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Albert Einstein... instantly recognise his bright silver grey hair. ?? Madiba's iconic grey hair. Anderson Cooper and Emmylou Harris are among famous faces who embrace their grey hair, but plenty of us are more than eager to make it go away. Premature gray occurs when your hair loses its pigment at an early age. This can even happen to children. The onset of gray hair earlier than usual remains somewhat of a mystery, but the condition is sometimes linked to an underlying condition. Until now, hair colorants remain the primary way to get rid of gray hair.

The age at which you'll get your first gray hair (assuming your hair doesn't simply fall out) is largely determined by genetics. You'll probably get that first strand of gray around the same age your parents and grandparents started to go gray. However, the rate at which the graying progresses is somewhat under your own control. Smoking is known to increase the rate of graying. Anemia, generally poor nutrition, insufficient B vitamins, and untreated thyroid conditions can also speed the rate of graying.

What causes your hair's color to change? That has to do with the process controlling the production of the pigment called melanin, the same pigment that tans your skin in response to sunlight.

Every hair follicle contains pigment cells called melanocytes. The melanocytes produce eumelanin, which is black or dark brown, and pheomelanin, which is reddish-yellow, and pass the melanin to the cells which produce keratin, the chief protein in hair. When the keratin-producing cells (keratinocytes) die, they retain the coloring from the melanin. When you first start to go gray, the melanocytes are still present, but they become less active. Less pigment is deposited into the hair so it appears lighter.

As graying progresses, the melanocytes die off until there aren't any cells left to produce the color. While this is a normal and unavoidable part of the aging process and is not of itself associated with disease, some autoimmune diseases can cause premature graying. However, some people start going gray in their 20s and are perfectly healthy. Extreme shock or stress can also cause your hair to go gray very quickly, though not overnight.

Researchers at the University of Bradford in the UK demonstrated how over time, accumulated oxidative stress leads to the overproduction of hydrogen peroxide in the hair follicles. In other words, the hair begins to bleach itself from the inside out. The buildup of hydrogen peroxide begins to block the production of melanin, the pigment that gives hair its blonde, red or brown color.

Underlying this process is a series of complex chemical mechanisms involving the effects of oxidative stress and follicle damage on key enzymes. One is catalase, which is supposed to break up the hydrogen peroxide into water and oxygen so the body can eliminate it. But catalase levels drop as we age, allowing hydrogen peroxide to accumulate unchecked.

Two other enzymes, known as MSR A and B, are supposed to stimulate hair follicles to repair the damage, but levels of MSR A and B drop with age as well. Without enough MSR A and B, the body can't produce enough of another enzyme, tyrosinase, which is directly involved in melanin production.