NEWS

Molecular mechanisms: Study ties growth factor to autism

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New growth: NHE6 (green), a protein linked to autism, is present at the same sites in the brain as new neuronal projections (red).

Mutations in the autism-linked protein NHE6 may block the development of neuronal junctions by interfering with a growth factor called BDNF, according to a study published 2 October in *Neuron*[1].

The results suggest that drugs that enhance BDNF signaling could treat some forms of autism, the researchers say.

Mutations in NHE6 lead to a condition called Christianson syndrome, characterized by **unusual facial features**, involuntary muscle movements and autism symptoms. A study published in May found that the postmortem brains of 29 people who had autism have **lower levels of NHE6** than do those of controls.

In the new study, researchers found that NHE6 is seen primarily in growing neurons, suggesting that it plays a role in neuronal development. Neurons from mice lacking the protein are less complex and have fewer **synapses**, or neuronal junctions, than do those from controls. They look similar to neurons from mice that model Rett syndrome, another autism-related disorder.

NHE6 is a component of endosomes — bubbles of membrane that carry proteins from the cell surface into the cell. As endosomes mature, they become increasingly acidic and eventually

degrade the proteins they carry. NHE6 is part of an ion channel that combats this acidification. This de-acidification process may encourage the endosome to release proteins back to the outside of the cell.

Endosomes in neurons lacking NHE6 are more acidic and are less likely to recycle proteins than control endosomes, the study found. In particular, the mutant endosomes enhance degradation of TRKB, a receptor for BDNF, which has also been **linked to autism**. Adding extra BDNF to cultured neurons lacking NHE6 normalizes these neurons.

Studies have shown that compounds that enhance BDNF signaling **improve symptoms** in Rett syndrome mice.

References:

1: Ouyang Q. *et al. Neuron* **80**, 97-112 (2013) **PubMed**