
Treating Depression without Medication: An Israeli Development

Depression is one of the most common mental disorders in today's world. In Western countries, 20 to 30 percent of the population suffer from symptoms of depression. While many researchers are racing to develop the ultimate antidepressant medication, others are examining innovative, alternative treatments. One possible breakthrough is a device, developed in Israel, that uses magnetic currents to stimulate deep brain tissue. During clinical trials of this method at Shalvata Mental Health Center, patients have reported significant improvement in their depressive symptoms. The method may also prove to have still greater benefits in the future, curing or alleviating neurological disorders such as strokes, Alzheimer's disease, Parkinson's disease, and autism.

Adapted from articles by Ariella Ayalon and Dr. Itai Gal, and Reuters published by Ynet, 2006-2007.

Ever since he was a teenager, Yitzhak (now 52) has suffered from depression. The variety of drugs he received over the years had no apparent effect. “There was no new- or old-generation antidepressant that I hadn't taken,” he says. Psychotherapy was another option he tried, but it, too, failed to improve his condition. “Nothing in the world interested, excited, or pleased me. My life seemed meaningless and dismal, as if I were just going through the motions,” he says. Recently, however, after receiving experimental treatment that stimulated his brain using magnetic currents, he experienced the first significant improvement in his symptoms. “By the fifth session, I was able to concentrate and focus again,” he reports. “And the hostility that is part of my depression disappeared. Suddenly, I felt a kind of cheerfulness that I'd forgotten was possible.” Yitzhak's newfound contentment lasted three weeks. “Then,” he says, “the depression returned, but in a much lighter, gentler form. This time, I didn't fall into an abyss of dark despair, didn't feel my life was worthless. Basically, I just felt kind of down-hearted.”

A Non-invasive Alternative

The treatment Yitzhak received was part of ground-breaking research on the treatment of depression now being conducted by the Emotion-Cognition Research Center of the Shalvata Mental Health Center in Hod Hasharon. Researchers there are experimenting with a non-invasive procedure—transcranial magnetic stimulation (TMS)—that stimulates or “excites” areas deep within the brain by transmitting magnetic fields to those locations. The magnetic fields produce electrical currents in areas of the brain that have been unreachable until now using this method. The researchers, who completed their experimental trials in June 2007, hope that their findings will convince the U.S. Food and Drug Administration (FDA) to approve the use of TMS for treatment of depression. Our interim findings have been very promising so far,” says Dr. Abraham Zangen, who heads the laboratory in Weizmann Institute's Department of Neurobiology and designed the experiments along with his colleagues, Dr. Eran Vadim Harel, a psychiatrist at Shalvata, and Dr. Hilik Levkovitz, director of the center's day care unit.

Treating depression has been an insurmountable challenge for psychiatrists and brain researchers the world over. An estimated 20 to 30 percent of the population of Western countries suffer from depression. For about a third of these

people, currently marketed medication has no effect. By the year 2020, experts believe that depression will be the leading illness that causes employees to miss work, and 15 percent of sufferers will attempt to commit suicide. Prominent pharmaceutical companies are vying to create the world's first, surefire antidepressant medication, and, at the same time, researchers have been exploring alternative forms of treatment for the condition. One of the most familiar non-drug options, electroconvulsive therapy (ECT, popularly known as electroshock therapy), led to the idea of combating depression by stimulating the brain.

“Until now, ECT has been the only viable alternative for the 30 percent of depression sufferers who do not respond to medication,” explains Prof. Leon Greenhouse, Director of the Jerusalem Mental Health Center, Eitanim-Kfar Shaul Hospitals. The side effects of this therapy, which include headaches and short-term memory loss, are less intense today, says Prof. Greenhouse, since it is being administered at a weaker level. The demonic image that ECT treatments once conjured up has given way to greater acceptance. Nevertheless, experts are still searching for ways to produce the same effect without the use of electricity.

The standard type of TMS technology, which has existed for the past 20 years, uses a coil that is capable of stimulating the brain up to a depth 1.5 cm. “In the field of neurological medicine, TMS has developed over the past decade primarily as a form of treatment for Parkinson's patients,” according to Dr. Harel. “Some of these patients also suffer from depression, and it turned out that the magnetic stimulation helped relieve some symptoms of that condition as well. The problem with the existing equipment was that it could not stimulate areas of the brain located deeper than 1.5 cm from the surface, and its effects were limited to the brain cortex only. The source of neurological and psychiatric disorders, however, lies deeper within the brain.” In 2002 and 2003, Prof. Greenhouse conducted comparative studies of depression patients who were resistant to antidepressant medication. Half were treated by ECT and half by magnetic stimulation (TMS). “The results showed that the magnetic stimulation, though reaching a depth of only 1.5 cm, was as effective as the electrical stimulation,” reports Prof. Greenhouse.

“Stimulating” the Brain

Until recent years, researchers assumed that there was no means of stimulating areas deep within the brain. In



2000, while based at the National Institutes of Health in the U.S., Dr. Zangen devoted his efforts to upgrading magnetic technology to enable it to penetrate more deeply into the brain. In collaboration with Dr. Yiftach Roth, a physicist at the Sheba Medical Center, he developed a device capable of stimulating the brain to a depth of 5.5 cm. The new product is manufactured by an Israeli firm called Brainsway.

“In 2003, with the approval of the FDA, we conducted the first experiments on human beings, and the results were very encouraging,” says Dr. Zangen. “In the course of our research, we saw that we were able to stimulate deep-seated brain structures that are involved in certain neurological disorders.”

How does the technique actually work? Dr. Harel explains: “The patient sits in a chair for 15 minutes wearing a sort of helmet with a coil inside it, through which flows a current measuring thousands of amperes. The current induces a pulsing magnetic field that “penetrates” the brain cortex to deeper regions and stimulates or “excites” pinpointed brain tissue. The treatment is administered daily over the course of five weeks. During the procedure, the patient senses a weak tickle over the scalp, the kind you feel when you blow dry your hair .”

Experimentation with the upgraded device is intended for people who suffer from treatment-resistant depression or respond only partially to medication, people who do not respond at all to medication, or people who experience severe side effects as a result of treatment. Dr. Harel reports that “fifteen patients have completed the round of treatment for depression so far, and a high percentage of them have shown significant improvement for dimensions such as mood, sleeping habits, appetite, individual and social functioning, problem-solving ability, cognitive evaluation, and memory.”

Dr. Shmuel Kron, Director of the Shalvata Mental Health Center, adds a few words of caution: “We’re still talking about an experiment. As treatment, we aren’t yet certain about its duration, that is, how many sessions will be required for patients to feel significant improvement.”

What exactly, is the effect of the magnetic fields on the brain? We’re still not sure. Neither do we know the long-term effect of the first TMS method, developed in 1985 and tested by scientists throughout the world.

Richard Hopkins, a 35-year-old British resident who participated in a clinical trial after learning about TMS on the Internet, testifies to the success of the treatments in alleviating his state of depression: “For 10 years my illness has ranged from bad to worse. I saw the leading psychiatrists in England, and I tried many drug treatments, but nothing was very successful. This new treatment works quite well, and I feel a lot better than I’ve felt in years.”

“I’m amazed to see how satisfied patients are,” comments Dr. Harel. “The treatment is not painful. It feels a bit strange at first, but you get used to it quickly. The results so far are promising, and people report that they sleep sounder, have a better appetite, and suffer less from emotional pain. They feel real relief.”

The developers of the device believe that magnetic treatment can also help stroke victims, drug addicts undergoing rehabilitation, and people afflicted with Parkinson’s disease, Alzheimer’s disease, hyperactivity, and even autism.

