NEWS

Two autism features may share common root in brain

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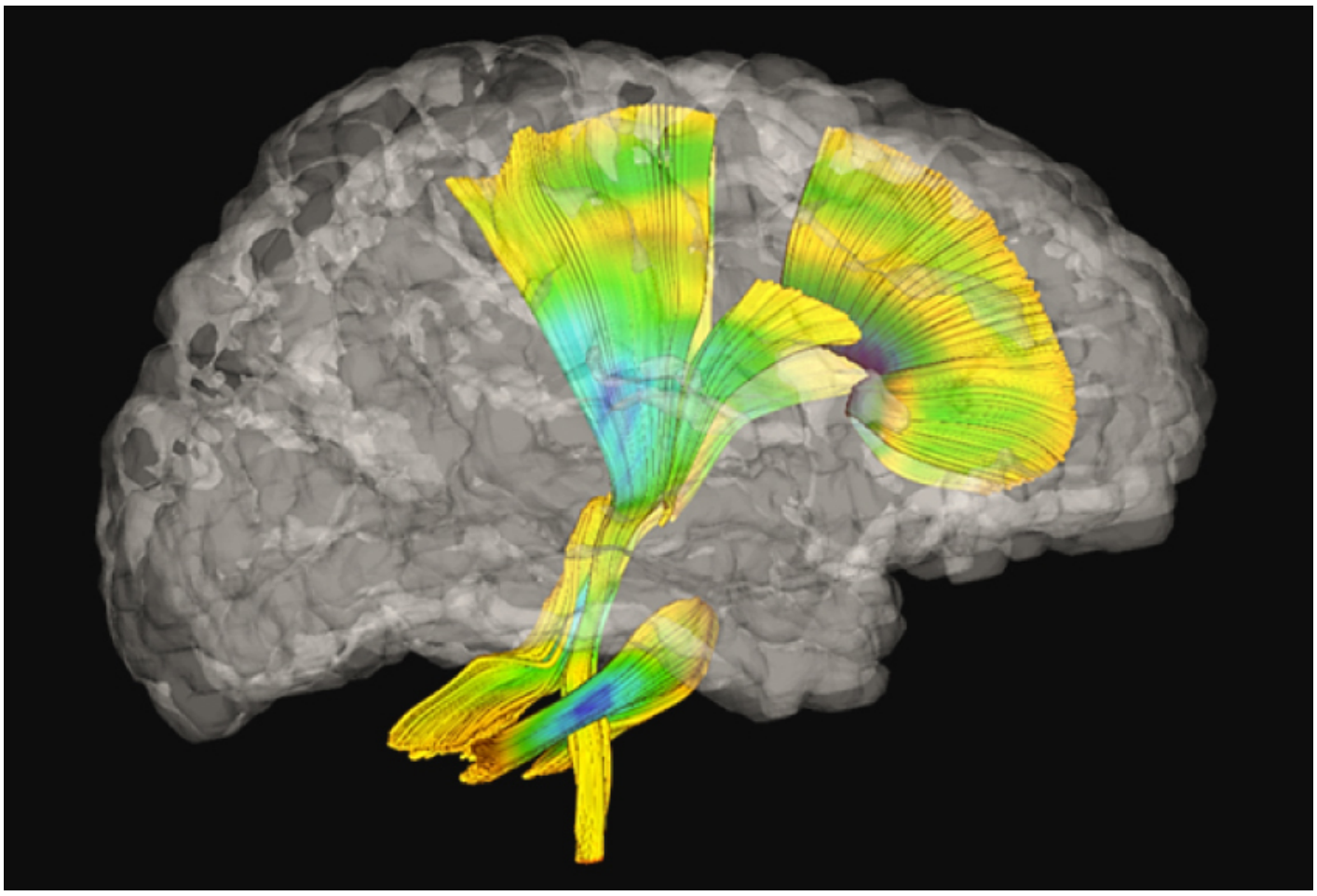

Children with autism who have both severe **repetitive behaviors** and sensory sensitivities tend to have had unusually structured nerve tracts in infancy, according to a new study[1]. The degree of alteration in the tracts at 6 months of age predicts the severity of the behaviors at age 2.

Repetitive behaviors, such as hand flapping, are a cardinal sign of autism. Children with autism who have severe repetitive behaviors often also have **unusual sensory features**, such as **sensitivities to sounds** or textures or an **insensitivity to pain**. The new study, published 4 March in *Molecular Autism*, may help explain why these features frequently co-occur.

“They both seem to share a similar relationship with underlying neural circuitry,” says lead investigator **Jason Wolff**, assistant professor of educational psychiatry at the University of Minnesota in Minneapolis.

The findings hint at an early **biomarker** of autism features: Wolff and his team detected the unusual nerve structure in infants as young as 6 months.

“It’s pretty exciting that at 6 months of age, before we can do sensory tests or even report on these autism features, there’s a measure that might be able to predict later sensory sensitivities and repetitive behaviors,” says **Brittany Travers**, assistant professor of kinesiology at the University of Wisconsin-Madison, who was not involved in the study.

Researchers might be able to use the measure to flag infants who would benefit from early treatment for their autism features, Travers says.

Wiring patterns:

Bundles of neurons called white-matter tracts bridge different brain regions. A technique called diffusion tensor imaging (DTI) **gauges the ‘strength’ of white-matter tracts** by tracking the flow of water along them. Water tends to move smoothly along cohesive, well-developed tracts and more diffusely along those that are immature or damaged.

White-matter tracts typically become ‘stronger’ throughout childhood. This may reflect an increase in either the number or thickness of the fibers that make up the tracts, or in the fatty insulation surrounding them.

Wolff and his colleagues looked at white-matter tracts in 217 children who have older siblings with autism. These so-called ‘**baby sibs**’ are about 20 times more likely to have autism than children in the general population.

All of the children in the study are part of the **Infant Brain Imaging Study**, which includes brain scans and behavioral data from hundreds of baby sibs at 6, 12 and 24 months of age. When the children were 2, their parents reported any repetitive behaviors and sensory sensitivities; 44 of the 217 children then received an autism diagnosis.

Among children with autism, the frequency and severity of repetitive behaviors track with those of sensory sensitivities, as expected. The association remained even after the researchers controlled

for cognitive and social differences between the children with and without autism.

The researchers zeroed in on five white-matter tracts previously linked to repetitive behaviors in people with autism or obsessive-compulsive disorder, among other conditions. They found that children with autism who have the most structurally intact bundles in three of the tracts between 6 and 24 months have the most severe repetitive behaviors and sensory sensitivities.

Bulging bridge:

One of these three tracts includes part of the **corpus callosum**, which connects the left and right halves of the brain. The other two tracts connect the **cerebellum**, a structure that coordinates movement, to other brain regions, including one that processes sensory stimuli. The corpus callosum and the cerebellum have both been implicated in autism.

Babies who have an unusual structure in the corpus callosum at age 6 months have severe repetitive behaviors and sensory sensitivities at age 2, the researchers found.

This finding is consistent with evidence that the two halves of the brain in people with autism may be **less specialized**, in both structure and function, than they are in neurotypical individuals, says **Ralph-Axel Müller**, director of the Brain Development Imaging Lab at San Diego State University in California, who was not involved in the study. “There seems to be something off in the way that kids with autism use their two hemispheres.”

Wolff’s team reported in 2015 that baby sibs later diagnosed with autism have an **atypically thick corpus callosum** at 6 months of age.

The results of the new study are specific to repetitive behaviors and sensory sensitivities. Wolff’s team did not see links between tract strength and social difficulties, as measured by the Autism Diagnostic Observation Schedule.

The new study did not include children without a family history of autism. That’s because most parents are not familiar with repetitive behaviors and sensory issues, and so have difficulty rating the behaviors.

Wolff says he would like to complement parent reports with video cameras and sensors to objectively record and measure these behaviors in baby sibs, as well as in controls.

REFERENCES:

1. Wolff J.J. *et al. Mol. Autism* **8**, 8 (2017) **PubMed**