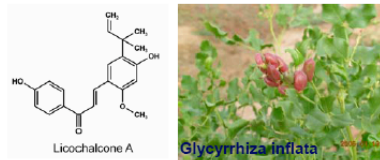


Anti-Oxidative and Anti-Inflammatory Properties of Licochalcone A from *Glycyrrhiza inflata* on Human Skin in vitro and in vivo

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Introduction

Licorice extract is not only used for candies or as sweetener in food industry but also as a basic compound of several traditional medicines for a broad range of diseases. Pharmacological activities have been attributed to several phenolic ingredients and terpene saponins found in different *Glycyrrhiza* species. We examined the in vitro inhibitory effects of licorice from *Glycyrrhiza inflata* containing licochalcone A (about 20 % of the extract) on various pro-oxidative reaction cascades and performed clinical studies to prove the anti-oxidant capacity of topical licochalcone A (LicA) in vivo.



In vitro

Reduction of Reactive Oxygen Species

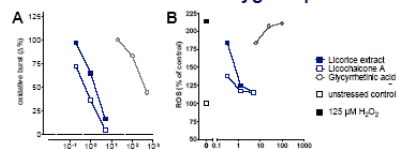


Fig. 1: Oxidative Burst of Neutrophils (A) and Fibroblast Protection against Oxidative Stress (B)

LicA and the Licorice extract reduced dose-dependently the formation of ROS after H₂O₂ exposure nearly down to control levels. LicA inhibited ROS formation significantly at concentrations at 0,3 µg/ml whereas glycyrrhetic acid from *G. glabra* displayed no positive effects at concentrations up to 100 µg/ml (B). Additionally the oxidative burst reaction of neutrophils stimulated with zymosan (opsonated yeast) was inhibited dose-dependently by LicA and the Licorice extract thus exceeding by far the effects of glycyrrhetic acid (A).

Inhibition of pro-inflammatory mediators

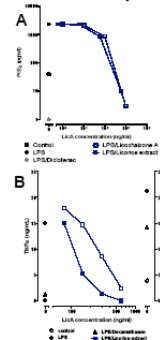


Fig. 2: Upon stimulation with LPS dermal fibroblasts release high levels of the inflammatory eicosanoid PGE₂. PGE₂ production was reduced to control levels by both, the extract and synthetic LicA. Diclofenac was used as a positive control (A).

Low LPS concentrations induce the production of both inflammatory cytokines IL-6 and TNF-α by immature dendritic cells. This inflammatory activation was dose-dependently suppressed by LicA and the licorice extract (B). Dexamethason was used as a positive control.

In vivo

Prevention of UVA-induced Photon Emission

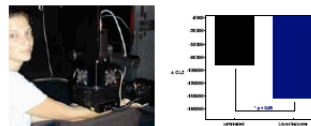


Fig. 3: With a special method, the chemiluminescence technique (UPE = Ultraweak Photon Emission), the formation of free radicals can be detected, since their destructive action is associated with the release of photons (light quanta). Defined skin areas were irradiated with UVA and the intensity and decay of the emitted photons/second measured. An in vivo study (n=20) with a LicA containing formulation confirmed anti-oxidative efficacy on UV-induced ultra weak photon emission.

Soothing of razor burn erythema

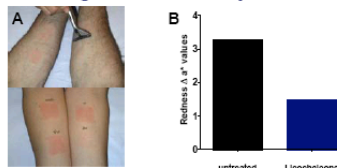


Figure 4B shows a statistically significant difference in skin redness (delta a values = shaved site values minus adjacent unshaven site) comparing the lotion containing LicA to the untreated control (p < 0,05; n=45). Clinical grading confirmed the instrumental measurements (A).

Conclusion

Topically applied licochalcone A demonstrates a potent inhibitory capability against oxidative and inflammatory skin damage and is a potent active ingredient for dermatological and cosmetic applications.