

NEWS RELEASE

Aging and Hair Thinning – What Happens Under the Scalp



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*In a study that could expand the understanding of hair loss with age, scientists from **the University of Bradford** and **AVEDA** have identified specific changes in the scalp cells of women that contribute to the thinning of hair – a condition that affects a vast majority as they grow older¹⁾²⁾. This cellular-level research focuses on the **dermal sheath (DS)** and **dermal papilla (DP)** cells, which are integral to the lifecycle of hair follicles. The findings provide a promising direction for understanding the underlying causes of hair thinning in aging women, with the potential to improve the quality of life for a demographic often underrepresented in scalp research. The study was presented at the **13th World Congress for Hair Research** in Dallas, Texas, which took place from April 6-9, 2024.*

1) Experimental Dermatology (2020) 29 (7), 588-597

2) Journal of Investigative Dermatology (2021) 141, 1041-1051

After **nine years of meticulous study** on scalp skin, researchers at **the University of Bradford**, in partnership with **AVEDA**, have pioneered an in-depth analysis of scalp cell biology, focusing on a diverse group of **female subjects aged 20 to 68**. Leveraging the latest techniques such as single-cell RNA sequencing and proteomics*, the team has significantly advanced the understanding of the intricate cellular processes that underpin **hair growth and maintenance**.

*Single-cell RNA sequencing is a technique that examines the gene expression of individual cells, identifying which genes are switched on or off, thereby revealing the cells' roles and states. Proteomics complements this by mapping out the entire set of proteins produced in a cell, providing a snapshot of its structure and function. The integration of these technologies enriches the depth and accuracy of the insights gained into hair biology.

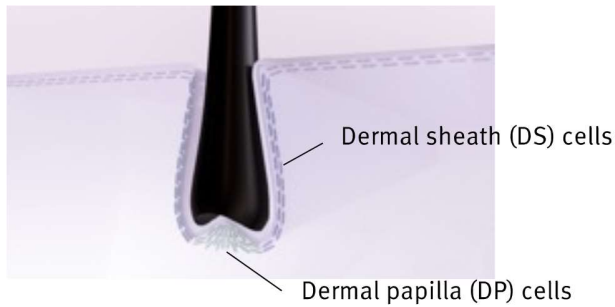


Figure 1: DS and DP Cells in Hair Follicle.

Their findings point to a **significant decrease** in the genetic markers associated with muscle contractility in DS cells, particularly noting the diminished presence of **Smoothelin**, a protein vital for the structural integrity of hair follicles. This decline implies that cells become **less efficient at contracting and relaxing**, which is essential for the movement and proper functioning of hair follicles throughout the hair growth cycle. Consequently, this can result in **weaker hair growth** and **more pronounced thinning**.

Parallel alterations were noted in **DP cells**, especially concerning the protein **Endoglin**, which is key to forming the blood vessels that supply the hair follicles with nutrients. Moreover, the researchers observed an age-related variance in the activity of ID2 and ID3 proteins, crucial in both the creation of new cells through the cell cycle and the formation of new blood vessels through angiogenesis. Discrepancies in their expression may lead to a **shortened growth phase for hair**, further contributing to the thinning process.

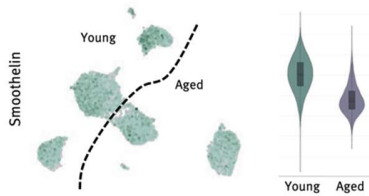


Figure 2: Noticeable decrease in the activity of genes and proteins responsible for muscle contraction.

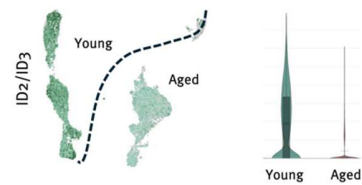


Figure 3: ID2 and ID3, showed different levels of activity in young versus old cells.

The study also uncovered shifts in **signaling pathways** that are essential for **intercellular communication** and **hair follicle cycling**, with particular pathways indicating a reparative response to the aging process. These discoveries offer a **broader understanding** of the aging scalp's cellular environment and open up potential pathways **for therapeutic intervention**.

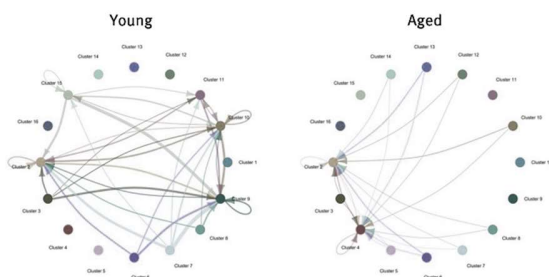


Figure 4: Changes in cellular signaling.

"Much of hair research has historically been hair-centric, but we're now peering beneath the surface," explains **Professor Thornton** from the Center for Skin Science at the University of Bradford. "Our focus is on the dermal sheath (DS) and dermal papilla (DP) cells—specific types of dermal cells within the scalp that play pivotal roles in the life cycle of a hair follicle." Their comprehensive **nine-year study**, conducted in collaboration with AVEDA, has unveiled critical functions of these cells, "We're seeing evidence that **DS cells might not just be bystanders** but could actively help replenish the surrounding scalp tissue," Dr. Thornton notes, suggesting a far more significant role than previously assumed.

The ongoing partnership with **AVEDA** has positioned the team on the cusp of further discoveries. "As we delve into this dynamic physiology of hair and scalp, we're embarking on a new chapter, one that promises to deepen our understanding of these complex biological interactions," Dr. Thornton concludes, indicating the potential for **novel insights** into **maintain hair and scalp health** as we age.

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ABOUT AVEDA

A force of nature since 1978, Aveda was founded by hair stylist Horst Rechelbacher with a mission to care for the world we live in. Crafted with care for people and planet, Aveda creates vegan, plant-powered high-performance products for hair, skin and body using botanical technologies and green chemistry, combining the principles of modern science and Ayurveda, the ancient healing art of India. Aveda is Leaping Bunny approved by Cruelty Free International and a certified B Corporation, meeting high verified standards of social and environmental performance, transparency, and accountability. Aveda products are available in more than 45 markets worldwide across freestanding stores, partner salons, specialty retailers and on [aveda.com](https://www.aveda.com). For every hair, everyone.

ABOUT THE UNIVERSITY OF BRADFORD, THE CENTRE FOR SKIN SCIENCE

The University of Bradford, tracing its roots back to 1832, achieved University status in 1966. Today, it hosts 10,000 students from over 150 countries and is renowned for its Centre for Skin Sciences (CSS), a leader in skin and hair research since 2009. The University's commitment to innovation is exemplified by the establishment of the UK's first Skin Ageing Network in 2022, a Julie Thornton-led initiative advancing the study of skin aging. This builds on Bradford's legacy of distinguished academics, including former Chancellor Harold Wilson and current Chancellor, broadcaster Anita Rani.