

Tracking in muscular lipid storage in the thigh of elderly women after diet or exercise with MRI/MRS

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We have developed a proton magnetic resonance imaging and spectroscopy (MRI/MRS) protocol to quickly and non-invasively assess *in vivo* fat composition in human skeletal muscle. The protocol was applied to quantify gross adipose tissue depots and intramuscular lipid concentrations towards developing and substantiating the use of MRI/MRS to measure muscle quality in the thigh in three groups of older women varying in adiposity and habitual physical activity levels: obese (O); lean and sedentary (LS), and lean and active (LA). In the cross-sectional portion of the study, no significant differences in relative adipose tissue volumes or intramuscular lipid concentrations were found between the groups O and LS, revealing that the lipid distribution and storage were similar between obese and lean, sedentary subjects. However, group LA had 10% less relative fat volume and double the relative amount of lipids stored in a metabolically active state than O and LS. The longitudinal portion of the study involved two different four-month interventions on the thigh adipose composition of the O group: weight-loss diet (DI) and weight-stable exercise (EX). Group DI increased lipid concentrations without a change in distribution, due to loss of lean mass, whereas group EX had a favorable redistribution of intramuscular lipids without a loss of overall lipid concentration. In addition to other potential applications of our protocol in the area of analytical techniques for metabolomics, our results add to the growing literature regarding the importance of physical activity for the management of intramuscular lipids, even in individuals who are normal weight.

Biography

John G Georgiadis is the Richard Kritzer Distinguished Professor of Mechanical Engineering, and is additionally affiliated with the Beckman Institute at the University of Illinois at Urbana-Champaign. The long-term goal of his group is to develop new MRI modalities to study age-related disorders and improve the quality of life of the elderly. This work has been performed in collaboration with the group of Prof. Ellen Evans, currently at the University of Georgia, Athens GA.

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