
RSNA Press Release

Brain Waves Show Sound Processing Abnormalities in Autistic Children

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At A Glance

- Abnormalities in language processing in children with autism can be identified using magnetoencephalography (MEG).
- The brain's auditory processing system is delayed a fraction of a second in children with autism.
- Autism affects one in every 150 American children, mostly boys.

CHICAGO — Abnormalities in auditory and language processing may be evaluated in children with autism spectrum disorder by using magnetoencephalography (MEG), according to a study presented today at the annual meeting of the Radiological Society of North America (RSNA).

"Using MEG, we can record the tiny magnetic fields associated with electrical brain activity," said Timothy Roberts, Ph.D., vice chair of research in the Department of Radiology at Children's Hospital of Philadelphia. "Recorded brain waves change with every sensation, thought and activity. It's like watching a movie of the brain in real time."

Typically used for epilepsy evaluation, MEG can also be used to identify timing abnormalities in the brains of patients with autism.

"We found that signatures of autism are revealed in the timing of brain activity," Dr. Roberts said. "We see a fraction of a second delay in autistic patients."

Autism is a complex developmental disability that affects approximately one in every 150 American children, mostly boys, according to the Autism Society of America. Autism inhibits the brain functions that govern the development of social and communication skills.

For a MEG exam, a helmet that houses magnetic detectors and looks similar to an old-fashioned hair dryer is lowered over the patient's head while the patient remains in a seated position. The helmet analyzes electrical currents from the brain.

For the study, 64 patients, age six to 15, with a diagnosis of autism spectrum disorder were evaluated with MEG. Audio stimulation was introduced to the children in the form of beeps, tones in pairs, vowels or sentences. Sounds were presented at different frequencies and tone pairs in rapid succession, including unusual streams of incongruous tones and vowels. The

results were analyzed and compared with the results from a control group of age-matched non-autistic children.

The findings showed that in the children with autism there was a fraction of a second delay in the brain's response while processing the rapid succession sounds and the unusual streams, giving researchers an insight into the dysfunction of the auditory processing system in autistic children.

"This delay in processing certain types and streams of sound may underpin the subsequent language processing and communication impairment seen in autistic children," Dr. Roberts said.

Dr. Roberts predicts that the signatures of autism found in brain activity will become biomarkers to improve classification of the disorder and aid in treatment and therapy planning.

"We hope that in the future these signatures will also be revealed in the infant brain to help diagnose autism and allow earlier intervention," he said.

Co-authors are J. Christopher Edgar, Ph.D., Deborah M. Zarnow, M.D., and Susan E. Levy, M.D.

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RSNA is an association of more than 42,000 radiologists, radiation oncologists, medical physicists and related scientists committed to excellence in patient care through education and research. The Society is based in Oak Brook, Ill. (RSNA.org)

Editor's note: The data in these releases may differ from those in the printed abstract and those actually presented at the meeting, as researchers continue to update their data right up until the meeting. To ensure you are using the most up-to-date information, please call the RSNA Newsroom at 1-312-949-3233.

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