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New brain cells listen before they talk

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Newly created neurons in adults rely on signals from distant brain regions to regulate their maturation and survival before they can communicate with existing neighboring cells—a finding that has important implications for the use of adult neural stem cells to replace brain cells lost by trauma or neurodegeneration, Yale School of Medicine researchers report in *The Journal of Neuroscience*.

In fact, certain important synaptic connections—the circuitry that allows the brain cells to talk to each other—do not appear until 21 days after the birth of the new cells, according to Charles Greer, professor of neurosurgery and neurobiology, and senior author of the study, In the meantime, other areas of the brain provide information to the new cells, preventing them from disturbing ongoing functions until the cells are mature.

It was established in previous studies that several regions of the adult brain continue to generate new neurons, which are then integrated into existing brain circuitry. However the mechanisms that allowed this to happen were not known.

To answer this question, Greer and Mary Whitman, an M.D./Ph.D. candidate at Yale, studied how new neurons are integrated into the olfactory bulb, which helps discriminate between odors, among other functions.

They found that new neurons continue to mature for six to eight weeks after they are first generated and that the new neurons receive input

from higher brain regions for up to 10 days before they can make any outputs. The other brain regions then continue to provide information to the new neurons as they integrate into existing networks.

The discovery of this previously unrecognized mechanism is significant, said Greer, because “if we want to use stem cells to replace neurons lost to injury or disease, we must ensure that they do not fire inappropriately, which could cause seizures or cognitive dysfunction.”

Source: Yale University

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