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Predominant effects of Polypodium leucotomos on membrane integrity, lipid peroxidation, and expression of elastin and matrixmetalloproteinase-1 in ultraviolet radiation exposed fibroblasts, and keratinocytes.

Philips N[1], Smith J, Keller T, Gonzalez S.

Author information

Abstract

BACKGROUND:

Polypodium leucotomos has been reported to have antioxidant, anti-inflammatory and photoprotective properties. Exposure of skin to ultraviolet (UV) radiation can lead to deposition of excessive elastotic material, reduction in collagen, and increased expression of matrix metalloproteinases (MMPs).

OBJECTIVE:

The goal of this research was to determine the effects of P. leucotomos in the absence or presence of UVA or UVB radiation on membrane damage, lipid peroxidation, and expression of elastin and MMP-1 in fibroblasts and keratinocytes, respectively.

METHODS:

Fibroblasts and keratinocytes, respectively, were irradiated by a single exposure to UVA (0.6, 1.8 or 3.6 J) or UVB radiation (0.75, 2.5 or 7.5 mJ), and then incubated with, or without, P. leucotomos (0.01, 0.1 and 1%) and examined for membrane damage, lipid peroxidation, expression of elastin (protein levels) and MMP-1 (protein levels or MMP-1 promoter activity).

RESULTS:

UV radiation did not significantly alter membrane integrity, lipid peroxidation or MMP-1 expression, but increased elastin expression. P. leucotomos significantly improved membrane integrity, inhibited lipid peroxidation, increased elastin expression, and inhibited MMP-1 expression in both fibroblasts, and keratinocytes. The effects of P. leucotomos predominated in the presence of UVA or UVB in both fibroblasts and keratinocytes, respectively, with the exception of inhibition of MMP-1 protein levels in fibroblasts only in combination with UV radiation.

CONCLUSION:

Lower concentration of P. leucotomos (lower than 0.1%), may be beneficial in preventing photoaging by improving membrane integrity and inhibiting MMP-1, without increasing elastin expression. Higher concentration (greater than 0.1%) of P. leucotomos may reverse the loss of normal elastic fibers associated with intrinsic aging.

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