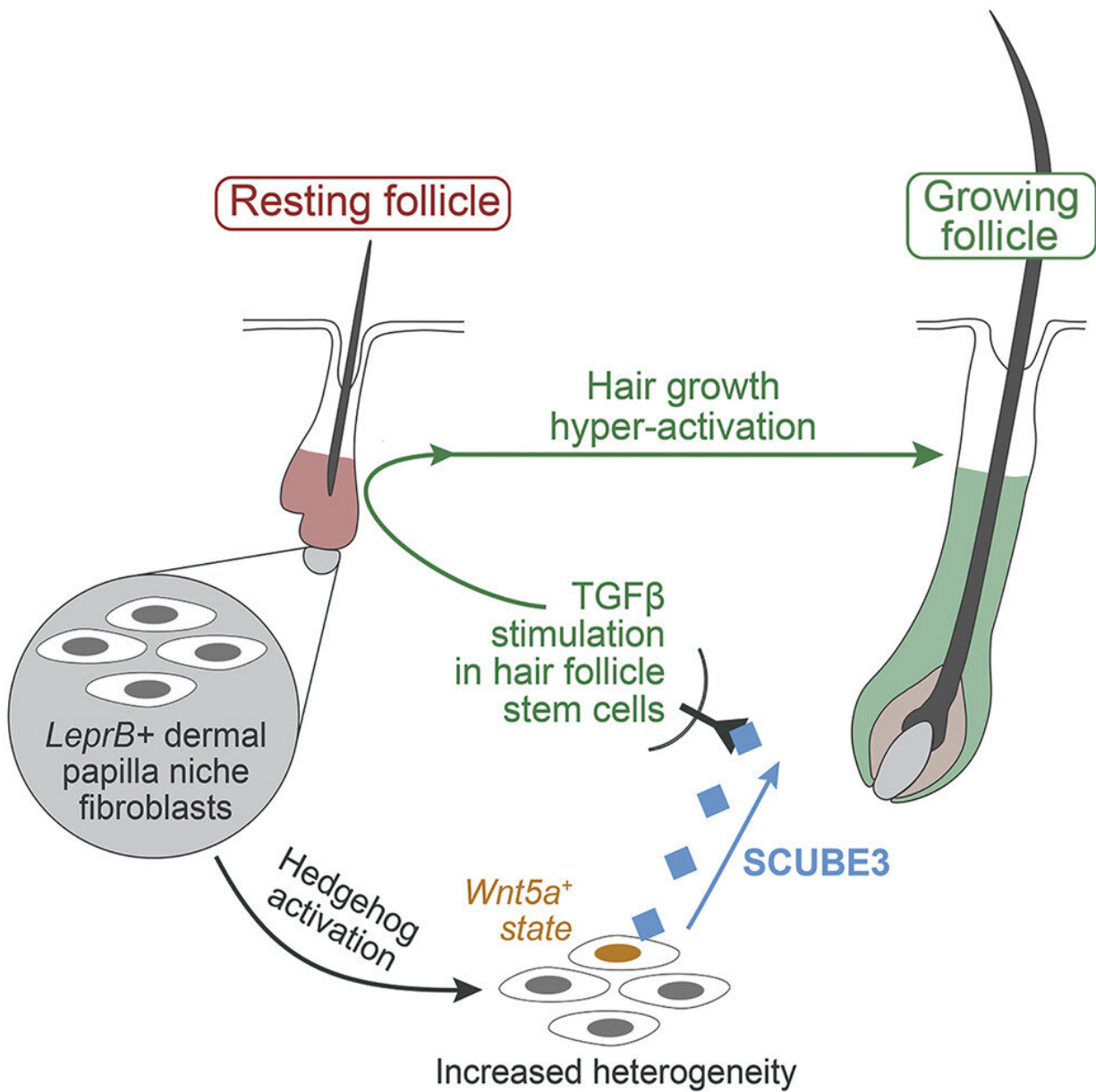


Team discovers signaling molecule that potently stimulates hair growth

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Graphical abstract. Credit: *Developmental Cell* (2022). DOI: 10.1016/j.devcel.2022.06.005

University of California, Irvine-led researchers have discovered that a signaling molecule called SCUBE3 potently stimulates hair growth and may offer a therapeutic treatment for androgenetic alopecia, a common form of hair loss in both women and men.

The study, published online today in *Developmental Cell*, determined the precise mechanism by which the dermal papilla cells—specialized signal-making fibroblasts at the bottom of each hair follicle—promote new growth. Although it's well known that dermal papilla cells play a pivotal role in controlling [hair growth](#), the genetic basis of the activating molecules involved has been poorly understood.

"At different times during the hair [follicle](#) life cycle, the very same dermal papilla cells can send signals that either keep follicles dormant or trigger new hair growth," said Maksim Plikus, Ph.D., UCI professor of developmental & [cell biology](#) and the study's corresponding author. "We revealed that the SCUBE3 signaling molecule, which dermal papilla cells produce naturally, is the messenger used to 'tell' the neighboring hair stem cells to start dividing, which heralds the onset of new hair growth."

The production of activating molecules by the dermal papilla cells is critical for efficient hair growth in mice and humans. In people with androgenetic alopecia, dermal papilla cells malfunction, greatly reducing the normally abundant activating molecules. A [mouse model](#) with hyperactivated dermal papilla cells and excessive hair, which will facilitate more discoveries about hair growth regulation, was developed for this research.

"Studying this mouse model permitted us to identify SCUBE3 as the previously unknown [signaling molecule](#) that can drive excessive hair growth," said co-first author Yingzi Liu, a UCI postdoctoral researcher in developmental & cell biology.

Further tests validated that SCUBE3 activates hair growth in human follicles. Researchers microinjected SCUBE3 into mouse skin in which human scalp follicles had been transplanted, inducing new growth in both the dormant human and surrounding mouse follicles.

"These experiments provide proof-of-principle data that SCUBE3 or derived molecules can be a promising therapeutic for [hair loss](#)," said co-first author Christian Guerrero-Juarez, a UCI postdoctoral researcher in mathematics.

Currently, there are two medications on the market—finasteride and minoxidil—that are approved by the Food and Drug Administration for [androgenetic alopecia](#). Finasteride is only approved for use in men. Both drugs are not universally effective and need to be taken daily to maintain their clinical effect.

"There is a strong need for new, effective hair loss medicines, and naturally occurring compounds that are normally used by the dermal papilla cells present ideal next-generation candidates for treatment," Plikus said. "Our test in the human hair transplant model validates the preclinical potential of SCUBE3."

More information: Yingzi Liu et al, Hedgehog signaling reprograms hair follicle niche fibroblasts to a hyper-activated state, *Developmental Cell* (2022). [DOI: 10.1016/j.devcel.2022.06.005](https://doi.org/10.1016/j.devcel.2022.06.005)

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