Abstract

Dietary supplements are globally used products designed to complement nutrition with additional nutrients. They contain a wide range of biologically active compounds: amino acids, vitamins, minerals, herbal extracts, etc. Due to the popularity and excessive consumption of food supplements, there is a growing need to research their potential interactions and impact on human health.

Certain dietary supplements are metabolized by enzymes from the cytochrome P450 group, which play a key role in the biotransformation of exogenous substrates. Some biologically active compounds may also affect their activity. The presented thesis was focused on studying the influence of several popular components of dietary supplements on cytochromes P450 3A4 and 1A1 expressed in the gastrointestinal tract. The influence of metal ions Zn^{2+} and Mg^{2+}, ascorbate from the vitamin group, and curcumin from the polyphenol group was examined.

A strong inhibitory effect of curcumin on the activity of both investigated isoforms was confirmed. The reaction of 6β-hydroxylation of testosterone catalyzed by CYP3A4 was significantly suppressed by the addition of curcumin, with the determined IC_{50} value being 4,7 μM. A significant decrease in the rate of resorufin *O*-deethylation by rat and human CYP1A1 isoforms was also observed (IC50 = 1.1 μM and 2.7 μM, respectively). Inhibitory effects were also observed with ascorbate and zinc ions, while the addition of magnesium ions had no effect on the activity of any of the investigated isoforms.

It was shown that CUR incubated for 30 minutes at 37°C in a phosphate buffer environment (pH 7.4) before being added to the reaction mixture partially loses its inhibitory effect on both studied CYP isoforms. In the case of the same preincubation of curcumin in a mixture with ascorbate and metal ions, there was no decrease in inhibitory potential. The preservation of the inhibitory effect was also observed when using a combination of curcumin with only ascorbate or with one of the metal ions. Therefore, the administration of curcumin with other components of dietary supplements (ascorbate or metal ions) may affect its ability to inhibit the studied CYP isoforms.

Key words: food supplements, curcumin, ascorbate, magnesium ions, zinc ions, cytochromes P450 1A1 and 3A4, inhibition