

## Document, Supplemental Digital Content 2

**Figure, Supplemental Digital Content 3** illustrates procedures for comparisons of scDCT and SPY-PHI measurements. Note that SPY-PHI generates a 2D perfusion map ( $1080 \times 1920$  pixels) of skin flap with mixed signals from its surface to deep tissue up to several millimeters. Text boxes with red or purple color represent multiple steps to process scDCT or SPY images. These steps and corresponding results in two illustrative patients are presented in **Figure 2** and **Figure, Supplemental Digital Content 5**. Our first step was to search the ischemic area with the lowest BF value on each individual 3D image of scDCT. Four cubes with varied volumes (from  $10 \times 10 \times 10 \text{ mm}^3$  to  $40 \times 40 \times 40 \text{ mm}^3$ ) were then selected centering this ischemic area for comparisons. Cubes larger than  $40 \times 40 \times 40 \text{ mm}^3$  were not investigated because they are out of the ROI of  $80 \times 80 \text{ mm}^2$ . Eight contours were then generated in each individual cube based on 8 evenly distributed BF levels across the minimal and maximal values inside the cube. The average BF values were calculated in these 8 contours respectively; with “C1” representing the contour with the lowest average BF and “C8” representing the contour with the highest average BF. Finally, average flow values in 8 contours were normalized to the averaged flow value in the cube of  $10 \times 10 \times 10 \text{ mm}^3$  with the highest BF in each patient for comparisons with the SPY-PHI results.

For comparison, the same ischemic area with the lowest BF determined by the scDCT was registered on the ICG perfusion map. Four squares with the same areas as selected on the surface of scDCT image (from  $10 \times 10 \text{ mm}^2$  to  $40 \times 40 \text{ mm}^2$ ) were marked on the 2D perfusion map. Following the similar steps for scDCT image processing, average ICG perfusion values in 8 contours were calculated in the four squares respectively and normalized to the normal perfusion value in the area near the sternum of each patient. Note that ICG accumulation at the edge of wound/incision may lead to high fluorescence intensities as artifact (**Figure 2**), rendering this to be a poor reference for the normalization.

Pearson’s correlations were calculated to investigate the liner relationships between the scDCT and SPY-PHI measurements at 8 contours (C1 to C8) in 4 areas (from  $10 \times 10$  to  $40 \times 40 \text{ mm}^2$ ) for SPY-PHI and in four cubes (from  $10 \times 10 \times 10$  to  $40 \times 40 \times 40 \text{ mm}^3$ ) for scDCT.