Software tool for analysing ventilation EIT data

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Software tool for analysing ventilation EIT data

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Abstract: In the field of electrical impedance tomography (EIT) no standardized image analysis software tools are available. Therefore we developed ibeX a freely available MATLAB-based software suite for EIT image analysis. ibeX is designed to facilitate analysis of data obtained from clinical and experimental research. In this abstract we briefly describe the recent state and the key features of ibeX.

1 Introduction

Electrical impedance tomography is a non-invasive real-time imaging technology, which allows measuring and recording up to 50 cross sectional images per second. From these images, showing the distribution of electrical impedance changes within the body, lung and heart function parameters can be extracted. In commercially available devices these thoracic images can be stored for offline analysis. However, the software tools available for offline analysis are either limited to one specific EIT device (Auspex) or to a specific study. To overcome this drawback ibeX, a software suite for EIT image analysis, was developed. We believe that such software facilitates research and the development of new functional parameters by providing an easy-to-use, fast data analyser, which will be further developed based on the needs of the EIT community.

2 Method

ibeX is a MATLAB (The MathWorks Inc., Natick, USA) based software to explore and analyse sequences of reconstructed EIT images. ibeX contains the following functions and features: graphical user interface (see Figure 1), currently, an import function for Swisstom BB[2] and Pioneer Set (Swisstom, Landquart, Switzerland) data, manual data range selection, automatic breath detection, filter functions, breath-by-breath lung function analysis and a data and figure export to Microsoft Excel spreadsheet (XLS) and Portable Document Format (PDF). As a start we implemented published EIT parameters such as the centre of ventilation [1], the regional ventilation distribution [2] as well as new ones like stretch and silent spaces [3].

3 Conclusion and outlook

This abstract presents the first version of ibeX which can be downloaded free of charge from www.swisstom.com. We are hopeful that ibeX will simplify EIT data analysis, helps researchers analyse their data in a reproducible way and export their results into a common file format. In the future we will expand the import function to deal with data from other EIT devices such as PulmoVista 500 (Dräger, Lübeck, Germany), Enlight (Timpel, São Paulo, Brazil) and Geo II MF (CareFusion, San Diego, USA). Furthermore, more lung function parameters will follow and we invite the EIT community to contribute their codes. Finally, cardiac related impedance changes such as local perfusion [4] or stroke volume variation [5] shall be taken care of, too.

References

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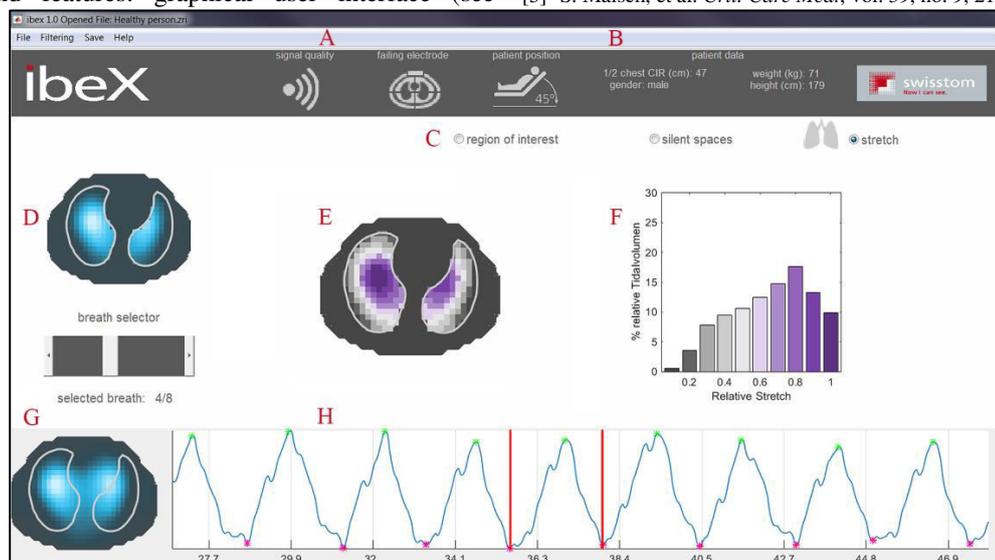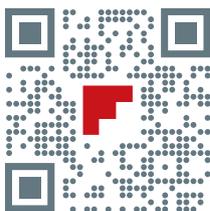[5] S. Maisch, et al. *Crit. Care Med.*, vol. 39, no. 9, 2173–6, 2011.

Figure 1: GUI of ibeX: The upper part shows signal quality **(A)** and patient data **(B)**. The middle part contains the lung function parameters **(C)**, the tidal image **(D)** and the results based on the selection such as the stretch image **(E)** with the stretch bars **(F)**. The lower part includes the standard deviation image **(G)** and the ventilation signal together with the detected breaths **(H)**.

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