

Relation between n-3 polyunsaturated fatty acids and cellular sensors of energetic state

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Abstract

The regulatory proteins, which are able to react to energetic state of the cell by feed-back mechanism, are important factors in regulation of metabolic processes. Big attention is focused on the AMP activated kinase (AMPK) and the NAD⁺ activated deacetylase SIRT1. These enzymes interact together and their stimulation increases mitochondrial biogenesis and fatty acid oxidation. Due to this fact they function beneficially against the onset of obesity, insulin resistance and ageing. Fasting, exercise and some antidiabetogenic drugs act through these regulators.

n-3 polyunsaturated fatty acids (PUFA) are also believed to be beneficial because of their stimulative effects on mitochondrial biogenesis and β -oxidation. Our previous work has showed that intake of higher doses of n-3 polyunsaturated fatty acids (PUFA) in diet leads to increase of AMPK activity in white adipose tissue. New results presented in this thesis show that SIRT1 is essential for increase of β -oxidation stimulators (PPAR α etc) expression in response to n-3 PUFA in diet. n-3 PUFA also improve the metabolic profile synergistically in combination with calorie restriction. It occurs probably through the activation of SIRT1/AMPK/PGC-1 α regulatory pathway.