UVM clinician and researcher Magdalena Naylor, M.D., Ph.D., explores the central nervous system to help patients with chronic pain. Her work has shed new light on how the brain deals with pain, and points to ways to use the mind to treat the body.

When Jeff Toon met Magdalena Naylor, M.D., Ph.D., he was using a wheelchair and suffering from so much chronic pain he couldn’t turn the pages in a book. Today, he is able to bike, sail, swim, and pursue a second undergraduate degree in engineering. Lee Rosenberg, a former nurse, now very rarely takes medication for a chronic pain condition.

“When I think of these people,” says Naylor, a professor of psychiatry, “I get goose bumps.” For 13 years, Naylor has been using cognitive behavior therapy (CBT) to help patients manage — and reduce — chronic sensory and emotional pain that stems from sources including back problems, arthritis, migraine headaches, chronic fatigue, and fibromyalgia. Her groundbreaking work on the use of CBT in pain management was published in the journal Pain in 2008.

Naylor’s approach begins with a two-hour evaluation of each new patient, followed by 11 weeks of cognitive behavioral group therapy focusing on techniques in meditation, mindfulness, coping skills, self care, exercise, and how to recognize stress factors, which can range from forgetfulness and teeth grinding to “catastrophizing,” or imagining worst case scenarios. Groups comprise seven to ten people — one group is made up of patients solely suffering from back pain — and participants, on average, have experienced chronic pain for about 11 years. “We treat the whole person,” says Naylor of the activities at her UVM/Fletcher Allen MindBody Medicine Research Clinic. That entails a complex approach to
internal and external stressors that includes letting go of anger about having pain. “Our patients have both sensory and emotional aspects to their pain, and they may also have high stress levels, depression, obesity and insomnia. Our focus is on health — not just physical pain. It’s about making lifestyle changes, and teaching strategies to support and maintain change. I’ve seen many patients decrease and control pain while regaining confidence, motivation, and hope.”

A typical group session emphasizes an overview of a particular coping skill and classroom exercises to demonstrate and practice that skill. “We have a ninety-one year old patient who sometimes leads us in yoga exercises,” Naylor attests. One result of the group therapy sessions is that patients’ medications may be adjusted — not only those for pain, but for a host of other ailments. Another is their ability to live fuller, more physically active lives. “The sessions are not about people talking about their pain — they are instruction-based,” says Naylor’s assistant Michael Krauthamer. The sessions are designed to help patients learn new coping strategies and to apply them in their daily lives. Patients are encouraged to practice these strategies in their daily lives and to report their progress at the next session.

“We’re not only changing behavior,” Naylor says, “we’re also changing the function of the brain.” Her research using magnetic resonance imaging (MRI) shows that exaggerated responses in the amygdala to pain and provocative emotional stimuli normalized after 11 weeks of cognitive behavior therapy. (The amygdala plays an important role in motivation and emotional behavior.) In addition, she demonstrated decreased activation in the primary somatosensory cortex, and increased activation in the prefrontal cortex. CBT may increase cortical suppression of amygdala and/or somatosensory cortex activity and this may be related to the reduction and experience of pain.

But how to sustain these changes over time? The answer was TIVR, or the Therapeutic Interactive Voice Response relapse prevention program. It works like this: for four months after cognitive behavior therapy ends, patients call in daily and hear a pre-recorded message that asks them 21 questions about how they are feeling and which coping mechanisms they are using. If prompted, the system will give a review of a particular coping skill for the patient to follow. Every month, each patient receives a recorded, personalized message from Naylor. After four months of TIVR, patients showed improved results, while pain worsened in the control group that had received only cognitive behavior therapy. Patients are free to continue using TIVR after the study period ends, but they no longer receive the personalized monthly response from Naylor.

Donna Bruno of Charlotte, Vt., was in Naylor’s therapy group followed by TIVR and three years later continues using the relapse prevention program daily. “It’s a good reminder about how I’m coping with what’s going on with new things in my life,” she says. “It prompts me to ask where my behavior is at.” Bruno was originally diagnosed with a hand injury in 1996 and had hand surgery but “wasn’t healing appropriately.” She broke the other hand, “and things kept snowballing,” she recalls. She subsequently developed Complex Regional Pain Syndromes, also known as CRPS, in all four limbs. CRPS is a condition that occurs when there is prolonged pain, usually in the area of a previously injured arm or leg.

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but it can develop anywhere in the body. It is associated with tissue swelling and an increased sensitivity to touch. Naylor’s program, says Bruno, “taught me different coping mechanisms and gave me different ways to look at the pain. It’s not a quick fix, but over time it taught me how to change the way my brain thinks about things.”

After her group therapy ended, Rosenberg called TIVR daily for six months, until she felt she had mastered the techniques, but continued to call occasionally to refresh her memory: “I liked having the availability of a therapist at the drop of a hat,” she says, noting that “I didn’t realize the state of tension I was in all day long.” She especially likes using Naylor’s visualization exercises (“It sounds hokey but it works,” she notes) and mini-relaxation techniques — exercises that can be accomplished in less than five minutes. Through group therapy and TIVR, she has been able to reduce what was about five hours a day of chronic pain to almost nothing, and learned to avoid negative self-talk.

“She puts the science together with cognitive techniques and really gets results,” says Rosenberg of Naylor’s approach. “It’s always easier to pop a pill, and you may have no pain but become addicted and sleep all day. I could really see people changing in group therapy, and not just their pain.” For many, the camaraderie in the group sessions and being with others who share their problems is another component to getting well. “You also learn that it’s not such a big deal to take a little bit of time for yourself,” says Rosenberg, whose son matriculated to the College of Medicine in August.

If there are skeptics to this mind-body approach to managing chronic pain, their numbers are dwindling. The National Institutes of Health (NIH) have funded Naylor’s neuroimaging research into the human brain’s response to chronic pain. Naylor is awaiting an NIH funding decision on her proposal for a study of MRI and treatment response in chronic pain. Naylor is also receiving more referrals from physicians, not only in primary care but also specialists in orthopedics, hepatology and obstetrics and gynecology.

“Dr. Magdalena Naylor is using both functional MR (fMRI) and diffusion tensor MR imaging (MRDTI) to elucidate the neural pathways of pain. Functional MR looks at cortical response while MRDTI looks at the white matter fiber tracts, which are the connections between cortical areas of the brain. Fletcher Allen Health Care has a team of neuroradiologists who are experts in this technology,” says Fletcher Allen radiologist and Associate Professor of Radiology and MRI Director Christopher G. Filippi, M.D. “Using fMRI and MRDTI will enable Dr. Naylor to better understand the brain’s response to chronic pain and how it affects the limbic system and amygdala as well as the white matter fiber tracts that transmit this information to different areas of the brain. Her research is groundbreaking.”

“Physicians like to see somatic images, and this is hard science,” Naylor explains.

Some patients initially question whether the mind-body approach to pain management will help them. “They know their pain is physical, so they may ask, ‘What am I doing talking to a psychiatrist?’” Naylor says. “They wonder, ‘Is the pain all in my head?’” The answer is yes and no. “It’s all in the central nervous system,” Naylor explains.

Jeff Toon’s problems started with a knee injury and spiraled into a psychological problem caused conversion disorder, which can both manifest as pain and amplify existing pain. After being bedridden for more than a year, his life is “more normal than I ever thought it would be,” he says. The meditation tools he acquired during group therapy “were a wonderful escape from the harsh realities of my situation and provided me with my most peaceful, restful moments,” he recalls. Further, Naylor’s coping techniques helped him “get to the crux of the problem,” he says, though he still works with a private psychologist to maintain his current active lifestyle.

Naylor, who in addition to her M.D. degree holds a doctorate in cardiovascular physiology from Warsaw Medical Academy and specialty in psychiatry from Duke University, can understand pain from both sides — she suffers from chronic lower back pain as the result of a car accident six years ago, which she modifies with her own pain relief techniques. She credits a New York Times article she read about 13 years ago with sparking her interest in mind-body science. The article concerned research suggesting that depressed patients were more likely to develop cardiovascular disease. From there was born her idea that “we can use the mind to treat the body.”

The program taught me how to change the way my brain thinks about things.

— patient Donna Bruno
What’s next for Naylor? “My main objective is to find a test to use as a biomarker to individualize treatment for different types of chronic pain,” Naylor says with conviction. In a sort of “one stop shopping” for pain relief, she hopes to be able to determine which patients will do best with specific types of therapy.

Her current projects include a pilot program that uses music instead of group therapy to manage chronic pain. Healthy patients (UVM students serve as the volunteers) enter an MRI facility and listen to “chill-inducing” music — be it Bach or the Black Eyed Peas — of their own choosing, while mildly painful stimuli, in the form of thermal heat, are applied. Naylor hypothesizes that the music may activate the reward centers in the brain and reduce the perception of pain. The program was developed through the Honors College thesis of UVM student Hayley Perelman and a collaboration with John Mantegna, a UVM music department faculty member.

Another project is a budding collaboration between Naylor and a Buddhist monk for mindfulness based treatment of pain. The monk is currently teaching mindfulness to adolescents, which seems to be helping them to improve their performance in school.

“Dr. Naylor has managed to do two very important things at once,” says Robert Pierattini, M.D., professor and chair of psychiatry at the College of Medicine and psychiatry physician leader at Fletcher Allen. “She helps patients to develop personal skills and strengths to manage their own symptoms. In addition, through rigorous research, she has demonstrated that her psychotherapeutic interventions are effective. Using functional neuroimaging, she has begun to investigate the impact of coping skills training on the neurobiology of chronic pain. Research of this kind is critical and will help patients and clinicians choose the best treatments for pain.”

“What we’re doing isn’t just research, it’s a community service,” Naylor says. Perhaps it’s that humanitarian approach to science that has helped to land her on the list of America’s Top Psychiatrists since 2004 and the Best Doctors in America since 2001. “We underestimate the number of people in chronic pain,” Naylor sums up, “but they don’t need to suffer.”

Just Relax...

Magdalena Naylor’s relaxation exercises — part of her cognitive behavior therapy program — don’t only benefit people with chronic pain. Professional athletes and actors use them to reduce performance anxiety, and anyone experiencing tension and who has five minutes to spare can do a mini-relaxation exercise. Here’s how:

1. Take a deep breath; as you breathe out, imagine all the tension in your body and mind leaving through this breath.
2. Take a moment to tense all the muscles you can at once. Then take a deep breath and slowly breathe out, letting all the tension go. Repeat this mini-relaxation until you have reduced the tension.
3. Take an inventory of body tension in your familiar stress points. For example, is there stress in your neck or upper back? If you find there is, pretend you can direct the breath into that area of tension. As you breathe out, feel the tension release.
4. Count to 10 taking a slow, deep breath. Hold the breath for one count. Then breathe out slowly, again as you count to 10.

The positive experiences of group therapy (a session of which Dr. Naylor prepares to lead at left) are later sustained using an innovative daily telephone session with a voice response system.