Title: Regional Volumetric Abnormalities in Pediatric Autism Revealed by Structural Magnetic Resonance Imaging

Authors: Jacob Levman, Lana Vasung, Patrick MacDonald, Sean Rowley, Natalie Stewart, Ashley Lim, Bryan Ewenson, Albert Galaburda, Emi Takahashi

PII: S0736-5748(18)30159-X
DOI: https://doi.org/10.1016/j.ijdevneu.2018.08.001
Reference: DN 2291

To appear in: *Int. J. Devl Neuroscience*

Received date: 3-5-2018
Revised date: 26-7-2018
Accepted date: 2-8-2018

Please cite this article as: Levman J, Vasung L, MacDonald P, Rowley S, Stewart N, Lim A, Ewenson B, Galaburda A, Takahashi E, Regional Volumetric Abnormalities in Pediatric Autism Revealed by Structural Magnetic Resonance Imaging, *International Journal of Developmental Neuroscience* (2018), https://doi.org/10.1016/j.ijdevneu.2018.08.001

Regional Volumetric Abnormalities in Pediatric Autism Revealed by Structural Magnetic Resonance Imaging

*Jacob Levman[1,2,3], Lana Vasung[1], Patrick MacDonald[1], Sean Rowley[3], Natalie Stewart[1], Ashley Lim[1], Bryan Ewenson[3], Albert Galaburda[4], Emi Takahashi[1,2]

Affiliations:
[1] Division of Newborn Medicine, Department of Medicine, Boston Children's Hospital, Harvard Medical School, 1 Autumn Street #456, Boston, MA 02215, USA.
[2] Athinoula A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Harvard Medical School, 149 13th Street, Charlestown, MA 02129, USA.
[3] Department of Mathematics, Statistics and Computer Science, St. Francis Xavier University, Antigonish, NS, B2G 2W5, Canada.
[4] Department of Neurology, Beth Israel Deaconess Medical Center, Harvard Medical School, 330 Brookline Ave FD-225, Boston, MA 02215, USA.
*Correspondence to: Jacob Levman, PhD, Boston Children's Hospital, Harvard Medical School, 1 Autumn Street, AU456, Boston, MA, 02215, USA, jacob.levman@childrens.harvard.edu.

Highlights

- Large scale clinical structural volumetric MRI analysis of autism
- Increased group-wise volumes of the choroid plexus observed among the autistic
- High correlations between choroid plexus volume and ventricular volume
- Increased group-wise regional volumes observed in the autistic early years

Abstract: Autism is a group of complex neurodevelopmental disorders characterized by impaired social interaction, restricted and repetitive behavior. We performed a large-scale retrospective analysis of 1,996 structural magnetic resonance imaging (MRI) examinations of the brain from 1,769 autistic and neurologically typically developing patients (aged 0 to 32 years), and extracted regional volumetric measurements distributed across 463 brain regions of each patient. The youngest autistic patients (< 2.5 years) were diagnosed after imaging and identified retrospectively. Our study demonstrates increased corpus callosum volumes among autistic patients in early childhood (0 to 5 years old), followed by a shift towards known decreased volumes in later ages. Results confirm known increases in ventricular volumes among autistic populations and extends those findings to increased volumes of the choroid plexus. Our study also demonstrates distributed volumetric abnormalities among autistic patients that affect a variety of key regional white and grey matter areas of the brain potentially associated with known symptoms of autism.

Keywords: autistic; development; magnetic resonance imaging; neuroanatomy; volumetric