New research provides clues on why hair turns gray

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A new study by researchers at NYU Langone Medical Center has shown that, for the first time, Wnt signaling, already known to control many biological processes, between hair follicles and melanocyte stem cells can dictate hair pigmentation. The study was published in the June 11, 2011 issue of the journal *Cell*.

The research was led by Mayumi Ito, PhD, assistant professor in the Ronald O. Pereleman Department of Dermatology at NYU Langone. "We have known for decades that hair follicle stem cells and pigment-producing melanocycte cells collaborate to produce colored hair, but the underlying reasons were unknown," said Dr. Ito. "We discovered Wnt signaling is essential for coordinated actions of these two stem cell lineages and critical for hair pigmentation." The study suggests the manipulation of Wnt signaling may be a novel strategy for targeting pigmentation such as graying hair. The research study also illustrates a model for tissue regeneration.

"The human body has many types of stem cells that have the potential to regenerate other organs," said Dr. Ito. "The methods behind communication between stem cells of hair and color during hair replacement may give us important clues to regenerate complex organs containing many different types of cells."

Using genetic mouse models, researchers were able to examine how Wnt signaling pathways enabled both hair follicle stem cells and melanocyte stem cells to work together to generate hair growth and produce hair

color. Research also showed the depletion (or inhibition or abnormal) Wnt signaling in hair follicle stem cells not only inhibits hair re-growth but also prevents melanocytes stem cell activation required for producing hair color. The lack of Wnt activation in melanocyte stem cells leads to depigmented or gray hair.

The study raises the possibility that Wnt signaling is a key pathway for the regulation of melanocyte stem cells and shows how melanocyte behavior is associated with hair regeneration. This insight provides further understanding of diseases in which melanocytes are either appropriately lost such as hair graying or undergo uncontrolled cell growth as in melanoma.

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