

No new neurons in the human olfactory bulb

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(Medical Xpress) -- Research from Karolinska Institutet shows that the human olfactory bulb - a structure in the brain that processes sensory input from the nose - differs from that of other mammals in that no new neurons are formed in this area after birth. The discovery, which is published in the scientific journal *Neuron*, is based on the age-determination of the cells using the carbon-14 method, and might explain why the human sense of smell is normally much worse than that of other animals.

"I've never been so astonished by a scientific discovery," says lead investigator Jonas Frisén, Tobias Foundation Professor of stem cell research at Karolinska Institutet. "What you would normally expect is for humans to be like other animals, particularly apes, in this respect."

It was long thought that all brain [neurons](#) were formed up to the time of birth, after which production stopped. A paradigm shift occurred when scientists found that nerve cells were being continually formed from stem cells in the mammalian brain, which changed scientific views on the plasticity of the brain and raised hopes of being able to replace neurons lost during some types of neurological disease.

In the adult mammal, new nerve cells are formed in two regions of the brain: the hippocampus and the [olfactory bulb](#). While the former has an important part to play in memory, the latter is essential to the interpretation of smells. However, owing to the difficulty of studying the formation of new neurons in humans, the extent to which this phenomenon also occurs in the human brain has remained unclear. In

this present study, researchers at Karolinska Institutet and their Austrian and French colleagues made use of the sharp rise in atmospheric carbon-14 caused by Cold War nuclear tests to find an answer to this question.

Carbon-14 is incorporated in DNA, making it possible to gauge the age of the [cells](#) by measuring how much of the isotope they contain. Doing this, the team found that the olfactory bulb neurons in their adult human subjects had carbon-14 levels that matched those at the atmosphere at the time of their birth. This is a strong indication that there is no significant generation of new neurons in this part of the brain, something that sets humans apart from all other [mammals](#).

"Humans are less dependent on their [sense of smell](#) for their survival than many other animals, which may be related to the loss of new cell generation in the olfactory bulb, but this is just speculation," says Professor Frisén.

Professor Frisén and his team now plan to study the extent of neuron generation in the hippocampus, a part of the [brain](#) that is important for higher cerebral functions in humans.

More information: Olaf Bergmann, Jakob Liebl, Samuel Bernard, Kanar Alkass, Maggie S.Y. Yeung, Peter Steier, Walter Kutschera, Lars Johnson, Mikael Landén, Henrik Druid, Kirsty L. Spalding & Jonas Frisén, The age of olfactory bulb neurons in humans, *Neuron*, print issue 24 May 2012. www.cell.com/neuron/

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