

Keratin-associated proteins in grey and pigmented hair: reaction to UV irradiation

P-02.5-31

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Low-molecular keratin-associated proteins (KAPs) in human-hair shaft are considered as an important component capable of interaction with structural water-insoluble keratin and with external factors (moisture, chemicals, UV light). Photo modification of KAPs can be detected using thiol content as was shown earlier [Fedorkova M. et al 2016]. In the current study we compared total amount of KAPs (as soluble proteins (SP, ug/mg) and thiol group (SH) content in these proteins (ug/mg) in grey and pigmented hair shafts of 15 volunteers aged 45-70 years, without hair coloring. A part of hair shafts in each sample were irradiated with UV-C light at an intensity of 1.5 mW/cm² on the sample using the band of a mercury lamp peaked at 254 nm with rejection of remaining bands. Irradiated and control samples were homogenized and both SP and SH were assayed in the resulting supernatants. No significant difference was found between pigmented and grey hairs in control samples. After UV irradiation SP increased by 16% in pigmented hairs ($p < 0.05$) and by 37% in grey hairs ($p < 0.01$), and SH content increased by 44% and by 52%, respectively ($p < 0.01$). Thus, SP content in irradiated grey hair (221 ± 46 ug/mg) was higher than that in pigmented hair (179 ± 39 ug/mg), $p < 0.05$. The probable mechanism may involve photoinduced damage of S-S bonds in insoluble keratins and/or between these keratins and KAPs with release of soluble peptides and proteins. Obviously, a pigmented hair is protected with melanin unlike a grey one, which may explain difference in SP content after irradiation. It was also found that proximal segments of grey hairs (3-20 mm from hair bulb) were more sensitive to UV light than the distal (100-120 mm from the bulb) ones: an increase in SP and SH content by 81 and 57%, respectively, was obtained for the former, and an increase in SP and SH content by 46 and 34%, respectively, was obtained for the latter.

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