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Synergistic effect of sesamin and eicosapentaenoic acid on hepatic mitochondrial and peroxysomal β-oxidation in rat

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Sesame oil lignan, sesamin (SE) and eicosapentaenoic acid (EPA), a n-3 very long chain polyunsaturated fatty acid rich in marine fish oil, have been shown to influence lipid metabolism in experimental animals and in human. Interaction of sesamin & EPA have not been studied. In this study we evaluate the interaction of SE and EPA in hepatic mitochondrial and peroxisomal β-oxidation in rats.

Four groups of male Sprague-Dawely rats (7-8 rats /group) were fed either a control diet or diets containing 0.2% SE or 3% EPA or a diet containing both 0.2% SE and 3% EPA (SE+EPA group) for 15 days. On day 16 animals were sacrificed, livers excised and liver homogenates prepared in 0.25 M Sucrose buffer. Immediately, the mitochondrial & peroxisomal fractions were obtained through centrifugation and β-oxidation was assessed radio-chemically using [1-^{14}C]palmitoyl-CoA as the substrate.

Compared to control group, SE and SE+EPA groups had a significantly higher mitochondrial fatty acid oxidation rate (72% and 97% increase, respectively). Peroxisomal fatty acid oxidation also showed similar trend but the increments were greater than those in mitochondrial fatty acid oxidation (SE=274%, EPA=36% and SE+EPA=610% increase, respectively). The extents of the increase in both mitochondrial and peroxisomal fatty acid oxidation rates, especially the latter, by the diet containing both SE and EPA were quite high compared to those obtained with diet containing SE or EPA alone indicating an interesting synergistic effect of these compounds in increasing hepatic fatty acid oxidation.

It is evident from this work that the combination of SE and EPA has a physiological activity distinct from those observed with individual compounds in the hepatic mitochondrial and peroxisomal β-oxidation in rat. Synergistic effect observed is very distinct in the peroxisomal β-oxidation.

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