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ON THE COVER
(L to R): CCHC Physicians Karen Lynch, MD; Gordon Nakata, MD, FAANS; and Michael Markowski, DO, FAAN
When I look at how far the Neurosciences program at Cape Cod Healthcare has advanced, I am truly in awe. It has evolved over the years to a place where, due to its level and sophistication of service, it has helped distinguish Cape Cod Healthcare as a high-quality tertiary medical center. A neurosurgical department at a community health system – and the caliber of care available to neurology patients here on Cape Cod – are unheard of elsewhere in the state and around the nation.

Our Neurosurgery Department began under visionary neurosurgeon Dr. Robert Leaver, who knew how important neurosurgical services were to the people of Cape Cod when he started Neurosurgeons of Cape Cod in Hyannis. He later recruited Dr. Patrick Murray to the practice. The two are now retired, and neurosurgeons Drs. Paul Houle, Achilles Papavasiliou, Gordon Nakata, Nicholas Coppa and David Leppla have ably filled their shoes, expanding the practice and, with it, the intricate and innovative surgical techniques we offer.

These physicians were educated and trained in some of the best medical schools and hospitals in the country, such as Georgetown University School of Medicine, Boston University School of Medicine, Albert Einstein College of Medicine, Brown University, Dartmouth-Hitchcock Medical Center, and Loyola University Medical Center. When they decided to bring their skills and experience to Cape Cod Hospital, they also elevated the level of care offered here.

In this issue of The Journal, you will read about some of the advances in neurosurgical science and how our surgeons and surgical teams are using new technology and skills to provide the latest and best care for our patients. For instance, you will hear about minimally invasive ways to treat back surgery, like the Transforaminal Endoscopic Surgical System, which helps get patients with herniated discs back on their feet faster. And how technology like the O-arm™ Imaging System has revolutionized how our neurosurgeons are performing spinal fusions. You will also read about how Mobi-C® disc replacement is offering herniated cervical disc patients faster, more successful recovery.

Patients suffering from tumors in the spine on Cape Cod can be given welcome relief from relentless pain by a technology known as the OsteoCool™ radiofrequency ablation. And those suffering from malignant or benign brain tumors can trust they will be in exceptionally skilled hands with our neurosurgeons.

The team of five neurosurgeons here at Cape Cod Healthcare often collaborates on cases, frequently providing patients with two board-certified, highly trained neurosurgeons working together in the operating room. This, too, sets Cape Cod Healthcare apart from larger academic health centers, where surgeons still undergoing fellowship training often assist the lead neurosurgeon on cases.

Turning now to our Neurology service line at Cape Cod Healthcare, we are fortunate to have excellent, highly skilled and experienced neurologists who have chosen to live and work on Cape Cod. Practicing at Neurologists of Cape Cod are Drs. Michael Markowski, Karen Lynch, Sean Horrigan, James McCarthy, Mathew Pulicken and Ahmad Abokhamis.

continued on page 52
Cape Cod Healthcare Neurosurgery (formally Neurosurgeons of Cape Cod) has been in existence for nearly a half century. The current physician members of the team have strong links to the department’s founders – and to one another.

“We’re like a family. We all have some deeper connection,” said Paul Houle, MD, FAANS, who heads the group.

In 1993, Dr. Houle was a third-year medical student at Boston University School of Medicine and did his general surgery rotation at Cape Cod Hospital, where, working closely with neurosurgeon Patrick Murray, MD, he became inspired to pursue a career in neurological surgery. As part of his residency in neurosurgery, Dr. Houle spent a year training in general surgery at Dartmouth Medical School (renamed the Geisel School of Medicine in 2012) in Hanover, New Hampshire. There, he met another resident, Achilles Papavasiliou, MD, FAANS, and the two became friends while covering the weekend general surgery service at the Veterans Affairs Medical Center in White River Junction, Vermont.

“I told him how great Cape Cod Hospital was and that when we finish our residencies, we’re going to come here,” recalled Dr. Houle.

And that’s just what happened. After completing his residency at the University of Georgia, Dr. Houle came to Hyannis to work with Dr. Murray and Robert Leaver, MD, the founder of Neurosurgeons of Cape Cod. Dr. Papavasiliou completed his neurosurgery residency and joined the team in 2003.

When Dr. Leaver retired in 2004, Dr. Houle reached out to Gordon Nakata, MD, FAANS, who was married to his cousin. They were living in California and eventually moved to the Cape in 2008, when Dr. Nakata became part of the neurosurgery team at Cape Cod Healthcare.

The retirement of Dr. Murray created a new opening on the team. Perusing potential applicants to fill the job, Dr. Houle noticed something intriguing about one candidate, Nicholas Coppa, MD, FAANS. He originally hailed from Cranston, Rhode Island, the community next to Dr. Houle’s hometown of Warwick. At the time, Dr. Coppa was an assistant professor of neurological surgery at Oregon Health & Science University and wanted to move his family back east. Interestingly, Dr. Coppa had never been to Cape Cod prior to coming for an interview at the hospital.

“As I drove around the Cape, I thought ‘I can see setting up shop here,’” said Dr. Coppa, who joined the team in 2013.

The neurosurgery team is now rounded out by David Leppla, MD, FAANS, who came to Cape Cod Hospital after spending 13 years in private practice in Reno, Nevada. Like Dr. Nakata, he’s a California native, but family drew him to make the move: Dr. Leppla’s three daughters all attend college on the East Coast.

Neurology through the years: A dramatic improvement in diagnosis and treatment

James McCarthy, MD, has been a practicing neurologist on Cape Cod for 45 years. That gives him a good perspective on the changes that have occurred in his field of practice - and they are substantial. Now practicing at Neurologists of Cape Cod in Hyannis, things that are taken for granted today, like advances in diagnostics, didn't even exist in 1973, when he first began practicing medicine.

“When I started off in 1973, there were no scans – no CAT scans, no MRI scans. All diagnoses had to be done clinically,” he said.

The availability of advanced imaging means that neurologists can now not only locate the part of the brain in which the disease process is located, but also what the actual disease process is. This is critical information that informs decisions on treatment. For example, when people had a stroke before scans were available, doctors didn’t know whether it was a
hemorrhagic stroke, due to a burst blood vessel, or whether it was an ischemic stroke, due to a blood clot.

The distinction is important because the treatment of each cause is the exact opposite. For a stroke that is due to a clot, doctors want to dissolve the clot with clot-busting medications. But if the stroke is due to a hemorrhage, the goal is to encourage the blood to clot and stop the bleeding. Prior to imaging capabilities, physicians were forced to make an educated guess and begin treatment, often with less than desirable results.

Scans also allow neurologists to conduct electrical studies of the nervous system to see whether the neurological problem is in the central nervous system or the peripheral nervous system. Each follows a different disease process that can now be defined.

The second big advancement in neurology is in the available treatments, according to Dr. McCarthy.

“It used to be that neurology was a diagnostic specialty,” he said. “We didn't have many treatments. People would come in for a consultation and we would say you have Parkinson's disease or you have multiple sclerosis or you had a stroke, and then send them back to the primary care physician. Now we have good treatments.”

There was “virtually no treatment” for MS until 1993, when injections were developed, according to Dr. McCarthy. In the past five years, 11 different oral medications have emerged on the market, he said.

There were no medications to treat Parkinson's disease until 1967, when L-dopa came out. Now there are many medications that have been extremely helpful in managing the disease.

“Basically, the diagnosis of neurological disease has had a complete revolution in the past 50 years,” Dr. McCarthy said. | TJ
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Gordon Nakata, MD, FAANS,
neurological surgeon, Cape Cod Healthcare
A BETTER VIEW

The O-arm™ Imaging System allows neurological surgeons at Cape Cod Hospital to perform faster, safer spinal fusions.

By Timothy Gower

Each year, more than 400,000 Americans with aching backs undergo the surgical procedure known as spinal fusion. Often performed in tandem with other forms of back surgery, spinal fusion helps ease pain and restore stability to the spine.

Cape Cod Hospital is one of the few medical centers in Massachusetts where neurological surgeons are able to perform this important operation in a way that’s faster and safer for patients, thanks to advanced technology known as the O-arm™ Imaging System.

“The O-arm has really revolutionized the way we do spinal fusions,” said Achilles Papavasiliou, MD, FAANS, a neurological surgeon at Cape Cod Healthcare. Dr. Papavasiliou and his colleagues at Cape Cod Healthcare Neurosurgery in Hyannis and North Falmouth have used the O-arm to perform several thousand spinal fusions and other procedures, and say the remarkably detailed, real-time images it provides during an operation allow them to work with greater precision and efficiency.

Spinal fusion is often compared to welding, but the procedure involves some carpentry, too. The procedure is commonly performed in tandem with a variety of other spinal surgeries, such as discectomy, in which a surgeon removes a herniated (or bulging) disc – the shock-absorbing cushion between two spinal bones (or vertebrae) – that’s compressing nerves and causing pain. In most cases, the next step is to fuse the two vertebrae together into one bone by filling the now-empty disc space with a bone graft, which is usually obtained from a donor cadaver. Over time, the graft will help the two vertebrae grow together as one. To keep the spine in position while the bones bond, the surgeon inserts tiny screws and rods to align and stabilize the two vertebrae.

MULTIPLE X-RAYS

Another common spinal condition that is frequently treated with spinal fusion is spondylolisthesis, which can occur when joints in the spine become arthritic and allow a vertebra to shift out of place, irritating nerves. In traditional spinal fusion surgery, surgeons rely on X-rays to position screws and rods, which can be cumbersome and slow, said Gordon Nakata, MD, FAANS, a Cape Cod Healthcare neurological surgeon.

“You have to rely on multiple, repeated snapshots” of the spine, he said. “You drill, take an X-ray, drill a little more, take an X-ray.”

Moreover, because X-rays produce only a flat, two-dimensional image, surgeons have to lean heavily on their understanding of the human body when placing the hardware used to stabilize the spine.

“We would make our best anatomic guess as to where screws should go,” said Dr. Papavasiliou. “The O-arm takes the guesswork out.”

WHAT IT DOES

The O-arm is a large circular device that stands roughly 6.5 feet high and is attached to a wheeled cart about the size of a washing machine. After the patient is in position on the operating table, one segment of
The ring is opened, causing the O-arm to now resemble the letter C. The open end of the C is slid over and under the operating table, then closed to form a ring around the patient. The O-arm now scans the patient, taking nearly 400 high-definition images in just 13 seconds. These images are used to create two- and three-dimensional reconstructions of the segment of the patient’s spine that the surgeons are treating.

The images that the O-arm acquires are synchronized with a surgical navigation system that acts much like the GPS in your car or on your smartphone. As a result, surgeons can watch the movement of their instruments on a 30-inch TV monitor as they attach hardware to the vertebrae. “We can see on the computer screen exactly where the screw is,” said Dr. Papavasiliou. In fact, the images produced by the O-arm are accurate to within one millimeter (or about 0.04 inch).
That precision has a major payoff. Dr. Nakata estimates that perhaps one percent to two percent of patients who undergo spinal fusion with traditional imaging end up needing a second trip to the operating room to have the position of their hardware adjusted. But among patients whose spinal fusions are performed with the O-arm, “the number is negligible,” he said.

Not only is accuracy of hardware placement superior, but at the end of every procedure, surgeons use the O-arm to perform another scan to confirm that the screws and rods are positioned properly.

What’s more, the O-arm has made spinal-fusion surgery safer, doctors say. For starters, noted Dr. Nakata, “the procedure is faster, and we know that complication risk is tied to the duration of surgery.” In other words, speedier procedures mean less blood loss, a lower risk for infection and less need for anesthesia. The latter is especially good news for elderly patients, who are at higher risk for complications related to anesthesia. | TJ

The images that the O-arm acquires are synchronized with a surgical navigation system that acts much like the GPS in your car or on your smartphone.
Joel Bornstein was a prisoner to back pain so severe that he rarely left his home in Mashpee, where he was forced to get around using a walker and wheelchair.

“The pain was excruciating. I was seeing stars,” said Bornstein, 78, who had a bone spur and a herniated disc in his spine. After cortisone injections failed to ease the pain, Bornstein’s doctor referred him to Paul Houle, MD, FAANS, a neurological surgeon at Cape Cod Healthcare.

Dr. Houle, who is one of five neurosurgeons at Cape Cod Healthcare Neurosurgery in Hyannis and North Falmouth, treated Bornstein’s bone spur first, then turned his attention to the herniated disc, which he repaired with an innovative new approach known formally as the Transforaminal Endoscopic Surgical System, but which is also called the Joimax® procedure, in a nod to the name of the German company that developed and manufactures the equipment.

“The Joimax procedure represents an evolution in the techniques we use to treat herniated discs,” said Dr. Houle.

As an analogy, he noted that knee surgery, such as repair of damaged ligaments, used to require large incisions, but is now usually performed with arthroscopy, which uses small instruments and illuminated lenses that are inserted through small puncture holes in the skin. Likewise, the way doctors treat herniated discs is evolving, with Joimax and other related techniques recently emerging as the latest step toward making the surgery less taxing for patients.

Dr. Houle is one of just two doctors in all of New England who perform the Joimax procedure. He regularly travels across the United States to lead seminars for other surgeons interested in learning the technique. He has taught the finer points of the procedure to physicians at major medical centers such as Boston’s Brigham and Women’s Hospital, the University of Southern California and the University of California San Francisco, among others, as well as doctors at hospitals in Europe and Asia. He even self-produces instructional videos about Joimax for interested clinicians (shot with his own video equipment against a green screen set up in his bedroom).

HERNIATED DISCS
Herniated discs are one of the most common causes of back pain, especially in the lower (or lumbar) region of the back. Discs are rubbery pads that sit between each vertebra (or spinal bone), where they act as cushions or shock absorbers and make the spine flexible. A disc has a hard shell and is filled with a jelly-like substance. A herniated disc occurs when the shell breaks open, allowing the substance to leak out and irritate nerves.

As Bornstein discovered, herniated discs can cause significant back pain. Often, the pain can be managed with conservative treatments, such as pain relievers, ice packs, massage and physical therapy. However, when these therapies don’t bring relief after an extended period, surgery is an option.

For many years, the standard technique for treating a herniated disc has been microdiscectomy. In this
The traditional approach, the patient is put to sleep under general anesthesia and positioned face down on an operating table. The surgeon makes an incision of about one inch in the back, then cuts through muscle to expose the spine. To reach the nerve root that’s irritated by the herniated disc, the surgeon uses surgical tools to remove a portion of the facet joint and cut away a ligament that stands in the way. Now that a path to the problem has been cleared, the surgeon trims away the disc fragment that’s compressing nerves, or in other cases, may remove the entire disc.

Microdiscectomy is an effective surgery, according to Dr. Houle, but patients who undergo the procedure face a lengthy recovery and must cope with significant postoperative pain—the more muscle a surgeon must cut, the longer the discomfort lingers. He pointed out that many patients who undergo microdiscectomies have already been through several months of physical therapy to strengthen the muscles around their spine in a failed bid to ease back pain, before they were referred for surgery. But a microdiscectomy, Dr. Houle noted with irony, “destroys those muscles that you
spent months trying to make strong. This doesn't make sense, right?" What's more, injury to the muscles and facet joint can make the spine less stable, leaving the patient at risk for future back problems.

In the early 2000s, Dr. Houle and other neurosurgeons at the hospital began using a less-traumatic approach to treating herniated discs that does not involve cutting muscle. The minimally invasive procedure, known as tubular microdiscectomy, requires only a small incision in the back, through which the surgeon slips a thin, cylindrical device known as a tubular retractor, which is guided between muscle fibers to the area of the spine to be treated. The tube is then dilated, or widened, giving the surgeon enough room to insert instruments used to perform the surgery. The surgeon views the spine with a microscope or other magnification device. When the disc fragment causing back pain has been excised, the tubular retractor is removed and the muscle resumes its shape.

Studies have found this less-invasive procedure to be just as effective as traditional microdiscectomy.

However, while this procedure doesn't destroy muscle, it nonetheless still requires cutting the facet joint and ligament.

A LEAP FORWARD

The Joimax procedure takes the treatment of herniated discs a leap forward by largely eliminating the need to cut or damage any healthy tissue in order to access the compressed nerve. Instead, explained Dr. Houle, “We exploit a natural opening in the spine.” That opening is the neuroforamen, a kind of doorway on either side of a vertebra where nerves pass through as they connect the brain to your

Dr. Houle is one of just two doctors in all of New England who performs the Joimax® procedure. He regularly travels across the United States to lead seminars for other surgeons.
muscles, organs and other tissues. That's also where a bulging disc crimps nerves, causing pain.

With that in mind, the developers of Joimax had an idea: Why not enter the spine through this passageway?

In the procedure, Dr. Houle makes an incision the width of a number two pencil in the patient’s side. Through this portal he inserts a tube that’s just eight millimeters in width, which is passed through muscle and enters the spine by way of the neuroforamen. The instruments used to perform the surgery are inserted through this tube, much as in tubular microdiscectomy, but they also include an endoscope, or illuminated camera, which projects images of the herniated disk and surrounding tissues onto a TV monitor.

While watching his work on the monitor, Dr. Houle uses forceps (a tweezer-like tool) and other instruments to remove the disc portion that’s pinching the nerve root.

**A RAPID RECOVERY**

Importantly, patients do not receive general anesthesia during the Joimax procedure. Instead, they are given a medication that relaxes them during the operation, similar to the sedation used in a colonoscopy, for example. Dr. Houle favors this approach because accessing the spine carries a small risk of damaging nerves.

“When the patient is awake, if you irritate a nerve, they’ll tell you,” said Dr. Houle, since he or she will feel a twinge. That allows Dr. Houle to reposition his instruments to avoid harming the nerve.

Since Joimax doesn’t require general anesthesia, patients can leave the hospital soon after the procedure, which is performed on
an outpatient basis. That's also a plus for elderly patients, who have an increased risk for complications after receiving general anesthesia. And because no muscle or other tissue is damaged, pain is minimal.

“A lot of patients don't take pain medicine after the surgery – none,” said Dr. Houle. Most others need very little pain relief and end up taking just a pill or two.

Studies indicate that the Joimax procedure and other endoscope-based microdiscectomies are just as effective as traditional surgery. Yet another key benefit for patients who have herniated discs repaired with the endoscopic approach is a rapid recovery. The typical employed patient who has a microdiscectomy returns to work in about seven weeks. By comparison, patients who undergo discectomy with the Joimax procedure and other endoscope-based techniques are back to work in about half that time.

Bornstein underwent the Joimax procedure in June 2018.

“I had very little pain during recovery,” he recalled.

More importantly, he was soon able to drive and now regularly walks laps at the Hyannis Community Center's indoor track.

“I couldn't walk the length of a room before the surgery,” said Bornstein. “It’s been a miracle that Dr. Houle could get me out of that pain.” | TJ

NEED A SECOND OPINION?

Cape Cod Healthcare neurosurgeons assess spinal diagnoses made off-Cape via an online assessment service.

People who are struggling with persistent back problems, but don’t live on Cape Cod, can nonetheless benefit from the expertise of the team at Cape Cod Healthcare Neurosurgery through a program called Free Online MRI Review. This program was created to allow people who may be candidates for spinal surgery to ensure they have received the correct diagnoses and treatment plans by having Cape Cod Healthcare neurosurgeons evaluate their cases.

The process is simple: If you have undergone magnetic resonance imaging (MRI) of your spine, obtain a digitized version of the images on a compact disc or other format. These images can be uploaded to a secure online portal on Cape Cod Healthcare’s website, www.capecodhealth.org. Your MRI will be reviewed by one of the neurosurgeons, who will make a diagnosis and recommend the optimal approach for remedying your back problem, whether that means conservative measures (such as physical therapy) or minimally invasive surgery. Patients can then seek a personal consultation with one of our neurosurgeons.

This program is not available to patients who are already under the care of a physician within the Cape Cod Healthcare system.

“The Free Online MRI Review program is popular with patients who live on Nantucket and Martha’s Vineyard, but we also conduct evaluations for many who live on the mainland and even overseas,” said neurosurgeon Paul Houle, MD, FAANS. | TJ

TJ
HOPE FOR HARD-TO-TREAT BACK PAIN

Sacroiliac fusion is a new option for back pain that originates at the base of the spine.

By Timothy Gower

Doctors can identify most causes of back pain with physical exams and tests, but some cases are more puzzling.

“A patient might come to us with back pain, we'll do an MRI of his or her spine, and we don't see anything that explains their symptoms,” said Paul Houle, MD, FAANS, a neurological surgeon at Cape Cod Healthcare. What's more, sometimes when doctors do identify a suspicious-looking spinal abnormality, surgery to correct it fails to relieve a patient's back pain.

For many such patients with mysterious, hard-to-pinpoint symptoms, the trouble turns out to originate in the very lowest region of the back, where the spine meets the pelvis, known as the sacroiliac (SI) joints. Studies suggest that 15 to 30 percent of low back pain arises in the SI joints. The pain radiates upward, into the lower back, and sometimes downward, into the legs.

Doctors have known for some time that dysfunction in the SI joints can trigger back pain, but until recently had little besides medication to offer patients debilitated by the problem. However, in recent years, doctors at Cape Cod Healthcare and other medical centers have developed and refined a surgical technique known as sacroiliac joint fusion that can bring rapid relief.

SUPPORT THE UPPER BODY

To understand how fusion surgery eases pain arising from the SI joints, it helps to recall a bit of high school anatomy. Humans have two triangle-shaped hip bones, and the upper portion of each one is called the ilium. Each ilium connects to the sacrum, a shield-shaped bone that sits just above the coccyx (better known as the tailbone), to form the two SI joints. The SI joints support the upper body, but don't hinge much, like your knee and elbow joints do. However, these joints move enough to create the pelvic movements necessary for women to give birth. The stress childbirth places on the SI joints explains why women are more at risk than men for this form of back pain. Also, people who have had lumbar joints surgically fused to treat low back pain sometimes develop SI joint problems. That's because fused joints transfer stress onto adjacent joints, irritating nerve endings and causing pain.

“But if you stabilize that joint, the pain goes away because you're no longer stressing those nerve endings,” explained Dr. Houle, whose practice, Cape Cod Healthcare Neurosurgery, is located on North Street in Hyannis and North Falmouth. When he suspects a patient's low back pain is caused by instability in an SI joint, he sends him or her to the Cape Cod Hospital Pain Center for cortisone injections into the joint. If the injections bring temporary relief, the patient's back pain is likely arising from the SI joint.
AN OUTPATIENT PROCEDURE
An operation to fuse an SI joint takes about a half hour and is usually performed as an outpatient procedure. Dr. Houle begins by using the O-arm\textsuperscript{TM} device (see page 1) to acquire a three-dimensional image of the SI joints, which he uses to plan positioning of the stabilizing implants. A small incision is made in the skin, through which a delicate drill is used to produce two holes that pass through the pelvis and into the sacrum. Next, tubular cages filled with donor bone from a cadaver are inserted into the holes.

“That provides immediate stability of the joint,” said Dr. Houle. Over time, the bone grows through the cages and fuses the two bones.

“A lot of patients report that within a couple of days the horrible pain that brought them to my office is gone,” he said, noting that discomfort from surgery fades over a few weeks. After the procedure, patients are encouraged to participate in a physical therapy program designed to promote healthier functioning of the SI joints. | TJ

SI Fusion System is intended to stabilize your sacroiliac joint and provide an environment for fusion (joining bones together into one solid structure) to occur. The system consists of cylindrical threaded devices designed to enhance sacroiliac joint fusion.
Implanting artificial parts of the body in humans once seemed like science fiction, but today it’s routine. That’s especially true for treating certain orthopedic problems, with legions of men and women able to walk with ease thanks to artificial knees and hips, for instance. Now some patients with chronic, often-disabling symptoms caused by a herniated cervical disc can opt for a man-made replacement, known as the Mobi-C® disc.

Take Nicole Wellbeloved, 45, of Cotuit, who first noticed tingling in her right arm that traveled down to her thumb and index finger in January 2018. Then, one night, Wellbeloved tried grabbing a cup of water with her left hand and it dropped to the floor.

“My hands were very weak. I could barely squeeze my toothpaste,” she said.

That’s frightening for anyone, but literally losing her grip was a major problem for Wellbeloved, since she runs Wellbeloved Wellness, a fitness studio in Marstons Mills, as well as several other businesses. Teaching yoga and barre (a workout that combines movement, stretching, weight training and other elements) became impossible.

Doctors eventually determined that Wellbeloved had a pair of cervical discs that were impinging nerves. Discs are cushion-like pads that sit between the seven vertebrae that form the neck portion of the spine. Like all spinal discs, a pad in the cervical region can become herniated, meaning the outer shell cracks and allows the jelly-like material inside to spill out and compress nerves. That can result in persistent pain, numbness and tingling in the shoulders, arms and fingers, with or without accompanying symptoms in the neck.

The Mobi-C® cervical disc has been designed for cervical disc replacement to restore segmental motion and disc height. No bone chiseling, no invasive screws required.
WHEN CONSERVATIVE MEASURES FAIL
When conservative measures such as physical therapy and steroid injections fail to relieve symptoms of a herniated cervical disc, surgery is often the next step. The conventional approach to repairing a herniated cervical disc is a procedure called anterior cervical discectomy and fusion (ACDF). Entering through a small incision (usually in the front of the neck), a surgeon removes part or all of the bulging disc. The empty space is filled with donor bone or other material, then the vertebrae above and below where the herniated disc was removed are fused together with screws and a plate.

ACDF is an effective solution for herniated cervical discs, but the fusing of vertebrae takes several months and may modestly limit a patient's neck mobility, explained Paul Houle, MD, FAANS, a neurological surgeon at Cape Cod Hospital and Falmouth Hospital. What's more, about one in five patients who undergoes ACDF later develops problems in neighboring sections of the spine, a condition known as adjacent segment disease, he said. That's because when two vertebrae are fused, they transfer stress to adjoining parts of the spine and below, which can speed up disc degeneration and other problems, producing painful symptoms that may require additional surgery.

“So if you have an operation to fix one problem, you've got a 20 percent chance of creating another problem,” said Dr. Houle.

The Mobi-C disc, which was approved by the U.S. Food and Drug Administration in 2013, was designed to preserve natural neck mobility and reduce the need for follow-up surgeries. The device, which is implanted in an outpatient procedure, is made of two metal plates that form a sandwich around a flat plastic insert. The plates have teeth that press into the vertebrae above and below, holding the device in place. The plastic insert slides and twists across the bottom plate, allowing the Mobi-C to mimic the movement of a healthy natural disc.

“If you have normal motion, you don't put increased stress on the adjacent levels of the spine,” said Dr. Houle. That may explain why patients who receive the Mobi-C are significantly less likely than those who undergo ACDF to require additional surgery in the future, which was the finding of a seven-year study published in the International Journal of Spine Surgery in 2018. The study also found that patients who got the Mobi-C maintained good range of motion in their necks.

WHO IS A CANDIDATE?
There are limitations on who can receive a Mobi-C disc. A good candidate is a man or woman with a cervical disc that has herniated but has otherwise not degenerated, that is, become significantly thinner. (If a disc has lost half or more of its height, the patient can't opt for the Mobi-C.) Also, patients who have developed bone spurs (bony growths that form near joints) in their neck joints due to osteoarthritis are not candidates for Mobi-C.

For patients who do have the Mobi-C implanted, an important benefit is a speedy recovery. Following ACDF, patients have to take it easy for about six weeks, compared to two weeks, on average, for those who receive the Mobi-C. Bouncing back faster appealed to Wellbeloved when Dr. Houle recommended Mobi-C, so she elected to have her two damaged cervical discs replaced with the implants in an operation Dr. Houle performed in November 2018.

As Wellbeloved lay in a hospital bed following the surgery, her husband, Blair, made a request: Squeeze my hand. She responded with a firm clasp. A month later, Wellbeloved was gaining more mobility in her neck and eagerly awaiting her chance to get back to work in her fitness studio.

“I'm counting down the days,” she said. “I'm not a ‘sit around’ type of person.” | TJ
WE’VE GOT YOUR BACK

Minimally invasive procedures are the gold-standard treatment for patients who require back surgery.

By Timothy Gower

Jared West, 44, is a firefighter in Mashpee who builds houses on the side. But the Sandwich resident had to give up saving homes and creating new ones a few years ago after twisting awkwardly on an emergency call while trying to hoist up a heavy-set man who had fallen out of bed.

“I felt something pop,” recalled West, who found himself hobbled by stabbing pain in his lower back and buttocks that left him unable to work.

West was eventually referred to Achilles Papavasiliou, MD, FAANS, a neurological surgeon at Cape Cod Hospital and Falmouth Hospital. Dr. Papavasiliou determined that West had aggravated a problem called spinal stenosis. This condition occurs when the spinal canal – the channel that runs vertically through the spine and houses the bundle of nerves called the spinal cord – narrows.

“As we age, the cushion-like discs between each vertebra begin to weaken and bulge, and the ligaments in the spine thicken to maintain alignment,” Dr. Papavasiliou said. “All those changes constrict the spinal canal and put pressure on the nerves.”

West was asymptomatic until he tried to lift the large man which led to a disc herniation and spinal stenosis.

WELCOME RELIEF
The solution to West’s back woes was one of the most common forms of back surgery, a procedure known as a laminectomy. The goal of this operation is to relieve pressure on nerves that are being compressed. That’s accomplished by removing a small piece of a bone from the spine called the lamina, which opens up space in the spinal canal and gives nerves more room. Surgeons may also remove any bony growths or disc fragments in the spine that may be impinging nerves.

At one time, all laminectomies were performed as open surgery, meaning they required an incision in the back measuring at least a few inches long. Muscle had to be cut to access the spine. But the minimally invasive techniques that Dr. Papavasiliou and other neurological surgeons at Cape Cod Healthcare employ when performing laminectomies and other spinal procedures spare patients much of the trauma traditional surgery entails.

The key tool in minimally invasive spinal surgery is a metal cylinder called a tubular retractor, explained Dr. Papavasiliou. A surgeon makes a small incision in the skin, through which he or she inserts a tubular retractor into the patient’s body, where it moves muscle and other soft tissue out of the way without any cutting required. The surgeon docks the cylinder on the spine; though it’s less than an inch in diameter, that’s enough space for the surgeon to peer through with a microscope and manipulate surgical instruments as they take out bone and other tissue that are compressing nerves.

Cape Cod Healthcare neurosurgeons have performed several thousand minimally invasive laminectomies over the past 15 years or so.
“Patients tend to do very well,” said Dr. Papavasiliou, noting that his observation is supported by the Spine Patient Outcomes Research Trial (SPORT), a study he was a part of while doing his spine fellowship at Dartmouth.

SPORT was a nationwide study that found that patients with spinal stenosis who opt for surgery had less pain and better functioning over the long term than others who choose nonsurgical treatments. SPORT also found that patients with another common condition, degenerative spondylolisthesis – which causes pain as the spine becomes misaligned – fared better over the years if they chose surgery instead of conservative treatments. Finally, the trial found that surgery to repair a herniated disc prompted speedier relief from pain than other treatments.

Cape Cod Healthcare neurosurgeons have performed several thousand minimally invasive laminectomies over the past 15 years or so.
Jared West is a testament to the benefits of minimally invasive surgery: He was jogging within a month of his laminectomy, back to work in three months and today regularly participates in a grueling competition known as the Spartan Race, which requires participants to climb walls, lug sandbags, wade through mud and overcome other obstacles.

But even if you simply want to be able to get back to golf (see page 18) or be able to play with the grandkids, the neurosurgeons at Cape Cod Healthcare can help. “We have a lot of ways to treat back pain these days,” said Dr. Papavasiliou. “We can tailor the procedure to the patient’s problem.”

A laminectomy is a surgical procedure that removes a portion of the vertebral bone called the lamina, which is the roof of the spinal canal.
Sue Curran, 61, has been playing golf since she was 5, but a few years ago the Centerville resident began developing a groan-inducing ache in her lower back after every round. And the pain didn't stop there, often radiating down into her lower body, especially the left leg.

"On a scale of one to 10, the pain was an 11," said Curran.

Curran tried everything from acupuncture to Advil to ease the anguish, but nothing helped. A doctor suggested cortisone injections, but those failed, too. Then a surgeon in Boston, where Curran has a home, recommended spinal fusion, in which two vertebrae are bonded to form one bone. The surgery was scheduled, though Curran remained uncertain it was the right choice for her.

Finally, a fellow golfer at the Hyannisport Club, where Curran plays, suggested she consult another member: Paul Houle, MD, FAANS, a neurological surgeon at Cape Cod Healthcare. After examining Curran, Dr. Houle recommended a different strategy: He would treat Curran with a procedure called a laminectomy, in which bone impinging on nerves and causing pain is removed, followed by the hospital's Golf-Specific Rehab Program, a physical therapy regimen designed specifically for golfers who have had back surgery.

Curran was quickly convinced that the surgery and rehab program were right for her.

“I loved it,” she said. “It seemed like the road to recovery.”

**JUST FOR GOLFERS**

Dr. Houle developed the program for golfers recovering from back surgery with Catherine Hoell, PT, DPT, OCS, an orthopedic physical therapist with the Cape Cod Hospital Rehabilitation Center. Dr. Houle is a devoted golfer, and Hoell knows a bit about the game herself. Her handicap is an impressive six, and she has won multiple championships at the public golf clubs in her town of Dennis, the Highlands and the Pines.

Both Drs. Houle and Hoell are certified by the Titleist Performance Institute, a program launched by the equipment manufacturer to teach golf instructors and healthcare professionals the biomechanics of the golf swing. The goal: Help golfers perform at a high level while staying healthy.

Many golfers struggle with back pain, including the most famous player in the world, Tiger Woods, who has had surgery on his spine four times, the most recent a spinal fusion. With more than three dozen golf courses on the Cape and South Coast, Dr. Houle and Hoell see plenty of players who have back problems.

“But a back injury isn’t always the problem, per se – sometimes it’s a symptom,” said Hoell. “Your back is hurting because another part of the body isn’t doing its job.”

That often means the hips or thorax (the area from the abdomen to the neck), which in many golfers – both competitive and casual – lack flexibility, so the body compensates by straining the spine. The rehabilitation program Dr. Houle and Hoell created...
is designed to remedy these and other orthopedic problems that can lead to problems for golfers.

“Dr. Houle can fix a back injury, but if you then don't follow it up with rehabilitation and get mobility in your hips and rib cage, you are going right back to the same problem,” said Hoell.

STRENGTHENING THE CORE

Golfers usually begin the rehab program a few weeks after undergoing back surgery. Most attend two or three weekly sessions, which last 45 minutes each. The program moves through three phases over the course of several months: First, Hoell guides the patient through exercises designed to promote healing and restore normal movement, and to begin building strength in the abdominal region, often called “the core.”

That work continues in the second phase, along with building strength and flexibility in other muscles and joints that play vital roles in the golf swing. In the final phase, the focus shifts to exercises aimed at improving performance – building the strength and flexibility needed to play better golf. When the program is complete, golfers gradually resume playing, a few swings at a time.

“We work with the whole spectrum of golfers,” said Hoell. “It doesn’t matter what level you play at. If you enjoy the game, we can get you back on the course.”

Sue Curran achieved that goal one beautiful day last fall, when she teed off at Hyannisport for the first time in months. And when she vacations in Florida this winter, she’s packing her clubs, eager to re-embrace the game she loves, thanks to her surgery and hard work in the rehab program.

“It was an extraordinary experience,” said Curran. “I wish I’d done it sooner.”

| TJ
David Leppla, MD, FAANS, neurological surgeon, Cape Cod Healthcare
Living with cancer often means coping with pain. Cape Cod Healthcare neurosurgeons can deliver rapid relief to cancer patients suffering from hard-to-treat chronic pain with a treatment called OsteoCool™, which uses cutting-edge technology to treat tumors that arise in the spine and may produce severe back pain and other problems.

“The name OsteoCool is a misnomer,” said neurosurgeon David Leppla, MD, FAANS. “The word ‘cool’ makes it sound like we’re freezing the tumor, but we’re not. We’re actually heating it up.”

These painful spinal tumors usually occur due to a phenomenon known as metastasis, which happens when malignant cells break away from tumors and travel to other parts of the body. When malignant cells migrate, the destination is often bone, which is the third most common site for cancer metastases (behind the lungs and liver). As high as 60 to 80 percent of cancer patients develop bone metastases, which are most common in people diagnosed with breast, prostate, liver and lung cancer. Metastases can form in any bone in the body, but they most frequently arise in the central part of the body, especially in the vertebrae, which are the bones that form the spine. Spinal metastases can cause severe pain and increase the risk for fractures and other problems.

**A NEW APPROACH**

Drugs can help control the growth of spinal tumors and ease the pain they cause in some patients, but these metastases frequently require more aggressive treatment. For years, the standard approach has been stereotactic radiosurgery, a noninvasive procedure that focuses beams of radiation from outside the body on a tumor, which damages the DNA of cancer cells. The cells gradually die off, the tumor shrinks and pain diminishes over time.

However, in recent years, a new treatment option has emerged for patients with aching, often-debilitating spinal metastases. This technology, known as radiofrequency (RF) ablation, uses intense energy delivered by probes inserted into these tumors to destroy cancer cells within minutes. Treatment of spinal tumors with the OsteoCool RF ablation system is performed as an outpatient procedure, with patients usually on their way home an hour after the operation is completed.

Here’s how OsteoCool works. After going through pre-operative preparation, the patient is sedated, brought to a neurosurgery suite and positioned face down on an operating table. An imaging device called a fluoroscope is directed at the patient’s body from both sides, which produces a kind of X-ray movie of the vertebra that will be treated. The image is projected on a monitor that the neurosurgeon views to guide the placement of instruments.

**DESTROYING TUMOR CELLS**

Next, the surgeon makes two small incisions in the patient’s skin, near the site of the spinal tumor. Thin tubes called cannulas are inserted into each incision and guided into cylinder-shaped vertebral structures called pedicles. 

**RELIEF FROM CANCER PAIN**

OsteoCool™ brings rapid relief of back pain caused by malignancies that spread to the spine.

By Timothy Gower
“That’s our entryway to get into the vertebral body,” explained Dr. Leppla.

Fine drills are threaded down each cannula and turned on to create access to the inside of the diseased bone, where the tumor lies. After withdrawing the drills, the surgeon inserts probes into the cannulas. The tips of the probes deliver an electric current and heat up to a temperature of 70 degrees Celsius (158 degrees Fahrenheit).

“That kills tumor cells in the bone,” said Dr. Leppla. “Meanwhile, the tip of the probe is irrigated with water to keep it from overheating the tissue.” Depending on the size of the vertebra being treated, the probes are kept in place for 11 to 15 minutes before the surgeon removes them. But the treatment is not yet complete, since destroying the tumor leaves the vertebra unstable. To remedy this problem, the surgeon inserts a device with a balloon on the tip into the bone. The balloon is inflated, then withdrawn—creating a cavity. The void is then filled with bone cement, a procedure called kyphoplasty.

“When bone cement solidifies, it’s as hard as a cue ball,” noted Dr. Leppla.

In 2018, a review of the scientific literature on radiofrequency ablation for treatment of metastatic spinal tumors, published in the journal Pain Physician, found the therapy to be an effective pain treatment with a very low risk for major complications. Dr. Leppla observes that about 80 percent of his patients benefit from the procedure. He recently treated a woman who had already undergone radiation treatment for a tumor in her lumbar spine, or lower back. But the cancer had returned and spread, so she now had three tumors on her spine. Dr. Leppla treated all three with OsteoCool, and then called to check on her the following day.

“She was delighted. She was giddy with the results,” he recalled. “Her pain relief was essentially instantaneous.”

The OsteoCool™ RF Ablation probe uses a coaxial, bipolar technology that delivers localized tumor ablation in bone.
All forms of brain surgery require an extraordinary level of planning and skill to reduce the risk of harming sensitive regions of the brain that control essential bodily functions, such as the motor cortex, which governs muscle movement. The same is true of back surgery, which requires surgeons to steer clear of the spinal cord and nerves exiting the spine when repairing diseased or injured discs and vertebrae. Damage to critical brain tissue or nerves can lead to complications such as limb weakness or numbness, to paralysis or loss of speech or vision.

To minimize such risks while taking out a brain tumor or treating a spinal disorder, the goal is straightforward, said Gordon Nakata, MD, FAANS, a neurological surgeon at Cape Cod Healthcare: “Take the safest path possible.”

To chart a safe course when removing a tumor from inside the brain, a key preplanning step is identifying its location in relation to regions that manage movement or control the senses, said his fellow neurological surgeon Nicholas Coppa, MD, FAANS. “We know roughly where (these regions) are laid out in the brain,” explained Dr. Coppa. “So if an MRI indicates that a tumor is next to the motor cortex, that’s where I need to be careful.”

To augment their knowledge of the brain’s anatomy, neurological surgeons at Cape Cod Hospital turn to image-guidance technology called the StealthStation Surgical Navigation System (which is also used with the O-arm™ Imaging System; see page 1). During the procedure, this system synchronizes the MRI of the brain taken before the operation with real-time images captured by an infrared camera. This allows the surgeon to track the movement of the very small scalpels and other tiny instruments used to remove a brain tumor. With the aid of the detailed, three-dimensional images provided by the StealthStation technology, “we can get the shortest, safest trajectory to the tumor,” said Achilles Papavasiliou, MD, FAANS, a neurological surgeon at Cape Cod Healthcare.

Other technology, such as electromyography, which measures muscles’ responses to signals from the brain—is often also used in neurological surgery to guard against nerve damage. Electrodes placed in the legs and arms of a patient undergoing brain or back surgery transmit information about nerve signals reaching the muscles in these limbs.

A doctor called a neurophysiologist monitors these signals on a computer screen during an operation. So, for example, if a screw implanted into a vertebra during a disc fusion procedure irritates or compresses a nerve, the screen flashes a warning and the neurophysiologist alerts the surgeon. In such a case, a smaller screw might be necessary. In the event a surgeon irritates a pinched nerve during the removal of bone or disc, “simply slowing down until the stimulation resolves is all that is necessary,” said Dr. Papavasiliou. In other cases, the danger of harming a nerve may require the surgeon to use smaller instruments or approach the tissue that needs to be excised or repaired from another angle.

Known as neuromonitoring, the various technologies used to keep tabs on whether nerves are in any danger during surgery give doctors immediate feedback that helps prevent postoperative side effects and complications. Coupled with advances in imaging technology, they add up to better surgical outcomes and greater safety for patients.
NEUROSURGEONS AT CAPE COD HOSPITAL HAVE EXPERTISE AND EXPERIENCE IN TREATING COMPLEX TUMORS AND OTHER PERILOUS GROWTHS IN THE BRAINS.

By Timothy Gower

The bottom of the human brain is a busy, chaotic place. The brain rests on the floor of the skull, which has many openings. Through these various portals pass the spinal cord – the bundle of nerves that manages the body’s every movement and mechanism – as well as blood vessels that keep the brain nourished. Treating a tumor that arises in this dense thicket of tissue is a delicate, daunting challenge.

“You can’t simply move the brain out of the way,” said Nicholas Coppa, MD, FAANS, a neurological surgeon at Cape Cod Healthcare.

Accessing the tumor is challenging, but fortunately, Dr. Coppa and other surgeons who specialize in skull base surgery have answers to the question of how to remove tumors and other unhealthy growths that form deep in the cranium. Before coming to Cape Cod Hospital in 2013, Dr. Coppa was an assistant professor of neurological surgery at Oregon Health & Science University (OHSU) in Portland. At OHSU, he completed a one-year fellowship (or advanced training) in skull base and cerebrovascular neurosurgery and neuro-oncology surgery, then spent the next four years performing these complex cranial operations.

The techniques used in skull base surgery allow doctors to treat a variety of diseases that strike in hard-to-reach recesses of the cranium. Some tumors that form at the base of the skull are cancerous, or malignant, though many are noncancerous, or benign. That doesn’t mean the latter are harmless, however. For example, meningiomas are a common type of tumor that forms in the membrane of the brain, including at the base of the skull. About 90 percent of meningiomas are benign, but left untreated they can grow and impair brain activity, causing disability and even death.

Likewise, formations called epidermoid brain cysts are usually benign, but can cause symptoms such as hearing loss, headaches and facial twitching. Clusters of abnormal blood vessels known as cavernomas can form within the brain and spinal cord, too, often in deep-seated locations with the potential to cause seizures, hemorrhages and stroke symptoms.

To treat most brain tumors, surgeons perform a craniotomy, which is the removal of a portion of bone from the skull. But to access deep-seated tumors and other abnormalities, doctors trained in skull base surgery use different strategies, approaching them with minimally invasive methods that take advantage of natural passages in the cranium. Using fine drills and other instruments, surgeons may enter through the posterior fossa, at the back of the neck, for example, or the temporal bone, behind the ear. Or, in some cases, through the nose. That’s the pathway used in certain operations, including a procedure called endoscopic endonasal transsphenoidal surgery, which is performed to remove tumors that develop on the pituitary gland. This pea-sized organ produces various hormones and is located at the base of the brain, at about eye level.

Most tumors that form on the pituitary gland are benign but, when they grow large enough, are capable of causing symptoms that include headaches and visual problems, such as double vision or loss of peripheral vision. “Moreover,” said Dr. Coppa, “these tumors can be locally aggressive, meaning that they tend to recur in that area and be a problem.”
To treat these and similar tumors, Dr. Coppa and other neurological surgeons at Cape Cod Healthcare collaborate with their colleagues in the department of otolaryngology services, who specialize in the treatment of disorders of the ear, nose and throat. After the patient has been placed under general anesthesia, the surgeon inserts small surgical instruments into the sinus cavity and removes a small amount of bone and soft tissue to create an opening in the base of the skull, allowing access to the tumor.

To guide his instruments, Dr. Coppa inserts an endoscope, a thin tube with a camera and light on the tip, into the sinus cavity. The endoscope is directed to the site of the tumor, projecting images onto a TV monitor. For many years, the standard method for performing this procedure was to insert a slender cylinder called a retractor into the sinus cavity. Surgical instruments were manipulated through the retractor, through which the surgeon peered down with a microscope to view the tumor and gland. Dr. Coppa was trained with this technique, but recently transitioned to the newer endoscopic approach.

“In my opinion, it’s becoming the new gold standard. The visualization (of the tumor) is a lot better—it’s more panoramic.”

To remove the tumor (which Dr. Coppa noted has the consistency of cottage cheese), a surgeon uses a scraping tool called a curette and a suction device. Using the endoscopic technique allows for more tumor removal, he said. Another advantage of the endoscopic method is that a surgeon can check his or her work at the end of the procedure.

“I can actually put my camera right in there and see for myself whether the tumor is out,” he said.

In many communities across the United States, patients who have pituitary tumors and other abnormalities at the base of the skull must travel to academic medical centers to be diagnosed and treated. With the expertise and experience Dr. Coppa and his colleagues bring to the operating table, it’s possible for Cape Codders unfortunate enough to develop one of these relatively rare conditions to receive top-quality care close to home.
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For more information, visit www.capecodhealth.org.
Sean Horrigan, DO, neurologist, Cape Cod Healthcare
According to the Alzheimer’s Association, Alzheimer’s disease is the most common cause of dementia in people over 65 years old. Unfortunately, the numbers are rising at an alarming rate. The number of those in Massachusetts living with Alzheimer’s is currently more than 130,000 people, being cared for by approximately 337,000 caregivers. That figure is expected to increase by 25 percent in the next eight years.

Because Cape Cod has an older population than the rest of the state, the local numbers are even more concerning. Approximately 15,000 people are currently living with some form of dementia on the Cape and Islands, according to neurologist Sean Horrigan, DO, at Neurologists of Cape Cod in Hyannis.

These numbers alarmed Dr. Horrigan, and earlier this year, he and his colleagues had a meeting to discuss what to do about this growing crisis. Now that their office has expanded from just two neurologists when Dr. Horrigan started working there eight years ago to six physicians and a nurse practitioner specially trained in neurology, they knew they were better able to tackle the issue.

The group decided to make their office at 46 North Street the Memory Care Center of Cape Cod.

“One of the most important aspects of care is identifying these patients. “It’s really shocking to me that approximately 50 percent of Americans with Alzheimer’s disease are not even diagnosed,” he said. “Right now, we are simply not doing our best job. We’re not catching this disease soon enough. If we can detect and diagnose earlier, we can do more to help our patients and their families.”

To address this issue, Neurologists of Cape Cod have been working with Kumara Sidhartha, MD, medical director of the Cape Cod Healthcare Physician Hospital Organization (PHO) and Cape Cod Healthcare Accountable Care Organization, and Gemma Jones, director of Clinical Integration at the Cape Cod Healthcare PHO, to publish an Alzheimer’s disease dementia care guideline for all primary care providers on the Cape.

THE GUIDELINES
This care map helps providers better screen and diagnose those individuals living with a cognitive impairment.

Some of the Hyannis neurologists will be giving talks at Cape Cod Hospital, Falmouth Hospital and at primary care offices to discuss how to best screen for cognitive impairment and what tools to use. The premise is that just as doctors regularly screen for high blood pressure, high cholesterol and diabetes, they should also be screening for memory loss with a five-minute mental status exam to identify any signs of cognitive impairment.
It is now recommended that all patients age 65 and older take a test known as the Mini-Mental State Examination on an annual basis. The exam score ranges from zero to 30. Anyone who scores 25 or less on this exam should be referred to the Memory Care Center for further cognitive testing.

Neurologists of Cape Cod is also planning to offer community talks to help educate the public about the risk factors and early signs of cognitive impairment. Warning signs include a person having new problems with managing their medications, trouble handling their personal finances and getting lost on the road while driving.

“I also consider it a red flag if someone in their 60s suddenly begins to experience new issues with depression, anxiety or hallucinations,” Dr. Horrigan said. “Early on, this disease can be variable in presentation,” Dr. Horrigan said. “Every patient has a different story. There are some patients with a delay in diagnosis because they have such a high cognitive reserve to begin with. They can be quite educated. They can be savvy in social settings with a knack for conversation. You have to dig a little deeper. You eventually find that there are growing problems affecting their day-to-day living.”

IT’S NOT ALWAYS ALZHEIMER’S
Not everyone who is forgetful is suffering from Alzheimer’s disease, according to Dr. Horrigan, and the Memory Care Center can help pinpoint the problem.

“First and foremost, there is age-appropriate forgetfulness,” he said. “I think that’s important to understand. We all experience memory loss that does not necessarily interfere with our quality of life. We have office visits with concerned patients who may have misplaced something around their house one too many times or worry that they are having more word-finding difficulties when talking to family, friends and coworkers. Add on a family history of Alzheimer’s disease, they are now understandably worried that they are experiencing early signs of dementia.”

At the Center, Dr. Horrigan performs a thorough neurological and mental status exam. He also orders routine labs because there are several reversible and treatable conditions that can cause changes in cognitive status. Examples include thyroid disease, vitamin deficiencies, infectious causes, psychiatric illness, learning disabilities, autoimmune disorders, and sleep apnea or other sleep disorders.

It’s also routine to order MRI or CT imaging to look for any patterns of brain atrophy and to better assess cerebrovascular health and brain function. Brain imaging can help identify strokes, tumors and other less common problems that can cause dementia. There are several factors to consider that can influence how well a person’s brain functions as they get older.

IF IT IS ALZHEIMER’S
If the diagnosis is Alzheimer’s disease, there are only four medications in the United States for memory loss.

“These medications don’t slow the disease down dramatically, but their use can lead to a very modest improvement in cognition and overall disease outcome. It’s

His mother-in-law, who lives in Rhode Island, was a registered nurse and began having difficulty at work. She’s a long-time widow who has lived alone for years. She had always been an eloquent speaker and a very social person. When she began having greater anxiety and frustration about her work performance, her family assumed that work-related stress was the cause. Her family encouraged her to see the primary care doctor and later a psychiatrist to help treat her anxiety. Two years later, she was diagnosed with Alzheimer’s disease.
appropriate for patients to be on some of, or a combination of, these medications,” said Dr. Horrigan. “With use of these medications, we are trying to help improve and maintain quality of life.”

Neurologists also talk to patients and their families about lifestyle modifications that can slow the disease. If a person has a dementing illness, it is still very important to exercise often, eat a healthy diet, not smoke and drink alcohol in moderation or, preferably, not at all. Being socially engaged is also critical.

“When I meet a patient with cognitive difficulties, I am very concerned they are at risk for faster progressing dementia if they are socially isolated,” he said. “If they are not getting out of the house, if they are not on the move, if they don’t have a strong support center with family and friends, I worry that their disease will worsen more quickly. These patients are the members of our community most at risk.”

For this reason, the Memory Care Center of Cape Cod has developed working relationships with the Alzheimer’s Family Support Center of Cape Cod, which holds hour-long counseling sessions onsite at Neurologists of Cape Cod’s office to educate families about the course and complications of dementia, as well as all the community resources that are available to help them. The neurologists also have many of their patients enrolled with Visiting Nurse Association of Cape Cod, which has consolidated HopeHealth Alzheimer’s and dementia services under the VNA parent organization, Cape Cod Healthcare, umbrella.

These invaluable community resources teach people about home care options, adult day care services, volunteer and discount transportation, elder care programs, elder law legal counsel and the many family support groups available throughout Cape Cod. These services help families plan for the present as well as the future, as the disease progresses.

“Most caregivers have a pretty good Plan A,” Dr. Horrigan said. “But most need help coming up with a better Plan B, like when something happens to a patient’s caregiver, especially if that person is an elderly spouse also struggling with ailing health.”

MEMORY CARE CENTER FUTURE

It is a challenging decision and discussion to take away a driver’s license from a patient. To simplify this process and remove all questions about whether it is necessary, the Memory Care Center of Cape Cod will soon be utilizing a clinically-certified driving cognitive assessment tool. The program, known as DrivABLE, will be added to their list of services in 2019. This program will help assess when a person living with a cognitive impairment needs to stop driving. The program will eventually be available to local healthcare providers and the general public.

The Memory Care Center of Cape Cod has also been expanding access to research. Many of Dr. Horrigan’s patients and their family members who are at risk of developing dementia have expressed interest in participating in clinical trials or observational studies. Both McLean Hospital in Belmont and Brigham and Women’s Hospital in Boston have treatment and research branches to study Alzheimer’s and other dementias. The hospitals also have grants to help pay for transportation costs for those who want to participate.

Continuing research and clinical studies are the only hopes for finding a cure, so the Memory Care Center of Cape Cod has reached out to both hospitals to establish a relationship. In the future, Dr. Horrigan hopes to be able to start a satellite office on the Cape and do trials at their own office.

“We’re very proud of what we do at our clinic for all of our patients and their families. Now is the time to expand and do even more for our community.” | TJ
Karen Lynch, MD, neurologist, Cape Cod Healthcare
Osterville resident Judy Liuzza had her first migraine 30 years ago when she was pregnant with her daughter. After her daughter was born, the migraines went away. They returned with a vengeance 28 years ago when she was pregnant with her son, and never went away. She was living north of Boston at the time and saw 10 to 12 doctors over the years.

Liuzza tried all of the medications available and none of them lessened the 27 migraines she was having every month. Her quality of life was terrible. When her children were growing up, she had to spend days in her bedroom with the shades down until the migraine passed. She finally found some relief eight years ago through Botox treatments and experienced a significant reduction in the number of migraines she had.

When she moved to the Cape two and a half years ago, Hyannis neurologist Karen Lynch, MD, continued her treatment.

“Now with Dr. Lynch I’ve been getting the Botox every three months for two and a half years and I would say that out of 30 days, I might have a headache maybe seven to 10 days a month,” Liuzza said. “Some months are better than others.”

She knows that it doesn’t make sense to those who don’t suffer from migraines, but that reduction has been life-changing for her. Her quality of life has improved dramatically.

Even though to most people seven to 10 migraines would still seem unbearable, Liuzza’s reaction to fewer migraines is not uncommon, according to Dr. Lynch, who practices at Neurologists of Cape Cod on North Street in Hyannis.

“I think that part of the expectation depends on how severe the patient is,” she said. “Those patients that I have who have chronic migraines, who have been through the gamut for many years sometimes sell themselves a little short as to what they expect, in part because they have not had much offered over the years.”

Until Botox (and specifically Botox brand) was FDA approved in 2010, doctors did not have any specific approved medications to treat migraines. They could prescribe other medications like blood pressure pills, antidepressants and medications used to treat epilepsy. None of them worked very well and they often came with intolerable side effects.

Dr. Lynch expressed dismay that for an illness that has been so prevalent, the medical field has only really just begun to make some breakthroughs in medication options in the past two decades.

She cited statistics from the World Health Organization (WHO) that migraine is the third most prevalent disease in the world. More people suffer from migraines than those suffering from diabetes, epilepsy and asthma combined. The WHO asserts that chronic migraines are as debilitating as quadriplegia and active psychosis.

“CAN LAST FOR DAYS

Chronic migraine is when patients have more than 15 headaches a month for more than three months, eight of which are migraine, according to Dr. Lynch.

“When somebody is in an acute migraine state, it’s just as bad as if they have lost their limbs or are in a psychotic state,” she said. “So it’s extremely debilitating as well as the financial burden that it places as regards lost work time, ER and doctors visits.”

Migraine sufferers often find relief by using Botox®, a drug most commonly used for cosmetic reasons.

By Laurie Higgins
Part of the reason that migraines are so debilitating is that they can last for days, beginning with events that include fatigue, yawning, appetite changes and a visual aura. The aura can include scintillating scotomas, vision floaters, orbs, spots, loss of vision and sometimes more dramatic neurological symptoms such as weakness, numbness down one side of the face or limbs, and speech difficulties.

“Some, people may look like they are having a stroke, so they may end up in the emergency department for their first migraine,” Dr. Lynch said. Botox treatments are given every 12 weeks at the neurologist’s office because the drug wears off over time. It involves a series of very small, superficial injections given to various points around the head, including the front and back of the head, along the neck region, and across the shoulders.

“Most people will report the headaches are generally less frequent and less severe (after Botox treatment),” Dr. Lynch said. “And often we see super-responders, where you get complete resolution from headaches or very minimal headaches and the triggers that used to trigger them don’t trigger them anymore. So it’s a very effective treatment.”

NEW TREATMENTS COMING
The good news is that more treatments for migraines are both available and on the way. Neurologists of Cape Cod already offers sphenopalatine ganglion blocks (see sidebar on page 35), which can be effective for patients, especially for those who experience migraines in the face or eye region. In January 2019, Dr. Lynch expected to begin to introduce other types of nerve blocks, including occipital nerve blocks, greater auricular nerve blocks and supraorbital nerve blocks.

And finally, there are other medications that have been granted FDA approval, including three in the past year, with more expected to gain approval next year and some very promising trials that are underway.

“It’s a very exciting time for migraine sufferers, and in the world of headache medicine,” said Dr. Lynch. “Just this past year, we’ve had a new swath of medications that have come out, specifically for migraine.”

The medications are known as calcitonin gene-related peptide monoclonal antibodies.

“They are a very exciting group of medications that are specific to migraine and they treat both episodic and chronic, so it’s really put a big spotlight on a condition that has been quite forgotten about for quite a long time in
In the past, when patients suffered from an intractable migraine that didn’t respond to oral medication, their only course of action was to go to the emergency department for intravenous medicine. Now, those suffering from severe migraine pain on Cape Cod have another option.

Neurologists of Cape Cod in Hyannis offers relief with sphenopalatine ganglion nerve blocks, commonly referred to as SPG blocks. Neurologist Sean Horrigan, DO, and nurse practitioner Tara Hart, NP, each offers the treatment. Falmouth Hospital pain specialist Adam Brown, DO, also offers the treatment.

“Migraines are an awful thing because it’s not an outward pain or injury,” said Hart. “It’s not something that people can see, so patients just suffer. The stories we hear by the time they get to us with chronic migraines are just so sad.”

The SPG blocks offer help via the ganglion, which is a bundle of nerves that lies deep behind the nose and is involved in a lot of headache pathways, according to Hart.

“It’s just topically treating that nerve cluster and hopefully breaking up that pain pathway,” she said. “It’s noninvasive with little to no side effects, and patients tolerate it really well.”

The procedure itself utilizes two simple pain medications – lidocaine and Marcaine. Patients lie down in a quiet dark room to make them as comfortable as possible and Hart gently inserts long cotton swabs that have been soaked in the anesthetic mixture; one in each nostril. The patient then rests for 20 to 30 minutes. Afterwards, she removes the swabs and lets the patient sit up and rest a bit more before sending them home.

“They can feel immediate relief,” she said. “The results are mixed and I would say it’s about 50/50 that people see a change right away. Unfortunately, other people do not get any relief from it.”

For those patients it does help, the treatment can last from a few days up to a few weeks.

SPG blocks can also be used to help people with atypical face pain and trigeminal neuralgia. Hart has worked at Neurologists of Cape Cod as a registered nurse since 2014. She earned her master’s degree and has been a practicing nurse practitioner for about a year. She is very heartened by all the new advances in treatment the office now offers.

A new anti-migraine drug class that the FDA approved this year promises even more hope for migraine patients, she said.

“It’s a really exciting time to be working in this practice.”
HOPE FOR A DEVASTATING CONDITION

New treatments and better awareness are making a difference for stroke patients.

By Laurie Higgins

Stroke (cerebrovascular accident or “CVA”) is the number one cause of disability in the U.S. and the fifth leading cause of death, according to neurologist Michael Markowski, DO, FAAN, who has been the stroke director at Cape Cod Hospital for over a decade. A stroke is brain damage caused by an abnormality of brain blood vessels, either a blockage of an artery or less commonly an artery rupture causing bleeding into the brain.

“People always think that it’s a disease of aging, which it is to some degree, but one out of three strokes occurs in people under the age of 65,” he said. “We see people in their 30s, 40s and 50s suffer a stroke, unfortunately. At Cape Cod Hospital, we see a lot of strokes, so we are one of eight extra-high-volume stroke centers in the state of Massachusetts.”

The hospital treats between 50 and 70 stroke patients or patients with transient ischemic attacks (TIAs) every month. Since 2005, both Cape Cod Hospital and Falmouth Hospital have been named primary stroke centers by the Massachusetts Department of Public Health. Both hospitals have also won multiple Get with the Guidelines awards from the American Heart Association and the American Stroke Association.

As the stroke director, Dr. Markowski leads the stroke committee at Cape Cod Hospital which is comprised of neurologists, emergency department physicians and nurses, inpatient nurses and rehabilitation therapists. The committee reviews stroke care guidelines and launches new patient care initiatives. Emergency medical technicians and rehabilitation facility clinicians have been brought onto the committee to cover all aspects of care.

ALTEPLASE ENTERS THE SCENE

“In terms of acute stroke treatment, there’s only one medication that has been FDA-approved since 1995, and that’s called tPA, or the generic is called alteplase,” he said.

The drug is used for ischemic strokes, which are caused by a blockage of a brain blood vessel. Strokes can also be caused by a rupture of a blood vessel in the brain, which are known as hemorrhagic strokes.

One of the difficulties with tPA is a definite window of time in which it must be given, along with other strict criteria. This medication has to be given within three hours of suffering a stroke or, if a patient is under 80 years old, it may be given up to four and a half hours as “off-label use,” or outside of normal administration, according to Dr. Markowski.

“So, for many patients, there is a three-hour window, and the benefit of tPA is much better if it’s given sooner rather than later. If it’s given in the first 90 minutes of that three-hour window, the benefit is definitely greater.”

Every minute that goes by without treatment, more brain cells die, he said. For that reason, in the past, when the hospital informed neurologists of a possible stroke patient coming in, they would either leave their clinical practices immediately or get out of bed in the middle of the night to get to the hospital as quickly as possible.

To allow patients to be treated more quickly, Cape Cod Healthcare has invested in a teleneurology system that allows more timely diagnosis, so those who qualify can start tPA as soon as possible.
“Neurologists can examine the patient through a monitor with the aid of an emergency department physician or a nurse at the bedside and they can make the decision whether alteplase should be given or not,” Dr. Markowski said. “It’s a quicker process and the sooner stroke patients receive alteplase the better their outcome, so that has been an excellent development in recent years. We use teleneurology 24-seven to improve patient evaluation and improve treatment time to starting tPA.”

Unfortunately, close to a quarter of stroke patients have what is called “wake-up strokes,” meaning they don’t notice the symptoms until first thing in the morning. That means there is no way to tell when the stroke occurred overnight. For this reason, along with many other strict criteria, both nationwide and on Cape Cod, only about 8 percent of patients receive tPA.

OTHER TREATMENTS
There is also a procedure called mechanical thrombectomy, or intra-arterial treatment, for acute ischemic stroke patients. It is similar to a cardiac catheterization in that blood clots can be accessed through the groin via a catheter to the brain to manually remove the blood clot. The procedure is done only at large university hospitals and it can only remove blood clots in the larger blood vessels on the outer surface of the brain, not the smaller blood vessels deep inside the brain.

The procedure improves the treatment window from three hours to six to 24 hours. The benefit is even greater than tPA alone and can be performed safely after tPA is given. Only one or two patients a month are transferred, usually to Brigham and Women’s Hospital in Boston, with whom Cape Cod Healthcare has a collaborative working relationship.

When a patient comes into the emergency department, the emergency room providers complete an emergent head CT to see if the stroke is a hemorrhagic stroke. This bleeding into the brain...
occurs in 15 percent of strokes. The other 85 percent of strokes are ischemic strokes that can be treated with tPA, mechanical thrombectomy or both.

“For years, all patients would complete an emergent head CT, as tPA was the only treatment for ischemic strokes,” Dr. Markowski said. “If they have bleeding in the brain, we would avoid clot-busting medications and treat them accordingly. Since some landmark studies in 2015, Cape Cod Hospital started routinely completing a CT angiogram also, which looks to see where the blockage of the blood vessel is (with an ischemic stroke). If the stroke is related to a blockage of a larger brain blood vessel, mechanical thrombectomy may be a treatment option.”

**TREATED HERE ON CAPE COD**

The vast majority of stroke patients on Cape Cod are treated right at Cape Cod or Falmouth Hospital, said Dr. Markowski.

“All stroke patients we care for have a very standard workup of brain MRI, which shows the area of stroke sooner than a CT scan would,” Dr. Markowski said. “They have vascular imaging to assess the blood flow to the brain, typically with a carotid ultrasound or the CT angiogram, or we can complete an MRI angiogram, which is an MRI of the blood vessels. As stroke
is a vascular disease, we focus on treating the underlying risk factors including hypertension, high cholesterol, diabetes mellitus and smoking.”

Stroke patients also complete an echocardiogram, an ultrasound of the heart, to look for any structural heart abnormalities that would predispose them to a stroke. In addition, they remain on a heart monitor to assess for atrial fibrillation or any other irregular heart rhythm that could cause a stroke.

When looking for the cause of a stroke, doctors are careful to detect whether the patient has a condition known as atrial fibrillation (AFib), he said. Atrial fibrillation is an irregular heart rhythm that is a significant risk factor for stroke and requires anticoagulation rather than medication like aspirin and Plavix. In AFib, small blood clots can form in the heart and travel to the brain, where they block an artery, resulting in a stroke.

When the cause of a stroke cannot be determined despite extensive inpatient workup, Dr. Markowski has many patients evaluated by a cardiologist for prolonged telemetry monitoring. In some patients, a small heart monitor can be implanted under the skin to detect AFib for up to three years.

Atrial fibrillation requires a different management technique, like blood thinners. Coumadin used to be the only available treatment, but in recent years there are newer and somewhat safer oral anticoagulant options, he said.

The vast majority of strokes will be discharged to a rehab facility, according to Dr. Markowski.

“Most of the recovery of neurological deficits from a stroke will occur over the first 90 days,” he said. “By six months, further recovery of stroke symptoms is much slower. There is a critical several-week window to get physical therapy, occupational therapy and speech therapy to get these patients better faster, and we have some wonderful rehabilitation services that we start in the hospital before they are transferred to an outpatient rehab facility.” | TJ
ADVOCATING FOR PATIENTS

Patient advocacy has been a passion of Dr. Michael Markowski’s for years. Because of that, he has been very active with the American Academy of Neurology for close to a decade. It’s the largest organization of neurologists throughout the world and he has held multiple elected positions, including chair of the general neurology section, which has offered him the opportunity to work with neurologists nationwide in a variety of practice settings.

“Patient advocacy is very important to me, and in this day of rapidly evolving healthcare, where new laws have had significant impact on patients and our ability to treat their diseases, I think it’s vital for physicians to advocate for our patients’ needs,” said Dr. Markowski, a neurologist with Neurologists of Cape Cod in Hyannis. “That is especially true for patients who have neurological diseases who are particularly vulnerable. There is just a handful of available treatments, and many of those medications are cost prohibitive.”

For the past several years, he has served as a member of the American Academy of Neurology’s Government Relations Committee. He travels to Washington, D.C., several times a year and has meetings with members of Congress and their healthcare aides, advocating for the needs of patients with neurological diseases.

“Last year, the efforts of our committee at the American Academy of Neurology led to passing of legislation of what was called the FAST bill (Furthering Access to Stroke Telemedicine),” he said. “That bill has increased access to stroke patients to teleneurology monitoring nationwide, regardless of whether they were in an urban or rural setting.”

He was scheduled to return to Washington in February to attend congressional meetings set up to discuss the exorbitant cost of prescription medicines, because he sees how those costs affect his patients.

“We need to start finding some simple solutions to reduce the cost of medications for our patients,” he said. “It is financially ruining many of them.

Medications that my patients take that used to be a $10 copay are now over $150 per month. It’s the same medication and there is no reason why it should have increased so much in price, not to mention that medications made here in the U.S. are significantly cheaper in other countries. Currently, drug companies can do whatever they want and there needs to be some reining in.”

He has also served on multiple task forces for the organization. He is co-authoring a neurology task force analysis that is reviewing the shortage of neurologists nationwide. The project’s goal is to try to predict the future needs in the field of neurology.

Dr. Markowski is also working on learning the future implications of Alzheimer’s disease and dementia on the medical field.

“Medicaid and Medicare spending on people with Alzheimer’s disease was $130 billion in 2011, and it’s been estimated that this will rise to be over $1 trillion by 2050,” he said. “So this single disease can bankrupt Medicare and cripple our healthcare system. For this, among other reasons, we need more money directed to Alzheimer’s disease research, which can lead to better treatments of this devastating illness.” | TJ
Ahmad Abokhamis, MD, neurologist, Cape Cod Healthcare
Any discussion about Parkinson’s disease should begin with the good news first. While there is no cure for the degenerative disease at the present time, the prognosis is not necessarily grim. Patients on Cape Cod can be assured they have access to the latest testing and treatment available, according to Hyannis neurologist Ahmad Abokhamis, MD.

“The progression varies widely among patients,” he said. “We still see bad cases, but on the other hand, we also see very slow cases. We can follow people even for a decade or longer and they still haven’t progressed badly and they are fully functional. So patients should not compare themselves to the worst cases that they see.”

This is especially true for people who are diagnosed in their 70s or 80s, said Dr. Abokhamis, who practices at Neurologists of Cape Cod on North Street in Hyannis, because it is not considered a terminal illness. Someone who is first diagnosed at an advanced age is much more likely to die of something other than Parkinson’s disease.

Parkinson’s disease typically starts with a tremor, according to Dr. Abokhamis. The tremor is most noticeable when the person is at rest, and it disappears when the patient tries to move or thinks of moving. For instance, if the tremor is in the right hand, it will go away when the patient is trying to do activities with that hand or even thinks of performing activities like writing.

“Patients literally tell me I feel like I can control the tremor,” he said.

The tremor is so subtle at first that the patient might not even notice it. Often it is family members or people around the patient who first notice something is going on.

While the diagnosis is mainly clinical, a nuclear brain imaging test, known as a DaTscan, is available at Cape Cod Hospital, Dr. Abokhamis said. The scan measures the presynaptic dopamine activity in the brain and has a high sensitivity and specificity in making the diagnosis earlier.

TREATMENTS AND PROGRESSION
The treatment for Parkinson’s disease is designed to address symptoms. Doctors use medications to cover up the symptoms to a certain degree, but the drugs do not slow the progression of the disease. The longer a person has Parkinson’s, the more medication they need.

“Parkinson’s disease is a progressive disease that results from the deterioration of the cells in the brain that produce a chemical called dopamine,” Dr. Abokhamis said. “The treatment is mainly medications that can enhance the dopamine activity or, in other words, replace the dopamine.”

Physical therapy also helps, as do activities like dancing and noncontact boxing with a punching bag.
Classic Parkinson’s disease tends to strike people when they are older, Dr. Abokhamis said. It has a much better prognosis, better response to medication and a slower progression than the less common Parkinsonian syndromes. People with the rarer forms often do not respond as well to treatment and progress more quickly. Eventually, all patients will worsen over time and need more medication for the same relief.

“The tremor, for the most part, is the presenting symptom, but it’s not the worst symptom,” Dr. Abokhamis said. “The worst symptom is basically stiffening and slower body control, so people tend to shuffle when walking.”

More concentration is needed to initiate the steps, they are slower to change direction and they tend to fall, he added. Classically, Parkinson’s patients have a stooped posture when they stand up and they have a shuffling gait. Their voice becomes hypophonic, or softer. In the advanced stages, people basically suffer from almost near complete body freezing as soon as the medication wears off, so they require the medication carbidopa/levodopa much more frequently, he said.

There is hope for the future. Recent studies on animals focused on injecting stem cells into the substantia nigra area of the brain with positive results. It’s too soon to know whether such therapies would translate to human trials, according to Dr. Abokhamis, but he and his colleagues at Neurologists of Cape Cod are monitoring it closely. | TJ
EMG TESTING: A USEFUL TOOL

Neurologists of Cape Cod offers testing known as electromyogram (EMG) at its office on North Street in Hyannis. This test is able to assess nerve and muscle function to assist in the diagnosis of various nerve and muscle disorders, according to neurologist Michael Markowski, DO, FAAN, who works at the practice and is also the stroke director at Cape Cod Hospital.

There are two parts to this test. The first is the nerve conduction study, where various nerves are stimulated and the resulting nerve function can be recorded. During the needle EMG analysis, the second part of this test, a very small needle is inserted into the muscle to record muscle electricity. This electrode detects electrical activity that is displayed on a monitor in the form of waves. Patients tolerate this test quite well and, while it can be mildly annoying, they understand this is the only way to diagnose many nerve and muscle disorders without performing a more invasive biopsy, he said.

“EMG testing is used to diagnose a variety of nerve and muscle conditions that range from a pinched nerve in the neck or back to peripheral neuropathy and a variety of muscle diseases,” Dr. Markowski said. “It’s a way to diagnose certain severe neuromuscular disorders, in particular ALS, or Lou Gehrig’s disease.”

EMG testing is commonly recommended by surgeons to localize the site of nerve damage and assess the severity, as these results can further guide treatment. EMG testing is the best way to localize damage to a particular nerve, for example a pinched median nerve at the wrist, which is commonly known as carpal tunnel syndrome, he said.

“It’s a very convenient test to be able to complete as a community neurologist because we can diagnose the problem and start them on any necessary treatment immediately afterward,” he added. “Of the six neurologists working in our office, four of us have completed neurophysiology fellowships where we became experts in this procedure. Between the four specially trained neurologists, we are able to perform this testing in our office five days a week.

“We are very excited to be able to provide this service for the community.” | TJ
There have been some dramatic improvements in recent years in the treatment of multiple sclerosis (MS), a previously intractable disease. Even though there is no cure for MS, the disease is more manageable today, thanks to better diagnostic tools and improved medications.

Multiple sclerosis is an autoimmune disease that causes the body’s own cells to attack the myelin sheath of the central nervous system, according to neurologist Mathew Pulicken, MD, MHS, of Neurologists of Cape Cod in Hyannis.

“The neurons have a myelin sheath, which helps with proper transmission of signals,” he said. “Think of it like an electrical wire with outer insulation, helping with the optimal spread of electrical signal between neurons. If the myelin sheath gets damaged (known as demyelination), the neurons will not be able to function at an optimal level, causing symptoms, depending on where the damage is happening.”

Newer MRIs are more precise and sensitive, picking up more subtle changes and often showing evidence of previous damage. Stronger magnets used for MRI, such as the 3T MRI at Cape Cod Healthcare’s Wilkens Outpatient Medical Complex in Hyannis, make the studies more sensitive in picking up abnormalities, he said.

The disease-modifying medications have made significant progress since the 1990s, with multiple drugs available to help prevent disease progression in MS. The goal is to reduce the attacks of demyelination, and thus prevent newer symptom and disease progression, especially in relapsing remittent multiple sclerosis, the most common subtype of MS.

“In the 1990s, the disease-modifying therapies used to be all injections, but starting in the early to mid 2000s, pills were approved for the same purpose,” Dr. Pulicken said. “You can take the pills orally on a daily basis compared to having injections daily or weekly. These developments have revolutionized MS care.”

Once the right medication is started, neurologists like Dr. Pulicken provide follow-up care that includes regular office visits, laboratory testing and MRI testing to assess the efficacy of the medication and monitor for side effects.

The goal with MS care is choosing the right medicine to avoid disease progression by preventing relapses, according to Dr. Pulicken.

“We also use medications to manage other symptoms that are common in MS patients, like fatigue, depression, bowel or bladder issues, and pain issues,” he said.

MORE AGGRESSIVE TREATMENTS
If the pills are not effective or if patients have more disease progression, there are more aggressive treatments that can be used, like intravenous infusions.

After his graduate training in Public Health, Dr. Pulicken spent three years as senior research coordinator overseeing the clinical trials/research studies and attending MS clinics at The Johns Hopkins...
Mathew Pulicken, MD, MHS, neurologist, Cape Cod Healthcare
Multiple Sclerosis Center. He moved to Cape Cod in 2015 and is dedicated to bringing the latest treatments to his patients.

He started offering monthly infusions of the drug TYSABRI® for MS patients at the Infusion Center at Cape Cod Hospital in 2015. And he began prescribing Ocrevus, which is administered once every six months, after it was approved by the FDA in 2018.

“We provide all the FDA-approved therapies on the Cape, be it in infusion or pills,” he said. “We did not want patients from the Cape having to travel all the way to Boston for treatments.”

Dr. Pulicken works closely with other MS groups in the Boston area and attends quarterly meetings with the other MS doctors in the state to keep up on the latest research and share ideas for the management of difficult-to-treat cases. The MS subspecialists in the state are members of a small group, and it’s helpful to have other doctors, both in his practice and statewide, who he can collaborate with for a second opinion, he said.

The field of treating MS has seen dramatic changes over the years. The good news is that more advancements are coming.

“With MS, we are still making bigger strides with the newer understanding about the mechanisms causing the disease and newer rationale for treatment options,” Dr. Pulicken said. “There are plenty of drugs in the pipeline for multiple sclerosis. We are looking at at least one to two that may get approved in the next year, and others that are in the clinical trial phase.” | TJ
Ed and Penny Emma of Sandwich are grateful they no longer have to worry when or if their son, Alex, 28, is going to have a seizure. The episodes that plagued Alex, who has Down syndrome, over the past couple of years are behind him since his diagnosis of epilepsy and the start of medication to control his seizures.

Epilepsy is a chronic disease characterized by surges in electrical activity caused by chemical changes in the brain that can produce seizures, according to the Epilepsy Foundation.

Alex's diagnosis, which marked the end of the family's search for answers, came about with the help of a new, comprehensive diagnostic tool, ambulatory EEG (electroencephalography) with video, which Cape Cod Hospital neurologist Mathew Pulicken, MD, MHS, began using last year.

"Ambulatory EEG with video is more specialized than a routine EEG in that we get a significant amount of brainwave data, which can be missed during routine EEG testing, and it captures brain wave activity during sleep," he said.

Ambulatory EEG with video is a monitor worn by patients for 48 to 72 hours. It records internal brain wave activity, as well as external activity during a seizure, with the aid of a video camera.

“The electrodes are placed on the patient’s scalp and covered with a cap,” said Dr. Pulicken. “The patient is given a video camera that they can set up to record when they are home and during sleep to capture episodes of seizure activity.”

**STARTS IN BOSTON**

Alex had his first seizure in a hotel room in 2015 when he and his parents made a trip from Wisconsin, where they lived at the time, to Boston for a visit with his sister.

“We didn’t know that when someone is having a seizure, they hold their breath,” said Penny. “I thought we had lost him.”

Alex was checked at a Boston hospital and, after that episode, was seizure-free for a couple of years.

Then he had some episodes at work.

“They mimicked a seizure, but when we brought him to the hospital to be evaluated and had an EEG, the doctors told us the episodes were psychogenic in nature (having a psychological rather than a physical basis) and didn’t warrant medication,” said Penny.

“Psychogenic seizures are non-epileptic and often considered a behavioral issue,” said Dr. Pulicken. “They are not associated with any abnormalities in brain wave testing.”

About six months before the family moved to Sandwich in March 2018, the seizures started occurring at night and more frequently. Over a period of four to five months, Alex’s parents called EMS three times.

“It was a very difficult time for us, in addition to the move,” said Penny. “We would be sound asleep at night and we would hear a piercing cry. We would run into his room and wait the seizure out with him.”

As for Alex, “I felt very tired, I felt like something was wrong in my head, it hurt and I was dizzy,” he said.

**DR. PULICKEN STEPS IN**

As the family connected with Cape Cod Healthcare providers, Alex began seeing Munir Ahmed, MD, FACP, an Emerald Physicians medical internist who then referred him to Dr. Pulicken.

continued on page 52
According to the Epilepsy Foundation, about one in 26 people will develop epilepsy in his or her lifetime. It is the fourth most common neurological disorder and affects 65 million people worldwide. Finding the right treatment can be life-changing for patients and their families.

“There are differences between a seizure and epilepsy,” said neurologist Mathew Pulicken, MD, MHS, of Neurologists of Cape Cod in Hyannis. “Epilepsy is diagnosed when patients have recurrent seizures, without provoking factors. Everyone has a chance for having seizures, depending on the individual’s seizure threshold. When you have repeated seizures, it means that something is wrong with the electrical activity in your brain.”

Seizures are caused by abnormal electrical discharges from the brain that spread and become out of control. It can lead to whole body convulsions or loss of consciousness or awareness. If the discharges do not spread to involve the whole brain, it can result in smaller episodes with changes in awareness or shaking/twitching affecting one side of the body. Sometimes, even episodes of prolonged staring can be a sign of seizure, he said.

Every person has a different seizure threshold, Dr. Pulicken explained, and a seizure can be triggered by many things, including changes in electrolytes, use of stimulant drugs, certain medications and excessive alcohol use.

When a patient who has experienced seizures comes to see Dr. Pulicken, he spends about an hour examining them and taking a detailed medical history, including:

- Any complications that may have occurred during their birth and childhood.
- History of childhood infections or meningitis.
- Head trauma or febrile seizures, or other unexplained episodes of loss of consciousness throughout their life.

“We need to figure out if the seizure was a one-time occurrence or if there is possibility of it happening again, and what tests to order and whether medications should be considered,” he said.

**DETAILED TESTING IS AVAILABLE**

If someone comes in after having a seizure, a 25-minute brain wave test, known as an electroencephalogram, or EEG, is ordered. If someone has a seizure during the test, or shows evidence of irritability in the regions of the brain, that puts the patient at higher risk for future seizures. This would indicate epilepsy and a diagnosis can be made based on the EEG results.

Sometimes, the short duration of the brain wave monitoring study has its limitations, because a person could be having multiple seizures a day and may still have a normal EEG during the time the study is recording the live brain wave activity. A repeat study or longer EEG study can inform the doctor whether there are epileptiform abnormalities, Dr. Pulicken said.

Dr. Pulicken completed his four-year neurology residency at Tufts University in Boston, followed by a fellowship in epilepsy and EEG at Massachusetts General Hospital, and he has been a member of
Seizures are caused by abnormal electrical discharges from the brain that spread and become out of control.
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HEALTHCARE IN THE FIRST PERSON continued from intro page

Practicing in North Falmouth is Dr. Michael Leahy, and in Hyannis is Dr. John Hamjian. They are surrounded by talented clinical teams. Their incredible skills and experience provide our community with top-notch neurological care.

Our community is particularly vulnerable to diseases and disorders of aging, such as stroke, movement disorders and dementia, because we have the highest population in the state of people who are over 65. I cannot stress enough how fortunate we are to have the neurological experts who have chosen to practice here and who are passionate about saving and improving the lives of patients who suffer from these conditions.

With Alzheimer’s disease being called an epidemic, we are facing a crisis in care for not only those who suffer from it, but those who care for them. To make sure we are ahead of this epidemic and that our community is offered the newest, most effective care, you will read about how our clinical team at Neurologists of Cape Cod in Hyannis has established itself as the Memory Care Center of Cape Cod.

Our neurologists have also joined forces with Dr. Kumara Sidhartha, medical director of the Cape Cod Healthcare Physician Hospital Organization and the Cape Cod Healthcare Accountable Care Organization, to develop Alzheimer’s disease and dementia guidelines for primary care providers on Cape Cod. This screening tool helps providers identify signs of dementia in their patients at an earlier, often more treatable stage.

You will also read in this issue about the latest care available for migraine sufferers, MS patients and those struggling with movement disorders like Parkinson’s disease and seizure conditions like epilepsy.

I hope you will enjoy learning about our neurosciences program at Cape Cod Healthcare and, after you have finished reading this 2019 issue of The Journal, you will feel as confident as I am that we have the best care available right here on Cape Cod.

‘I THOUGHT WE HAD LOST HIM’ continued from page 49

Testing began with a routine EEG that takes about 20 minutes. It did not show any abnormalities, so Dr. Pulicken decided a 72-hour ambulatory EEG with video was the next step.

Alex was diagnosed based on the one episode captured by the monitoring system, explained Dr. Pulicken.

“I saw one typical episode with corresponding changes on EEG, suggestive of clinical seizure. I started him on anti-epilepsy medication and he isn’t having any more episodes.”

Alex and his parents are now free from worrying about the next episode. They are thankful to Dr. Ahmed, Dr. Pulicken and his medical assistant, Gordana Lambert, CMA, for getting them through the diagnosis and treatment.

“They always got back to me when I called, especially Gordana,” said Penny. “If I didn’t have that, it would have been even more difficult. I am very grateful.”

“It’s a new lease on life,” added her husband, Ed.

Alex is back to feeling well and he can be found working as a greeter at Café Chew in Sandwich.
Wide-ranging experience and extraordinary skill give our team of neurosurgeons the edge in producing successful outcomes. At Cape Cod Healthcare, we’re not just treating our patients, we’re treating our neighbors.

Advanced neurosurgery, here at Cape Cod Healthcare.

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