

# Coaxing new hair: Scientists work on perking up dormant follicles

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When a man's hair stops growing back, it would be logical to assume his scalp has suffered a loss of stem cells, those versatile dynamos that have the ability to regenerate hair, blood, and other parts of the body.

Not so, according to new research from the University of Pennsylvania. Bald men have just as many [stem cells](#) in their [hair](#) follicles as any magnificently tressed Samson. The cells may just need to be woken up.

It is not clear yet how to do this, but the researchers say their findings, published online last week in the [Journal of Clinical Investigation](#), give them hope that male baldness is reversible.

"The stem cells are still present, which to me was quite surprising," said senior author George Cotsarelis, chair of the dermatology department at Penn's medical school. "We should be able to figure out a way of stimulating them."

Such a treatment would find a large audience. Various estimates have placed the number of men with male-pattern baldness at more than 35 million in the United States. While many opt for hair transplants, the pharmaceutical industry would dearly like to capture some of that market. It has stumbled upon two drugs thus far by accident, Rogaine and Propecia, but these are successful primarily in maintaining existing hair, not in stimulating growth on a bald scalp.

In the new research, the kinds of stem cells in question are the adult

variety, not the more versatile [embryonic stem cells](#) that have stirred controversy.

Still, many scientists think these adult cells are a promising area of study, holding the potential to regenerate certain organs or heal wounds without scars. And what better laboratory to study them than the scalp, where hair stem cells are accessible and plentiful?

"Many of us think we can gain clues about how to regenerate other organs by understanding how to regenerate the hair," says Stanford University [dermatologist](#) Anthony Oro.

Oro, who was not involved with the new research, said it provided "one additional step along the way to better understanding the disease" of male baldness.

Andrzej Dlugosz, a University of Michigan dermatologist who also was not involved with the study, said it was promising but cautioned "there is no guarantee that the stem cells in this setting would still be responsive to stimuli that effectively activate normal follicle stem cells."

Luis A. Garza, the paper's lead author, agreed that more work was needed, adding that for some, the wait would be hard. Eager for treatment, bald people have been known to scour patent websites for promising treatments before coming in to Penn for an appointment, Garza said.

"It's a big part of people's self-image," said Garza, who is now at Johns Hopkins University. "It's a big part of who people think they are."

For the new study, Garza, Cotsarelis, and colleagues studied scalp samples left over from men who underwent hair transplants. Bald scalp was found to have just as many stem cells as scalp with hair.

Where the scalp samples differed, however, was in their levels of two other kinds of so-called progenitor cells that appear to be descendants of follicle stem cells. Samples of bald scalp contained one-tenth as many of these progenitor cells, on average, when compared to "haired" scalp.

Progenitor cells are created by the division of stem cells; the progenitors then divide further to produce hair and other kinds of cells. So in bald men, stem cells seem to have slowed way down in the process of dividing to form progenitor cells, and the answer may be simply to reactivate this process, the researchers wrote.

To further test their theory, the scientists transplanted [progenitor cells](#) from one mouse to another, where the cells led to the creation of new hair follicles. This experiment could not be done in people because such donor cells would be rejected; the mice that received donated cells were immunodeficient.

Cotsarelis said he now wants to determine the chemical signal that tells stem cells to divide into progenitors, in hopes that someday such an agent could be put in a product and applied to the scalp. He also plans to look for the chemical signals that drive hair loss in women, which are likely to be different.

Instead of a topical treatment, another possible solution for baldness would be to remove some of a person's hair-generating cells, grow them outside the body, and reimplant them, the authors said.

Yet if some other deficiency is also to blame for hair loss, then replenishing the depleted supply of hair-generating cells might not be enough, Garza said.

Hair "loss" is perhaps not even the most exact term, by the way. Men with male-pattern baldness still have hair - it's just very tiny and delicate.

Their follicles are much smaller and they produce "vellus" hair shafts that are correspondingly smaller and gossamer-thin.

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