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When smell cells fail they call in stem cell reserves

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Hopkins researchers have identified a backup supply of stem cells that can repair the most severe damage to the nerves responsible for our sense of smell. These reservists normally lie around and do nothing, but when neighboring cells die, the scientists say, the stem cells jump into action. A report on the discovery will appear online next week in *Nature Neuroscience*.

“These stem cells act like the Army Reserves of our nose,” explains lead author Randall Reed, Ph.D., a professor of neuroscience at Johns Hopkins, “supporting a class of active-duty stem cells that help repair normal wear and tear. They don’t come in until things are really bad.”

The only nerve cells in the body to run directly from the brain to the outside world, olfactory cells are under constant assault from harsh chemicals that one might happen to catch a whiff of by accident, risking damage or death.

To figure out how the olfactory system repairs severely damaged nerve cells, Reed’s team exposed mouse olfactory nerves to a cloud of toxic methyl-bromide gas. Methyl bromide kills not only olfactory nerve cells but also neighboring, non-nerve cells in the nasal passage. Three weeks after chemical exposure, the researchers examined nasal cells to see which, if any, had grown back.

They discovered that the newly grown cells, both nerve and non-nerve, grew from HBCs-a population of cells not previously known for repair

abilities. “We were stunned because HBCs normally don’t grow much or do anything,” says Reed. “And the most surprising thing is that HBCs can grow into both nerves and non-nerve cells; they do so by generating the other active type of nasal stem cell.”

The team then went back and looked at nerve repair under less damaging circumstances where only the olfactory nerve cells are killed. In this situation, the HBCs did nothing to repair the damaged cells; rather, they allowed the previously known stem cells to do all the repair work.

“The ability to smell is crucial for eating, mating and survival, and it’s important that the olfactory system be fully operational all the time,” explains Reed. “The HBCs act as a fail-safe to ensure continued function of the sense of smell.”

The discovery of these two distinct types of stem cells in one neural tissue is a first, says Reed, who is interested to see if other types of nerves in the body have similar repair mechanisms in play.

Source: Johns Hopkins Medical Institutions