

lek. dent. Mateusz Falkowski

**„Ocena wpływu WPC-80 na procesy oksydacyjno-redukcyjne ślinianek
podżuchwowej i przyusznej u szczurów”**

SUMMARY

Whey is considered to be a rich source of proteins, peptides and trace elements. It is also a valuable source of sulfur amino acids, especially cysteine and methionine, which are involved in the biosynthesis of cellular glutathione. The literature describes nutritional, antihypertensive, antimicrobial, immunomodulatory, anticarcinogenic, and immunostimulating properties of whey proteins. Due to its high antioxidant capacity, more and more attention has been recently paid to the protective role of whey products in disorders with increased involvement of oxidative stress, such as metabolic diseases (e.g. obesity, diabetes type 1 and 2), autoimmune diseases (e.g. rheumatoid arthritis, scleroderma, Sjögren's syndrome) and oral cavity cancer (e.g. squamous cell carcinoma). Oxidative stress can also damage the salivary glands as a result of the aging process, leading to an increased incidence of oral diseases. Changes in the morphology of the salivary glands resulting in impaired flow rate, qualitative composition, decreased buffering properties and altered immune response of saliva in these conditions have already been demonstrated. Searching for new substances that could improve the secretory function of the salivary glands, is clinically reasonable.

The aim of this study was to evaluate the effect of WPC-80 (whey protein concentrate containing 80% of protein) on the oxidation-reduction parameters in the parotid and submandibular salivary glands of old rats.

The experiment was performed on 14-month-old male Wistar rats, treated for 7 or 14 days with WPC-80 (0.3 g/kg b.w., intragastrically). Control animals received water. Parotid and salivary glands were collected. In the supernatants of obtained homogenates total protein content, total antioxidant status (TAS), total oxidant status (TOS), the activities of catalase (CAT), glutathione peroxidase (GPx), and superoxide dismutase (SOD) as well as the concentration of reduced glutathione (GSH) were analyzed. Factor TOS/TAS and the correlation between oxidant-antioxidant parameters were also calculated. Furthermore, physico-chemical composition of WPC-80 was examined.

Results of the present study indicate a significant reduction of total protein in the parotid glands of rats treated with WPC-80, regardless of the time of whey administration. In

the submandibular gland of rats fed with WPC-80 for 7 days, a significant increase of TOS and TOS/TAS ratio, with simultaneous increase of CAT specific activity were demonstrated. Prolonged administration of whey diet resulted in an increase of GSH concentration and specific activity of CAT, but also in reduced TOS and specific activity of GPx in these gland. A significant decrease in the specific activity of CAT and a significant increase in the specific activity of SOD were demonstrated in the parotid gland of rats treated with WPC-80 (for 7 or 14 days). Shorter administration of WPC-80 resulted in a significant increase of GPx specific activity, while longer diet resulted in a significant increase of the GSH content and reduction of TOS/TAS ratio. It has been reported that prolonged administration of WPC-80 significantly reduced the TOS and TOS/TAS ratio in both salivary glands, which justifies the use of WPC-80 for 14 days. Positive correlation between TAS and the specific activity of CAT in the parotid (WPC-80 used 7 days) and submandibular (14-day WPC-80) glands as well as a positive correlation between TAS and GSH content in the parotid gland of rats fed WPC-80 for 7 days show the beneficial antioxidant effect of whey diet on salivary glands.

Conclusions:

1. Whey protein concentrate (WPC-80) affects the enzymatic and non-enzymatic antioxidant defense mechanisms of parotid and submandibular salivary glands of old rats.
2. Parotid and submandibular glands of rats treated with WPC-80 are characterized by different antioxidant properties.
3. The main source of antioxidants in the salivary glands of rats fed with high-protein whey diet is parotid gland.
4. The use of WPC-80 for 14 days is the proper period of supplementation in order to improve the antioxidant properties of the salivary glands.
5. WPC-80 can promote the antioxidant properties of salivary glands during aging.