

RF Treatment Offers Hope for Alzheimer's Patients

Rick Lindquist, WW1ME

Inveterate inventor and ARRL member Eric Knight, KB1EHE, hopes that a device that he has developed with Alzheimer's disease researcher Dr. Gary Arendash, which saturates brain cells with low levels of RF, may prove a viable treatment for the dreaded disease affecting millions.

"Sometimes breakthroughs happen in ways that are unexpected," said Knight, who describes himself as "an enthusiastic radio amateur" whose passion has not waned. Several years ago, he learned of experiments Arendash carried out on mice specially bred to have the disease, in which the mice were exposed to low levels of RF for therapeutic purposes. The effects were dramatic, sometimes even reversing the disease's effects.

Borrowing some concepts from earlier experiments with small rockets and avionics, Knight set about developing, and later patenting, a wearable device that could deliver the requisite RF to a human head.

"In the early 2000s, we were trying to figure out then how to make antennas that would wrap around the airframes of the rockets we were designing," he recounted, noting that the diameter of his group's space vehicle was about the same as that of the human head.

At about the same time, Arendash was developing a "first-generation" wearable — a fabric cap resembling old-time aviators' headgear, which is the form factor being used in the clinical trials. Eventually, Knight and Arendash collaborated.

"He came at it from mice and science, I came at it from an aerospace and hobby perspective," said Knight.

UHF Therapy

The current effort has been dubbed the MemorEM 1000. The headgear actually consists of two electroencephalograph (EEG) caps with the antennas sandwiched between them and a cord to the electronics. The device delivers what NeuroEM Therapeutics, Inc. (www.neuroem.com) — the company set up to develop the technology — is calling "transcranial electromagnetic treatment" (TEMT). The therapy bathes the entire brain with RF in UHF spectrum set aside for industrial, scientific, and medical (ISM) applications — some 100 MHz higher than a cell phone's frequency. Trial participants get twice-daily doses.

Eric Knight, KB1EHE, may be on the cusp of medical history as technology that he and prominent Alzheimer's disease researcher Dr. Gary Arendash developed has entered FDA clinical trials.



Eric Knight, KB1EHE.



The MemorEM 1000 device is now undergoing Food and Drug Administration (FDA) clinical trials. [Photo courtesy of WNPR/Harriet Jones, Photographer]

What is Alzheimer's Disease?

According to the Mayo Clinic, Alzheimer's is a progressive disease that eventually leads to the loss of memory and other important mental functions and dramatic personality changes, and, ultimately, death.

While someone with Alzheimer's disease at first may only notice mild confusion and difficulty remembering, symptoms progress to the point where sufferers forget important people and events in their lives, as brain cells degenerate and die.

It's possible to manage Alzheimer's disease with medications and other strategies, to stave off dementia for a while, but there is, as yet, no cure. The rate at which symptoms worsen varies from person to person.



Dr. Gary Arendash adjusts the MemorEM 1000 on a volunteer during a demonstration. [Photo courtesy of WNPR/Harriet Jones, Photographer]

"Ironic for sure," Knight said, referring to studies that say cell phone radiation may be harmful to humans. "Who would imagine that cell phone radio waves could be a potential treatment for Alzheimer's disease?" Knight allowed, however, that for some outside observers, the concept may not pass the "tinfoil beanie" test.

Having no medical background, Knight is quick to defer to Arendash's expertise. "The genius here is really Dr. Gary Arendash," Knight said, calling him "a brilliant neuroscientist."

From the Food and Drug Administration's (FDA) standpoint, the clinical trials aim primarily to show that the technology is safe and has no negative side effects, but Knight and Arendash are also looking — hoping — for data that might demonstrate efficacy in treating Alzheimer's. The protocol they've developed goes further than what the FDA requires and attempts to identify Alzheimer's markers. It includes before-and-after baseline data, with cognitive testing, assays of spinal fluid and blood, and PET scans.

Theory of Underlying Physiology

A lot of the information about Alzheimer's talks about abnormal protein structures called "plaques" and "tangles" on the brains of sufferers. In the TEMT approach, Arendash told ARRL, three mechanisms are in play that reach inside brain cells — something drug therapies cannot do. TEMT in the 900 MHz range breaks down the small protein aggregates (amyloid oligomers) in brain cells that are now thought to initiate Alzheimer's development, he explained.

TEMT also dramatically increases the very low energy production of Alzheimer's-diseased brain cells by enhancing their mitochondrial function. Arendash said mitochondrial dysfunction is an early and critical event in the development of Alzheimer's. This further leads to a general increase in brain activity. Going too high in frequency won't penetrate the brain; go too low and the RF passes right through, Arendash said.

"The combination of all three — a 'cocktail,' if you will — we believe stands a very good chance of working," Arendash told ARRL.

Results from the fully independent staggered clinical trials, taking place at the Byrd Alzheimer's Institute at the University of South Florida, are not likely to be available until sometime in May.

"The hope is that there is a tiny bit of efficacy. Then we can work to refine it," Knight said. "No one is expecting a magic cure."

ARRL News Editor Rick Lindquist, WW1ME, lives in Down East Maine and has been a radio amateur for nearly 60 years. He enjoys CW, contesting, vintage clocks, and photography. Rick is also managing editor of *National Contest Journal (NCJ)*.

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