Differences in language circuits in the brain linked to dyslexia

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Children with dyslexia often struggle with reading, writing, and spelling, despite getting an appropriate education and demonstrating intellectual ability in other areas. New neurological research has found that these children's difficulties with written language may be linked to structural differences within an important information highway in the brain known to play a role in oral language. The findings are published in the June 2010 issue of Elsevier's *Cortex*.

Vanderbilt University researchers Sheryl Rimrodt and Laurie Cutting and colleagues at Johns Hopkins University and Kennedy Krieger Institute used an emerging MRI technique, called diffusion tensor imaging (DTI), to discover evidence linking dyslexia to structural differences in an important bundle of white matter in the left-hemisphere language network. White matter is made up of fibers that can be thought of as the wiring that allows communication between brain cells; the left-hemisphere language network is made up of bundles of these fibres and contains branches that extend from the back of the brain (including vision cells) to the front parts that are responsible for articulation and speech. "When you are reading, you are essentially saying things out loud in your head", said Cutting. "If you have decreased integrity of white matter in this area, the front and back part of your brain are not talking to one another. This would affect reading, because you need both to act as a cohesive unit."

Rimrodt and Cutting used the DTI technique to map the course of an important white matter bundle in this network and discovered that it ran

through a frontal brain region known to be less well organised in the dyslexic brain. They also found that fibers in that frontal part of the tract were oriented differently in dyslexia. Rimrodt said, "To find a convergence of MRI evidence that goes beyond identifying a region of the brain that differs in dyslexia to linking that to an identifiable structure and beginning to explore physical characteristics of the region is very exciting. It brings us a little bit closer to understanding how dyslexia happens."

More information: Cortex is available online at www.sciencedirect.com/science/journal/00109452

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