

Stress hormone found to cause hair loss, new study discovers

The process by which stress influenced hair loss remained a mystery, until now.

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Hair loss caused by alopecia areata.
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Can reducing stress be the secret to hair growth?

According to a new study led by Seyku Choi of Harvard University's Department of Stem Cell and Regenerative Biology, that may just be the case.

Generally speaking, a person has three stages of hair growth cycle: growth, degeneration and rest. In the first stage, the hair is a continuously pushed-



out shaft, whereas the hair stops growing and its lower portion shrinks while staying in place in the second stage. In the third stage, however, the hair eventually falls out.

While it has been known for some time that stress is linked to hair prematurely entering the third stage and falling out, as is the overall link between hair loss and chronic stress itself, the exact mechanism behind this link had remained a mystery.

What is known is that hair-follicle stem cells (HFSCs) play an essential role in hair growth by interpreting internal and external signals. Knowing this, Cho and the other researchers tested the role another area of the body – the stress-hormone producing adrenal gland – played in the cycle. To do this, they removed them from mice via surgery.

Without the adrenal glands to produce stress hormones, the mice's "rest" phase in their hair cycles was much shorter, while their hair follicles grew around three times more than normal. But when fed the hormone corticosterone, the stress hormone produced by animal adrenal glands, their hair growth was suppressed.

So does corticosterone play a role in making hair fall out? That's what this implies. HFSCs detect the stress hormone through signals, and not by detecting the hormone itself. This was determined when the researchers selectively deleted the protein known as glucocorticoid receptors in the dermal papillae. These receptors are the means by which the hormone signals the HFSCs.



BUT HOW does the dermal papillae transmit the signal? According to the study, this is done via another protein, the growth arrest-specific 6 (GAS6). Through this protein, the signal is passed to the HFSC's through yet another protein, the receptor AXL.

These findings, published in the academic journal *Nature*, essentially map out the process by which stress influences hair loss, and could pave the way for helping treat stress-induced hair loss.

In addition, the findings also come in the wake of the COVID-19 pandemic, which has caused considerable stress on the global populace as the battle rages on against the disease.

However, the study cautions that multiple issues still need to be further explored. For instance, corticosterone is not the human stress hormone, but is merely considered to be the rodent equivalent to human cortisol. As such, it isn't known if the process is exactly the same. Secondly, hair-cycle phases have different durations among humans, so it is unclear if the hormones influence it in the same way.

Thirdly, the GAS6 protein isn't limited to simply this one particular signal. In fact, the researchers found it is involved in expressing several different genes involved with the HFSCs. As such, tampering with it could have other unforeseen effects. In particular, there are fears that this could unwittingly lead to the growth of potentially mutation-causing HFSCs.

It should also be noted that there are different types of hair loss associated with stress. According to the Mayo Clinic, one of these is telogen effluvium, which sees the hair pushed into the resting phase leading to significant hair loss. The other two, however, are different.

One of them, known as Trichotillomania, is the condition when stress, frustration and other negative emotions form an irresistible compulsion, as the saying goes, to "pull one's hair out."

The third form is much different. Known as alopecia areata, this condition is an autoimmune disorder and sees hair loss caused by the body's own immune system attacking the hair follicles. There are a number of potential



causes of this condition, with high stress being one of them – although notably, the condition itself is also known to be a cause of significant psychological stress.

Nonetheless, the findings in the study have found valuable links between stress and hair loss, and this can pave the way for future studies that can explore these links further.

