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NEWS

RSNA Press Release

Brain Activity Abnormal in Children with Delayed Speech

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At A Glance

- When children with delayed speech listen, different brain areas are activated compared to children without delayed speech.
- Speech-delayed children may be increasingly less receptive to language as they age.
- Radiologists may eventually be able to help diagnose, guide and monitor treatment of children with delayed speech.

OAK BROOK, Ill. - Children with unusually delayed speech tend to listen with the right side of the brain rather than the left side of the brain, according to a study published in the December issue of the journal *Radiology*. Preliminary study results were presented at the Radiological Society of North America's (RSNA) Annual Meeting in 2002.

The research represents the first time functional magnetic resonance imaging (fMRI) has been used to investigate brain activity associated with speech delay. "With the advent of neuroimaging, we saw a new way of looking at language disorders," said Nolan R. Altman, M.D., lead author of the study and chief of radiology at Miami Children's Hospital.

The researchers completed fMRI studies on 17 abnormally speech-delayed children and 35 age-matched children without delayed speech to compare the brain activation patterns between the two groups. To study the brain's reaction to passive language, the children's brains were imaged as they listened to audiotapes of their mothers. The children were between ages 2 and 8 with a mean age of approximately 4½ years.

The findings indicated that children with seriously delayed speech have higher levels of right brain lobe activity than children without delayed speech, who tend to use the left side of their brains when they listen. They also found that language-delayed children age 4 and older had less total brain activation than the children in the control group, potentially indicating that speech-delayed children are less receptive to language as they age.

Children typically say their first words by age 1 and advance to simple sentences by age 2½ or 3. If a 1-year-old child has not made verbal sounds, or if his or her speech is extremely unclear compared with that of children of similar age, then it may be advisable for parents to consult their family physician or a speech pathologist to determine if the child has a language disorder, according to the researchers.

"The overall ramifications of our early research augment the accepted importance of early intervention for children with language disorders," Dr. Altman explained. "With fMRI,

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radiologists may be able to help diagnose, guide and monitor treatment of children with these complex disorders." According to the American Speech-Language Hearing Association (ASHA), an estimated 2 percent of children have a condition that may cause speech delay, including emotional or behavioral disabilities, birth complications, cleft lip or palate, developmental disabilities, hearing loss or lack of environmental stimulation.

Dr. Altman said the next step is to expand the study and develop a reliable test to diagnose language delay. He emphasized the importance of early identification of children with speech-delayed brain activation patterns, so that interventions can be started early, when they are most effective.

"A valid test identifying language delay would be valuable to both the practitioner and the child," Dr. Altman said. "Alternatively, after the child goes through speech therapy or another intervention, we can re-scan to see if the brain appears more normal."

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"Speech-Delayed Children: An FMRI Study." Collaborating with Dr. Altman on this paper was Byron Bernal, M.D.

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