

SUMMARY

In food industry six synthetic phenolic antioxidants are allowed to use : butylated hydroxytoluen (BHT, E321), butyleted hydroxy anisol (BHA, E320), tert-butylatedhydrochinon (TBHQ, E319), propyl gallate (GP, E310), octyl gallate (GO, E311) or dodecyl gallate (GD, E312). This compounds protect fat in food product against oxidation proces. In few nutritional studies in which these antioxidants were introduced into the diet in dose permitted for use in food industry, it was observed that their addition affects weight gain, the amount of cholesterol and triacyloglycerols in the liver and the lipid composition of the blood plasma of laboratory animals. So far the mechanism of this compounds action was not explained.

In this research an attempt was created to evaluated the effect of antioxidants, used in food industry, on fat bioavailability and lipid metabolism. In order to reflect the processes taking place in the human body as much as possible, I used *in vitro* models: simulation of digestion in gastrointestinal tract, absorption in intestinal (monolayer of Caco-2 cells) and lipid metabolism in the liver (HepG2 cells).

The research carried out in this study showed that synthetic antioxidants used at a dose of 100 mg / kg of fat (permitted for used in food) modify intestinal absorption of fats, chylomicron catabolism and lipid metabolism in liver cells. Most of the changes observed can have a negative effect on the health of the consumer. This includes increasing the absorption of fat hydrolysis products (BHT, BHA, TBHQ, GP) and the secretion of apoC-III by hepatocytes (all antioxidants). In the body, this can lead to problems with the removal of triacylglycerols from the bloodstream. Moreover, antioxidants such as BHA, GP, GD strongly inhibited the process of residual chylomicron removal (high level of apoB48), which is considered a factor in the development of atherosclerosis. In liver cells, BHT, TBHQ, GP, GD decreased the level of phosphorylation of enzymes (AMPK and ACC) regulating lipid metabolism. This resulted in an increase in the synthesis of fatty acids. Moreover, BHA, GP, GD decreased the level of secreted apoA-I, a protein associated with HDL particles. Among all synthetic antioxidants, GO showed the best effect. It did not increase the amount of absorbed triacylglycerols but stimulated the process of residual chylomicron removal. Moreover, it inhibited the process of fatty acid biosynthesis and increased the amount of secreted apoA-I.

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