



## Gray hair

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Besides skin wrinkling, volume shifts, and photoaging, graying hair can also be a telltale sign of aging. While it was recently a fashionable trend for younger persons to dye their hair white or gray, graying hair can make a younger person appear older, even in those with naturally premature graying of the hair.

In a study recently published in *Genes & Development*, researchers at the University of Texas Southwestern Medical Center, Dallas, identified hair shaft progenitors in the matrix that are specific to

the hair shaft and not to follicular epithelial cells.<sup>1</sup> These hair shaft progenitors express transcription factor KROX20, which expresses stem cell growth factor necessary for hair pigmentation by maintenance of differentiated melanocytes. When KROX20+ is depleted, hair growth is halted and hair turns gray, proving its important role in both hair growth and graying pathways.

Other mechanisms for hair graying include oxidative stress to the hair, at the level of the melanocyte stem cell or at the end stage of the hair melanocyte, resulting in follicular melanocyte death. With aging and certain genetic mutations (such as that seen in Chediak-Higashi syndrome), reduction of catalase and sometimes downregulation of antioxidant proteins such as BCL-2 and TRP-2 are reduced, resulting in higher reactive oxygen species (ROS) that lead to bulbar melanocyte malfunction and death.

Last year, for the first time, researchers at University College of London identified a gene involved in gray hair, the interferon regulatory factor 4 gene (IRF4).<sup>2</sup> The IRF4 gene is involved in regulating production and storage of melanin.

Besides photoprotection and vitamin antioxidants as a preventive measure, therapies that have been developed to

target the reduction of ROS in hair have been largely unsatisfactory in treating gray hair. Most people either allow their hair to gray or dye their hair, which can be time consuming and costly and is required on a more frequent basis over time – not to mention the distress related to allergic contact dermatitis caused by some components of some hair dyes, including paraphenylenediamine, which we sometimes see in our profession.

Knowledge of KROX20+, the IRF4 gene, and other pathways involved may be useful in developing novel treatments to prevent or treat graying hair. Information regarding the use of platelet rich plasma (PRP) for hair growth is increasingly being published in the literature. While some physicians purport seeing a reversal in graying with scalp PRP injections, the majority say the results are not universal.

Currently, there are no published studies evaluating the effects of PRP on gray hair. Perhaps providing stem cell factors via injections of PRP or other growth factors may aid not only in hair regrowth but in preserving pigmentation and repigmentation. ■

### References:

1. *Genes Dev.* 2017 May 2. doi: 10.1101/gad.298703.117.
2. *Nat Commun.* 2016 Mar 1;7:10815.



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