



# 25 Breakthroughs in Georgia



## NO. 23:

### Treatment for drug-resistant depression

For about 10 million Americans, antidepressants fail to relieve the suffering of chronic depression. But a breakthrough engineered by Emory and Georgia Tech researchers has brought fresh hope for many thousands of these patients.

It involves transcranial magnetic stimulation (TMS), a technique that delivers intense pulses of electromagnetic energy to targeted regions of the brain. Beginning in the 1990s, researchers were developing evidence that TMS could treat depression. But the technology to apply it efficiently wasn't available – until Emory neurologist Charles Epstein teamed up with Georgia Tech's Kent Davey.

An expert in epilepsy research and an electronics hobbyist in his spare time, Epstein knew about the potential of TMS and had begun to build his own device. For support, he called on Davey, an electromagnetics expert and then a professor at Georgia Tech. Together they created the first magnetic stimulator with an iron-core coil.

Earlier magnetic stimulators were designed with air-core coils, which required millions of watts for every pulse. This massive burst of power produced tremendous amounts of heat, and the high-voltage components were prone to malfunction.

Epstein and Davey's patented iron-core magnetic stimulation coil needed only a quarter of that power and generated eight times less heat, an advance that made TMS an efficient and practical technology for large numbers of treatments.

Emory partner Neuronetics, Inc. commercialized the technology as NeuroStar TMS Therapy®. Following a successful clinical trial, NeuroStar received FDA clearance in 2008, making it the first TMS therapy to be approved as a treatment for depression. Today, NeuroStar is offered by more than 650 physicians across the nation.

A growing body of clinical evidence and expanding insurance coverage are steadily making TMS therapy accessible to more Americans with depression.

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*"25 Breakthroughs in Georgia" celebrates 25 years of the Georgia Research Alliance. GRA expands research and commercialization capacity in Georgia's universities to launch new companies, create high-value jobs and transform lives. More: [GRA.org](http://GRA.org)*



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