



UNIVERSITÀ DEGLI STUDI DI SALERNO



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Characterization and biological properties of Citrus industrial derivatives and waste products for the formulation of nutraceuticals

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Abstract:

Polyphenols are natural chemical compounds, common in higher plants as and particularly known and appreciated for their health properties. We focused attention on *Citrus bergamia*, *Citrus sinensis*, *Mela annurca* and *Vitis Vinifera*. *Citrus* is one of largest species among plant; it consists of 40 species which are distributed in all continents and its fruits. We have developed a fast HPLC with ion-trap TOF-MS method for the analysis of flavonoids in these juices. With respect to the typical methods for the analysis of these matrices based on conventional HPLC techniques, a tenfold faster separation was attained. The nutraceutical potential of *Citrus bergamia* and *sinensis* extract was evaluated in vitro, on J774A.1 murine macrophages induced by LPS and in human hepatoblastoma cells Hepg2. Our results demonstrated that juices act as antioxidant and anti-inflammatory agent in LPS-treated J774A.1 macrophages. *Annurca* apple, possesses not only a particular taste and flavor, but also several healthy properties. With the aim to thoroughly elucidate the polyphenolic profile of this variety, an extensive qualitative profiling of *Annurca* apple polyphenolic extract was carried out, by employing a combination of ultra high performance reversed phase (RP-UHPLC) and hydrophilic liquid chromatography (HILIC) coupled to ion trap-time of flight (IT-TOF) mass spectrometry. Thanks to the different selectivity obtained with the HILIC, in combination with accurate mass measurements, an improved separation and detection of procyanidins, was obtained for the first time in this kind. Red grapes are rich in phenolics, flavonoids, anthocyanins and resveratrol, all substances which have been suggested as having nutraceutical and health benefits. The berry skin and wine of grape cultivar *Vitis vinifera* L. (cv. Aglianico), were examined to determinate the presence of the above mentioned compounds as well as to establish the inorganic cation profile. The wine made with the same grape used for berry skin assays showed a notable presence of quercetin-3-O-glucoside. The processed grape juice processed (lioRGJ) was tested on cardiac-derived H9C2 myocytes to ascertain its effects on reactive oxygen species(ROS) generation and caspase-3 activity. These results would suggest that higher doses of

antioxidants occurring in the juice sample may cause apoptotic cell injury via effector caspase-3 activation and subsequent induction of ROS and RNS generation.