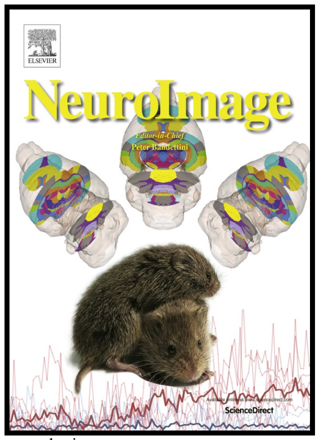
Author's Accepted Manuscript



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PII: S1053-8119(17)30123-4
DOI: http://dx.doi.org/10.1016/j.neuroimage.2017.02.019
Reference: YNIMG13804

To appear in: *NeuroImage*

Received date: 13 December 2016
Accepted date: 7 February 2017

Cite this article as: Joshua H. Balsters, Dante Mantini and Nicole Wenderoth Connectivity-based parcellation reveals distinct cortico-striatal connectivit fingerprints in Autism Spectrum Disorder, *NeuroImage* http://dx.doi.org/10.1016/j.neuroimage.2017.02.019

Connectivity-based parcellation reveals distinct cortico-striatal connectivity fingerprints in Autism Spectrum Disorder

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Abstract

Autism Spectrum Disorder (ASD) has been associated with abnormal synaptic development causing a breakdown in functional connectivity. However, when measured at the macro scale using resting state fMRI, these alterations are subtle and often difficult to detect due to the large heterogeneity of the pathology. Recently, we outlined a novel approach for generating robust biomarkers of resting state functional magnetic resonance imaging (RS-fMRI) using connectivity based parcellation of gross morphological structures to improve single-subject reproducibility and generate more robust connectivity fingerprints. Here we apply this novel approach to investigating the organization and connectivity strength of the cortico-striatal system in a large sample of ASD individuals and typically developed (TD) controls (N=130 per group). Our results showed differences in the parcellation of the striatum in ASD. Specifically, the putamen was found to be one single structure in ASD, whereas this was split into anterior and posterior segments in an age, IQ, and head movement matched TD group. An analysis of the connectivity fingerprints revealed that the group differences in clustering were driven by differential connectivity between striatum and the supplementary motor area, posterior cingulate cortex, and posterior insula. Our approach for analysing RS-fMRI in clinical populations has provided clear evidence that cortico-striatal circuits are organized differently in ASD. Based on