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Abstract Group: 2.2. Noninvasive Ventilatory Support

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Title: Combining impulse oscillometry and multi-lead impedance pneumography for regional analysis of dynamic lung function

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Body: Studies suggest that dynamic lung mechanic properties are not homogeneously distributed within the lungs [1]. We hypothesise that pressure pulses induced at the mouth by impulse oscillometry (IOS) produce different volume responses in different lung areas depending on the regional lung mechanic properties. We developed a novel multi-lead impedance pneumography measurement method, that unlike earlier impedance methods, has sufficiently high time resolution to track IOS volume changes in multiple locations [2]. In an initial experiment, three IP signals were recorded at different levels of the thorax while IOS was being performed. Ensemble averaging of the recorded IP signal gated to IOS pulses was used to remove respiratory and cardiac impedance changes. Results show that IOS pressure pulses can be seen in IP measurement. Furthermore, it was observed that IP signal responses showed consistent differences in shape between the three measured locations (Fig1). We believe that, with the appropriated processing this method will allow for the first time to assess lung distribution of dynamic air-flow resistance and lung compliance, thus leading to new insights in pulmonary diseases such as asthma and COPD.

[1] R. Pikkemaat et al. "EIT: New diagnostic possibilities using regional time constant maps" [2] J. Gracia et al. "Multilead Measurement System for the Time-Domain Analysis of Bioimpedance Magnitude".