Researchers have found how brain cells control their movement to form the cerebral cortex

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A study led by Academy Research Fellow Eleanor Coffey identifies new players that put the brakes on. They show in mice that lack the star player "JNK1", that newborn neurons spend less time in the multipolar stage, which is when the cells prepare for subsequent expedition, possibly choosing the route to be taken. Having hurried through this stage, they move off at high speed to reach their final destinations in the cortex days earlier and less precisely than in a normal mouse. The results of their study are published in the latest issue of *Nature Neuroscience*.

Incorrect placement of neurons during brain development may leave us at risk of diseases and conditions ranging from epilepsy and mental retardation to schizophrenia and dyslexia. When our brains develop, they do so at an impressive rate with up to 250,000 new cells produced every minute. These newborn neurons do not remain in place but instead migrate long distances in wave after wave to settle in the layers that make up the largest part of our brain, the cerebral cortex. If a neuron moves too fast during this journey, it may not take the correct route or reach its destination. The way neurons control their speed of migration has not been clear.

So how does JNK1 control movement of neurons in the developing cortex? Brain cells move as a consequence of positive and negative regulatory mechanisms. Coffey and her team identified a protein called SCG10 that cooperates with JNK1 to slow down the pace. We have

known for years that SCG10 is abundant in the developing cortex and that it can bind to and control the brain cell skeleton or cytoskeleton. However no-one realised that its function is to regulate movement of neurons.

Coffey's results indicate that JNK1 and SCG10 cooperate to make the cytoskeleton more rigid. When cytoskeleton is stiff and inflexible, neurons stay longer in the multipolar stage and move slower, possibly because they are less able to squeeze through the cell layers generated earlier in development. How precisely is the cooperation between JNK1 and SCG10 accomplished? JNK1 is an enzyme which can add phosphate onto SCG10. Once SCG10 is modified in this way, it stabilizes the cytoskeleton.

More information: www.nature.com/neuro/journal/v … n3/full/nn.2755.html

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