Photoaging hair: Key concepts and clinical relevance

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Human hair is constantly subjected to repeated environmental assaults, commonly termed weathering. Among the various sources of hair damages, it is well known that exposure to ultraviolet (UV) radiation damages hair fiber. UV light induced hair photoaging is difficult to avoid during daily life.

Photoaged hair showed sequential cortical and cuticular alterations and restoration especially severe in the endocuticular layer of hair cuticle. Release of soluble hair protein and partial degeneration of integral hair lipid (IHL) were also noted and restored gradually by UV irradiation. UV induced photoaging show morphological and chemical changes of human hair. It also affects alterations of cell membrane complex (CMC) lipids.

Lipid in the hair follicle is mainly distributed in hair cuticle and keratinized inner root sheath. IHL is mainly composed of fatty acid, cholesterol sulfate, ceramide, and cholesterol. The lipid content of human hair, takes up to 0.7% ~ 1.3% in total components of hair. The IHL in hair is the only continuous structure that plays a key role in maintenance of hair integrity including hydrophobicity and stiffness. IHL has major significance in determining the surface properties of hair. Surface cells in hair are abundant in fatty acids and about 40% of such fatty acids were composed of 18-methyl-eicosanoic acid (18-MEA) and known to be bound to proteins by ester or thioester bond in living or keratinized cells.

In intensive cases partial alopecia may occur due to hair breakage. These extrinsic hair damage cause disruption of IHL which invariably cause changes in the hair structure. In most cases, such structural alterations remain at a subclinical level. If aggressive damages are accumulated, considerable change, such as the development of clinically evident irreversible hair damage, is the consequence. So recognition of extrinsic hair damage is important, in order that clinicians may provide appropriate advice on the avoidance of such damages to the patients and keep their hair in good condition.