

Anthocyanins from black soybean seed coat prevent skin fibrosis by downregulating TGF- β expression in a mouse model of cutaneous radiation injury

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Background

Anthocyanins are polyphenols responsible for many fruit and floral colors. Anthocyanins are especially abundant in the epidermal palisade layer of the black soybean seed coat. The aim of this study was to evaluate the protective effects of anthocyanins from the black soybean seed coat against radiation injury in mouse skin.

Methods

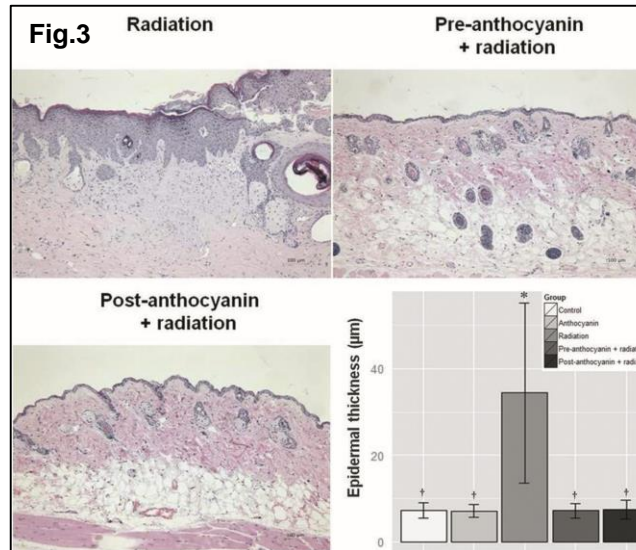
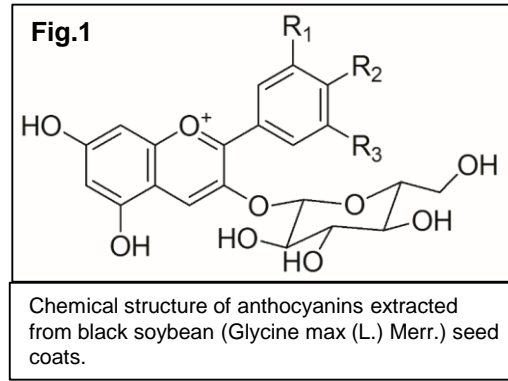
A total of 60 mice were used for an in vivo study. A dose of 100 $\mu\text{g}/\text{mL}$ anthocyanins (Fig.1) was administered daily for 5 days before or after radiation therapy. Following irradiation (45 Gy), mice were inspected for gross pathology twice per week for 8 weeks. At 4 and 8 weeks post-irradiation, dorsal skin was harvested for histopathologic examination and protein isolation.

Results

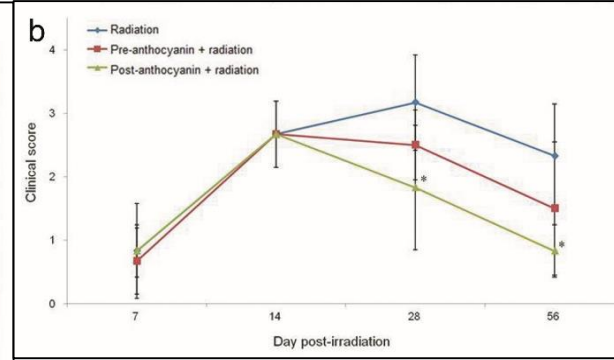
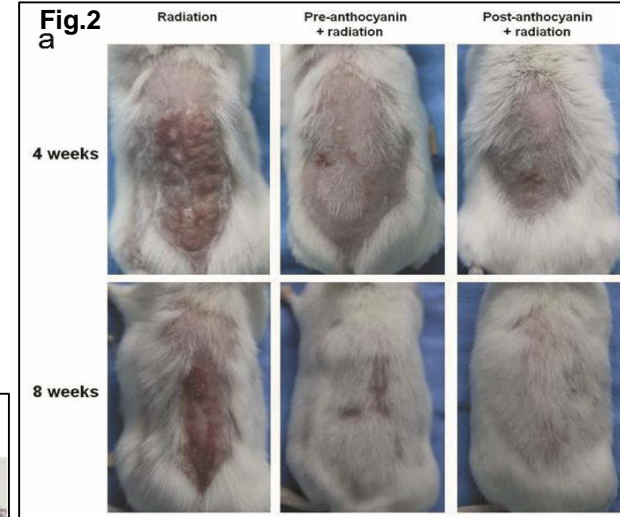
Treatment with 100 $\mu\text{g}/\text{mL}$ anthocyanins resulted in a significant reduction in the level of skin injury (Fig.2), epidermal thickness (Fig.3), and collagen deposition after irradiation. Treatment of irradiated skin with 100 $\mu\text{g}/\text{mL}$ anthocyanins significantly decreased the number of myofibroblasts (Fig.4) and TGF- β 1 protein expression (Fig.5).

Conclusions

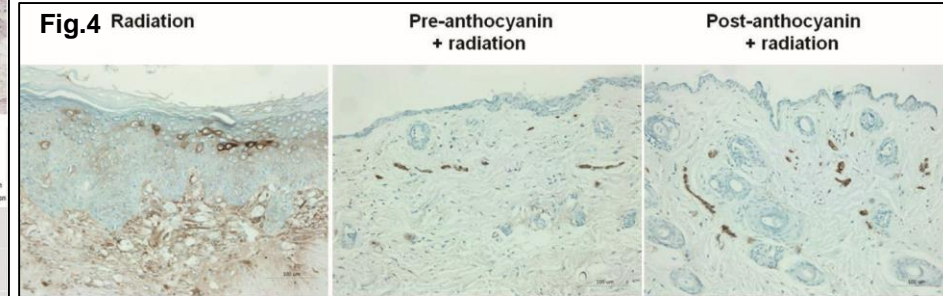
Our study demonstrated that black soybean anthocyanins inhibited radiation-induced fibrosis by downregulating TGF- β expression. Therefore, anthocyanins may be a safe and effective candidate for the prevention of radiation-induced skin fibrosis.



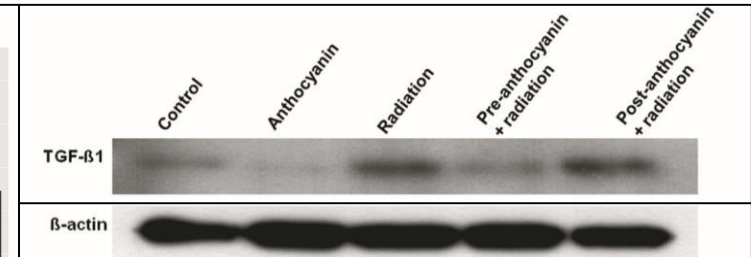
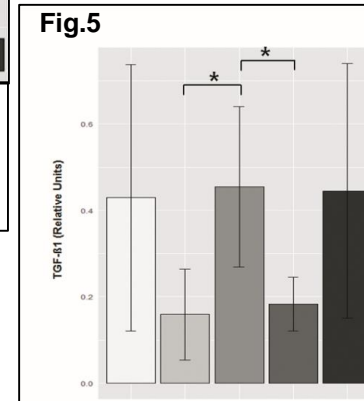
Results of hematoxylin and eosin staining at 8 weeks. The epidermal layer in the irradiated, nontreated group was markedly thicker than that in the untreated, nonirradiated, anthocyanins-treated, and irradiated, anthocyanins-treated groups.



a Gross photographs. **b** At 4 and 8 weeks, the irradiated, anthocyanins post-treated group had a significantly lower level of skin injury compared to the irradiated, nontreated group ($p=0.03$ and 0.017 , respectively).



Results of α -smooth muscle actin staining at 8 weeks. In the irradiated, anthocyanins-treated groups, the number of α -SMA-positive fibroblast cells was significantly reduced compared to the irradiated, nontreated group.



In the irradiated, nontreated group, protein levels of TGF- β 1 were significantly higher than levels in the non-irradiated and anthocyanin-treated group ($p=0.04$) and the anthocyanins pre-treated group ($p=0.01$)