

## BroadcastMed | Examining Repetitive Transcranial Magnetic Stimulation as a Treatment for Adolescent Depression

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Hi. I'm Paul Croarken, a child and adolescent psychiatrist with the Mayo Clinic Depression Center. I'm here today to talk a little bit about our noninvasive brain stimulation research program. It's very exciting. At Mayo Clinic, we are one of the few facilities internationally that's actively conducting studies in children and adolescents with an emerging technology called transcranial magnetic stimulation.

This is a technology that uses a rapidly oscillating magnetic field, which painlessly penetrates the skull to generate electrical currents in the brain for the purposes of treatment or physiologic studies. Most clinicians are familiar with RTMS, repetitive transcranial magnetic stimulation, as it has been FDA approved for the treatment of adults with depression who failed to benefit from one medication trial since 2008. Recently, we have conducted two open-label trials of this same treatment in adolescents who failed to respond to prior medication trials.

In total, we've now treated 18 adolescents. And the results have been promising. We've also been able to look at a number of other measures related to response and neurocognitive outcomes for the purposes of safety and future studies. Initial results are promising in that we need to be a little skeptical, as they're small sample sizes. But one recent publication describes 18 subjects who had neurocognitive measures at baseline, midway through these treatments, and then after treatments.

And in all cases, there were no decrements in these measures. And in some cases there were actually some improvements in memory. We were hopeful that this will be useful in future planning for other studies. This treatment involves 30 sessions of RTMS in which patients come five days a week, over six to eight weeks, and sit in a chair and have high-frequency stimulation treatment. We use the adult parameters for our studies.

As I mentioned, these are open-label trials. So we have recently embarked on a more definitive gold standard study to examine the efficacy of this treatment in adolescents. This is what's called a randomized controlled trial in that we will have a much larger sample size. We will randomize adolescents to treatment with the RTMS or a sham treatment, which is a stimulator, which is not the active treatment.

We are hopeful that results from this study will be helpful in moving this modality forward for children and adolescents so that they can benefit from this novel treatment. We are also interested mechanistically in how this therapy works and are collecting a number of other interesting data points. One example is we're looking at what's called magnetic resonance spectroscopy scans of the anterior cingulate cortex and the dorsolateral prefrontal cortex in adolescents at baseline, midway through treatment, and at the conclusion of treatment.

We are doing this with specific interest in monitoring the glutamatergic system, which is thought to be implicated in an adult and adolescent mood disorders. We are hopeful that this line of research will expand to other areas. For example, we were actively planning for a bipolar disorders study in adolescents and are hopeful that we will also, in the future, have trials for autism spectrum disorders.

Thank you for joining me today to discuss these exciting research projects. Have a great day.