Non-Invasive Electrical Impedance Tomography for Multi-Scale Detection of Liver Fat Content

Supplementary Information

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I. Change of geometric boundaries

We compared EIT images obtained from two distinct geometric boundaries: (1) an oval-shaped geometry established from the camera-captured image of the rabbit liver (**Figure S1A**), and (2) an ideal circular geometry (**Figure S1B**).

All of the simulation methods, including finite element modeling and data generation, were kept the same for the two geometric boundaries. As illustrated in **Figure S1**, the circular geometry engendered a more distorted liver geometry as compared to the oval-shaped liver in the finite element model. The average conductivity of the liver in the region of interest (ROI) was determined by identifying the minimal conductivity value around the liver region, followed by identification of the area that was within 400% of the minimum value. The identified ROI deviates by a higher percentage from the initial assigned value when using the less accurate circular geometry (15% in the circular vs. 5.8% in the oval geometry).

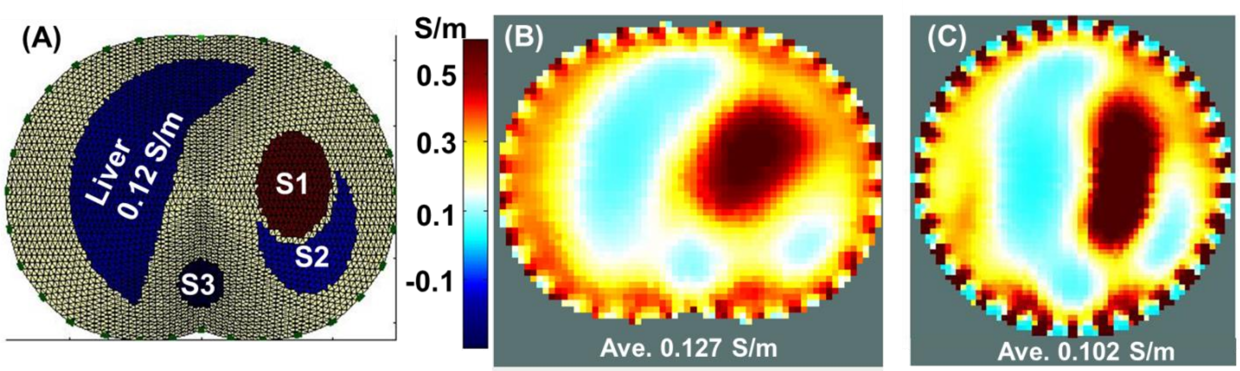

Figure S1: Impact of distinct geometric boundaries. (A) The finite element model highlights the liver geometry in relation to the other organs: stomach at 0.523 S/m (S1), spleen at 0.132 S/m (S2), and spine at 0.028 S/m (S3). The EIT image was generated by using (B) the oval geometry or (C) the circular geometry.

II. Change in the size of the liver

We demonstrated the effects of inaccurate liver size by simulating a change in liver size of up to 200% (as calibrated by the weight from the rabbit livers) while keeping the general geometry of the body and other organs (stomach, spleen, and spine) in the FEM model the same. The initial conductivity values assigned to all the sub-regions (organs) in the FEM model are as follows: liver at 0.12 S/m, stomach at 0.53 S/m (S1), spleen 0.13 S/m (S2), and spine at 0.02 S/m (S3). As shown in **Figure S2**, as the liver size is enlarged (see upper panel), the average conductivity deviates further from the assigned values in the simulation (see lower panel).

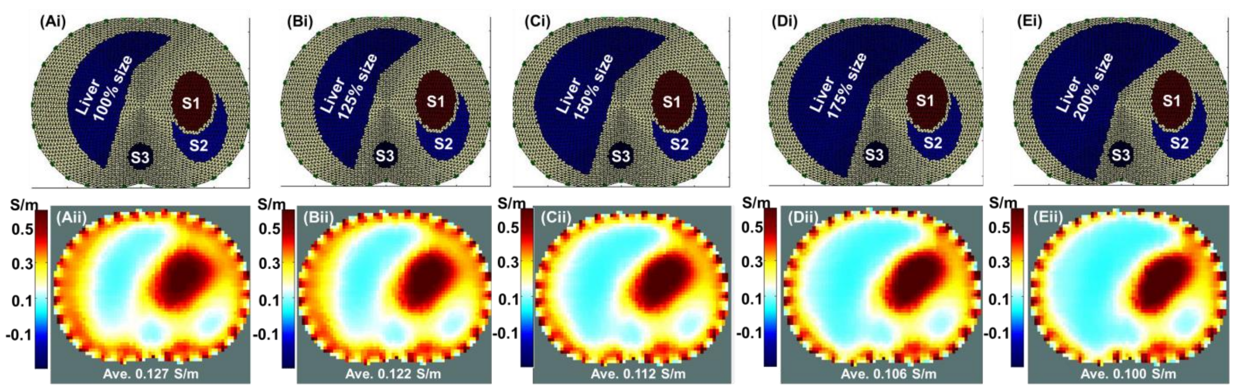

Figure S2: Demonstration of the size effects by simulation. (Ai-Ei) The finite element model includes the liver (0.120 S/m) with an increase in size from 100% to 200% at 25% increment while the size of other organs remains the same: stomach at 0.523 S/m (S1), spleen at 0.132 S/m (S2), and spine at 0.028 S/m (S2). (Aii-Eii) The EIT images correspond to the individual upper models.