Characterization of the regional distribution of skeletal muscle adipose tissue in type 2 diabetes using chemical shift-based water/fat separation.

Abstract:

To show the feasibility of assessing the spatial distribution of skeletal muscle adipose tissue using chemical shift-based water/fat separation and to characterize differences in calf intermuscular adipose tissue (IMAT) compartmentalization in patients with type 2 diabetes mellitus (T2DM) compared to healthy age-matched controls. A chemical shift-based water/fat separation approach using a multiecho 3D spoiled gradient echo sequence was applied in a study of 64 patients, including 35 healthy controls and 29 subjects with T2DM. Masks were defined based on manual segmentations to compute fat volume within different compartments, including regions of subcutaneous adipose tissue (SAT) and six muscular regions. IMAT was divided into two compartments representing fat within the muscular regions (intraMF) and fat between the muscular regions (interMF). Two-sample Student's t-tests were used to compare fat volumes between the two groups. The subjects with T2DM had a lower volume of SAT compared to the healthy controls (P = 4 × 10(-5)). There was no statistically significant difference in the IMAT volume between the two groups. However, the intraMF volume normalized by the IMAT volume was higher in the diabetics compared to the controls (P = 0.006). Chemical shift-based
water/fat separation enables the quantification of fat volume within localized muscle regions, showing that the IMAT regional distribution is significantly different in T2DM compared to normal controls. J. Magn. Reson. Imaging 2012; 35:899-907. © 2011 Wiley Periodicals, Inc.