Category :**Respiratory: monitoring**

A302 - ***A method for personalized reconstruction of electrical impedance tomography static images***

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Introduction:

Electrical impedance tomography (EIT) is a non-invasive bedside tool for personalized monitoring of lung ventilation[1]. Although for years in clinical practice, the capabilities of the technology for monitoring the structural changes in the lung tissue are not fully revealed. That is why we aimed to develop a method for personalized reconstruction of EIT static images.

Methods:

Based on patient's thoracic CT scan analysis, the slice, presenting the largest intersection with the region of interest, is selected. The level of the slice defines the level of interest at which the electrodes are positioned according to patient's anatomical reference points. The margins of the patient's thorax are determined by applying a fem mesh onto the CT image. Subsequently the raw data from the EIT is processed within the individualized contour of the thorax, reflecting the body structure of the patient[2].

Results:

The method provides reliable EIT images with significant conformity to the CT images taken at the corresponding level. This personalized approach surmounts the limitations for placing the EIT electrodes[3] at different than initially recommended positions and reveals indications for potential clinical application of EIT in conditions characterized by heterogeneously disseminated or solitary lesions.

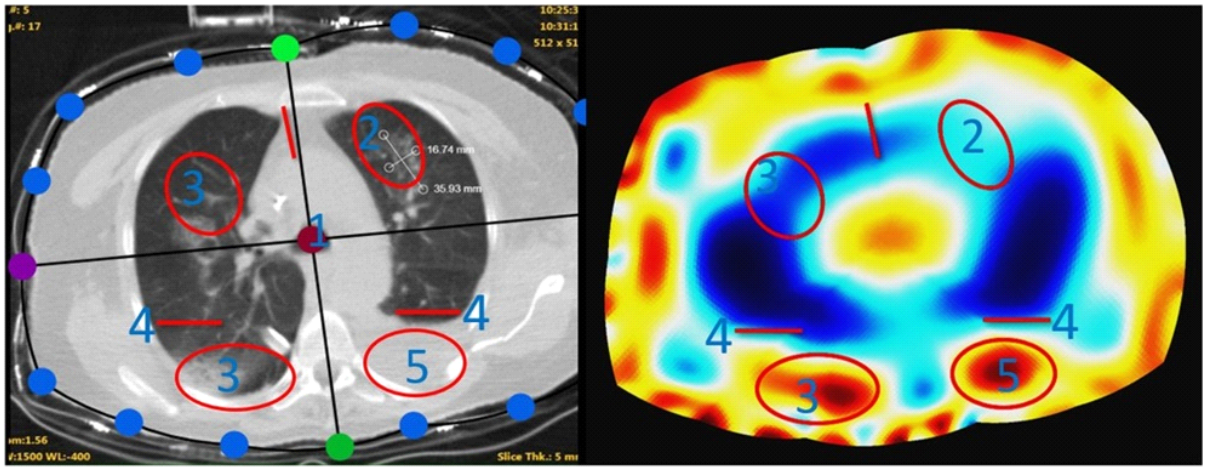
Conclusion:

The personalized approach in reconstruction of EIT images reveals potential for optimization of monitoring of mechanical ventilation and the monitoring of lung injury dynamics at the bedside.

References:

1. Rauseo M et al. Expert opinion document: Electrical impedance tomography: applications from the intensive care unit and beyond. J Anesth Analg Crit Care 2022; 2:28.
2. Grychtol B et al. Impact of model shape mismatch on reconstruction quality in electrical impedance tomography. IEEE Trans Med Imaging. 2012; 31:1754–60.
3. Karsten J et al. Influence of different electrode belt positions on electrical impedance tomography imaging of regional ventilation: a prospective observational study. Crit Care 2016;20:3.

Image :



1 – fem mesh 2 – lung contusion 3 – infiltration 4 – hydrostatic level 5 – pleural effusion

Comparison between CT scan and the resultant EIT reconstructed image