NEWS

Molecular mechanisms: Star cells abnormal in autism brains

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7 DECEMBER 2012

Small stars: Astrocytes (arrows) have fewer and shorter branches in autism brains (top) than in controls (bottom).

Postmortem brains from individuals with autism have astrocytes that are smaller but denser than in control brains, according to a study published 21 Septemberin the *Journal of Neuroinflammation*[1]. The researchers found similar alterations in a mouse that lacks the autism-linked gene **NLGN3**.

Astrocytes are star-shaped cells with long, thin projections that insert at the junctions, or **synapses**, between two neurons. Astrocytes provide structural support to the brain and transmit nutrients to neurons. They may also help strengthen synapses in response to experience, a process that **underlies learning and memory**.

Studies in the past few years have shown that glia, the family of brain cells that includes astrocytes, may play a **more significant role in brain function** than previously thought.

For example, neurons lacking **MeCP2** — the Rett syndrome gene — **normalize when cultured alongside astrocytes**. And a bone marrow transplant that may regrow healthy microglia — another type of glial cell — **improves symptoms** in Rett syndrome mice.

In the new study, researchers looked at the structure of astrocytes in the frontal cortex — a brain region involved in cognitive function — and the cerebellum, which plays a role in motor function, in

six postmortem brains from individuals with autism and six control brains.

Compared with controls, astrocytes in the frontal cortex of the autism brains are dense, but have small cell bodies with a few short projections. Astrocytes in the cerebellum look similar to those in control brains.

Levels of WNT and beta-catenin, two proteins that regulate the development of both neurons and glia, are also lower in autism brains than in controls. A study published in April found that about **40 percent of spontaneous mutations** in people with autism are in genes involved in the WNT pathway.

The frontal cortex of mice with dampened expression of NLGN3, an autism-linked gene that functions at synapses, also has small astrocytes. These cells are just as dense as those in the brains of control mice, however.

These mice show autism-like behaviors, such as high anxiety and little social interest. In contrast, astrocytes in the brains of BTBR mice, an inbred strain that has **autism-like behaviors**, look normal.

References:

1: Sheikh A. *et al. J. Neuroinflammation* **9**, 223 (2012) **PubMed**