S-3-2 The Effects of Fish Oil on Glucose Transport Systems

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The inverse relation between fish oil consumption and coronary heart disease has been reported. Glucose intolerance frequently coexists with abnormalities of lipoprotein metabolism and hypertension. Diabetes mellitus has been reported to be uncommon in Greenland Eskimos, and it has been speculated that may be linked to the fish oil consumption of this population. These epidemiological studies have led to several recent trials in which supplemental fish oil have been given to patients with diabetes mellitus.

In early studies, supplementation of fish oil to NIDDM subjects and rats have been shown to improve not only lipid metabolism but also insulin sensitivity (1, 2). However, in recent studies several groups have indicated that consumption of fish oil in NIDDM patients results in elevation of blood glucose concentration possibly by an increase of glucose output from the liver (3). We examined the effects of fish oil feeding on insulin sensitivity in rat adipocytes.

To elucidate of mechanisms of alterations of insulin-stimulated glucose transport activity, the amounts of glucose transporters in subcellular fractions was estimated by immunoblotting.

In cells from high-fish oil fed rats in which two-thirds of sunflower oil was replaces by fish oil, insulin stimulates glucose transport activity increases 1.7-fold after one week feeding, when compared with those from sunflower oil-fed rats, but its effect decline thereafter.

Corresponding to transport activity, erythrotype glucose transpoter (GLUT1) and muscle-/fat-type glucose transpoter (GLUT4) per cell in plasma membrane from insulin-treated cells increase 1.4-fold and 2.6-fold after one week with concomitant transporter increase in low-density microsome fraction.

These finding indicate that fish oil feeding for one week increases in insulin-sensitivity by altering the total cellular number of glucose transporters.
References

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