

MicroRNAs: CELLULAR DRIVER TO PROTECT SKIN CELLS AGAINST UVA-INDUCED DAMAGE?

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Abstract

Ultraviolet (UV) radiation is the main exogenous factor to induce skin aging. Our objective was to evaluate the effects of low dose UVA radiation in the expression of microRNAs (miRNAs) in human keratinocytes (HaCaT) *in vitro*. Our results demonstrated that cells exposed to UVA at a dose 5 J/cm² had an increase in their levels of miR-145 and a decrease in their levels of miR-21. Besides, there was an up-regulation in the expression of antioxidant proteins (catalase and SOD1), which supports the fast ROS balance recovery and the low cell toxicity at this UVA dose. Interestingly, we observed an up-regulation the SIRT1 protein expression, which has been broadly studied as an important antiaging factor. In a whole, our data suggest that miR-145 may play a key role in cellular protection against UVA-induced damage.

Key words: keratinocytes, UVA, microRNA.

Introduction

UV radiation is one of the main exogenous factors to induce skin aging^[1]. miRNAs levels vary in response to environmental changes, including UV radiation damage, and act in cell adaptation by regulating genetic expression in a post-transcriptional level^[2]. Our objective was to evaluate the effects of low doses of UVA radiation in miRNAs expression in human keratinocytes (HaCaT) *in vitro*.

Results and Discussion

Firstly, we determined cellular response to different UVA radiation doses in terms of cellular viability (MTT reduction assay) and reactive oxygen species (ROS) levels (fluorescence microscope assay, using a DCFH-DA probe). Cells exposure to 5 J/cm² UVA dose did not impair cellular viability, on the other hand, 15 J/cm² reduced the cell viability, which lasted even after a 24 h recovery period (Fig. 1A). HaCaT exposure to 5 J/cm² UVA led to an increase in the ROS levels that lasted for more 1 h after the treatment and decreased after a 2 h period. (Fig. 1B-D). This observation supports the influence of antioxidant cellular mechanisms in cell protection.

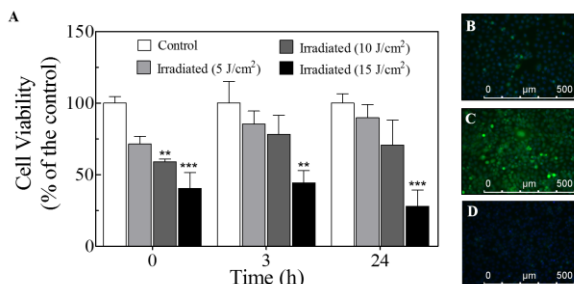


Figure 1. Cellular response to different UVA radiation doses. A) Cellular viability (MTT reduction assay); B-D) ROS levels. B) Non-treated group; C) Treated group, 1h recovery; D) Treated group, 2h recovery.

Afterwards, we determined the influence of 5 J/cm² UVA dose in miRNAs and proteins expression across time. We observed an up-

regulation in the miR-145 expression (Fig. 2A) and a down-regulation in the miR-21 expression (Fig. 2B). A similar correlation between these two miRNAs has already been reported^[3]. Besides, the up-regulation of SOD1 and catalase (Fig. 2C) and the reduction in the ROS levels (Fig. 1B-D) are supported by miR-21 down-regulation^[4]. Interestingly, we observed a significant up-regulation in SIRT1 expression (Fig. 2D), which has been broadly studied as an antiaging factor^[5].

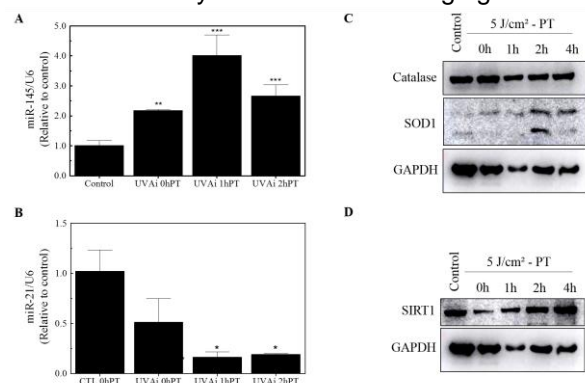


Figure 2. Effects of 5 J/cm² UVA dose treatment in miR-145 (A); miR-21 (B) and Catalase, SOD1 and SIRT1 expression (C-D)

Conclusions

Discovering factors that influence aging may lead to identification of biomarkers, as well as important cellular targets to protect skin against UV radiation-induced damage. Our data suggest that miR-145 may play an important role in protecting cells against UV radiation damage.

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