Supplementary

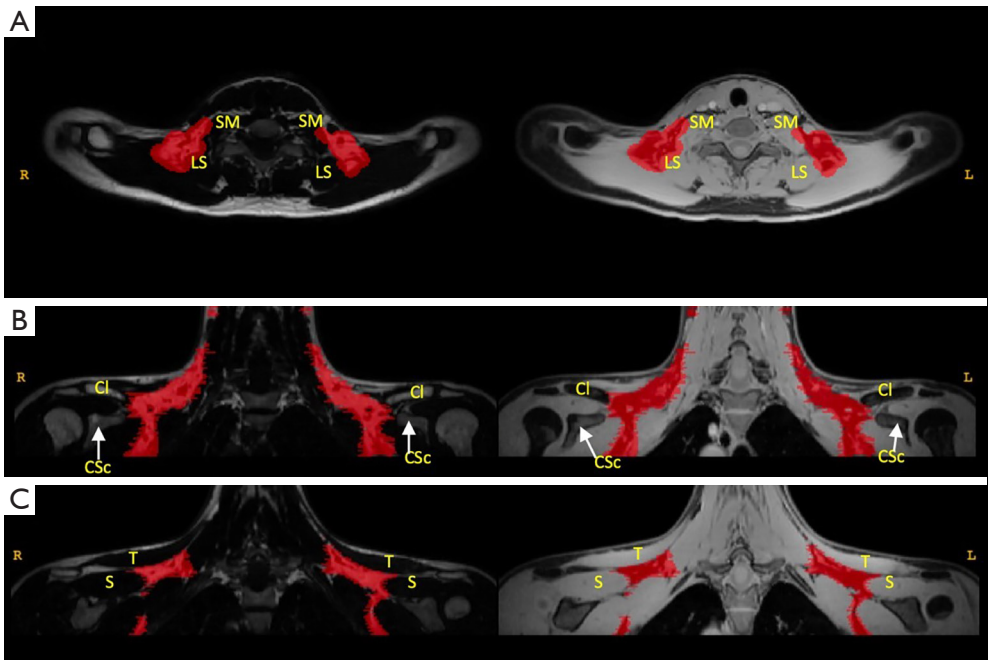

Figure S1 Fat and water image of one example subject displaying applied annotation rules. (A) Axial view of annotation example; (B) coronal view; (C) coronal view. SM, scalene muscles; LS, levator scapulae muscle; Cl, clavicle; CSc, collum scapulae; T, trapezius muscle; S, supraspinatus muscle.

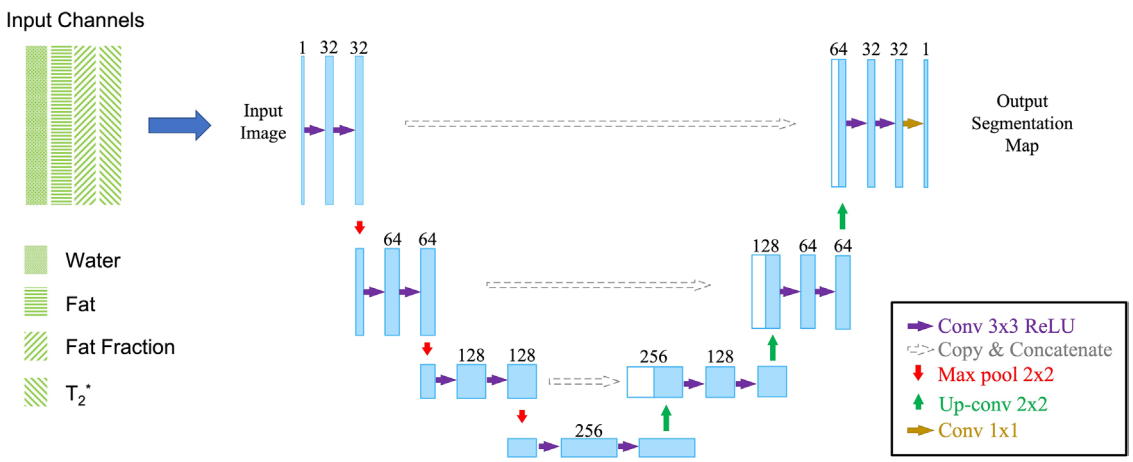

Figure S2 The detailed architecture of the U-Net, which consists of an encoder (left) and a decoder (right). Different 2D operations are denoted by different arrows. The learnt multi-channel feature maps are shown in light blue and the copied feature maps are shown in white. The channel numbers of the feature maps are denoted by the digits above the feature maps. ReLU, rectified linear unit; conv, convolution; 2D, two-dimensional.

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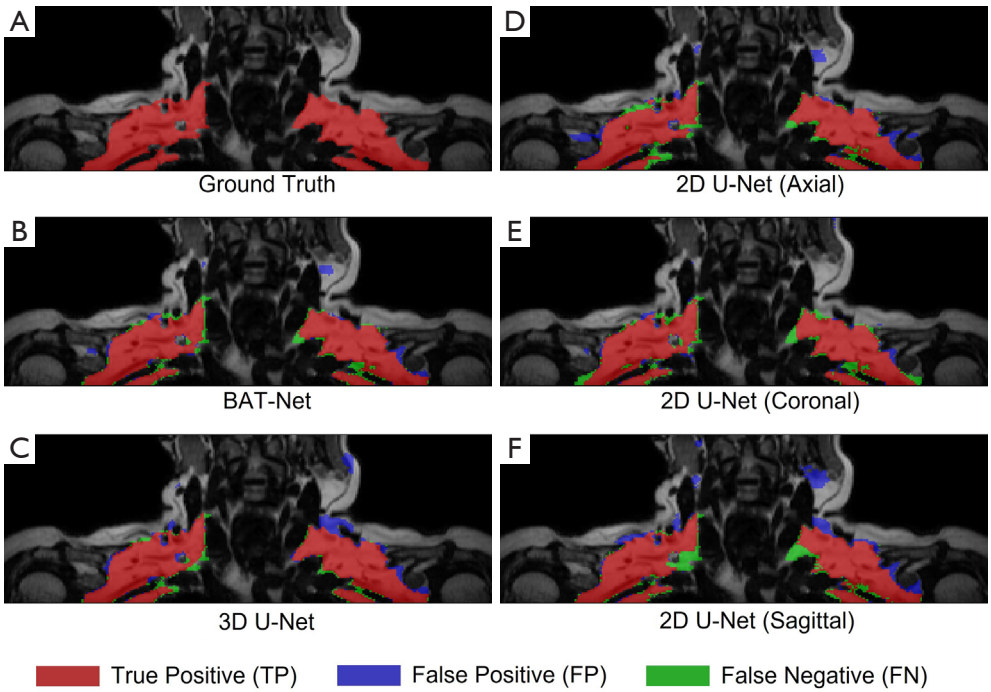

Figure S3 Comparison between (A) ground truth, predictions of (D-F) 2D U-Nets, (C) 3D U-Net, and (B) the BAT-Net of another subject with higher volume of supraclavicular fat depots. BAT, brown adipose tissue; 3D, three-dimensional; 2D, two-dimensional.

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Table S1 The overall evaluations of training of the BAT-Net with different loss functions

Loss function	Evaluation metrics, mean ± SD		
	DSC	Precision	Recall
Generalized dice loss	0.874±0.021	0.912±0.028	0.840±0.027
Tversky loss	0.877±0.024	0.890±0.039	0.864±0.024
Focal Tversky loss	0.880±0.022	0.893±0.037	0.868±0.024
Dice loss	0.878±0.020	0.910±0.030	0.848±0.026

BAT, brown adipose tissue; SD, standard deviation; DSC, dice similarity coefficient.

Table S2 Average mean DSC of 5-fold cross-validation on different networks

Methods	Average DSC, mean ± SD
2D U-Net (axial)	0.84±0.01
2D U-Net (coronal)	0.84±0.01
2D U-Net (sagittal)	0.83±0.01
3D U-Net	0.83±0.02
BAT-Net	0.85±0.01

DSC, dice similarity coefficient; SD, standard deviation; 2D, two-dimensional; 3D, three-dimensional; BAT, brown adipose tissue.

Table S3 Comparison of the proposed BAT-Net with 2D U-Nets and 3D U-Net on number of trainable parameters, training time, rate of convergence and inference time

Methods	Network performance			
	Number of trainable parameters (M)	Training time (seconds/epoch)	Time of convergence (epochs)	Inference time (seconds/subject)
2D U-Net (axial)	7.76	50	48	0.7
2D U-Net (coronal)	7.76	48	58	0.6
2D U-Net (sagittal)	7.76	49	34	0.6
3D U-Net	16.32	130	65	7.1
BAT-Net	0.23	55	132	2.6

BAT, brown adipose tissue; 3D, three-dimensional; 2D, two-dimensional.

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