Supplemental Tables and Figures

We investigated the use of different deep learning techniques with DeepFat, either with or without *bisect*, as shown in Table S1. The study included training on the same 50 CT scans and testing on the same 39 CT scans using the DeepFat method, while changing the internal deep network block (see Figure 1 step 4). We compared U-Net (with CNN as internal blocks), SegNet (with VGG-16 internal blocks), and our DeepLab-v3 Plus (using ResNet-18). Our method provided the highest average Dice score of 88.52%± 3.35 and the highest average IOU score of 79.38%±4.71, with a small average EAT volume error of 0.5%±8.1. Overall, results from *bisect*-based slice organization were better than those from *without bisect,* across all three deep networks. This analysis emphasized the advantage of the DeepFat method associated with the suggested DeepLab-v3 Plus deep network.

Figure S1 shows the internal structure of the DeepLab-v3 Plus used for segmentation of the region within the pericardial sac. In the training phase, the input slab with $k, k+1,$ and $k+2$ slices is provided with the binary labeled, *k*, output image (region interior to sac contour). The encoder, ASPP, and decoder parts of the semantic segmentation are presented. In the testing phase, the trained deep network predicts the enclosed labelled of sac region output.

Figure S2 compares the automated DeepFat (with and without *bisect*) versus the manual EAT volumes from each CT slice. The regions are presented in color: blue for slices in the bottom 25%, brown for slices between 25%-50%, orange for slices between 50%-75%, and bright green for slices in the top 25%. A scatter plot of results from the without-bisect method shows a correlation of R=0.9584 (p<0.001) while results from the bisect method shows correlation of R=0.9662 (p<0.001).

TABLE S1

DEEPFAT RESULTS OF DIFFERENT DEEP SEGMENTATION NETWORKS USING THE SAME TRAINING/TESTING COHORT WITH/WITHOUT BISECT METHODS

Deep Segmentation Network	Slice organizing method	Average Dice Score (%)	Average IOU Score (%)	Average EAT volume error (%)
U-Net (CNN)	*without bisect*	62.81±9.47	46.43±9.63	-51.24±10.3
U-Net (CNN)	*with bisect*	63.24±9.47	46.89±9.76	-52.78±9.8
SegNet (VGG-16)	*without bisect*	85.23±4.22	74.50±6.25	18.82±15.3
SegNet (VGG-16)	*with bisect*	86.63±4.07	76.62±6.01	**-0.18±8.9**
SegNet (VGG-19)	*without bisect*	85.92±3.36	75.47±5.04	0.36±10.7
SegNet (VGG-19)	*with bisect*	86.98±3.69	77.14±5.61	-3.45±9.6
DeepLab-v3 Plus (ResNet-18)	*without bisect*	85.29± 3.59	74.52±5.35	21.04±10.1
DeepLab-v3 Plus (ResNet-18)	*with bisect*	**88.52±3.35**	**79.38±4.71**	0.5±8.1

CNN, Convolutional Neural Network; EAT, epicardial adipose tissue; IOU, Intersection Over Union.

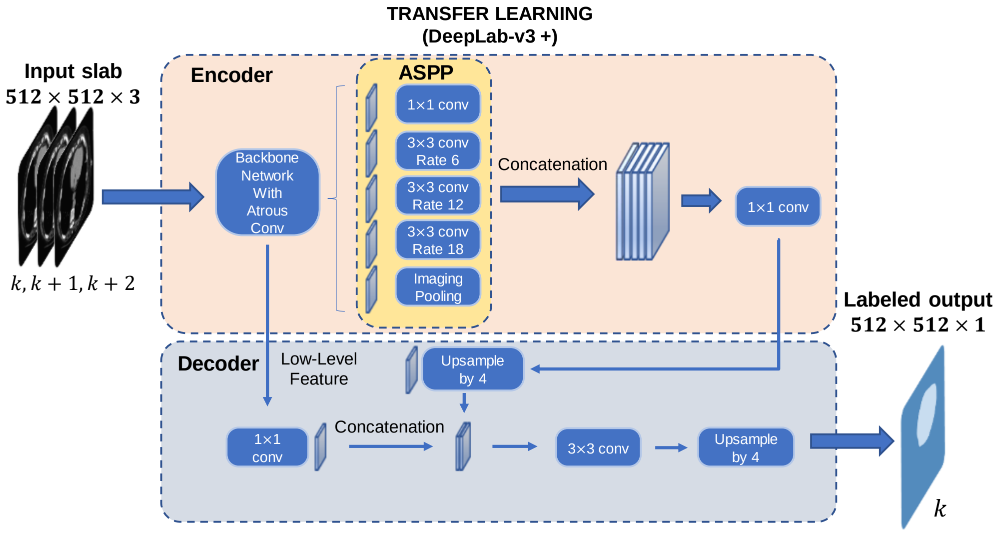

Figure S1. The internal structure of the DeepLab-v3 Plus used for segmentation of the region within the pericardial sac. This image expands on item 4 in Fig. 2. During training, the input slab of three image slices is provided with the binary labeled output image (the region interior to sac contour). The encoder, ASPP, and decoder parts of the semantic segmentation are shown (see text for details). In the testing phase, the trained deep network predicts the untrained k slice labeled output.

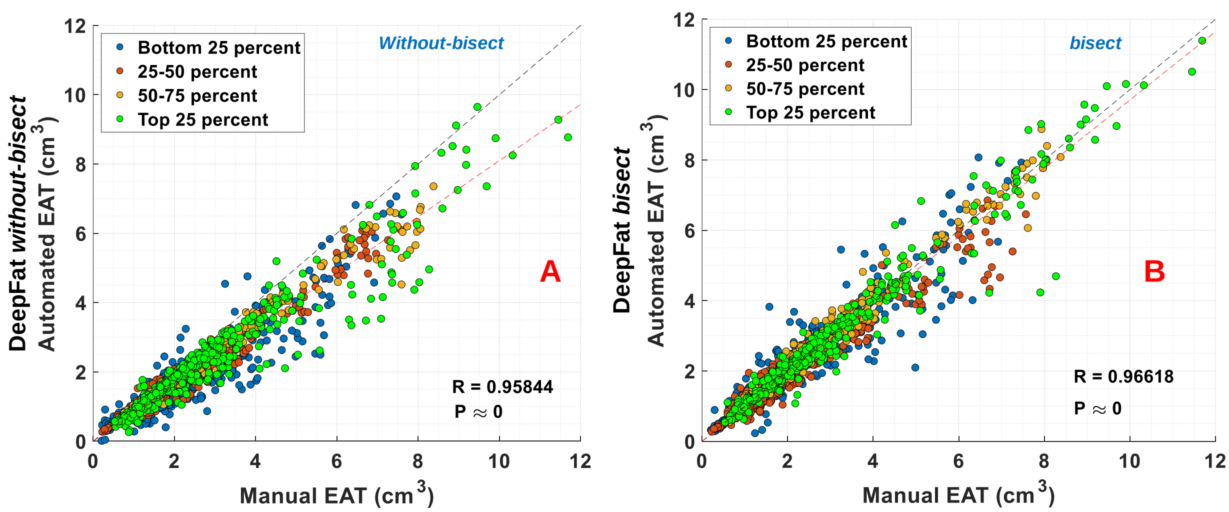

Figure S2. Comparison of automated DeepFat (*without-bisect* and *bisect*) versus manually segmented EAT volumes from each CT slice. Colors represent axial location in the heart from the bottom 25% (towards the apex) to the top 25%. (towards the base). Compared to *without-bisect* (A), DeepFat with *bisect* (B) gives a tighter distribution that lies closer to the ideal line of slope 1.0. Particularly, the *without-bisect* graph shows slices in the top 25% (bright green) are spread and tend to undershoot the ideal line. In both cases, measurements in the middle of the heart (brown and orange) tend to cluster together. Analyzing only slices from the top 25% (bright green) and the bottom 25% (blue), fitting DeepFat with *bisect* data to the equation y=mx gave a slope of 0.971, very near the ideal value of 1.0 and much better than the value of 0.81 obtained for the DeepFat *without-bisect* method.