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Spontaneous, long-lasting re-pigmentation of grey hair: an association with psychoemotional stress relief

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To the Editor:

Recently, Rosenberg et al. revealed that melanin production in the hair follicle (HF) pigmentary unit (HFPU) can be completely switched off/on during a single anagen phase, providing a plausible biological basis for rapid changes in hair pigmentation [1]. Hair depigmentation appeared to be associated with stressful life events and re-pigmentation with stress relief [1]. This was interesting, since the impact of perceived stress on hair pigmentation has long been discussed controversially and is an area of active research [2-5]. Even ex vivo, partial re-pigmentation is possible in selected white human scalp HFs with a few surviving melanocytes [6].

This widely publicized study [1] triggered a flurry of emails sent to the senior author from individuals wishing to share their personal experience of hair re-pigmentation events. This encouraged us to obtain IRB approval for a simple, strictly anonymized questionnaire study. A questionnaire ([Supplementary text](#)) was sent out to all 45 correspondents. Thirty-five correspondents returned answers after informed written consent, but only 29 respondents had completed the survey entirely and were thus included in our analysis. This approach is obviously limited by an inherent sampling bias as well as insufficient sample size and stratification to

be considered representative for a defined population. Nevertheless, the survey revealed interesting, shared characteristics among the participants that deserve systematic exploration in subsequent work.

Most respondents self-identified as Caucasian (N=21) and female (N=24), (age range 22-105 and mean age 53.2±17.5). No medication or drug class was self-reported with sufficient frequency to generate a trend. Half the respondents reported having “no past medical history”. Every single respondent listed scalp hair as being affected by re-pigmentation, whereas 10.7% respondents reported the phenomenon also in pubic and/or facial hair.

Most importantly, in most respondents, hair re-pigmentation was believed to be related to stress relief (**Figure 1A**). Fourteen respondents indicated that their re-pigmentation experience was associated with decreased stress through various forms of social and lifestyle-related stress relieving events/activities (e.g., vacation, physical exercise). Only three respondents believed their re-pigmentation event to be associated with a medical therapy or dental treatment. Two respondents even associated their re-pigmentation experience with increased stress, whereas 5 respondents did not



Figure 1. A) Event associated with greying reversal; social/life stress relief (15), diet change or nutritional supplement (3), medical or dental procedure (4), increased stress (2), and unknown (5). **B)** Pattern of greying reversal; Pattern A (11), Pattern B (16), and Pattern C (2). Above the chart, the image of each pattern that accompanied the question is shown.

indicate any associated events/activities (marked as “unknown association”), (Figure 1A).

An overwhelming majority of survey participants reported an alternating re-pigmentation pattern, with melanin still present at the proximal and distal ends of the hair shaft (Figure 1B). Furthermore, re-pigmentation affected 100-1000 or more hairs on the scalp in most respondents (Figure 2A). This suggests that the reported re-pigmentation events represented a systemic and synchronized phenomenon. Another parallel noted between

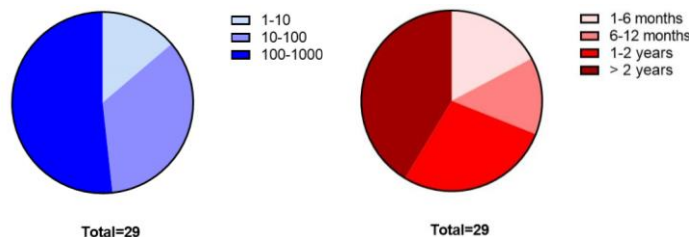


Figure 2A. Number of hairs with greying reversal; 1-10 (4), 10-100 (10), and 100-1000 (15). **B)** Duration of greying reversal; < one month (0), 1-6 months (5), 6-12 months (4), 1-2 years (8), and >2 years (12).

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respondents is that hair re-pigmentation was long-lasting (>2-year duration in most) (Figure 2B).

This confirms that hair greying is not a linear, fixed biological process [1,2], that hair shaft de- and re-pigmentation occur within a single anagen phase during which it remains reversible in principle, and that the hair follicle pigmentary unit retains its capacity to generate melanin over a long period of time despite production of a white hair shaft [1,2,4,6]. This, in turn, supports that, at least initially, human hair greying does not primarily result from a defect of bulge melanocyte stem cells, as is still often presumed on the basis of studies in mice [5], but strictly reflects events within the pigmentary unit of the anagen hair matrix that are reversible in principle.

Moreover, the self-reported re-pigmentation phenomena summarized above confirm that there is a substantial window of opportunity for reactivating defective melanogenesis and melanosome transfer within the hair follicle pigmentary unit of greying/white HFs [1,2,4], if the former contains surviving, functional melanocytes [6]. Thus, together with the observation that several drugs and hormonal changes can induce re-pigmentation of white hair in some individuals [4,6], the outcomes of this simple questionnaire study encourage one to systematically explore, next, whether stress-relief and other interventions can promote human hair re-pigmentation during this window of opportunity.

Potential conflicts of interest

The authors declare no conflicts of interest.

Supplementary text.

Questionnaire for individuals with Grey Hair Reversal

Please fill out this questionnaire to describe your grey hair reversal experience

Date: _____

Age: _____

1. Are you completing this survey on your behalf, or on the behalf of someone else?

- I am answering about my own hair
- I am answering about someone else's hair
 - Mother
 - Father
 - Friend
 - Child
 - Other: _____

2. Gender:

- Female
- Male

3. Race/Ethnicity:

- African American
- Asian
- Caucasian
- Hispanic
- Other: _____

4. Body region of hair with grey reversal:

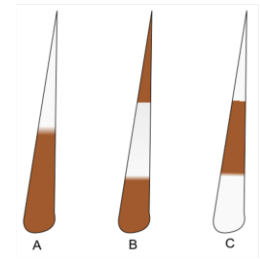
- Scalp
- Face
- Neck
- Genital
- Extremities
- Other: _____

Please make sure you have answered all the questions

Thanks for your time

5. Please choose the main pattern of greying hair reversal you have observed:

- A
- B
- C



6. Estimate # of hairs with grey reversal.

- 1-10
- 10-100
- 100-1000

7. Event (or life stress) associated with hair greying reversal:

- Social/Life stress relief
- Diet change or nutritional supplement
- Physical activity (Exercise)
- External stimulation
- Hair care products
- Cognitive change (e.g., dementia)
- Other: _____

8. Age during event (Years Old):

- 0-10
- 11-20
- 21-30
- 31-40
- 41-50
- 51-60
- 61-70
- 71-80
- > 80

9. Duration of life event or life stress

- 1-4 weeks
- 1-6 months
- 6-12 month
- 1 to 2 years
- >2 years

10. Duration of greying reversal

- 1-4 weeks
- 1-6 months
- 6-12 month
- 1 to 2 years
- >2 years

Please make sure you have answered all the questions

Thanks for your time

11. Do you take any prescription medicines? If so, what is the name, dose and frequency?

- 1. Drug: _____ Dose: _____ (mg) Times per day: _____
- 2. Drug: _____ Dose: _____ (mg) Times per day: _____
- 3. Drug: _____ Dose: _____ (mg) Times per day: _____
- 4. Drug: _____ Dose: _____ (mg) Times per day: _____
- 5. Drug: _____ Dose: _____ (mg) Times per day: _____
- 6. Drug: _____ Dose: _____ (mg) Times per day: _____
- 7. Drug: _____ Dose: _____ (mg) Times per day: _____

12. History of chronic medical condition?

- Hypertension
- Heart disease
- Liver disease
- Kidney disease
- Thyroid disease: If yes, Type: _____
- Diabetes: If yes, Type 1 or 2: _____
- Cancer: If yes, Type: _____
- Others: _____

Is there anything else you want to share about your experience?

Please make sure you have answered all the questions

Thanks for your time