No longer a gray area: Our hair bleaches itself as we grow older

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Wash away your gray? Maybe. A team of European scientists have finally solved a mystery that has perplexed humans throughout the ages: why we turn gray. Despite the notion that gray hair is a sign of wisdom, these researchers show in a research report published online in The *FASEB Journal* that wisdom has nothing to do with it. Going gray is caused by a massive build up of hydrogen peroxide due to wear and tear of our hair follicles. The peroxide winds up blocking the normal synthesis of melanin, our hair's natural pigment.

"Not only blondes change their hair color with hydrogen peroxide," said Gerald Weissmann, MD, Editor-in-Chief of The *FASEB Journal*. "All of our hair cells make a tiny bit of hydrogen peroxide, but as we get older, this little bit becomes a lot. We bleach our hair pigment from within, and our hair turns gray and then white. This research, however, is an important first step to get at the root of the problem, so to speak."

The researchers made this discovery by examining cell cultures of human hair follicles. They found that the build up of hydrogen peroxide was caused by a reduction of an enzyme that breaks up hydrogen peroxide into water and oxygen (catalase). They also discovered that hair follicles could not repair the damage caused by the hydrogen peroxide because of low levels of enzymes that normally serve this function (MSR A and B).

Further complicating matters, the high levels of hydrogen peroxide and low levels of MSR A and B, disrupt the formation of an enzyme

(tyrosinase) that leads to the production of melanin in hair follicles. Melanin is the pigment responsible for hair color, skin color, and eye color. The researchers speculate that a similar breakdown in the skin could be the root cause of vitiligo.

"As any blue-haired lady will attest, sometimes hair dyes don't quite work as anticipated," Weissmann added. "This study is a prime example of how basic research in biology can benefit us in ways never imagined."

More information: J. M. Wood, H. Decker, H. Hartmann, B. Chavan, H. Rokos, J. D. Spencer, S. Hasse, M. J. Thornton, M. Shalbaf, R. Paus, and K. U. Schallreuter. Senile hair graying: H2O2-mediated oxidative stress affects human hair color by blunting methionine sulfoxide repair. FASEB J. doi:10.1096/fj.08-125435.
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