NEWS

Response to biological motion may predict autism

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Two new studies show that the brain's response to **biological motion** can distinguish typically developing children from those who have a biological risk of autism. The research was presented at the **2012 Society for Neuroscience annual meeting** in New Orleans.

So-called '**baby sibs**,' or siblings of children with autism, have a **20 percent chance** of developing the disorder, compared with an estimated 1 percent risk in the general population.

In one new study, researchers found that response to biological motion can distinguish children who have a sibling with autism but do not have the disorder themselves from those who don't have a family history of the disorder. The children in this study ranged in age from 10 to 12 years.

The second study found that baby sibs show these differences as early as 9 months of age. That's well before behavioral differences can reliably be detected.

It's not yet clear whether this response can predict which infants will go on to develop autism, however.

The infant brain is finely tuned to detect biological motion — coordinated movement of animals or people. Scientists often study this phenomenon using point-light displays, simple animations of moving dots that are either scrambled or designed to look like a person moving.

In 2010, **Kevin Pelphrey** and his collaborators showed that, when watching point-light displays of biological motion, a number of different brain regions are less active in people with autism than in controls[1].

In the new work, Pelphrey's team found that the brain response to biological motion is clear enough to distinguish those who have a genetic risk but did not develop the disorder."The model is so sensitive you can pick up unaffected siblings where there are no obvious behavioral differences," says Pelphrey, director of the child neuroscience lab at Yale University.

The researchers analyzed data from the same group as in the 2010 study: 17 controls and 19 unaffected siblings, as well as a second group of 19 controls and 19 unaffected siblings.

Sensitive measure:

Malin Björnsdotter, a postdoctoral fellow at the University of Gothenburg, Sweden, who collaborates with Pelphrey's lab, used machine-learning tools to develop an algorithm that can distinguish unaffected siblings from controls. She found that low activity in a region called the fusiform gyrus, which is best known for its role in recognizing faces, is the best predictor of risk status. This region has previously been linked to autism[2].

The 2010 paper detected differences between the groups overall. In contrast, the new algorithm correctly predicts whether a given individual has a genetic propensity for developing autism, by virtue of having an affected sibling, about 80 percent of the time.

Pelphrey calls the response to biological motion an 'endophenotype,' because it is present even in those who do not show outward symptoms. Endophenotypes are important because they are

more likely to reflect a disorder's cause rather than its consequence. "It says something about underlying risk that's not expressed in behavior," Pelphrey says.

In the second study, Pelphrey's group found that response to biological motion can also distinguish infants at risk of developing autism.

Rather than using functional magnetic resonance imaging (fMRI), which is challenging to conduct in infants, the researchers used functional near-infrared spectroscopy. Like fMRI, this method uses blood flow as an indirect measure of brain activity, but is less sensitive to movement than fMRI is.

Rather than lie in a scanner, babies wear a special cap and can sit on a parent's lap while watching movies of biological and scrambled motion.

The researchers have so far analyzed eight high-risk infants and eight controls who don't have a sibling with autism, all aged 3 to 9 months.

They found that in the controls, the left hemisphere responds similarly to biological and scrambled motion, but the right hemisphere shows significant differences. In high-risk infants, both hemispheres respond similarly to scrambled and biological motion.

"It's plain as day; they process biological information differently," Pelphrey says.

The findings suggest that a neural signature of autism may be detectable as early as 9 months, before outward symptoms can reliably be detected. The researchers plan to study 125 high-risk infants and 75 controls, testing them every three months from 3 through 36 months, when a reliable diagnosis can be made.

Pelphrey says a unique signature for autism is likely to be most evident in the trajectory of brain activity over time, rather than at a single static point.

"No one has ever seen infants that frequently before, so we will get a really good sense of how their brain activity is changing," he says. "Hopefully we can say something interesting about fluctuations in activity from month to month."

For more reports from the 2012 Society for Neuroscience annual meeting, please ***click here****.*

References:

1: Kaiser M.D. *et al. Proc. Natl. Acad. Sci. USA* **107**, 21223-21228 (2010) **PubMed**

2: Pelphrey K. *et al. Ment. Retard. Dev. Disabil. Res. Rev.* **10**, 259-271 (2004) **PubMed**