

ADHD AND BRAIN ASYMMETRY — A LITTLE IMBALANCE IS A GOOD THING

The importance of the differences between the left and right hemispheres of the brain is being increasingly highlighted in brain imaging studies. In fact, lack of brain asymmetry has been linked to attention deficit hyperactivity disorder (ADHD).

*“In healthy, right-handed adults,” says Dr. Philip Shaw, lead clinician of the ADHD research program at the National Institute of Mental Health (Maryland, USA), “the right front part of the brain and the left back part are bigger. But the puzzle has been, if you look at the brains of infants, this is reversed.” To find out how asymmetry in the brain shifts over time and to determine whether abnormalities in this process might help explain what is seen in ADHD, a condition in which weakness in the functioning of the right front part of the brain has been noted, Dr. Shaw used magnetic resonance imaging (MRI) to produce images of the brains of hundreds of children with and without ADHD. Importantly, most of the children were scanned repeatedly at different points in time, providing a longitudinal perspective. The results of this study were published in the August 2009 issue of the *Archives of General Psychiatry*.*

LONGITUDINAL DATA DEMONSTRATE DIFFERENT PATTERN OF BRAIN DEVELOPMENT IN ADHD

“ADHD changes over time. If you want to understand how something grows,” says Dr. Shaw, “using longitudinal data, where you collect the same information at multiple time points in the same subject, can really help you capture developmental processes.”

The investigators were particularly interested in the thickness of the cortex, the outer layer of the brain responsible for higher level functioning. Dr. Shaw’s team included Dr. Alan Evans, from the Montreal Neurological Institute (MNI), and it was there that they developed

computer software to map over 40,000 corresponding points on the left and right sides of the cortex and then compare them to identify differences.

“In very young healthy kids,” who are right-handed, says Dr. Shaw, “we confirmed what others have found: there’s a reversal of the adult pattern of asymmetry. The frontal cortex and the right rear region were thicker. We then did this little movie of how it grows from one end to the other, and you see this very nice progression of a flip. At the very front of the brain, it goes from left being thicker to the right being thicker, and then the opposite is happening at the back of the brain.”

But the patterns of change were different for children with ADHD. *“In the back bit of the brain, the same developmental pattern was there, though a bit delayed, but for the front part*

of the brain, they just showed no change at all.” In children with ADHD, the right frontal part of the brain did not increase in size relative to the left, as it should.

Dr. Stacey Ageranioti Bélanger, director of the ADHD clinic at CHU Sainte-Justine in Montreal, says this is one of the largest imaging studies of the brains of children with ADHD. *“This study explains better than others the importance of anatomical asymmetries in the human brain,”* she says. It also helps explain one component of ADHD, which is a multifactorial disease. There may be *“links between abnormalities in brain development in very particular regions, for which the causes may not be completely known, but for which genetics may play a role,”* she explains. 🦋

BY ALISON PALKHIVALA

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Ref.: Shaw P, Lalonde F, Lepage C, Rabin C, Eckstrand K, Sharp W, Greenstein D, Evans A, Giedd JN, Rapoport J. Development of cortical asymmetry in typically developing children and its disruption in attention-deficit/hyperactivity disorder. *Archives of General Psychiatry* 2009;66(8):888-896.