Chalcones versus 2-styrylchromones: which are the best oxygen and nitrogen reactive species scavengers?

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Introduction
During the inflammatory process a state of oxidative stress can arise, characterized by an imbalance between the production of prooxidant reactive species [e.g. hydrogen peroxide (H₂O₂), superoxide anion radical (O₂⁻•) and nitric oxide radical (·NO)], by inflammatory cells, and an incapacity of the body’s antioxidant defence systems to counteract these reactive species’ products. This condition often results in increased tissue damage and development of chronic diseases (e.g. rheumatoid arthritis and atherosclerosis) 6. 2-Styrylchromones (2-SC) and chalcones are two classes of naturally occurring chromones, showing several biological activities (e.g. antiviral and anti-inflammatory) with potential therapeutic application, and with interesting scaffolds for drug design (2,3). However, as far as we know, their antioxidant potential has never been compared using the same in vitro methodologies.

Aim
The aim of this study was to evaluate the potential antioxidant activity of seven structurally related hydroxylated 2-SC (Fig. 1A) and chalcones (Fig. 1B) through the scavenging of physiological relevant reactive oxygen (H₂O₂ and O₂⁻•) and nitrogen (·NO) species, using non-cellular in vitro systems, and to establish a structure-activity relationship.

Methods [4]

Hydrogen peroxide (H₂O₂)

Superoxide anion radical (O₂⁻•)

Nitric oxide radical (·NO)

Results

Hydrogen peroxide (H₂O₂)

Superoxide anion radical (O₂⁻•)

Nitric oxide radical (·NO)

Conclusions

► The 2-SC SC4 was the only one able to scavenge more than one reactive species, O₂⁻• and ·NO.
► The chalcone C1 demonstrated some selectivity as it scavenged H₂O₂, but not O₂⁻• or ·NO.
► The presence of hydroxy groups on the B-ring seems to contribute to this activity, in both 2-SC and chalcones scaffolds, namely at C3’, C4’ and C5’.
► Overall, chalcones seemed to be slightly more active than 2-SC.

References


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