

Welcome to EIT 2014

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Abstract: On April 24–26 2014, the 15th International Conference on Biomedical Applications of Electrical Impedance Tomography (EIT 2014) takes place at the Glen House Resort in Gananoque, Canada. Exciting developments are taking place in EIT: developments in hardware, software, and reconstruction algorithms, and new clinical applications and better understanding of the current ones. This paper introduces this fascinating conference.

1 Introduction

Electrical Impedance Tomography (EIT) estimates the distribution of impedance within a body from electrical stimulation and measurement on the body surface. EIT shows significant promise for medical monitoring and imaging with applications to thoracic, brain, breast, abdominal and prostate imaging.

We have all written an introductory paragraph like the previous one, many, many times. And – each time – we try to compress the text, just a little more. Why? We are looking forward to the day when there is no longer a need to explain EIT; when there is no longer the need to call it a promising, "new" technology. Instead, we would like to write, "EIT devices are increasingly used in applications A, B and C, based on evidence of improved patient outcomes and safety [refs D, E, F]". At our 15th International Conference on Biomedical Applications of EIT, we look forward to this day, and review how far along this road we have come.

When discussing EIT's potential, one joke has been often made, referring to the frustrations of a technology that shows much promise, and many challenges: "I wish EIT would either work properly, or fail consistently. That way I can move on with my life." However, joking aside, there are reasons to be enthusiastic about EIT and its potential.

2 Conference

This conference gives an excellent view of the many exciting developments in EIT. Some brief comments are given, but space prevents referring to individual innovations. For this, please see the full proceedings!

- *Scientific interest* in EIT is strong and growing. Within its traditional areas of interest there is increasing interest and appreciation of the unique information it can provide. We see improving collaboration between mathematicians, engineers, physiologists and clinicians; and also interaction with the corresponding geophysical community. Novel image reconstruction and analysis approaches are proposed, incorporating deep mathematical insights and concern for the challenges of EIT data.

- *Commercial devices* are now available. Two companies (both sponsors of the conference) sell EIT devices which are approved for clinical use. This will help address a big limitation which has kept many researchers from using EIT.
- *Medical results* are promising. EIT is now beginning to move beyond the stage of validation to other gold standards, and is being used for prospective interventions, and to detect physiological conditions for which no other technology is available.

3 Discussion

In a recent review[1], a continuous increase in scientific interest in EIT was noted, which was explained by the evidence of a clinical need; this trend has continued (Figure 1).

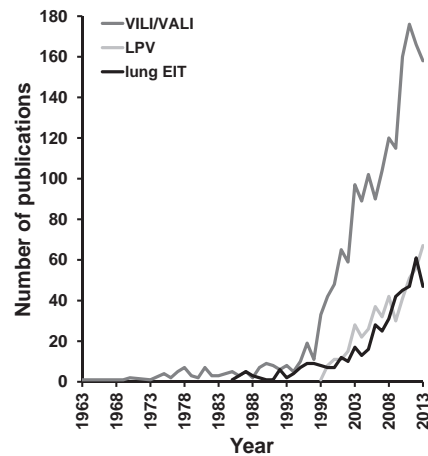


Figure 1: Number of publications vs publication date on VILI/VALI (Ventilator Induced/Associated Lung Injury), LPV (Lung Protective Ventilation) and lung EIT published in peer-reviewed journals. (Image credit: Inéz Frerichs; Source: ISI Web of Knowledge, Thomson Reuters, New York, USA.)

The review offered two suggestions: (1) think about the physiology and pathophysiology ... to provide insights which lead to therapeutic interventions and (2) analyse EIT images in creative ways. When we look at the interesting collection of papers for this conference, we feel optimistic. Many novel insights and creative ways to acquire and analyse EIT are proposed. We will soon say?

EIT is a **promising lifesaving** technology, ...

References

- [1] Adler A, Amato MB, Arnold JH, Bayford R, Bodenstern M, Böhm SH, Brown BH, Frerichs I, Stenqvist O, Weiler N, Wolf GK, "Whither lung EIT: where are we, where do we want to go, and what do we need to get there?", *Physiol Meas*, 33:679–694, 2012.

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