Abstract

The study aimed to determine the effect of resveratrol, *cis*-9,*trans*-11 CLA, *trans10*,*cis*-12 CLA and various variants of their combinations on the metabolism of fatty acids in 3T3-L1 adipocytes. The impact of the above-mentioned bioactive substances under standard and induced oxidative stress culture conditions. This paper describes quantitatively the effect of the tested compounds on the expression of selected genes related to the de novo fatty acid biosynthesis process (Fasn, Acc1, Acly, Prkaa1, Prkaa2, Prkaca, Srebp1). The expression of genes associated with the process of β-oxidation of fatty acids (Cpt1a, Cpt2, Slc25a20, Pparα, Pparδ Pparγ, Sirt1, PGC1α, Acsl1) and lipolysis (Lipe, Mgll, Pnpla2) was also measured. As part of the conducted experiments, how the level of the corresponding mRNA translates into the content of selected proteins formed as a result of its translation in mouse 3T3-L1 adipocyte cells (acetyl-CoA carboxylase 1 (ACC), long-chain fatty acid ligase 1 (ACSL1), acid synthase fatty acids (FASN).

As a result of the conducted experiments, it was established that the inhibition of fatty acid biosynthesis processes was stronger in the case of the combination of the tested CLA isomers with resveratrol than in the case of their single action. This effect was much stronger after 24 hours of incubation. The β-oxidation process was intensified in the cells after 48 hours, especially when using a mixture of all three substances and when the *trans*-10,*cis*-12 isomer of CLA combining with resveratrol. Strong inhibition of the expression of lipolytic genes after 24 hours was also demonstrated in almost all of the tested variants. This effect was reversed in the case of 48-hour incubation for each of the combinations of resveratrol with CLA isomers under standard and oxidative stress conditions. Only the 48-hour exposure of the mixture of resveratrol with cis-9, trans-11 CLA and *trans*-10,*cis*-12 CLA under conditions of oxidative stress showed a reduction in the expression of lipolytic genes.