

Phytochemical Profile and Phototoxicity of Eleven Hypericum Species Extracts

1)Cristani M.. 2)Siracusa L.. 3)Carrubba A.. 4)Lazzara S.. 5)Speciale A.. 6)Cimino F.. 7)Saija A.. 8)Ruberto G.. 9)Napoli E..

Dept. Chemical, Biological, Pharmaceutical and Environmental

The genus *Hypericum* (family Hypericaceae) contains 484 species, one of which, *Hypericum perforatum*, is largely used in medicine as antidepressant, as well as antiinflammatory, and antimicrobial agent. Hypericin, together with the other naphthodianthrone derivatives named hypericins (the red pigments recognized as partially responsible for biological activities of this plant), has been identified largely in more than 300 *Hypericum* species (Skalkos et al., 2006). Particularly, hypericins are one of the most potent naturally occurring photodynamic agents; indeed, upon light irradiation, they very effectively induce apoptosis and/or necrosis of cancer cells (Karioti et al., 2010) and thus might be valued for the photodynamic therapy of cancer,.

The aim of this study was to evaluate the in vitro phototoxic activity and antioxidant efficacy of 11 different (wild or cultivated) *Hypericum* species (*perforatum* L., *aegypticum* L., *androsaemum* L., *calycinum* L., *hircinum* L., *hirsutum* L., *montanum* L., *patulum* Thunb., *perfoliatum* L., *pubescens* Boiss., *tetrapterum* Fr.) also in correlation with their phytochemical profiles. Plant samples were extracted with ethanol in dark conditions and analyzed by HPLC-DAD-MS in order to determine the content of the main polyphenols, phloroglucinols, and naphthodiantrones.

The extracts were also evaluated for their photocytotoxicity using murine fibroblasts NIH/3T3 exposed to either white light (5.2 J/cm²) or dark conditions. The photocytotoxic effects of the *Hypericum* extracts were determined by means of the sulforhodamine B assay and compared to hypericin and pseudohypericin as positive control. Moreover, the antioxidant/radical scavenging capacity of the *Hypericum* ethanolic extracts was investigated by means of 3 redox-based assays (Folin-Ciocalteu assay, DPPH assay, and ORAC-FL assay).

We found that *H. perforatum* and *H. perfoliatum* are the two species with the highest content of hypericin and its biosynthetic precursors, being significant amounts of these compounds present also in *H. montanum*, *H. pubescens* and *H. tetrapterum*.

Furthermore we demonstrated a relevant dose-dependent photocytotoxicity of *Hypericum* extracts under light exposure conditions and the activity was significantly stronger for the species with the higher amount of naphthodianthrone such as *H. perfoliatum* and *H. tetrapterum*. Finally, all *Hypericum* extracts exhibited a good antioxidant radical scavenger activity.

Our study represents a further contribute to the knowledge of the chemical composition and biological activity of *Hypericum* species. Results show that, in addition to the well known *H. perforatum*, at least other three species (*H. tetrapterum*, *H. pubescens* and *H. montanum*) are potential sources of biologically active compounds, and at least other two (*H. perfoliatum* and *H. tetrapterum*), due their phototoxicity, may be good candidates for their application in photodynamic therapy.

Karioti and Bilia (2010) *Int J Mol Sci.* 11(2), 562-94.

Skalkos et al. (2006) *J Photochem Photobiol B.* 82(2), 146-51.