Signaling between neuron types found to instigate morphological changes during early neocortex development

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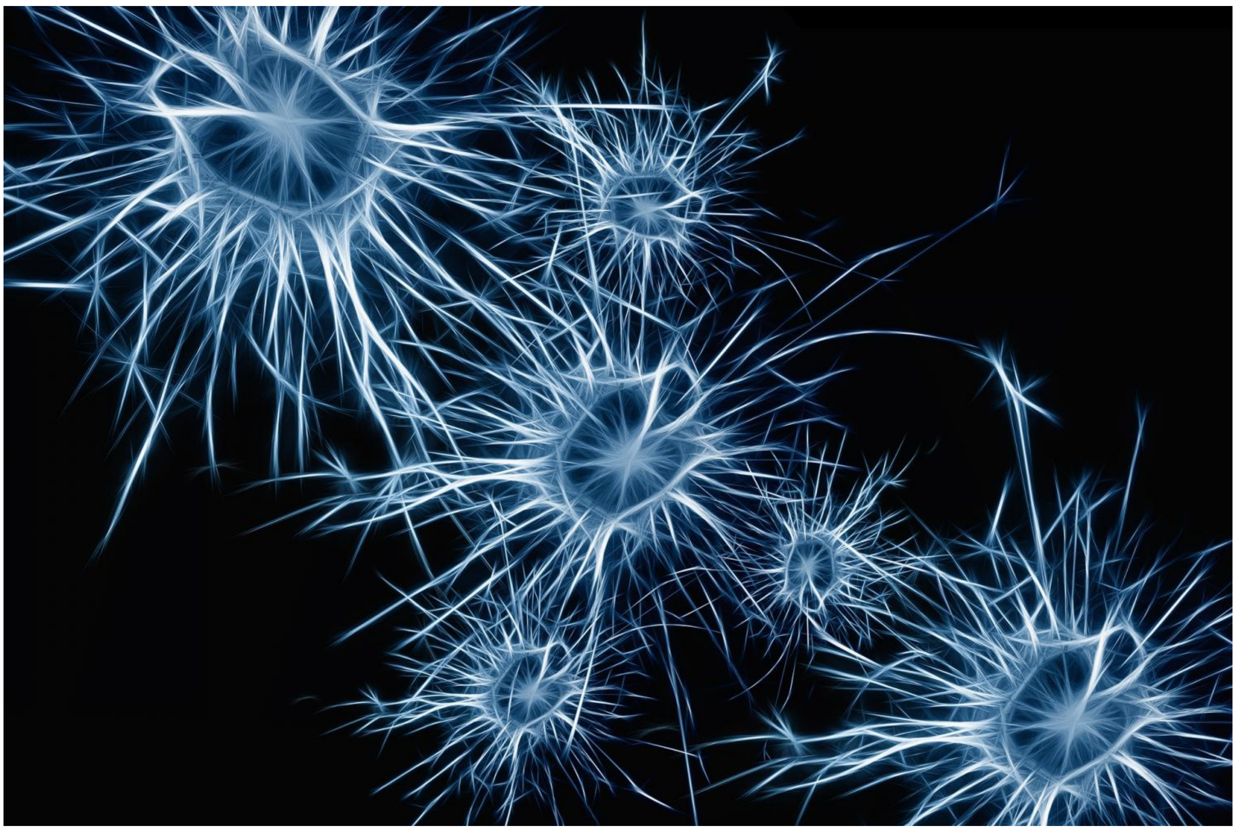

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A team of researchers from several institutions in Japan has found that developing neocortex neurons in mammals undergo a morphological transition from a multipolar shape to a bipolar shape due at least partially to signaling in neuronal migration during brain development. In their paper published in the journal *Science*, the group explains the techniques they used to study the process by which the neocortex develops in mammals and what they found. Alejandro Schinder and Guillermo Lanuza with Fundación Instituto Leloir, Instituto de Investigaciones Bioquímicas de Buenos Aires, offer a Perspective piece on the work done by the team in the same journal issue.

As the researchers note, the mammalian neocortex is one of the most intricate assemblages in all of nature—it is a section of the cerebral cortex, and plays a major role in cognition and in processing information from the senses. The development of the neocortex is equally complex, as it develops in neuronal layers. Prior research has shown that during early development of the neocortex, excitatory neurons created in the ventricular zone migrate toward the cortical plate (a layer of gray matter covering the brain, made of fibers and nerve cells). Other research has also revealed that the neuronal shape actually changes during migration, from multipolar to bipolar cells. But how this process occurs has been a mystery. In this new effort, the researchers used histochemical, imaging, and microarray analyses to study early neocortex development in mice.

The team reports that they found that sub-plate neurons actually extended neurites towards glutamatergic synapses on the multipolar neurons, instigating signaling and causing the multipolar neurons to undergo a morphological change, resulting in a bipolar shape. The change to a bipolar shape, the team notes, resulted in neurons that were more directed, and which could migrate faster.

But as Schinder and Lanuza note, it is still not clear if the sub-plate neuronal extension and signaling is the only factor at play in coaxing the morphological changes. More research will need to be done to see if there are other players involved.

More information: "Synaptic transmission from subplate neurons controls radial migration of neocortical neurons" *Science* (2018). science.sciencemag.org/cgi/doi … 1126/science.aar2866