

Abstract

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Title of diploma: Searching for natural cobalt chelators

Cobalt, as a trace element, is mostly found in the human body as the central atom of vitamin B12. Its deficiency is manifested by psychological impairment, memory loss, dementia or megaloblastic anemia. In excess amount, it is toxic to the body, which has been most described in patients with MoM hip replacement surgery. Cobalt causes damage to surrounding tissue until it is destroyed, or also cardiotoxicity, thyroid hypofunction, memory and hearing loss. Flavonoids are natural polyphenolic compounds with the ability to bind metals, scavenge free radicals and hence protect against oxidative stress.

The aim of the work was to determine the cobalt chelating activity of a row of flavonoids using spectrophotometric measurements *in vitro* at 4 pathophysiologically relevant pH conditions (pH 4.5, 5.5, 6.8 and 7.5). Of the test substances, only 3-hydroxyflavon and baicalein showed chelation activity. 3-hydroxyflavon in a 1:1 ratio achieved 100 % chelation at pH 7.5 and about 60 % at pH 6.8. Baicalein was reactive at pH 7.5 and 6.8, when at 10:1 it was able to bind about 50 % of cobalt ions. At pH 4.5 and 5.5, none of the substances responded.

In addition, it was investigated whether these substances affected red blood cell lysis in the presence of cobalt. Rat blood was used for the *in vivo* experiment. 3-hydroxyflavon alone affected lysis more significantly, with a ratio of 4:1 to 20 %, with cobalt ions only 10 %. In baicalein, lysis was found to be below 10 %, baicalein alone caused up to 20 % lysis in a 4:1 ratio, and in the case of cobalt ions it was up to 90 %.

The diploma thesis has shown that some flavonoids are able to chelate cobalt ions. Furthermore, *in vivo* experiment, baicalein in particular acts as a prooxidant, which could be used in cancer therapy.