

REVIEW ARTICLE

# Skeletal muscle lipid deposition and insulin resistance: effect of dietary fatty acids and exercise<sup>1,2,3</sup>

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Mounting evidence indicates that elevated intramyocellular triacylglycerol concentrations are associated with diminished insulin sensitivity in skeletal muscle. This lipid accumulation is most likely due to enhanced fatty acid uptake into the muscle coupled with diminished mitochondrial lipid oxidation. The excess fatty acids are esterified and either stored or metabolized to various molecules that may participate or interfere with normal cellular signaling, particularly insulin-mediated signal transduction, thus altering cellular and, subsequently, whole-body glucose metabolism. Impaired insulin responsiveness, if not managed, can further progress to type 2 diabetes mellitus, an all too common condition. For most of the human population this is avoidable, given that causes of intramyocellular lipid deposition are predominantly lifestyle-mediated. Chronic overconsumption of calories coupled with deleterious intakes of saturated or *trans*-unsaturated fatty acids inconsistent with the recommendations outlined in the Dietary Guidelines for Americans have been shown to increase the risk of insulin resistance. Furthermore, lack of exercise, which can have a profound effect on skeletal muscle lipid turnover, is implicated in this lipid-induced insulin resistance. This review summarizes the current understanding of the effects of elevated intramyocellular lipids on insulin signaling and how these effects may be altered by varying dietary fat composition and exercise.

Key Words: Insulin resistance • skeletal muscle • intramyocellular triacylglycerol • dietary fat • exercise

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