Title (tentative): A new software, based on Speckle tracking technology, for quantifying lung sliding and mechanical ventilation in critically ill patients.

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### Description

**Motivation and application domain**

Acute respiratory failure is a common and serious condition in hospitalized patients caused by several diseases including mostly congestive heart failure (CHF) and acute respiratory distress syndrome (ARDS). Only in association with clinical history and radiological assessment the underlying causes of acute respiratory failure can be recognized. Supplemental oxygen delivery is the main therapy for acute respiratory failure.

**General objectives and main activities**

The proposed project has the ambitious aim of creating and clinically validate new diagnostic biomarkers in critically ill patients through quantitative analysis of lung ultrasonography, able to give important information such as distribution of lung ventilation, therefore including all benefits of techniques such as CT (i.e. quantitative, repeatable and objective) but avoiding their limits, thus being free of ionizing radiation, non-invasive, executable at the bedside and at low cost.

**Training Objectives (technical/analytical tools, experimental methodologies)**

From a recent previous study from our group (thesis), we developed a preliminary version of a quantitative pleural software and we were able to track displacements of the pleural surface during breathing with tidal volumes during mechanical ventilation with CT scan as reference. Now we want to extend these results to measuring lung strains during respiration as a means of assessing local lung ventilation. Ultrasonography may be able to assess local lung ventilation.

**Place(s) where the thesis work will be carried out:** DIBRIS

**Maximum number of students:** 1