

## **Researchers pinpoint key stem cells for eating and sex**

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New research, published in the journal *Development*, by Dr. Anthony-Samuel LaMantia, professor of Pharmacology & Physiology and director of the newly formed GW Institute for Neuroscience, and his colleagues have identified the stem cells that generate three critical classes of nerve cells - olfactory receptors (ORNs), vomeronasal (VRNs) and gonadotropin releasing hormone (GnRH) neurons - that are responsible for enabling animals and humans, to eat, interact socially and reproduce.

This research is the first evidence identfying these stem cells. By studying mice at the earliest stages of embryonic development, LaMantia and his colleagues were able to identify the location of these cells, confirm that they divide slowly and symmetrically—thus making more stem cells, have a distinct molecular identity, and give rise to all cell types in the tissue—including ORNs, VRNs and GnRH neurons. These embryonic olfactory stem cells also are ultimately responsible for generating stem cells that remain in the lining of the nose throughout life and make new ORNs and VRNs. Thus these stem cells are also essential to enable a rare example of nervous system regeneration that continues throughout life.

"By identifying these stems cells, our research will help physicians understand why people have certain genetic, neurological, and mental disabilities. Olfaction is often compromised early in the course of a number of serious diseases including autism, schizophrenia, and Alzheimer's disease, and GnRH deficiency is important in many cases of infertility. It is my hope that in the future, we will combine this sort of



cell and molecular biology with clinical practice to develop better treatments for patients with these disorders," said Dr. LaMantia.

To identify the early olfactory stem cell, Dr. LaMantia and his colleagues used multiple methods to define the identity and potential of dividing cells in the embryonic tissue that eventually becomes the nasal epithelium—the sheet of nerve cells that lines the nasal cavity. The researchers studied these tissues using molecular markers to distinguish different classes of cells and recombinant DNA technology as well as mutant mice to assess how several key genes define olfactory stem cell identity. They found a subset of cells that divide slowly and symmetrically—suggesting that these were indeed, the stem cells. They also showed that these cells were self renewing—another essential characteristic of stem cells. They defined several molecules that influence whether these stem cells remain as stem cells or divide terminally to make olfactory, vomeronasal and GnRH neurons. Finally, they showed that these <u>stem cells</u> uniquely give rise to ORNs, VRNs, and GnRH <u>neurons</u>.

**More information:** View the journal Development article: <u>dev.biologists.org/content/137/15/2471</u>

## Provided by George Washington University Medical Center

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