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Sperm precursor cells made in the lab could one day restore male fertility

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(Medical Xpress)—Human embryonic stem cells (hESCs) and human induced pluripotent stem cells (hiPSCs) can be coaxed into becoming precursor sperm cells, suggesting that it might be possible one day to restore fertility for sterile males with an easily obtained skin sample, according to researchers at the University of Pittsburgh School of Medicine. Their findings are available today in the online version of *Cell Reports*.

Infertility can be a side effect of some cancer treatments because the drugs work by destroying rapidly-dividing cells, which includes sperm precursor cells, explained the study's lead author Charles Easley, Ph.D., formerly a post-doctoral fellow in the Department of Obstetrics, Gynecology and Reproductive Sciences at the University of Pittsburgh School of Medicine, and now a faculty member at Emory University.

"Sperm can be banked for future artificial insemination procedures, but that does not help some patients, such as pre-pubertal boys," Dr. Easley said. "There are procedures to store testicular tissue prior to cancer therapy, but men who didn't have the opportunity to save tissue are permanently sterile, and so far there are no cures for their sterility."

There is growing research evidence that adult somatic cells, such as those of the skin, can be induced or biologically prodded to return to a more primitive state and then redirected to become different cell types. To see if it was possible to derive sperm cells Dr. Easley and his colleagues cultured lab-grade hiPSCs from commercially available skin samples, as

well as hESCs from established cell lines, in conditions typically used to sustain spermatogonial stem cells.

They found that both kinds of stem cells were able to generate key cells, including the spermatogonial stem cells, spermatocytes containing a full complement of chromosomes prior to cell division known as meiosis, then post-meiotic spermatocytes with half the chromosome number, and round spermatids, which are precursors to sperm. Testing of certain chromosome sites showed correct parent-of-origin genomic imprints in these haploid cells as well, the researchers noted.

"No one has been able to make human sperm from pluripotent stem cells in the lab, but this research indicates it might be possible," Dr. Easley said. "This model also gives us a unique opportunity to study the molecular signals that govern the process, allowing us to learn much more about how sperm are made. Perhaps one day this will lead to new ways of diagnosing and treating male infertility."

Provided by University of Pittsburgh Schools of the Health Sciences

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