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## New Therapies Fight Phantom Noises of Tinnitus

By KATE MURPHY

Modern life is loud. The jolting buzz of an alarm clock awakens the ears to a daily din of trucks idling, sirens blaring, televisions droning, computers pinging and phones ringing — not to mention refrigerators humming and air-conditioners thrumming. But for the 12 million Americans who suffer from severe tinnitus, the phantom tones inside their head are louder than anything else.

Often caused by prolonged or sudden exposure to loud noises, tinnitus (pronounced tin-NIGHT-us or TIN-nit-us) is becoming an increasingly common complaint, particularly among soldiers returning from combat, users of portable music players, and aging baby boomers reared on rock 'n' roll. (Other causes include stress, some kinds of chemotherapy, head and neck trauma, sinus infections, and multiple sclerosis.)

Although there is no cure, researchers say they have never had a better understanding of the cascade of physiological and psychological mechanisms responsible for tinnitus. As a result, new treatments under investigation — some of them already on the market — show promise in helping patients manage the ringing, pinging and hissing that otherwise drives them to distraction.

The most promising therapies, experts say, are based on discoveries made in the last five years about the brain activity of people with tinnitus. With brain-scanning equipment like functional magnetic resonance imaging, researchers in the United States and Europe have independently discovered that the brain areas responsible for interpreting sound and producing fearful emotions are exceptionally active in people who complain of tinnitus.

“We’ve discovered that tinnitus is not so much ringing in the ears as ringing in the brain,” said Thomas J. Brozoski, a tinnitus researcher at Southern Illinois University School of Medicine in Springfield.

Indeed, tinnitus can be intense in people with hearing loss and even those whose auditory nerves have been completely severed. In the absence of normal auditory stimulation, the brain is like a driver trying to tune in to a radio station that is out of range. It turns up the volume trying but gets only annoying static. Richard Salvi, director of the Center for Hearing and Deafness at the State University of New York at Buffalo, said the static could be “neural noise” — the sound of nerves firing. Or, he said, it could be a leftover sound memory.

Adam Edwards, a 34-year-old co-owner of a wheel repair shop in Dallas, said he developed tinnitus four years ago after target shooting with a pistol. “I had all the risk factors,” he said. “I grew up hunting, I played drums in a band, I went to loud concerts, I have a loud work environment — everything but living next to a missile launch site.” His tinnitus, which he described as a “computer beeping” sound, was so intense and persistent that he needed sedatives to sleep at night.

Mr. Edwards says he has gotten relief from a device developed by an Australian audiologist, which became widely available in the United States last year. Manufactured by Neuromonics Inc. of Bethlehem, Pa., it looks like an MP3 player and delivers sound spanning the full auditory spectrum, digitally embedded in soothing

music.

Similar to white noise, the broadband sound, tailored to each patient's hearing ability, masks the tinnitus. (The music is intended to ease the anxiety that often accompanies the disorder.) Patients wear the \$5,000 device, which is usually not covered by [health insurance](#), for a minimum of two hours a day for six months. Since completing the treatment regimen last year, Mr. Edwards said his tinnitus had "become sort of like Muzak at a department store — you hear it if you think about it, but otherwise you don't really notice."

A small, company-financed study in the journal *Ear & Hearing* in April 2007 indicated that the Neuromonics method was 90 percent successful at reducing tinnitus. A larger study is under way to determine its long-term effectiveness.

Anne Howell, an audiologist at the Callier Center for Communication Disorders at the University of Texas at Dallas, said the Neuromonics device was a big improvement over older sound therapies that required wearing something that looked like a [hearing aid](#) all the time and took 18 to 24 months.

"The length of time was discouraging for many patients," she said. "And a lot of them told me that wearing something that looks like a hearing aid would cause a problem in their professional life."

Other treatments showing promise include surgically implanted electrodes and noninvasive magnetic stimulation, both intended to disrupt and possibly reset the faulty brain signals responsible for tinnitus. Using functional M.R.I. to guide them, neurosurgeons in Belgium have performed the implant procedure on several patients in the last year and say it has suppressed tinnitus entirely.

But the treatment is controversial. "It's a radical option and not proven yet," said Jennifer R. Melcher, an assistant professor of otology and laryngology at Harvard Medical School.

The magnetic therapy, similar to treatments used for [depression](#) and chronic pain, involves holding a magnet in the shape of a figure eight over the skull. Clinicians use functional M.R.I. to aim the magnetic pulses so they reach regions of the brain responsible for interpreting sound. Patients receive a pulse every second for about 20 minutes. "It works for some people but not for others," said Anthony Cacace, professor of communication science and nerve disorders at Wayne State University in Detroit. Since tinnitus has so many causes, Dr. Cacace said, the challenge now is to find out which "subsets of patients benefit from this treatment."

Researchers in Brazil have published a study indicating that a treatment called cranial-sacral trigger point therapy can relieve tinnitus in some head and neck trauma cases by releasing muscles that constrict hearing and neural pathways.

And drugs intended to treat [alcoholism](#), [epilepsy](#), [Alzheimer's](#) and depression that alter levels of various neurotransmitters in the brain like serotonin, [dopamine](#) and gamma-aminobutyric acid have quieted tinnitus in some published animal and human studies.

"We've never been so hopeful," said Dr. Salvi, of SUNY Buffalo, "of finding treatments for a disorder that haunts people and follows them everywhere they go."