Oral Supplementation with Cocoa Extract Reduces UVB-Induced Wrinkles in Hairless Mouse Skin.

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Abstract

Cacao beans contain various bioactive phytochemicals that could modify the pathogenesis of certain diseases. Here, we report that oral administration of cacao powder (CP) attenuates UVB-induced skin wrinkling by the regulation of genes involved in dermal matrix production and maintenance. Transcriptome analysis revealed that 788 genes are down- or upregulated in the CP supplemented group, compared with the UVB-irradiated mouse skin controls. Among the differentially expressed genes, cathepsin G and serpin B6c play important roles in UVB-induced skin wrinkle formation. Gene regulatory network analysis also identified several candidate regulators responsible for the protective effects of CP supplementation against UVB-induced skin damage. CP also elicited antiwrinkle effects via inhibition of UVB-induced matrix metalloproteinases-1 expression in both the human skin equivalent model and human dermal fibroblasts. Inhibition of UVB-induced activator protein-1 via CP supplementation is likely to affect the expression of matrix metalloproteinases-1. CP supplementation also downregulates the expression of cathepsin G in human dermal fibroblasts. 5-(3',4'-Dihydroxyphenyl)-γ-valerolactone, a major in vivo metabolite of CP, showed effects similar to CP supplementation. These results suggest that cacao extract may offer a protective effect against photoaging by inhibiting the breakdown of dermal matrix, which leads to an overall reduction in wrinkle formation.