

Summary

This Ph.D. thesis deals with the deep analysis of polyphenols effects toward vascular disorders. This work provides a number of experimental results of studying both the effects of natural bioactive compounds in red wines and potatoes, and their application to the experiments which includes experimental animal models with spontaneous hypertension.

Methods and equipment used in experimental studies allowed us to make several new statements regarding the universal nature of the relationships between the antioxidant capacity and the polyphenolic content in examined foodstuffs.

Besides this it is also recognized that food is a source of minerals which also contribute to the total antioxidant capacity and therefore may have influence the endogenous antioxidant enzyme system by providing the essential cofactors. Experimentally we have found that the concentrations of magnesium known for its therapeutic action in wine and red wine extract are comparable to the mineral waters recommended for the treatment and prevention of cardiovascular and metabolic diseases. Moreover, synergistic interactions between selected minerals have been found.

The key issue of bioavailability of polyphenols for supporting the idea of the beneficial effects of diet rich in fruits and vegetables toward vascular disease prevention was verified in laboratory animal models. Polyphenolic compounds were detected in plasma in concentrations of several times higher in experimental animals treated with the polyphenols compared to control groups. This enables us to conclude, that these compounds circulate in the blood of experimental rats and may exert positive effects toward vessels. Moreover, our experimental findings have confirmed that activity of one of the main antioxidant enzyme superoxide dismutase and the nitric oxide synthase, an enzyme crucial for the maintaining of normal vascular tonus were increased in the group of experimental animals with spontaneous hypertension treated with the polyphenols rich extract.

Key words: polyphenols, atherosclerosis, red wine, potato, NOS, SOD, phenolic content, antioxidant activity, minerals.