

Study of the Antioxidant Properties and Characterization of *Cynara scolymus* L., *Hamamelis virginiana* and *Croton lechleri* Müell Arg. Extracts

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Radicalar species can be generated in our metabolic processes by very complex chain of reactions. These radicalar species, known as oxygen (ORS) and nitrogen (NRS) reactive species, when generated in large amounts, are responsible for serious damage in our biomolecules. It is therefore important to prevent, reduce or even eliminate these effects. Our organism has its own antioxidant defences but they become weaker through the years. It is therefore important to strengthen those defenses by means of antioxidants from our diet. Plant extracts have long been used for therapeutical purposes. Their healing effects have been well recognized in traditional medicine since ancient times. *Cynara scolymus* L., *Hamamelis virginiana* and *Croton lechleri* Müell Arg. have been successfully used for the treatment of cardiac and circulatory diseases. Their therapeutical properties have been related to the existence of antioxidants, such as flavonoids, in these plant extracts. In order to compare the three different extracts studied, their total phenolic and flavonolic content was investigated. The total antioxidant activity against radicalar species was measured using the ABTS/HRP and the DDPH assays. The scavenging activity of these extracts against hypochlorous acid, a very powerful oxidant that is produced intra and extra cellularly by activated neutrophils has also been measured. Solid phase microextraction allowed the extraction of the volatile components in the extracts with great efficiency and simplicity. This technique followed by capillary gas chromatography coupled to

mass spectrometry (HS/SPME/GC-MS) proved to be a powerful tool for the identification of those volatile components. Nevertheless, and since many flavonoids are non volatile, we started to optimize a method based on solid phase extraction followed by high performance liquid chromatography (SPE/HPLC). SPE enables the extraction of non-volatile compounds. When followed by HPLC, and provided suitable standards are available, it could become a very useful tool for the identification of the non-volatile components in the extracts under study. In a preliminary study, and for identification purposes, we used standards of several non volatile flavonoids.

Croton lechleri Müell Arg. is the richest extract in terms of phenolic and flavonolic content whereas *Hamamelis virginiana* presents higher antioxidant activity against free radicals. The results obtained by the ABTS/HRP and DPPH methods enabled to establish the following hierarchy: *Hamamelis virginiana* > *Croton lechleri Müell Arg.* > *Cynara scolymus L.*

The *Croton lechleri Müell Arg.* extract has a significantly low IC50 value suggesting that it is a better protector against HOCl oxidation which justifies its effectiveness in inflammatory diseases.

The results obtained by SPME/GC-MS enabled to identify a large range of volatile compounds, including phenols and terpenes. The preliminary results obtained using the SPE-HPLC techniques, appear to be quite promising in order to complement the above mentioned information.

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