

〈一般論文〉

## UVA 照射による細胞膜コレステロールの減少は真皮線維芽細胞において コラーゲン代謝に影響する

足立浩章<sup>1,2,\*</sup>, 田中 浩<sup>1</sup>, 八代洋一<sup>1</sup>, 中田 悟<sup>1</sup>, 平嶋尚英<sup>2,3</sup>

### The Loss of Membrane Cholesterol Caused by UVA Irradiation Affects Collagen Metabolism in Dermal Fibroblasts

Hiroaki ADACHI<sup>1,2,\*</sup>, Hiroshi TANAKA<sup>1</sup>, Youichi YASHIRO<sup>1</sup>, Satoru NAKATA<sup>1</sup>, Naohide HIRASHIMA<sup>2,3</sup>

(Accepted: July 28, 2017)

#### Abstract

Ultraviolet rays (UV) cause premature wrinkle and sagging skin, which is called photoaging, through damage on human skin tissues and cells. Plasma membranes play an essential role in receiving extracellular signals and nutrients through membrane receptors and endocytotic membrane traffic events. Although damage on plasma membranes *via* membrane lipid peroxidation by UV was already reported, the relationship between photoaging and plasma membranes is still not fully understood. In this study, we investigated the relationship between functions of plasma membranes and collagen metabolism in UV-irradiated human dermal fibroblasts. The aim of this study is to clarify a part of relationship between wrinkle formation in photoaging and plasma membrane function in dermal fibroblasts. As a result, an irregular staining of plasma membranes by DiI, a reduction in neutral red (NR) uptake and a loss of membrane cholesterol were observed after UVA irradiation, while no changes were observed after UVB irradiation. The irregular DiI staining of plasma membranes and the reduction in NR uptake were also observed after Methyl- $\beta$ -Cyclodextrin (M $\beta$ CD) treatment which removes cholesterol from cell membranes. In addition, M $\beta$ CD significantly decreased type I collagen mRNA expression and increased matrix metalloproteinase-1 mRNA expression in fibroblasts. These results suggest that UVA irradiation reduces plasma membrane cholesterol, alters plasma membrane behavior, and reduces the amount of collagen through changing a balance of collagen synthesis and degradation in dermal fibroblasts. Since a decrease in collagen causes wrinkle in photoaging skin, the loss of membrane cholesterol caused by UVA irradiation may be one of the causes of alterations observed in photoaging skin.

**Key words:** plasma membrane, function, ultraviolet, collagen.