Automatic segmentation of abdominal organs and adipose tissue compartments in water-fat MRI: Application to weight-loss in obesity.

To develop a fully automatic algorithm for abdominal organs and adipose tissue compartments segmentation and to assess organ and adipose tissue volume changes in longitudinal water-fat magnetic resonance imaging (MRI) data. Axial two-point Dixon images were acquired in 20 obese women (age range 24-65, BMI 34.9±3.8kg/m²) before and after a four-week calorie restriction. Abdominal organs, subcutaneous adipose tissue (SAT) compartments (abdominal, anterior, posterior), SAT regions along the feet-head direction and regional visceral adipose tissue (VAT) were assessed by a fully automatic algorithm using morphological operations and a multi-atlas-based segmentation method. The accuracy of organ segmentation represented by Dice coefficients ranged from 0.672±0.155 for the pancreas to 0.943±0.023 for the liver. Abdominal SAT changes were significantly greater in the posterior than the anterior SAT compartment (-11.4%±5.1% versus -9.5%±6.3%, p<0.001). The loss of VAT that was not located around any organ (-16.1%±8.9%) was significantly greater than the loss of VAT 5cm around liver, left and right kidney, spleen, and pancreas (p<0.05). The presented fully automatic algorithm showed good performance in abdominal adipose tissue and organ...
segmentation, and allowed the detection of SAT and VAT subcompartments changes during weight loss.