
Scan a Child's Brain, Find Autism



Autism spectrum disorders encompass a wide range of symptoms, which are often diagnosed too late to start early childhood treatment. To celebrate World Autism Awareness Day (2 April 2021), there is promising news based on research done in the laboratory of Rasha Makkia, at the University of Mary Washington, Virginia.

Traditionally, autism is diagnosed in early childhood based on a child's ability to communicate and interact. Yet, there are no imaging or blood tests in existence to verify these findings. However, this will soon change.

Shannon Brindle, a final-year physics major, is developing an imaging analysis technique for the speedy diagnosis of autism spectrum disorders. By using these techniques, clinicians would be able to verify if a child – at a younger age than currently possible – has an autism spectrum disorder, its severity and thus develop better interventions to meet the child's specific needs.

The computational technique can simultaneously extract multiple structures from 3D magnetic resonance imaging brain scans, isolate the structures and render them with graphical representations, "NURBS", that capture and maintain the topological intricacies of the structures better than any other method currently used.

This technique focuses on the cerebellum at the back of the brain (controlling motor functions) and the corpus callosum (C-shaped nerve bundle that connects right and left lobes). If changes are detected in the functioning of these regions as well as the sizes of the neurons within these structures, it could indicate autism.

The researchers applied the analysis technique to images of the brains of three eight-year-old boys, two of which had been diagnosed with autism. Early observations showed that the boys with autism had larger cerebella, and the corpus callosa were smaller. Also, the right "stalk" or peduncle – that connects the cerebellum to the rest of the brain – was smaller than the left peduncle. The opposite was true for the other boy.

Although the observations have not yet been peer reviewed or undergone a thorough vetting in the laboratory, the measurements appear to be meaningful. Moreover, a radiologist confirmed that this technique has correctly isolated the structures. The preliminary results refer only to three patients, which makes it too early to claim clinical significance. However, Ms Brindle envisions adding more patients to the study, and developing tools that help clinicians to tailor-make treatment plans for a wide range of conditions.

Source: <https://physics.aps.org/articles/v14/44>

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