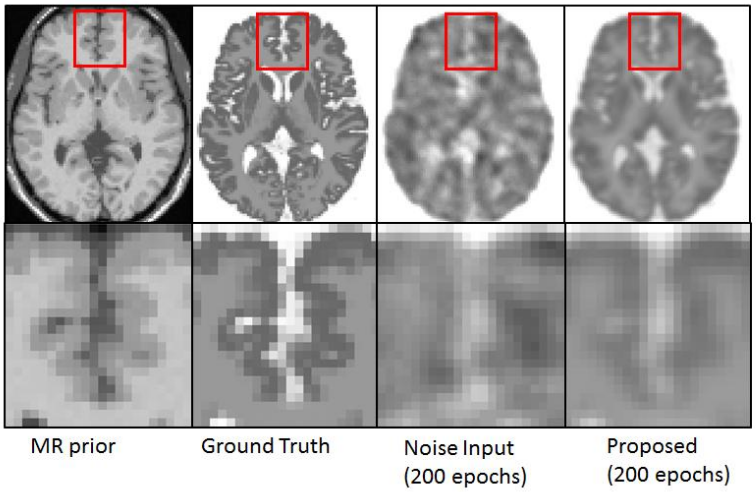
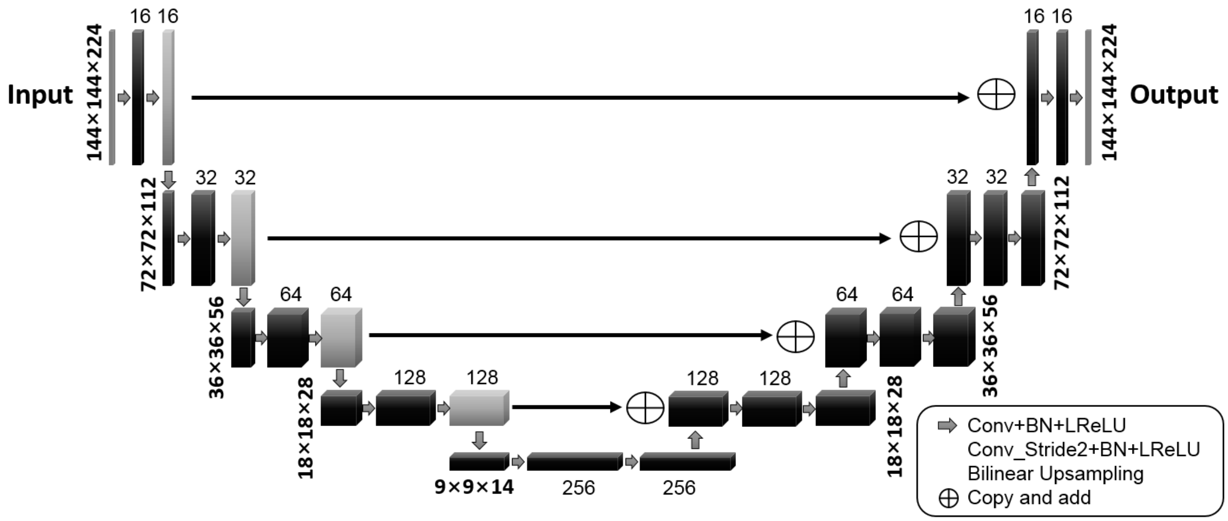
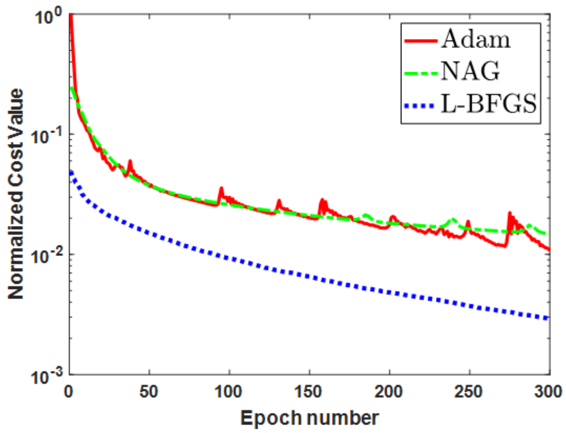
Supplementary data



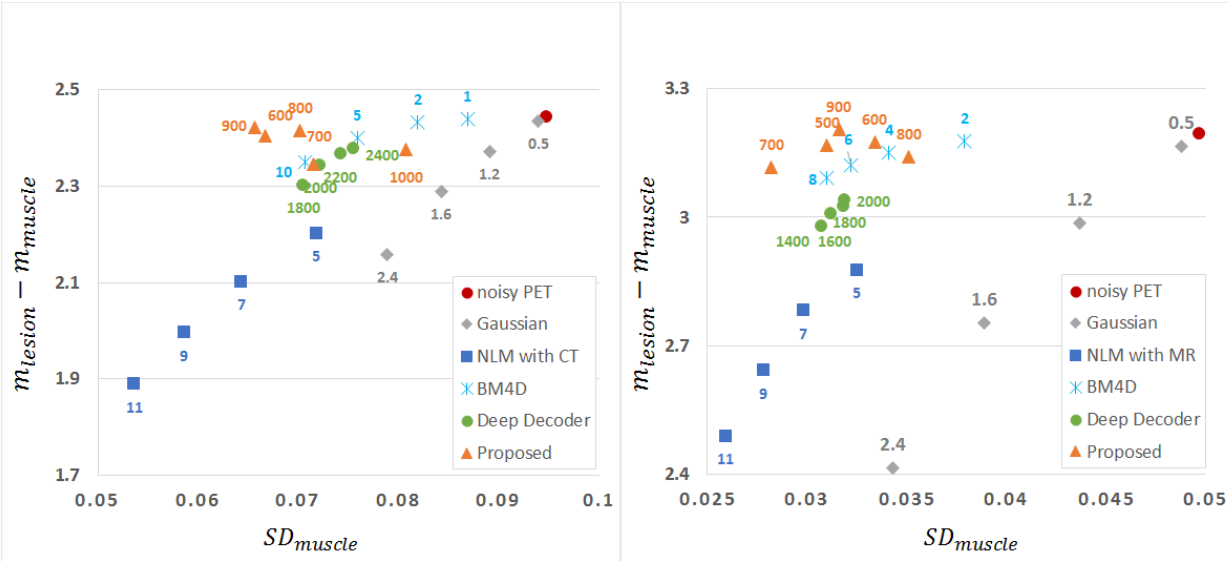
Suppl. figure 1. Comparisons between using the noise image as input and using anatomical prior image as input (proposed) based on the simulated BrainWeb phantom.



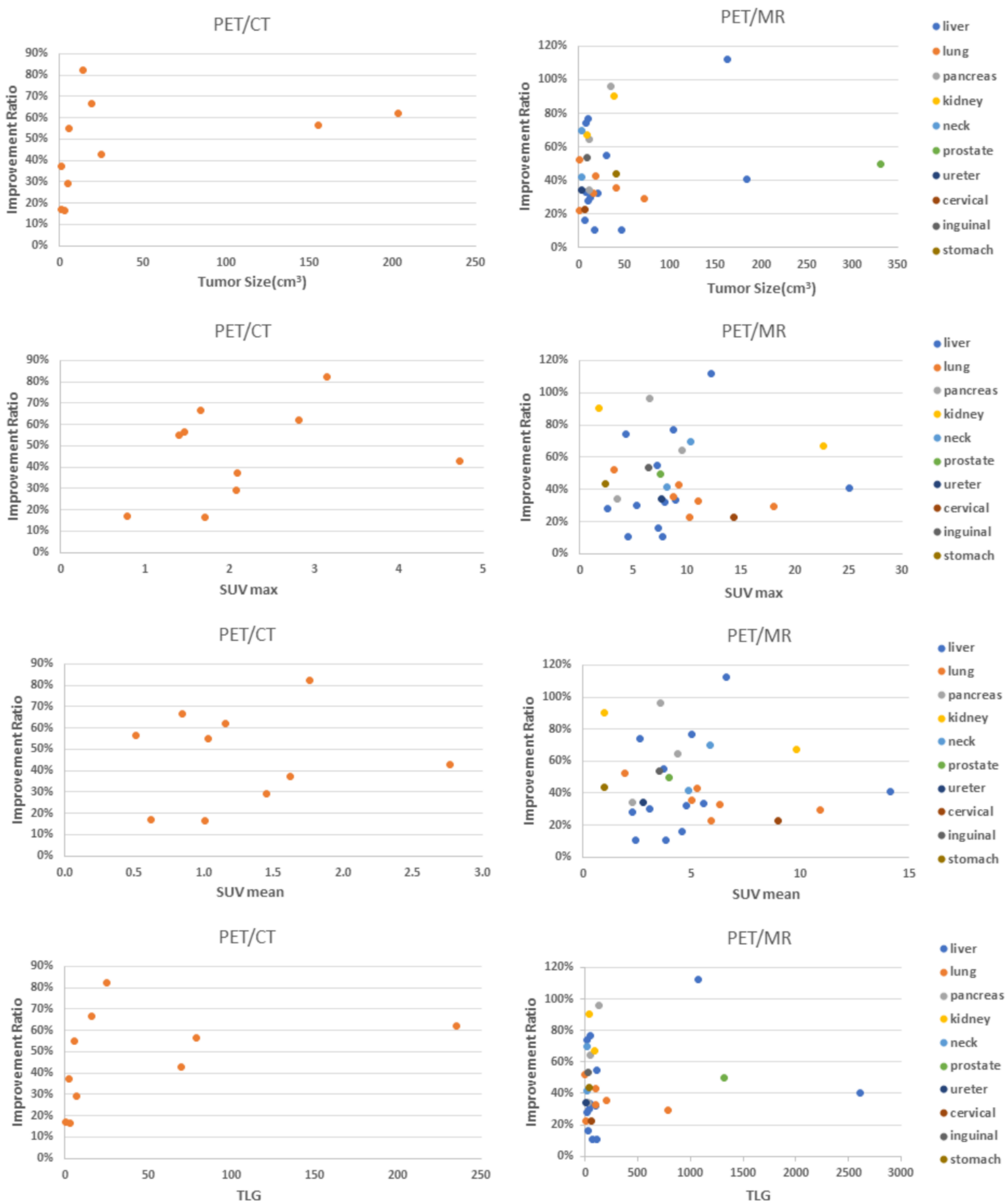
Suppl. figure 2. Network structure of the modified 3D U-net employed in the proposed method.



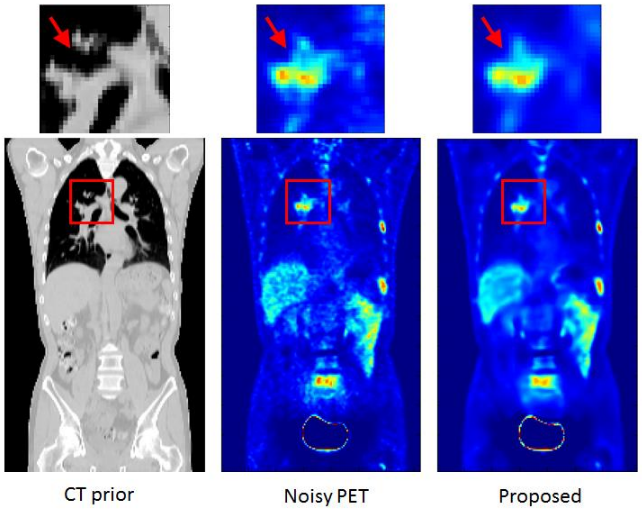
Suppl. figure 3. Comparison of the normalized cost values for the Adam, Nesterov's accelerated gradient (NAG) and L-BFGS algorithms based on one PET/CT dataset. The normalized cost value is defined as $L_n = \left(\emptyset_{Adam}^{ref} - \emptyset^{n}\right)/\left(\emptyset_{Adam}^{ref} - \emptyset_{Adam}^{1}\right)$, where $\emptyset_{Adam}^{ref}$ and $\emptyset_{Adam}^{1}$ are the cost value using the Adam algorithm running 700 epochs and 1 epoch, respectively.



Suppl. figure 4. The lesion contrast .vs standard deviations in reference ROIs by varying FWHMs (gray) of the Gaussian filter, window sizes (blue) of the NLM method, noise standard deviation (light blue) of the BM4D, and training epochs of the Deep Decoder (green) and the proposed method (orange). Left plot is based on one patient scan from the PET/CT dataset. Right plot is based on one patient scan from the PET/MR dataset.



Suppl. figure 5. Tumor size, SUV_{max}, SUV_{mean} and TLG versus CNR improvement ratios. Left: PET/CT data set; Right: PET/MR data set.



Suppl. figure 6. A mismatch example from PET/CT dataset. Zoomed regions shown on top row indicate the tumor structure mismatches between the CT prior and the noisy PET image.