Study of Carnosine's effect on nude mice skin to prevent UV-A damage

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Abstract

The skin is an important barrier against external attacks from bacteria, radicals, or radiations. UV-A radiations cause significant impairment of this barrier, inducing inflammation, oxidative stress, and wrinkle formation, thereby promoting photoaging. Previous studies reported that carnosine, a potent antioxidant, and carbonyl scavenger agent, may prevent photoaging features in the skin of hairless mice exposed to UV-A radiations. In the present study, we used a quantitative proteomic approach to analyze the changes evoked by carnosine in the skin proteome of hairless mice exposed to UV-A. This approach allowed to quantify more than 2480 proteins, among them consistent differences were observed for 89 proteins in UV-A exposed vs control unexposed skins, and 252 proteins in UV-A-exposed skin preventively treated by carnosine (UVAC) vs UV-A. Several functional pathways were altered in the skins of UV-A exposed hairless mice, including the integrin-linked kinase, calcium signaling, fibrogenesis, cell migration and filament formation. An impairment of mitochondrial function and metabolism was observed, with an up-regulation of cytochrome C oxidase 6B1 and NADH: ubiquinone oxidoreductase S8. Skins pre-treated by carnosine were prevented from UV-A induced proteome alterations. In conclusion, our study emphasizes the potency of a proteomic approach to identify the consequences of UV radiations in the skins, and points out the capacity of carnosine to prevent the alterations of skin proteome evoked by UV-A.