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Meeting abstract

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The infrared A gene response of human dermal fibroblasts involves several mitochondria dependent and independent signaling pathways

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Infrared A radiation (IRA 760–1440 nm), a major component of solar radiation reaching the human skin, has been shown to alter the expression of matrixmetalloproteinase-1 (MMP-1) in human dermal fibroblasts involving retrograde mitochondrial signaling pathways.

Aim of this study was to examine the gene regulatory potential of IRA beyond MMP-1, the role of mitochondria in initiating IRA-induced signaling responses and the signaling pathways involved.

Primary human dermal fibroblasts were irradiated with a single dose of IRA (860 J/cm^2).

Gene expression analysis was performed utilizing Affymetrix DNA-microarrays, realtime PCR and Western Blot. To identify differentially regulated genes despite a bias due to interindividual differences in gene expression, we applied a filtering strategy, which selects genes regulated in at least three of nine independent experiments performed, revealing 599 regulated genes (250 up- and 349 downregulated). From those genes we selected ones that relates to skin aging, based on functional Gene-Ontology clustering. Thirteen genes (BAX, BAD, FASTK, TNFRSF6B, PIK3R3, PIP5K1B, ITPR3, ITPR2, ATP1B1, FN1, VCAM1, IL6ST, STAT3) were further analyzed in additional experiments by realtime PCR and Western Blot analysis, results confirmed the findings from microarray analysis. In a third step inhibitors of retrograde and other signaling pathways as well as mitochondria targeted and whole cell distributed antioxidants were applied to investigate the role of mitochondria in the cellular response to IRA. Mitochondria dependent and independent pathways were found to be involved. Our results underline the impact of IRA on gene expression in skin, with the mitochondria being the major player in IRA-induced signaling.