



The Effects of Pomegranate on the Skin

Studies Relating to the Benefits of Pomegranate on the Skin

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Protective effect of pomegranate-derived products on UVB-mediated damage in human reconstituted skin.

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Abstract

Solar ultraviolet (UV) radiation, particularly its UVB (290-320 nm) component, is the primary cause of many adverse biological effects including photoaging and skin cancer. UVB radiation causes DNA damage, protein oxidation and induces matrix metalloproteinases (MMPs). Photochemoprevention via the use of botanical antioxidants in affording protection to human skin against UVB damage is receiving increasing attention. Pomegranate, from the tree *Punica granatum*, contains anthocyanins and hydrolysable tannins and possesses strong antioxidant and anti-tumor-promoting properties. In this study, we determined the effect of pomegranate-derived products--POMx juice, POMx extract and pomegranate oil (POMo)--against UVB-mediated damage using reconstituted human skin (EpiDerm(TM) FT-200). EpiDerm was treated with POMx juice (1-2 microl/0.1 ml/well), POMx ex-tract (5-10 microg/0.1 ml/well) and POMo (1-2 microl/0.1 ml/well) for 1 h prior to UVB (60 mJ/cm(2)) irradiation and was harvested 12 h post-UVB to assess protein oxidation, markers of DNA damage and photoaging by Western blot analysis and immunohistochemistry. Pretreatment of Epiderm with pomegranate-derived products resulted in inhibition of UVB-induced (i) cyclobutane pyrimidine dimers (CPD), (ii) 8-dihydro-2'-deoxyguanosine (8-OHdG), (iii) protein oxidation and (iv) proliferating cell nuclear antigen (PCNA) protein expression. We also found that pretreatment of Epiderm with pomegranate-derived products resulted in inhibition of UVB-induced (i) collagenase (MMP-1), (ii) gelatinase (MMP-2, MMP-9), (iii) stromelysin (MMP-3), (iv) marilysin (MMP-7), (v) elastase (MMP-12) and (vi) tropoelastin. Gelatin zymography revealed that pomegranate-derived products inhibited UVB-induced MMP-2 and MMP-9 activities. Pomegranate-derived products also caused a decrease in UVB-induced protein expression of c-Fos and phosphorylation of c-Jun. Collectively, these results suggest that all three pomegranate-derived products may be useful against UVB-induced damage to human skin.

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Extract of *Punica granatum* inhibits skin photoaging induced by UVB irradiation.

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Abstract

BACKGROUND: *Punica granatum* (pomegranate) is kind of a fruit consumed fresh or in beverage. It has been widely used in traditional medicine in various parts of the world. In this study, we examined the efficacy of a *Punica granatum* (PG) extract in protecting skin against UVB-induced damage using cultured human skin fibro-blasts. **METHODS:** A Korean red PG sample was used, and its effects classified according to if the PG source originated from the rind, seed and fruit. The polyphenol content of PG, which is known to prevent other adverse cutaneous effects of UV irradiation, was measured by GC-MS. The protective effects of PG on UVB-induced skin photoaging were examined by determining the level of procollagen type I and MMP-1 after UVB irradiation. **RESULTS:** Based on the GC-MS quantitative analysis, catechin, quercetin, kaempferol, and equol were the pre-dominant compounds detected in PG. In the changes of expression of procollagen type I and MMP-1 in UV irradiated human skin fibroblasts treated PG, especially extract prepared from rind, the synthesis of collagen was increased and the expression of MMP-1 was decreased. **CONCLUSION:** The major polyphenols in PG, particularly catechin, play a significant role in its photoprotective effects on UVB-induced skin damage.

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Inhibition of UVB-mediated oxidative stress and markers of photoaging in immortalized HaCaT keratinocytes by pomegranate polyphenol extract POMx.

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Abstract

In recent years there has been an increase in use of botanicals with antioxidant properties as skin photoprotective agents. Pomegranate (*Punica granatum* L.) fruit possesses strong antioxidant and anti-inflammatory properties. Recently, we have shown that pomegranate-derived products rich in anthocyanidins and ellagitannins inhibit UVB-mediated activation of nuclear factor kappa B and modulate UVA-mediated cell proliferation pathways in normal human epidermal keratinocytes. In this study, we evaluated the effect of polyphenol-rich pomegranate fruit extract (POMx) on UVB-induced oxidative stress and photoaging in human immortalized HaCaT keratinocytes. Our data show that pretreatment of HaCaT cells with POMx (10-40 microg mL(-1)) inhibited UVB (15-30 mJ cm(-2))-mediated (1) decrease in cell viability, (2) decrease in intracellular glutathione content and (3) increase in lipid peroxidation. Employing immunoblot analysis we found that pretreatment of HaCaT cells with POMx inhibited UVB-induced (1) upregulation of MMP-1, -2, -7 and -9, (2) decrease in TIMP-1, (3) phosphorylation of MAPKs and (iv) phosphorylation of c-jun, whereas no effect was observed on UVB-induced c-fos protein levels. These results suggest that POMx protects HaCaT cells against UVB-induced oxidative stress and markers of photoaging and could be a useful supplement in skin care products.

Dietary compound ellagic acid alleviates skin wrinkle and inflammation induced by UV-B irradiation.

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Abstract

Please cite this paper as: Dietary compound ellagic acid alleviates skin wrinkle and inflammation induced by UV-B irradiation. *Experimental Dermatology* 2010. Abstract: Ellagic acid, a polyphenol compound present in berries and pomegranate, has received attention as an agent that may have potential bioactivities preventing chronic diseases. This study examined photoprotective effects of ellagic acid on collagen breakdown and inflammatory responses in UV (ultraviolet)-B irradiated human skin cells and hairless mice. Ellagic acid attenuated the UV-B-induced toxicity of HaCaT keratinocytes and human dermal fibroblasts. Non-toxic ellagic acid markedly prevented collagen degradation by blocking matrix metalloproteinase production in UV-B-exposed fibroblasts. Anti-wrinkle activity of ellagic acid was further investigated in hairless mice exposed to UV-B, in which it attenuated UV-B-triggered skin wrinkle formation and epidermal thickening. Topical application of 10 mumol/l ellagic acid diminished production of pro-inflammatory cytokines IL-1beta and IL-6, and blocked infiltration of inflammatory macrophages in the integuments of SKH-1 hairless mice exposed to UV-B for 8 weeks. In addition, this compound mitigated inflammatory intracellular cell adhesion molecule-1 expression in UV-B-irradiated keratinocytes and photoaged mouse epidermis. These results demonstrate that ellagic acid prevented collagen destruction and inflammatory responses caused by UV-B. Therefore, dietary and pharmacological interventions with berries rich in ellagic acid may be promising treatment strategies interrupting skin wrinkle and inflammation associated with chronic UV exposure leading to photoaging.

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