A STUDY ON BIOLOGICAL ACTIVITIES OF CYANIDIN-3-O-GLUCOSIDE RELATED TO ITS ANTIOXIDANT PROPERTIES

[1]SPECIALE A.,[1]CIMINO F., [1]CHIRAFISI J., [1]CRISTANI M., [2]ERMITO S., [1]SPINZIA C., [1]SAIJA A.

[1]Dept. Farmaco-Biologico, School of Pharmacy, University of Messina - Vill. SS. Annunziata 98168 Messina, Italy. [2]Institute of Gynecology and Obstetrics, University of Messina, Italy

Anthocyanins are a group of polyphenols widely distributed in fruits and vegetables;. the glycosides of cyanidin, delphinidin, malvidin, pelargonidin, peonidin and petunidin are the most frequent in nature. Several *in vitro* and *in vivo* studies have demonstrated that anthocyanins such as cyanidin-3-O-glucoside (C3G) are phytoprotectans due to their different biological properties, so that these natural compounds can elicit beneficial effects in various human pathological conditions including endothelial dysfunction and cancer (1). We have carried out a study to investigate some biological activities of C3G which may be related to its antioxidant properties. Firstly, human umbilical vein endothelial cells (HUVEC) have been employed for investigating *in vitro* the C3G capability to positively modulate the cellular redox status affected by TNF-alpha; at this aim the activity of two enzymatic and non-enzymatic antioxidant systems (SOD and GSH) and the levels of lipid peroxidation products (MDA/HNE) and oxidant species (H_2O_2) were evaluated. C3G was able to protect endothelial cells against TNF-alpha induced damage. In fact, in HUVECs challenged by TNF-alpha, C3G pre-treatment maintained at normal values the ratio GSH/GSSG and the levels of SOD, H_2O_2 and MDA/HNE. Furthermore, the effects of C3G on angiogenesis (a key step in tumor growth, invasion and metastasi) was evaluated by means of Matrigel Invasion Assay. C3G appeared to impair *in vitro* angiogenesis by reducing capillary tube formation, when compared with the control group. Finally, a protective *in vitro* effect of C3G against the well known mutagen 4-nitroquinoline-1-oxide in the SOS Chromotest on the *Escherichia coli* PQ37 strain was demostrated; however, cyanidin-3-O-glucoside had not mutagen activity on *Escherichia coli* PQ37 strain. Finally, the influence of C3G on the metabolism of arachidonic acid was evaluated by studying its inhibitory properties on expression/activity of cyclooxygenase using human whole blood (2). C3G was able to inhibit the COX-2 pathway but not the COX-1 activity. In conclusion, one could speculate that C3G possesses several biological properties which might be closely related to its antioxidant properties.

REFERENCES:

1. Saija A. and Cimino F. (2005) *Curr. Top. Nutr. Res*. 3(4): 243-258
2. Vigorita M.G., Ottanà R., Monforte F., Maccari R., Manforte M.T., Trovato A., Taviano M.F., Miceli N., De Luca G., Alcaro S. and Ortuso F. (2003). *Bioorg. Med. Chem*., 11(6): 999-1006.