Validation of a DIXON-Based Fat Quantification Technique for the Measurement of Visceral Fat using a CT-Based Reference Standard.
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PURPOSE:
The purpose of the study is to determine whether a novel semi-automated DIXON-based fat quantification algorithm can reliably quantify visceral fat using a CT-based reference standard.

METHODS:
This was an IRB-approved retrospective cohort study of 27 subjects who underwent abdominopelvic CT within 7 days of proton density fat fraction (PDFF) mapping on a 1.5T MRI. Cross-sectional visceral fat area per slice (cm²) was measured in blinded fashion in each modality at intervertebral disc levels from T12 to L4. CT estimates were obtained using a previously published semi-automated computational image processing system that sums pixels with attenuation -205 to -51 HU. MR estimates were obtained using two novel semi-automated DIXON-based fat quantification algorithms that measure visceral fat area by spatially regularizing non-uniform fat-only signal intensity or de-speckling PDFF 2D images and summing pixels with PDFF ≥50%. Pearson's correlations and Bland-Altman analyses were performed.

RESULTS:
Visceral fat area per slice ranged from 9.2 to 429.8 cm² for MR and from 1.6 to 405.5 cm² for CT. There was a strong correlation between CT and MR methods in measured visceral fat area across all studied vertebral body levels (r=0.97; n=101 observations); the least (r=0.93) correlation was at T12. Bland-Altman analysis revealed a bias of 31.7 cm² (95% CI [-27.1]-90.4 cm²), indicating modestly higher visceral fat assessed by MR.

CONCLUSION:
MR- and CT-based visceral fat quantification are highly correlated and have good cross-modality reliability, indicating that visceral fat quantification by either method can yield a stable and reliable biomarker.