NEWS

Genetics: Protein transport affects neuronal junctions

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Curious link: Proteins that function in cellular compartments called endosomes may influence the expression of autism-linked genes.

Two proteins involved in shuttling other proteins between the outside and inside of a cell show a distinct pattern of expression in autism brains, according to a report published 19 March in *Molecular Psychiatry*[1].

These proteins, NHE6 and NHE9, may regulate the levels of other proteins active at neuronal junctions, or **synapses**.

The two proteins are components of ion channels in endosomes — lipid-bound bubbles that recycle proteins between a cell and its exterior. Mutations in NHE6 and NHE9 have been linked to cases of severe autism with **epilepsy** inherited from both parents, and to Christianson syndrome, a developmental disorder characterized by seizures and some features of autism.

The researchers reanalyzed data from a 2011 study of gene expression in postmortem brains from 29 individuals with autism and 29 controls[2]. That study found **lower expression** of proteins active at the synapse in the autism brains than in controls.

The original study had excluded analysis of NHE genes, however, which are usually expressed at

low levels in the brain.

The new study found that there is less NHE6 and more NHE9 in the cerebral cortex of autism brains than in that of control brains. Expression of NHE6 and NHE9 appears to be inversely related. What's more, the brains that have the least NHE6 and the most NHE9 show the lowest expression of 21 synaptic genes.

Using the **Allen Human Brain Atlas**, the researchers found that NHE6 — but not NHE9 — is expressed at around the same time in development as these 21 synaptic genes.

Data from two other studies link the expression of NHE6 and NHE9, but the results are not statistically significant. The studies confirm the association between the NHE genes and synaptic genes, however.

References:

1: Schwede M. *et al. Mol. Psychiatry* Epub ahead of print (2013) **PubMed**

2: Voineagu I. *et al. Nature* **474**, 380-384 (2011) **PubMed**