities that expand our clinical options. And we make our professionals available—to legislators, to educate them about clinical and fiscal concerns, and to the media, to explain medical news and controversies.

Rehab facilities also advocate for individual patients, making sure they get the services and help they need to remove the community-based barriers to their achieving the highest level of function. And we advocate for patient groups, challenging our society to create the kind of environments our patients need to live the fullest lives possible.

Doing our best as employers, providers and advocates, we prove our value both as good corporate citizens and as practitioners. For rehabilitation hospitals, being socially responsible isn't just a good business strategy. It is really the only way we can maintain our patients' trust and the integrity of our specialty.

—*Bruce M. Gans, M.D., Editor-in-Chief*

Rehab hospitals' role
as a safety net goes
far beyond what can be
measured in dollars.



Today's hi-tech prostheses allow amputees to live active lives

► *Shailesh S. Parikh, M.D.*

The loss of a lower limb no longer means the loss of one's demanding job or active lifestyle. Today, the active adult or pediatric lower-extremity amputee expects to live a life with minimal limitations, and technology is making great advances to meet this expectation. There are now many examples of golfers, skiers, motorcyclists and other athletes who have returned to these sports after amputations, and other amputees have resumed physically demanding work lives. Besides giving the user a better quality of life, these technological advances also reduce the costs of lost productivity.

Significant improvements in all components of prosthetic devices have made new, high-tech products possible. The use of microprocessor technology in prosthetic knee joints, for example, allows the knee to adapt and compensate when the individual walks on various surfaces, including stairs, slopes and uneven ground. These computerized units have multiple sensors that provide feedback to operate the mechanical and hydraulic knee system. The result is a more normal gait.

Better prosthetic feet

Recent advances have also led to the development of prosthetic feet that are more flexible, resilient and comfortable than older units. These are stronger and more durable, and they allow for a higher level of activity than previous components.

This newer type of prosthetic foot can respond to ground reaction forces much like a natural foot, resulting in a decreased energy demand on the user. There are also specialized prosthetic feet made for skiing, running, jumping, swimming and other "extreme" activities.



Technology available today can in many cases help amputees resume the athletic activities or physically demanding jobs they pursued before they lost a limb.

The availability of strong, aerospace-grade, lightweight material such as carbon fiber has also made great advances possible. Artificial limbs and joints made from these high-tech materials can withstand intense activity. Superior shock absorption and torsion capability are also available for those users who require them.

Advances in computer-aided design and manufacturing of pros-

thetic sockets further help us to meet the demands of today's active amputees. With these CAD-CAM systems, limb sockets can be designed electronically and manufactured more quickly and accurately. The result is a better fit and more comfortable socket. Newer modes of suspension

for prostheses, including silicone suction sleeves with locking systems, allow for greater comfort and holding capacity.

What lies ahead

Improving prosthetic devices is a continual process, and we can look forward to even more sophisticated units in the future. Lower extremity prostheses may someday use myoelectric control with motorized prosthetic joints. Now used in upper extremity prostheses, myoelectric control systems employ electrosensors that let the individual control the artificial limb by contracting the muscles in the socket.

This technology, if used with a stronger motorized joint, may someday be useful for the lower extremities, which require more strength than upper limbs. Research is also focused on "embedded chip" technology that would allow the brain to directly control an attached prosthetic limb, initiating and directing motion of the limb.

For those who use prostheses, ongoing improvements in the devices promise even greater opportunities for enjoying an active life.

Shailesh S. Parikh, M.D., is clinical chief of outpatient services at Kessler Institute for Rehabilitation. He can be contacted at sparikh@kessler-rehab.com.

Why one physician volunteers her time to help advocacy and support groups

There are rich rewards, says this busy doctor, in an off-hours view of your patients—and their causes

Helping patients with Huntington's disease to enjoy a week of recreation in the country and speaking to patient support groups about amyotrophic lateral sclerosis (ALS) may not be part of every doctor's practice, but for Kathleen Francis, M.D., volunteering time in such ways is routine. Dr. Francis, director of outreach services for Kessler Institute of Rehabilitation, says lending a hand to advocacy and support organizations is a natural outgrowth of wanting to help her patients live better lives.

She works mostly with lymphedema, ALS and Huntington's advocacy groups, but her volunteer life embraces physicians, too. Dr. Francis is secretary of the board of trustees of the UMDNJ–New Jersey Medical School Alumni Association, where she also gives talks to medical students on career path choices.

Focus on Rehabilitation

recently asked Dr. Francis about the varied activities she makes time for. **FOCUS:** Could you tell us a little about your volunteer work?

FRANCIS: I am a member of the medical advisory committee for the National Lymphedema Network, which provides clinical and medical background for the network. The group's mission is to promote knowledge, education, research and support for individuals who have lymphedema.

I also attend a summer camp excursion for people with Huntington's disease. The event is sponsored by the Columbia Presbyterian Neurological Institute and includes 12 to 18 campers and an equal number



As co-director of the Huntington's Disease Summer Retreat in Cornwall-on-Hudson, N.Y., Dr. Francis helps a camper take his first horseback ride.

of staff who gather each year at a recreational summer camp in Cornwall, New York. There, campers can take part in horseback riding, swimming, water volleyball and hiking. We also take special trips during the week and play charades and other games.

In addition, the camp gives us the opportunity for some informal treatment and clinical management. For instance, we take our meals together, and speech therapists are on hand to supervise and provide therapy to those campers who require it, because Huntington's patients can be prone to choking. And because weight loss is a common problem, there is also a contest

each year to see who can gain the most weight. We find that the week-long event gives campers a relaxing and fun experience and also allows caretakers a short respite.

As an advocate for patients with ALS, I attend professional meetings and fund-raising events. I previously ran an ALS clinic, and I am still a referral physician for the ALS Association.

FOCUS: Why do you feel it's important to contribute your time and expertise to patient advocacy groups?

FRANCIS: There are so many reasons. It's exciting to be involved with my patients as a clinician, but as a volunteer I can also have an impact on a wider community. To me, working with patient advocacy organizations is another way to help my patients, by striving to increase society's understanding of their medical

conditions and by promoting funding for research.

For many conditions, a national organization is the only place where people can find the information and resources they need. In the case of lymphedema, for example, the condition is not life-threatening, but patients usually require close medical management to prevent and treat complications such as chronic infection, disability and disfigurement. However, locating specialists and information can be very difficult for them. Patients with lymphedema often say they had looked everywhere for help before they found the National Lymphedema Network. They tell me what a relief it was to

find information on their condition, physicians and clinics, support groups and equipment and suppliers. And so often, it's just comforting to know they're not alone.

There are many professional advantages too. I gain a lot of knowledge from the interaction with other volunteer physicians and providers. And I relish the opportunity to share with patients and physicians the benefits of my own expertise.

FOCUS: Is it difficult to juggle volunteer work and a professional and personal life?

FRANCIS: It does tend to make a busy schedule even busier, and it's not easy to spend time away from my family and work. But my children are grown and luckily my husband handles it very well when I'm away. I'm also really fortunate to have an employer that is very progressive and that supports my volunteer efforts.

One of the hardest things for me, I must admit, is the travel. I'm a white-knuckle flyer and would drive everywhere if I could. Even so, I like the opportunity to take these trips. It's fun to see my colleagues and catch up on the latest news and tales of the trade.

Also, of course, my volunteer activities give me a chance to meet many wonderful people. I remember one young man with Huntington's disease, a fatal condition that causes slurred speech, drooling and uncoordinated movement. He told me that he used to love going out to dinner with his wife and two small children, but because of his symptoms he felt uncomfortable being in public.

"Here at camp, we're the normal ones," he told me. "For once I can relax and not worry that I'm attracting attention."

What could be more rewarding than an experience like that?

Readers may contact Dr. Francis at kfrancis@kessler-rehab.com.

Evaluating outpatient programs for patients with brain injuries

► *George J. Carnevale, Ph.D.*

Every brain injury is unique, and rehabilitation programs for brain injured patients should also be unique. An individualized approach presents a challenge for measuring the success of therapy, but evaluating these programs is crucial for improving outcomes in today's quick-discharge environment.

How well a brain injury patient does after the acute phase is not easy to quantify. Standardized neuropsychological tests of IQ, memory, speed of processing information and so on don't always show how a patient will fare in complex environments. One reason is that the rehab program may not affect the underlying cognitive impairment significantly, but may improve the patient's ability to compensate for or function within his or her limits.

Overcoming obstacles like this for evaluating outpatient programs hinges on goal-setting. An interdisciplinary team of experts on cognitive and community reentry issues should set specific functional goals, and each person's goals will be different; a clerical employee will have a different treatment plan than a factory worker.

The emphasis of post-acute brain injury programs is to improve cognitive/behavioral functioning and to meet the psychosocial and vocational goals that are set. This is done by observing and evaluating how the individual functions in both simulated and actual environments. It is in real situations that problems, perhaps missed in the artificial rehabilitation environment, are most likely to arise. If the patient wishes to return to teaching, for example, he or she might first simulate teaching to a group in the hospital. Then the patient might progress to teaching an actual class, and the rehabilitation



Measuring the success of outpatient programs for brain injury patients depends on setting individual goals.

team would receive important feedback from his or her employer. In addition to isolating cognitive problems, the program would expose behavioral problems such as acting or speaking inappropriately. After counseling and targeted remedial training, patients are discharged gradually to work, school or other community settings.

Using simulated and actual situations for the brain injured patient to master provides more goal-oriented treatment and helps fine-tune the effectiveness of the individual's outpatient program. Additionally, while test scores may have limited validity or relevance to real-world outcomes, behavioral assessments help insurers and other payers understand the process and value of brain injury rehabilitation more clearly.

George Carnevale, Ph.D., assistant director of psychology and neuropsychology at Kessler Institute for Rehabilitation, can be reached at gcarnevale@kessler-rehab.com.

Bridging the gap between care and cure

► *Bruce M. Gans, M.D.*

Earlier this year, Kessler's flagship hospital in West Orange, New Jersey, hosted a momentous event. Governor James McGreevey came to Kessler Institute for Rehabilitation to sign a landmark bill expanding stem cell research within the state. About 200 patients, patient advocates and state legislators attended, as did Christopher Reeve, who has spent years lobbying to further stem cell research efforts.

But why was a rehab hospital chosen as the setting to highlight research that is pure, basic science in nature?

To answer that question, consider the future beneficiaries of this research. Who among the patients we treat won't potentially benefit from stem cell advances? Anyone who is aging, experiences trauma or has cancer, cardiovascular disease, neurological injury or disease, might someday see his or her condition remedied or substantially improved by knowledge gained through this research.

Imagine the possibilities. Stem cell research could give us the ability to repair damaged brain tissue, replace damaged or missing parts of the body and renew injured or diseased organ systems. By advancing our knowledge of cellular rejuvenation, stem cell research may even provide us with the fabled fountain of youth, enabling us to achieve whole-body rejuvenation.

Becoming obsolete?

While many of these advances may be decades off, I believe we will begin to see dramatic innovations from this research within the next five to 10 years.

But won't all this replacing and rejuvenating put us out of a job a

decade from now? Not in my view of the future. The more curative options our patients have, the more they will need what we offer—our expertise, teaching, strengthening and skill-building—to take advantage of their enhanced recovery.

Not only will that require more work on our part, but we will also be able to achieve vastly better outcomes. Instead of threatening the viability of physical medicine and rehabilitation, those improvements will boost the value of rehabilitation and represent a tremendous opportunity for our field.

Many people with disabilities may bristle at the notion of pursuing cures, as if it implies that they are “broken” and need to be fixed.

But the prospect of dazzling advances exposes a serious rift running through our field, one I believe it's time we heal. Among both researchers and clinicians, a strong tension exists between the concepts of *caring* for patients—helping them achieve as much function as possible—and *curing* them, restoring that level of health patients enjoyed before they became ill or injured.

Up to now, those two viewpoints have competed for research dollars and clinical attention. And those whose service and research have improved care have long fought against the ignorance and prejudice of the acute care world, defending the value of our work even when cure has not been possible. They may not lightly embrace what many of them have come to see as an antithetical point of view.

But this new legislation makes dramatic treatment advances a

much more concrete possibility. Instead of continuing to fuel the care-versus-cure dichotomy, we need to start seeing the two as complementary strategies.

Needed: new partnerships

Proponents of both approaches must begin looking for ways to cooperate, striking important partnerships between basic and clinical research and working in tandem for better outcomes. Agencies that fund research need to combine their efforts to link cure- and care-directed projects and create incentives for the two approaches to look for value in each other.

We also need to be sensitive to the fact that many people with disabilities may bristle at the notion of pursuing cures, seeing in that laudable goal a judgment that they are “broken” and need to be fixed. In championing research efforts aimed at cures, we must make sure we don't send the message that we devalue people who are successfully living with disabilities.

Also, as physicians, we must accept the challenge that stem cell research presents: to stay on the cutting edge and be aware of where the knowledge is headed, so we can incorporate new drugs and interventions when they become available.

And if the day comes when researchers devise a pill that, when taken with water, will repair spinal cord injury, eliminating any need for rehabilitation? I, for one, look forward to that day and will be happy to start looking for a new line of work.

Bruce M. Gans, M.D., is chief medical officer of Kessler Institute for Rehabilitation. Readers may reach him by e-mail at bgans@kessler-rehab.com.

Musculoskeletal ultrasound—and what it means for rehabilitation

continued from page 1

Nerves can also be visualized, and this will aid in the quick diagnosis of a compressed or inflamed nerve, such as the median nerve in carpal tunnel syndrome. In these cases, the technology permits physicians to actually visualize the flexor tendon compressing the median nerve. And significantly, physicians now have another imaging alternative for patients with contraindications for MRI—for example, individuals with metallic implants or claustrophobia.

An aid in training

In addition to being a new diagnostic tool, musculoskeletal ultrasound promises to be an invaluable training and research aid. In the clinical setting, for instance, residents and attendings will be able to visualize the exact placement of a needle being introduced for a therapeutic injection. Until now, fluoroscopy was the only way to accomplish this. The technology also will aid in research on the efficacy of rehabilitation treatment modalities, because it allows researchers to observe the healing process for various treatments. This will help determine and document which modalities are most useful for rehabilitation patients and how best to direct rehabilitation efforts.

Musculoskeletal imaging is bound to become increasingly important as the use of restorative techniques grows. Gene therapy, for instance, uses a method for activating or suppressing gene activity that is involved in certain disease processes. This could be employed to reverse the destruction of joint tissues. Another evolving restorative technique uses the body's own growth factors in highly targeted ways to increase the natural process

of healing. These therapies are already known to be useful and may soon offer a quantum departure from major surgical procedures. To know if these therapies work—if they can actually restore ligaments that have been worn by age or heal tendons or muscles, for example—it is very helpful to be



Musculoskeletal ultrasound enables doctors to visualize muscles, joints and nerves in the office or at the bedside, facilitating rapid and accurate diagnosis.

able to see and record their effects. Musculoskeletal ultrasound will be an ideal tool with which to document the outcomes for these emerging therapies.

Appropriate training on musculoskeletal ultrasound technology, however, is critical for doctors who utilize it. To this end, Kessler is developing a training center for this modality. It will offer workshops on using the software and interpreting the musculoskeletal ultrasound images correctly. Physicians and res-

idents in training programs will need to apply a well-honed knowledge of anatomy.

Ultrasound vs. MRI and EMG

Extensive research on musculoskeletal ultrasound is much needed. For example, it will be important to trace over time the use of ultrasound versus MRI and electromyography (EMG) for different types of diagnoses. To date, the technology is not as useful as MRI for deep structures such as the spine and spinal cord. The images of these structures are still fairly crude with ultrasound, and MRI should still be employed in these cases. Also, ultrasound is used to view anatomy, while EMG is used to observe function—as in nerve conduction velocity and reflex testing. Ultrasound therefore will not replace EMG, but will be a complementary tool, to help view the structural causes of tissue damage. It may also be useful along with EMG in determining which patients will benefit most from conservative treatment versus surgery.

Ultrasound is a tried and true technology that has been recreated with sophisticated software and equipment. This makeover opens an exciting world of potential uses for the rehabilitation community. The only way to gain its full benefit and ensure that musculoskeletal ultrasound is not underused or overused, however, is through thorough training and research.

Gerard A. Malanga, M.D., is director of sports, spine and orthopedic rehabilitation at Kessler Institute for Rehabilitation. Readers may contact him at gmalanga@kessler-rehab.com.

Body weight-supported treadmill training shows promise for stroke patients

► *Daniel C. Fechtner, M.D.*

A new therapeutic intervention to help stroke patients walk will most likely become a routine part of inpatient and outpatient stroke programs. A number of studies have shown very promising results for chronic stroke patients who undergo body weight-supported treadmill training. Fewer studies have been done with acute patients. Now, researchers at Kessler Institute for Rehabilitation and the Kessler Medical Rehabilitation Research and Education Corporation are further exploring the effects of this therapy on new stroke patients.

In this therapy, an overhead harness supports the patient during exercise on a treadmill. Therapists move the patient's affected leg and guide the torso manually. At first, the harness supports 40 percent of the patient's weight and the treadmill is set at a low speed. Over time, however, the assistance is decreased and the speed and/or weight borne by the patient are increased. The goal is to help the patient recover the most normal walking pattern possible.

Studies have shown that the training gives stroke patients a faster, more symmetrical and balanced gait. The technique is based on research in brain plasticity and recovery following injury or stroke. The research shows that after a brain injury, repet-

itive activity can let healthy areas of the central nervous system take over the functions of the affected areas. Remapping of the brain occurs with stimulation and use of the limbs. Central pattern generators may also



Body weight-supported training can help patients recover walking skills.

play a role for some patients. These are groups of cells in the spinal cord that can mediate a stepping pattern without input from higher levels of the central nervous system. This may be the mechanism of action for patients with spinal cord injury.

The one-year Kessler study will

compare patients who receive only standard therapies after a stroke with those given standard therapies along with a regimen of body-weight supported treadmill training. Both groups will get the same overall amount of exercise per week. The regimen consists of 20 minutes of exercise on the treadmill per day, five days a week, during the inpatient stay at Kessler Institute. Previous investigations suggest that this approach is at least as effective as standard physical therapies. The study will help determine whether the treadmill exercise is an effective treatment for improving walking in patients with recent strokes, and it will also highlight areas for further research.

In the long term, the treadmill training will likely play an important part in inpatient and outpatient stroke programs. If Kessler's results are as promising as previous research suggests, the therapy will be cost-effective for both chronic and acute stroke patients. With this therapy, patients who might now go home as wheelchair users could become part-time walkers, and part-time walkers could progress to full-time walkers.

Daniel C. Fechtner, M.D., is director of stroke services at Kessler Institute for Rehabilitation. He can be contacted at dfechtner@kessler-rehab.com.

Focus on

Rehabilitation

1199 Pleasant Valley Way • West Orange, NJ 07052

PRSR STD
U.S. POSTAGE
PAID
Lebanon Junction, KY
PERMIT 19