SUPPLEMENTAL MATERIAL

Supplemental Methods

Clinical Ablation Procedure

Under sedation, non-invasive programmed stimulation was performed through the patient's ICD to identify the primary VT morphology to be targeted for ablation. Under general anesthesia or moderate sedation, access to the LV was achieved via a retrograde aortic or trans-septal approach. Electroanatomical mapping in sinus rhythm was performed with a multipolar catheter (Penta Ray or Deca Nav) or irrigated tip ablation catheter. In cases where VT was hemodynamically stable, limited entrainment mapping was performed in the area of interest to identify the critical isthmus. Ablation was performed using 35-50 watts in areas consistent with the critical isthmus along with areas of abnormal electrogram activity (fractionated potentials, late potentials, LAVAs, etc) and areas to connect scar to nearby non-conducting structures. The procedure endpoint was elimination of all VTs induced with programmed stimulation at two drive cycle lengths, up to triple extra-stimuli.

Registration of Ablation Procedure Data to Digital Hearts

A rigid registration was performed from the available registered clinical anatomical data to landmarks defined from CT. This same registration was then applied to the EAM surface and ablation lesion locations to properly align clinical procedural data with the digital heart reconstructed from the CT. For patients without available anatomical data, a rigid registration was performed to match the EAM surface geometry with the endocardium reconstructed from CT.

Comparison of EAM-defined Scar and DIFAT Lesion Volume Locations

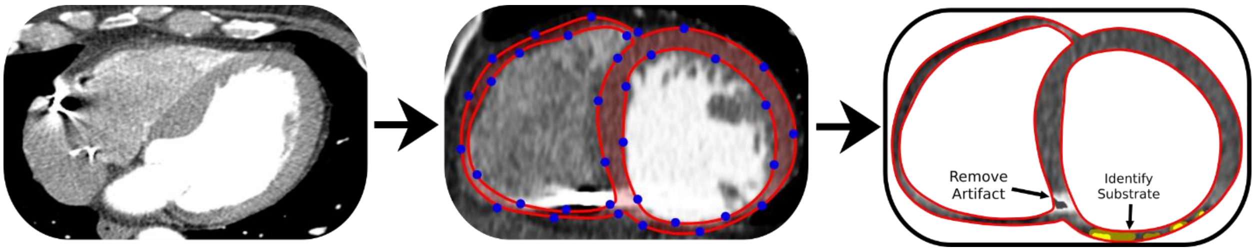
For direct comparison, points on EAM surfaces with electrogram recordings were projected to the closest point on the corresponding digital heart endocardium. To account for registration errors, EAM points that were >5 mm away from the digital heart endocardium were removed. All projected EAM points were categorized as being in scar (bipolar voltage amplitude <0.5 mV) versus in border zone or healthy tissues (bipolar voltage amplitude >0.5 mV). To account for the fact that DIFAT lesion volumes were located in the mid-myocardium and epicardium in addition to the endocardium, a point on the EAM surface, registered to the digital heart endocardium, was categorized as being close to a DIFAT lesion volume if it was <10 mm away versus being far away from a DIFAT lesion volume if it was >10 mm away. A Fisher exact test was then used to determine whether locations of scar on the EAM were associated with locations close to a DIFAT lesion volume.

Supplemental Tables

Supplementary Table 1: Comparing infarct location and predominant inFAT location.

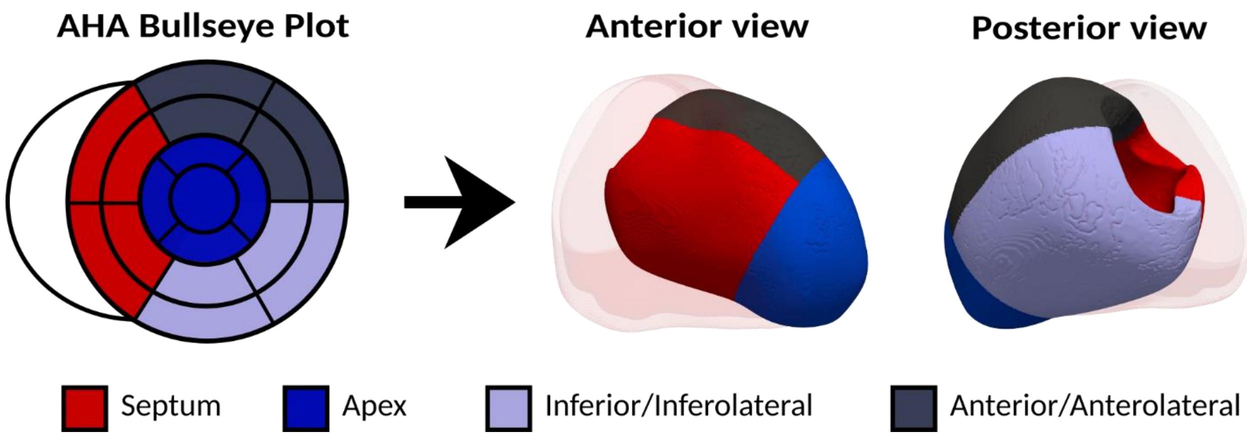
Patient Number	Infarct Location	Predominant inFAT Location
1	Inferior	Mid inferoseptum
2	Anterior/Anteroseptal	Apical anterior
3	Inferior	Basal inferior
4	Anterior/Anteroseptal	Apical septum
5	Lateral	Mid inferolateral
6	Inferior	Basal inferior
7	Lateral	Mid anterolateral
8	Inferior	Basal Inferior
9	Lateral	Basal inferolateral
10	Inferior	Basal inferior
11	Inferior	Basal inferolateral
12	Lateral	Mid inferolateral
13	Anterior/Anteroseptal	Apical anterior
14	Inferior	Mid inferolateral
15	Anterior/Anteroseptal	Apical septum
16	Anterior/Anteroseptal	Apical anterior
17	Anterior/Anteroseptal	Apical septum
18	Unknown	Mid anterolateral
19	Anterior/Anteroseptal	Apical anterior
20	Inferior	Mid inferior
21	Lateral	Mid inferolateral
22	Anterior/Anteroseptal	Apical anterior
23	Unknown	Mid inferolateral
24	Inferior	Mid inferoseptal
25	Inferior	Basal inferior
26	Inferior	Mid inferolateral
27	Anterior/Anteroseptal	Apical septum
28	Anterior/Anteroseptal	Apical anterior
29	Anterior/Anteroseptal	Apical lateral

Supplemental Figures



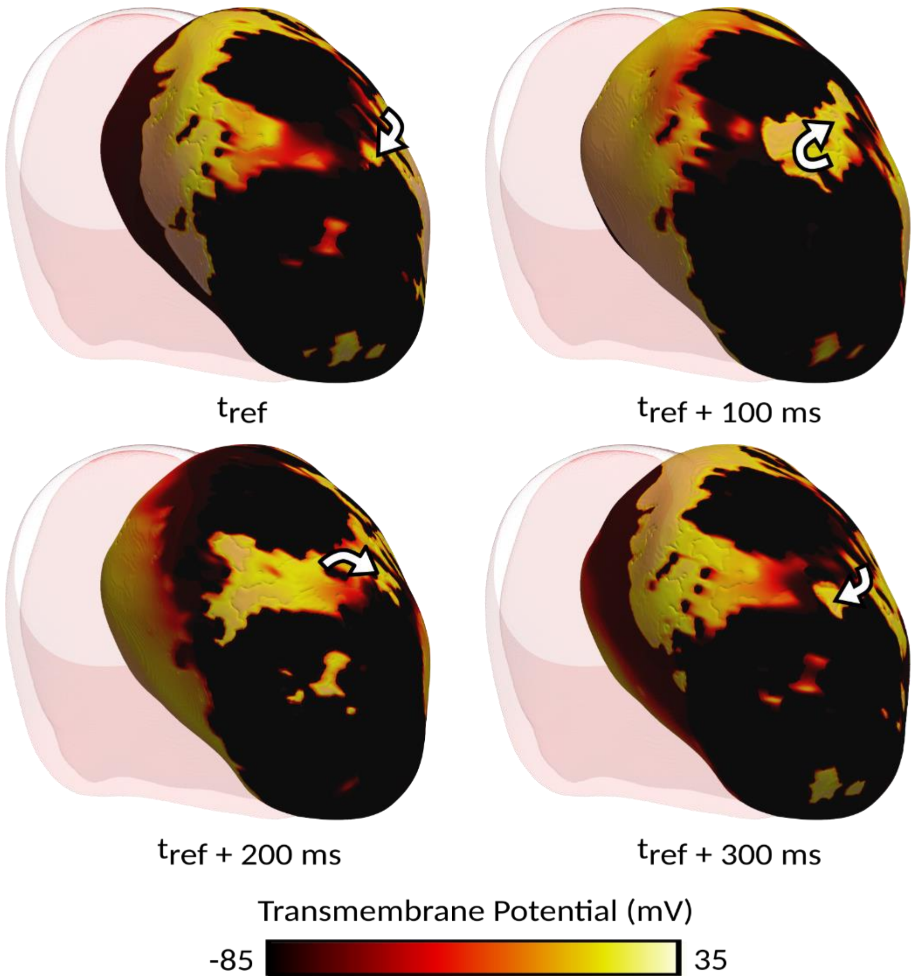
Supplementary Figure 1: Image processing workflow.

Cardiac contrast-enhanced computed tomographic (CE-CT) images (left) were acquired and resampled into short axis at an isotropic resolution of 0.35 x 0.35 x 0.35 mm. Short axial scans were segmented (middle) using a semi-automated method by placing control points (shown in blue) that are used to generate a smooth interpolated surface (shown in red). From the contoured surface, the myocardium was extracted (right). Artifact voxels, defined as <-180 HU and >250 HU, and surrounding regions were removed. These regions were assumed to be normal myocardium. Lastly, infiltrating adipose tissue (inFAT) in yellow and fat-myocardium admixture in gold were identified in the myocardium using ranges of -180 to -50 HU and -50 to -5 HU, respectively. Because noise can have negative HU and be mistakenly identified, inFAT or fat-myocardium admixture cluster volumes of <1 mm^3 were removed.



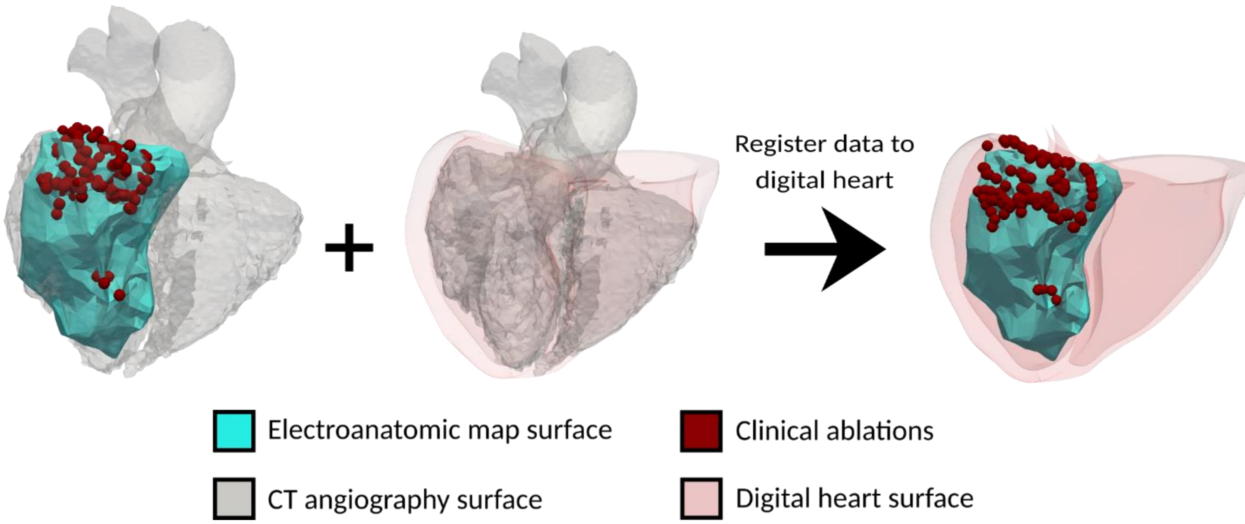
Supplementary Figure 2: Subdividing the heart into anatomical regions for analysis.

Digital hearts were subdivided, using custom software, into 4 gross anatomical regions based on the American Heart Association (AHA) segment classification (left). Three-dimensional views (anterior and posterior) of the different anatomical regions in one patient digital heart are shown (right).



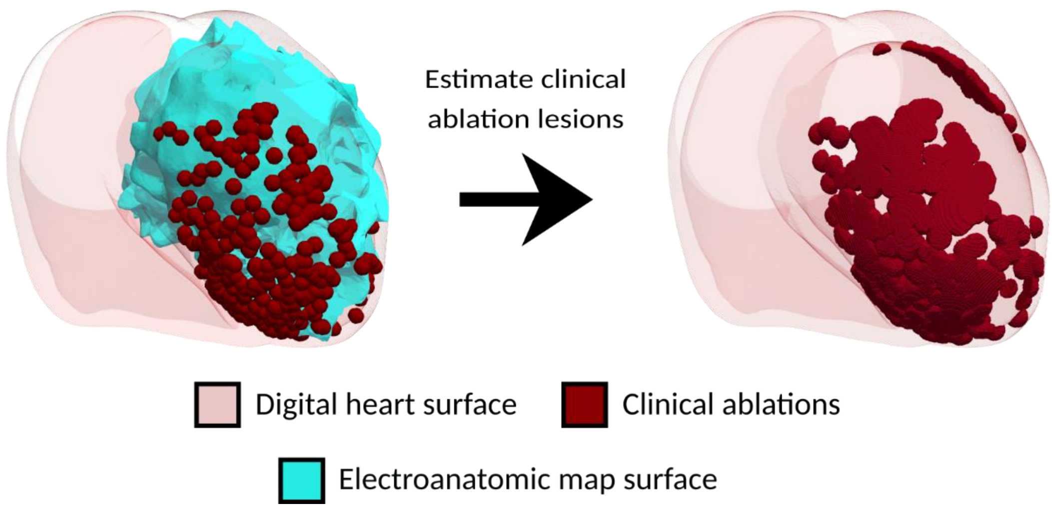
Supplementary Figure 3: Example VT in one patient's digital heart.

Transmembrane potential maps over a 300-ms cycle of a VT in a patient's digital heart. t_{ref} refers to reference time. The direction of the wavefront propagation is shown with the white arrows.



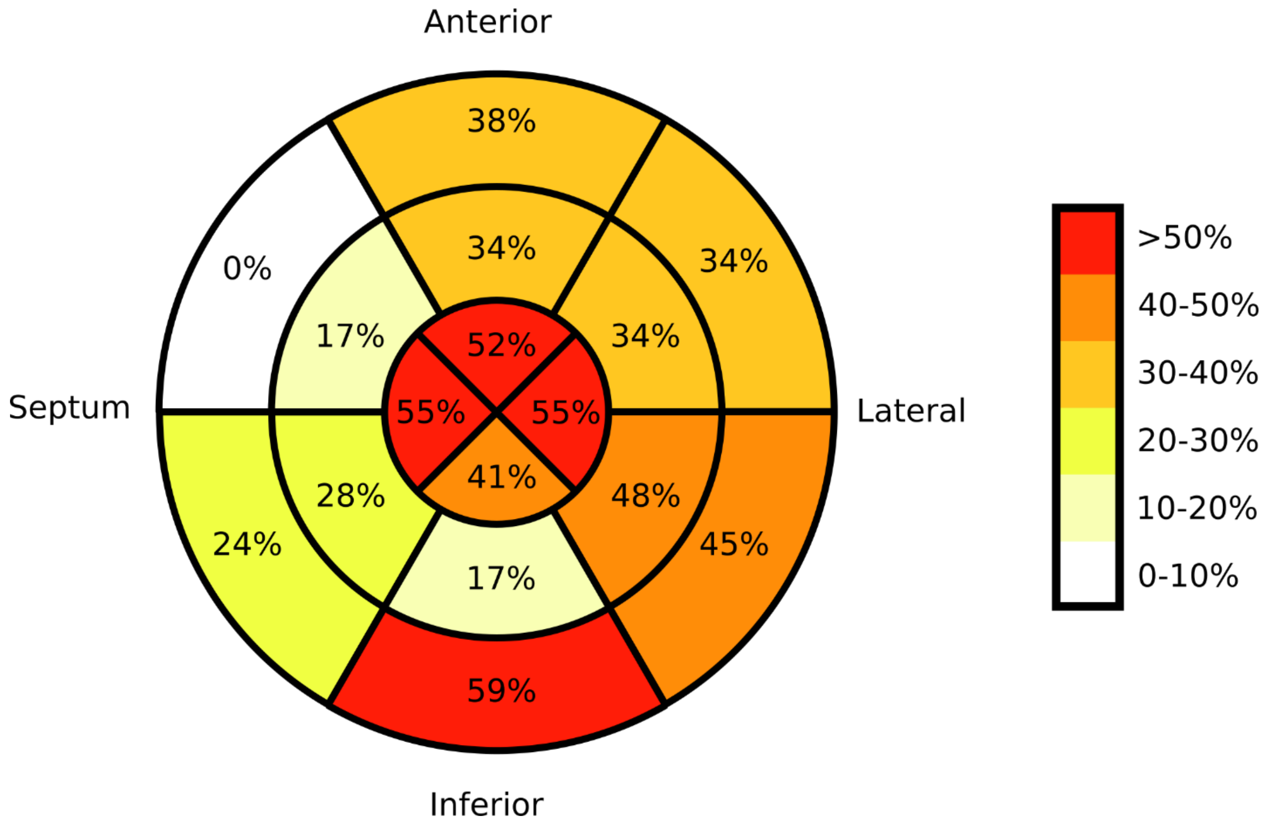
Supplementary Figure 4: Registration of electroanatomical map (EAM) surface and ablation catheter tip locations to digital heart surface.

Anatomical data (computed tomography (CT) angiography surfaces and/or landmarks defined by mapping/ultrasound) were registered to the EAM surface and ablation catheter tip locations during the ablation procedure (left). All available anatomical data were retrospectively registered to the digital heart (middle). This same registration was then used to register the EAM surface and clinical ablation locations to the digital heart (right).

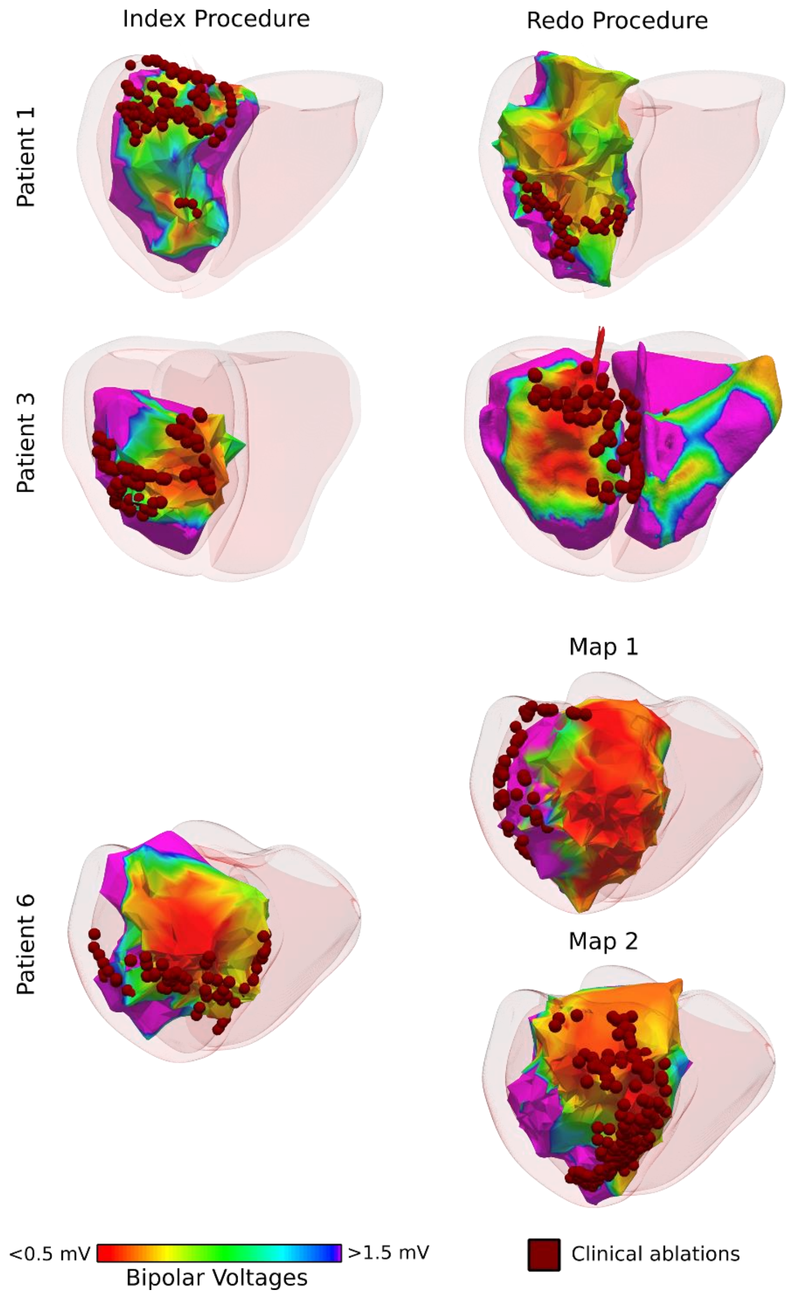


Supplementary Figure 5: Estimation of clinical ablation lesions sizes.

Left: Once registered, ablation catheter tip locations were projected to the closest point on the digital heart endocardium. *Right:* Each clinical ablation was estimated to create a lesion of radius 3.5 mm from the endocardial surface (corresponding to a volume of up to 90 mm^3), based on standard catheter tip size. The resulting ablated tissue is shown in dark red.



Supplementary Figure 6: inFAT prevalence across AHA segments. For each AHA segment, the percentage of patients who had >5 mm^3 of inFAT is shown. inFAT was most present in the apical and inferior/inferolateral regions, partially in the anterior/anterolateral regions, and seldom in the septum. AHA: American Heart Association, inFAT: infiltrating adipose tissue



Supplementary Figure 7: Electroanatomical mapping data for index and redo ablation procedures for patients 1, 3, and 6. The first and second column denotes the bipolar voltage maps during the index procedure and redo procedures, respectively.