

EIT monitoring of the premature lung

International consortium on mechanical ventilation in children
16 Sept 2017

Andy Adler

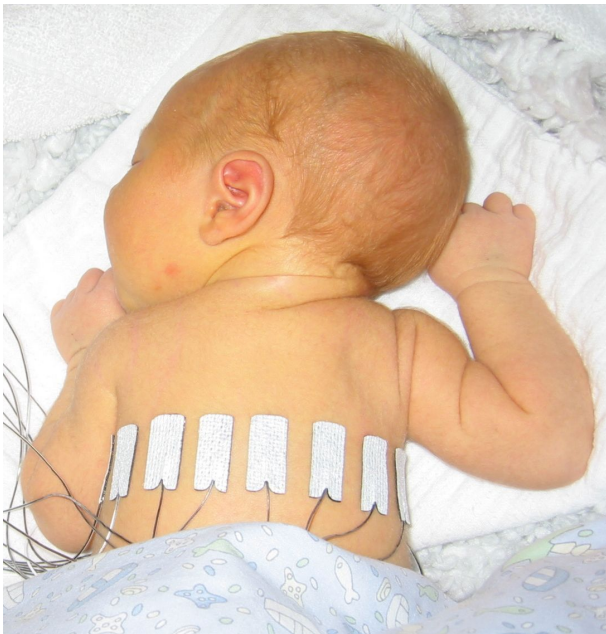
Systems and Computer Engineering, Carleton University, Ottawa

Electrical Impedance Tomography

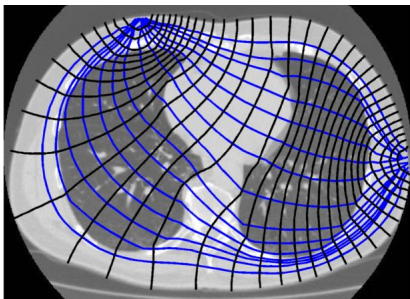
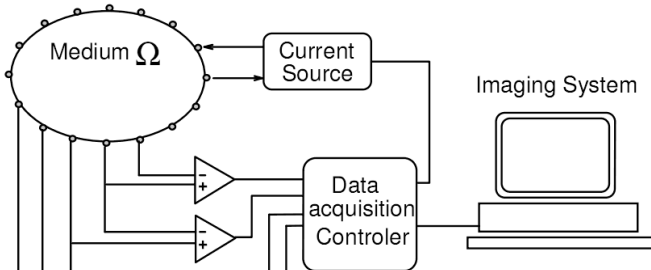
Electrical Impedance Tomography

10-day old healthy baby with EIT electrodes

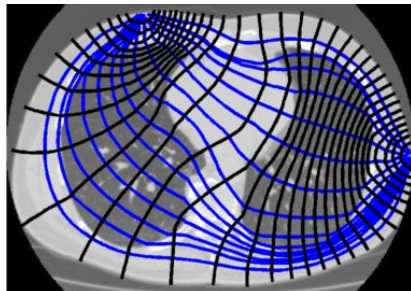
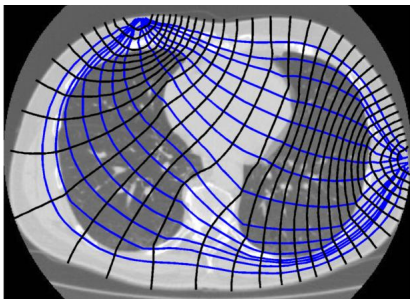
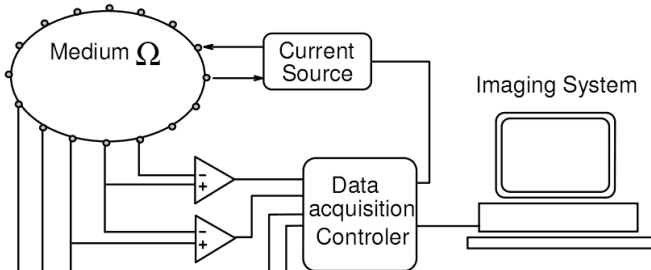
Source:
eidors3d.sf.net/data_contrib/if-neonate-spontaneous



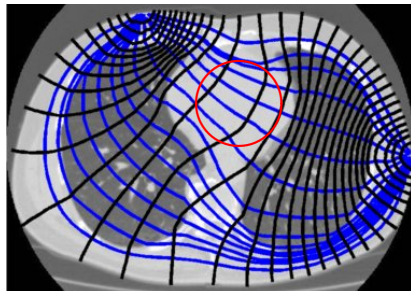
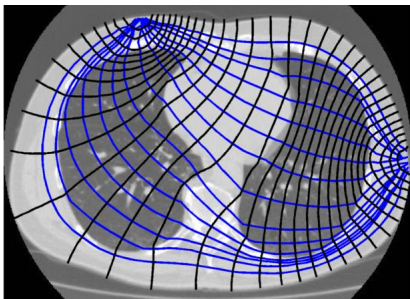
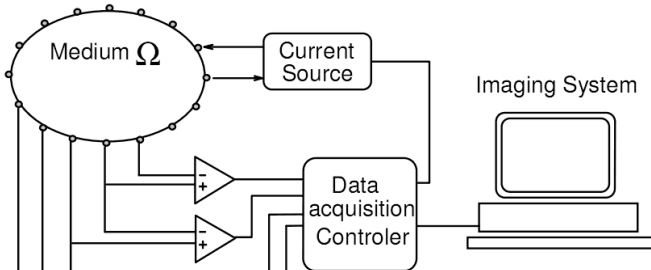
EIT – Imaging system and current in the body



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Mechanical Ventilation and EIT

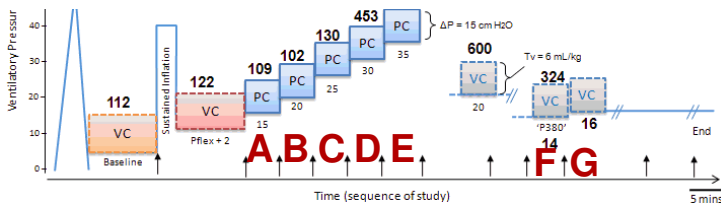


Mechanical Ventilator with EIT monitor
(Sorry, no pictures of child with EIT belt)

Source: Swisstom.com

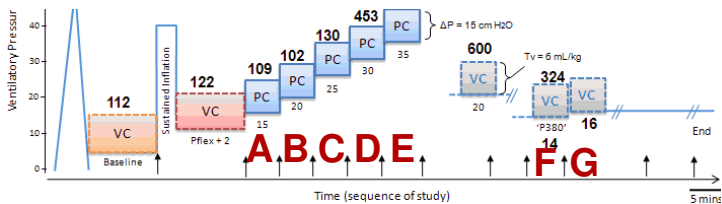
EIT + Lung Opening

Patient: 5.9 years, ARDS triggered by pneumonia. (Gómez-Laberge, IEEE TMI, 2012)

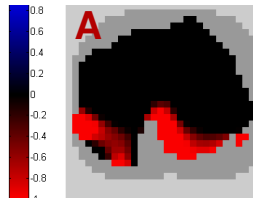


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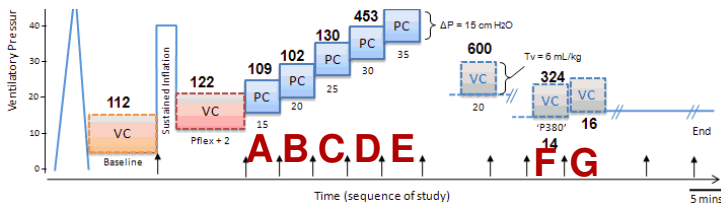
Overdistension



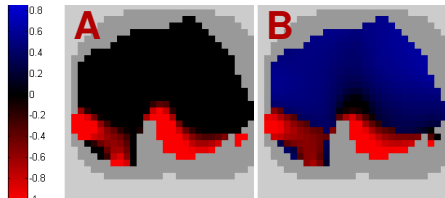
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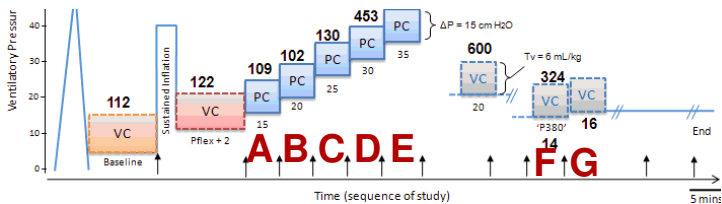
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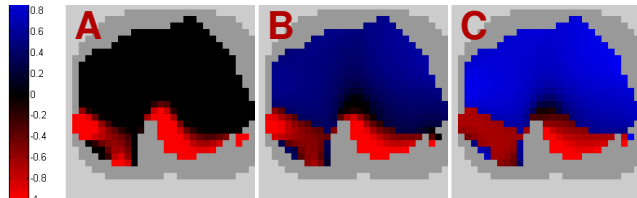
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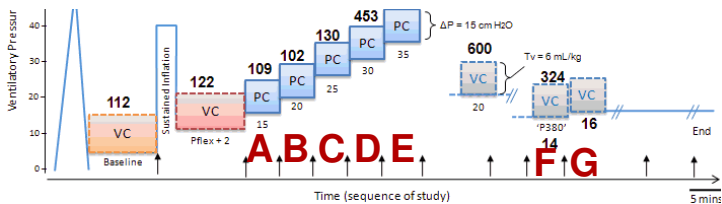
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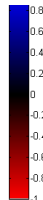
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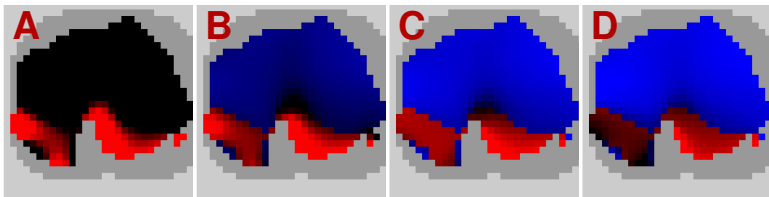
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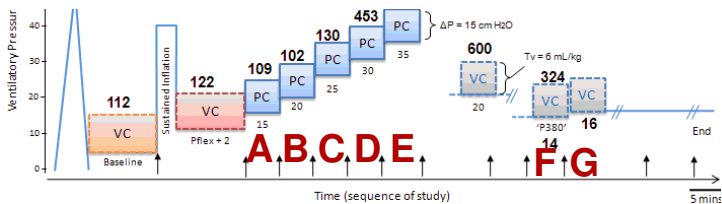


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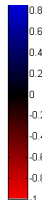


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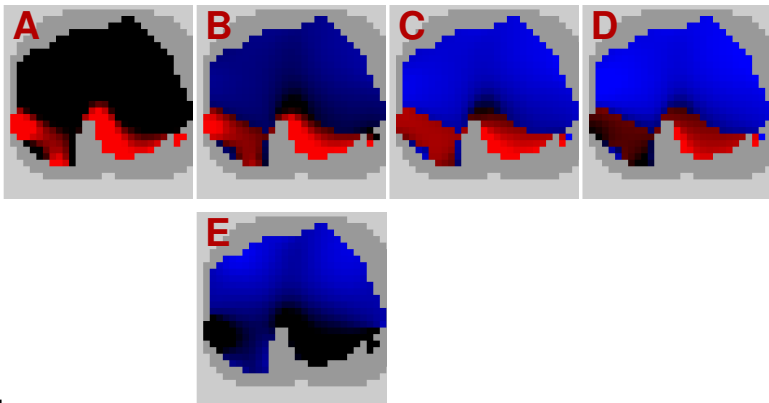
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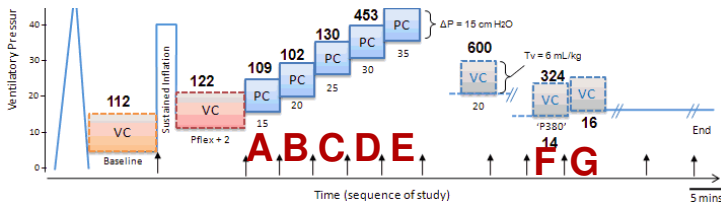


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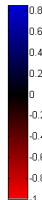


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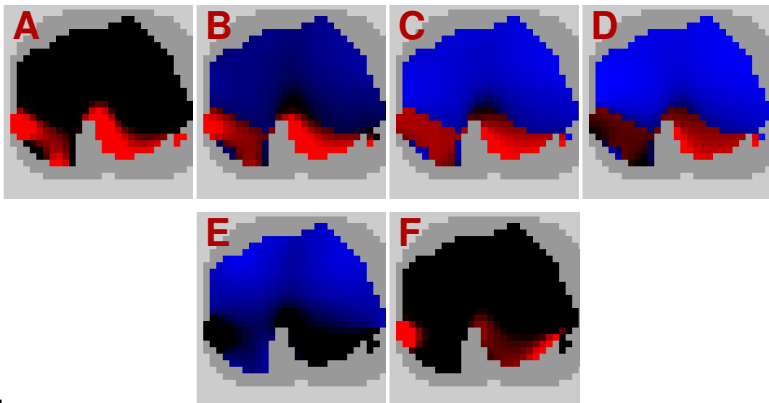
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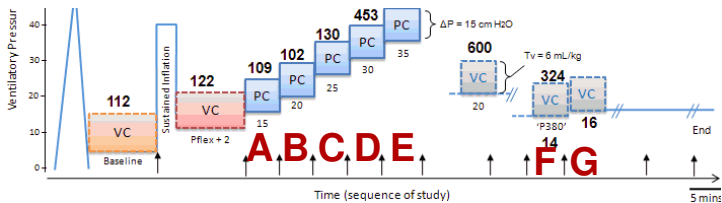


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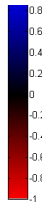


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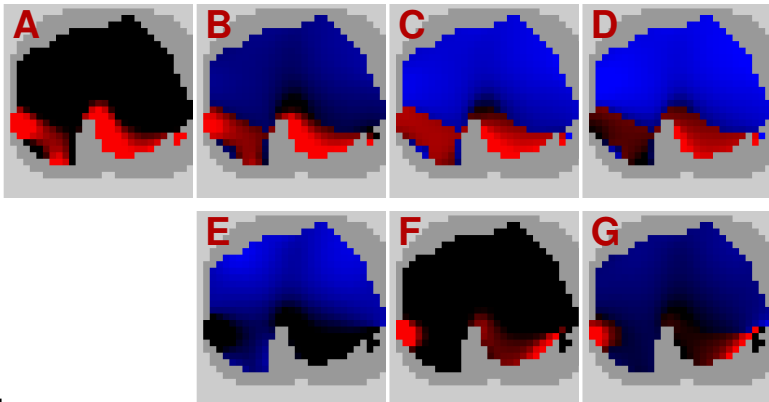
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Overdistension



Collapse



First breath – Rescue inflation

- First breath in preterm lung
- Spatially and temporally heterogeneous response

Source: D. Tingay *et al*, 2016

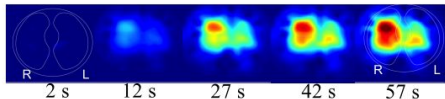
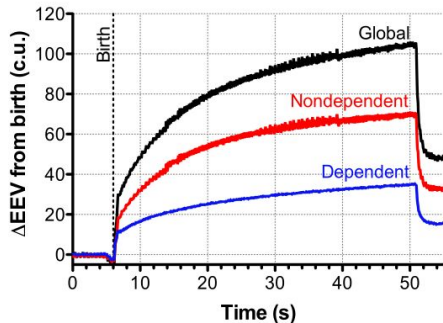
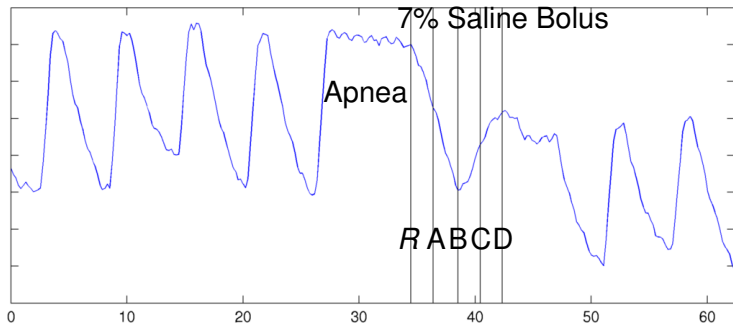


Figure 1. Exponential pattern of volume change during a SI, as measured by EIT, in global thorax and gravity-dependent

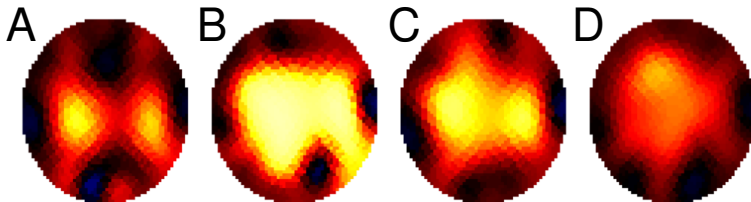
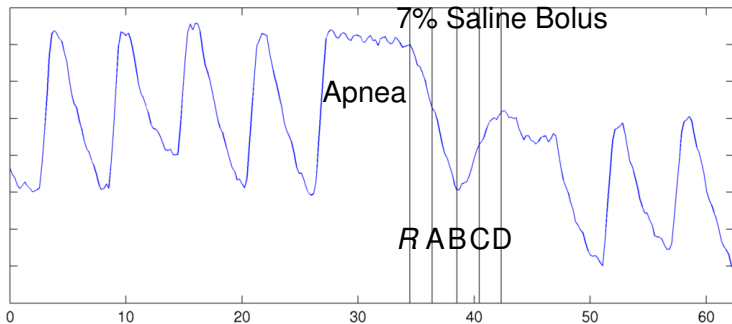
Perfusion via contrast bolus

Adler *et al*, EIT Conf, 2016

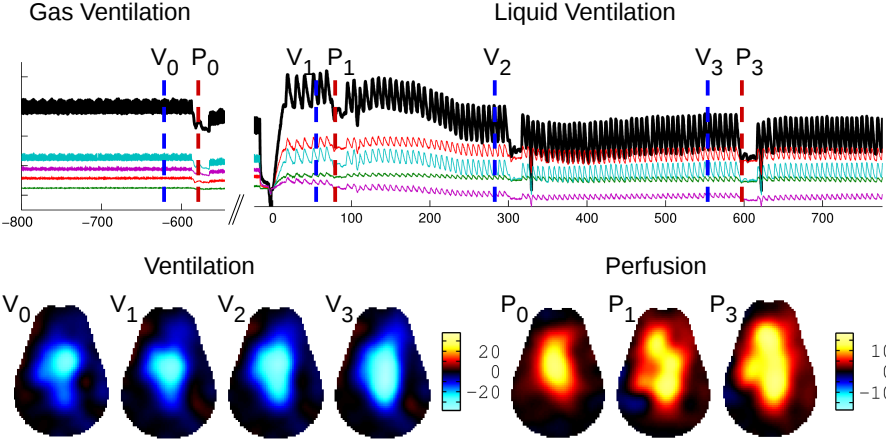


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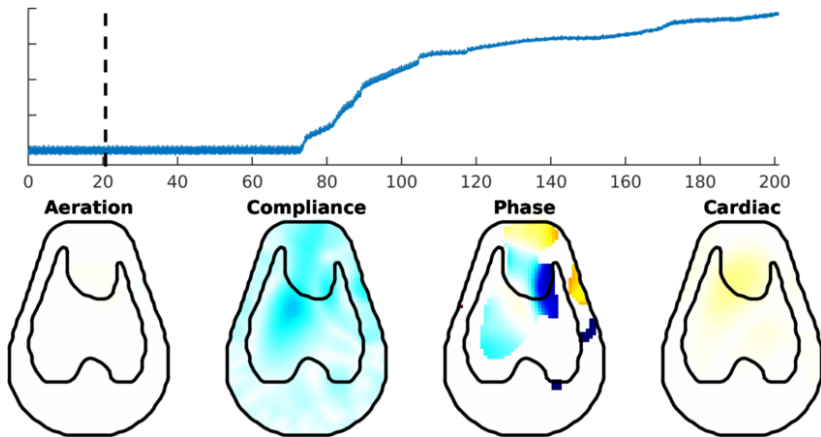
Adler *et al*, EIT Conf, 2016



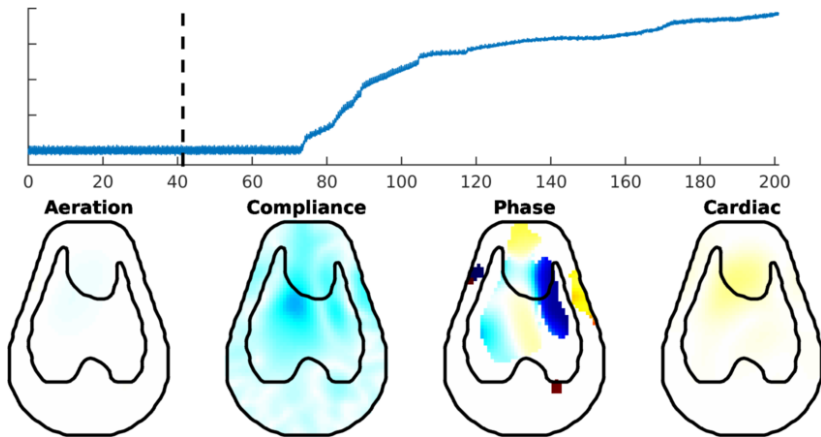
Distribution of Ventilation / Perfusion



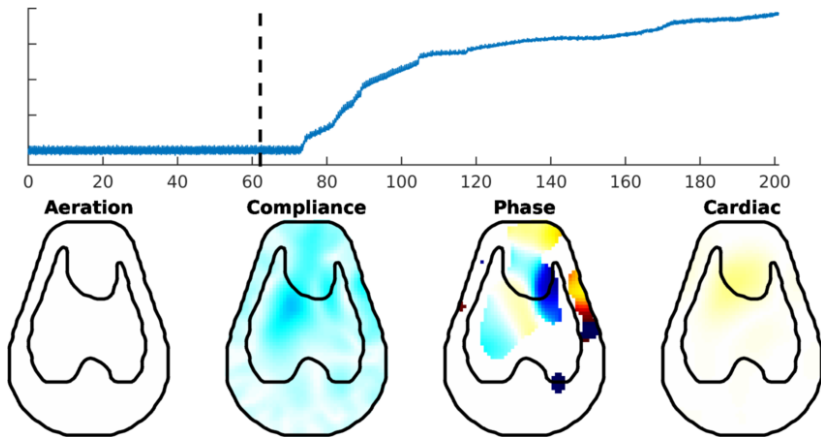
Can EIT predict Pneumothorax?



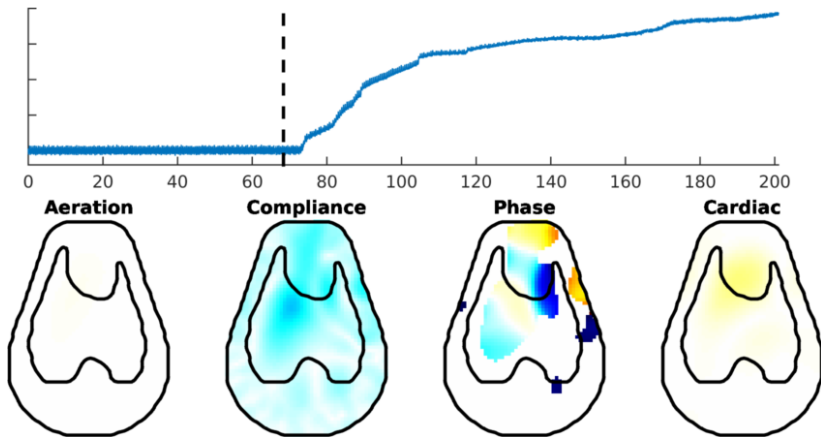
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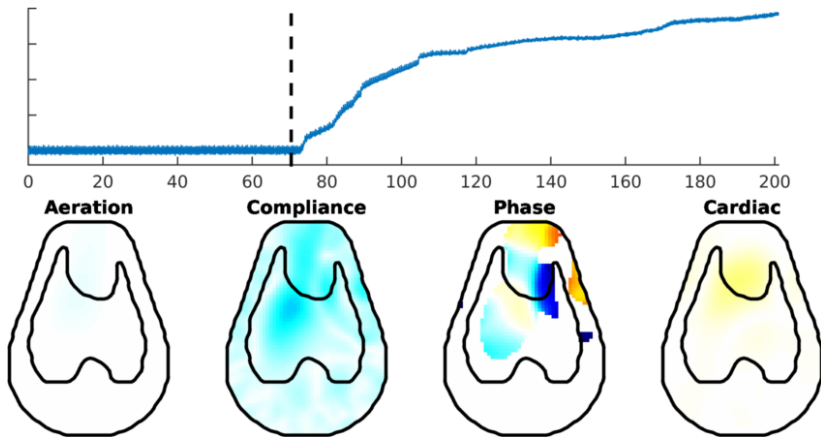
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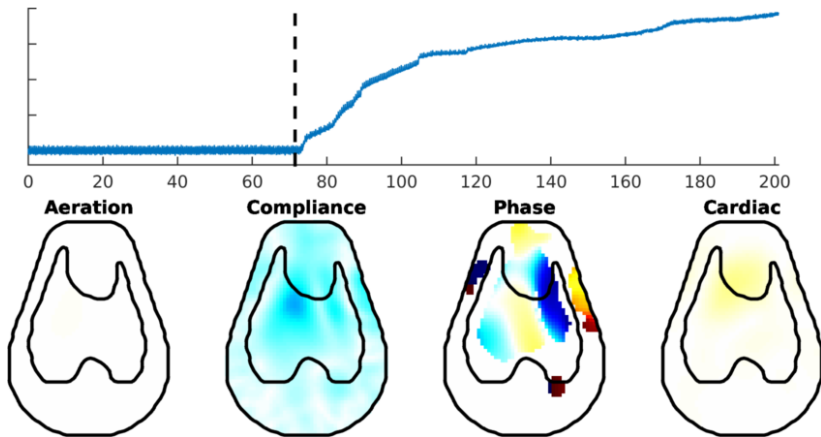
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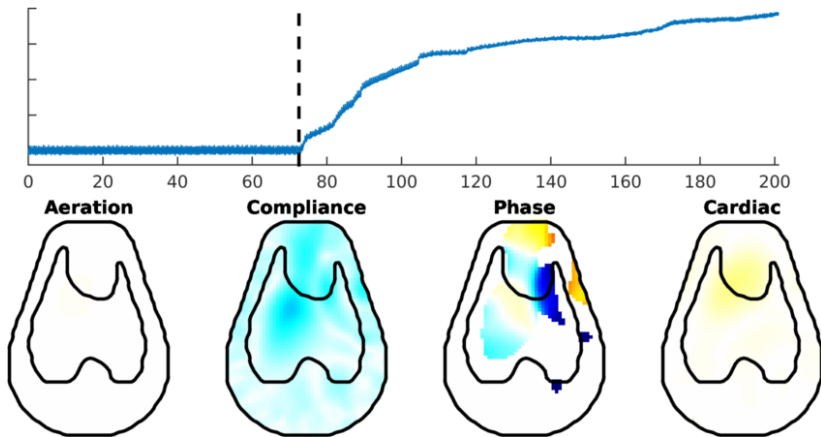
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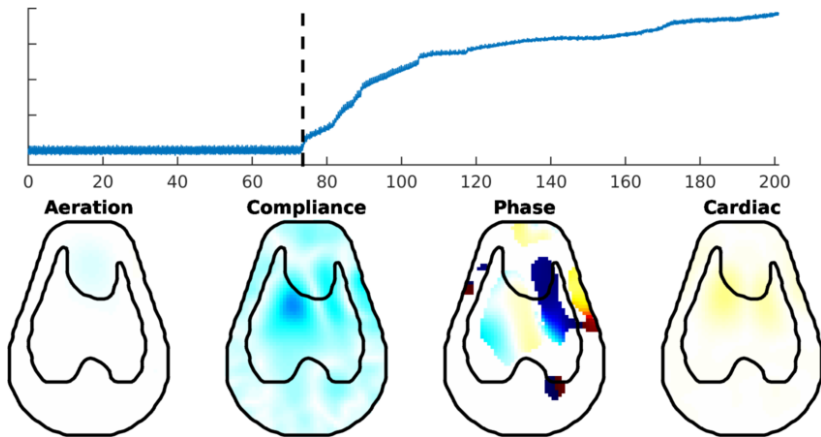
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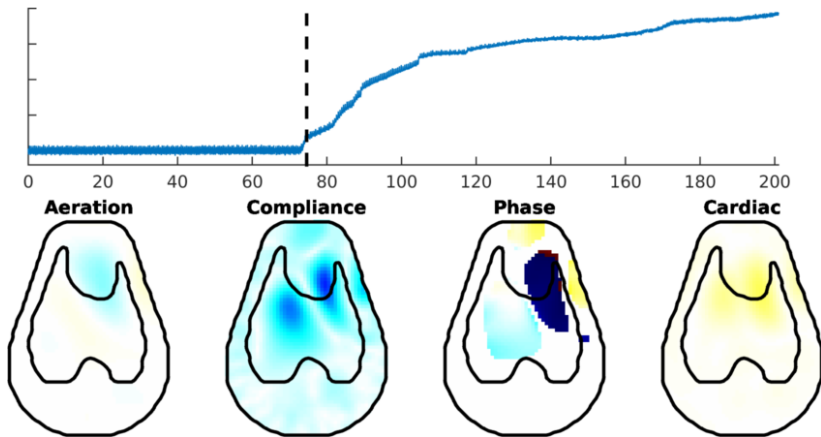
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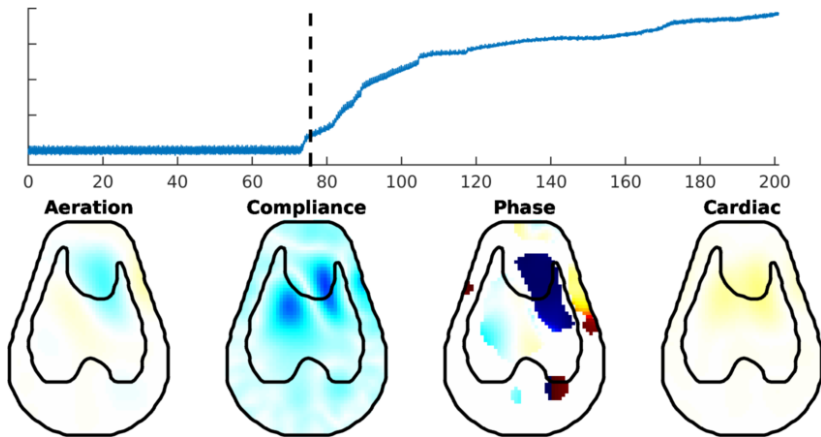
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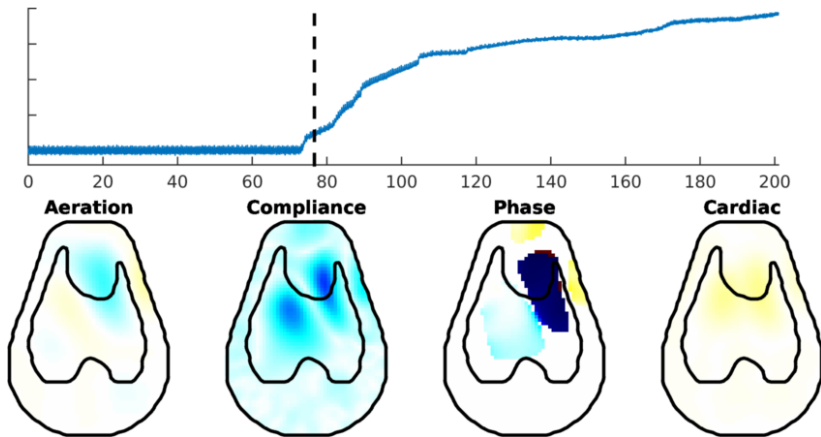
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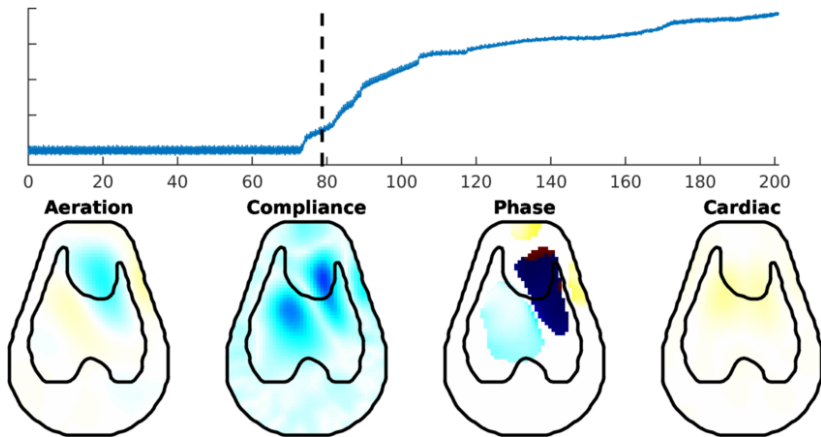
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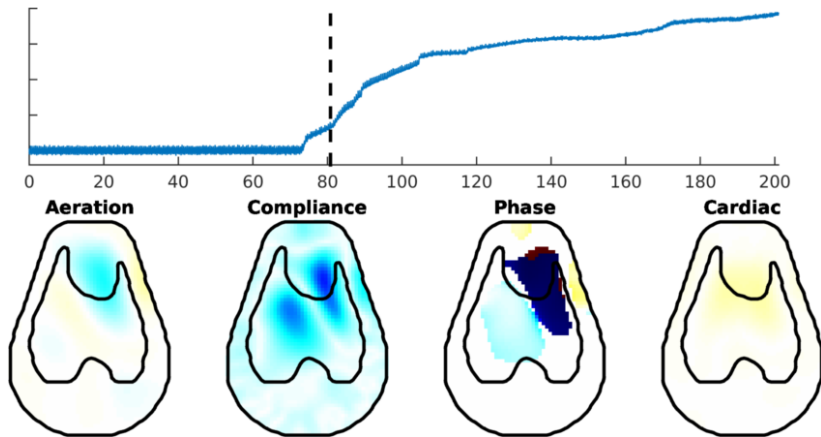
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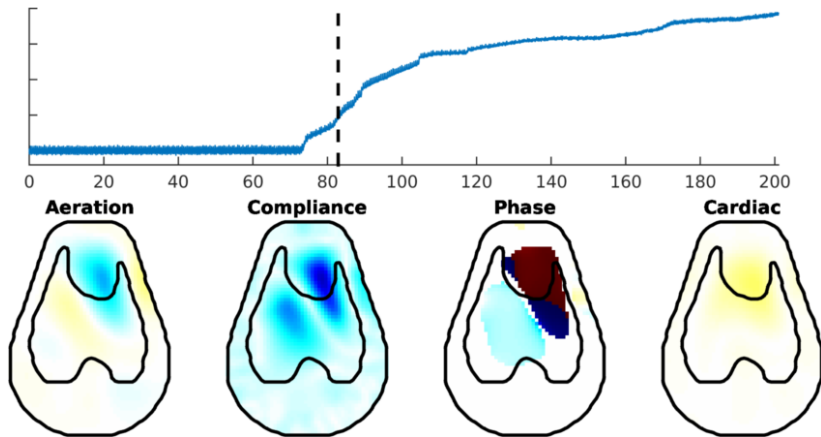
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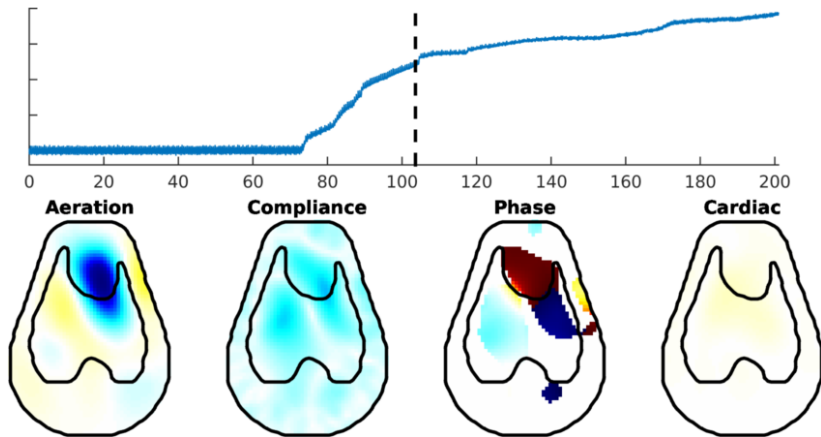
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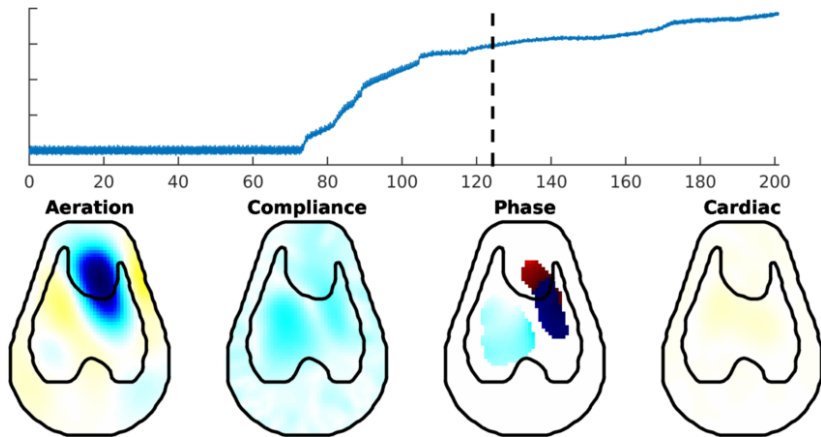
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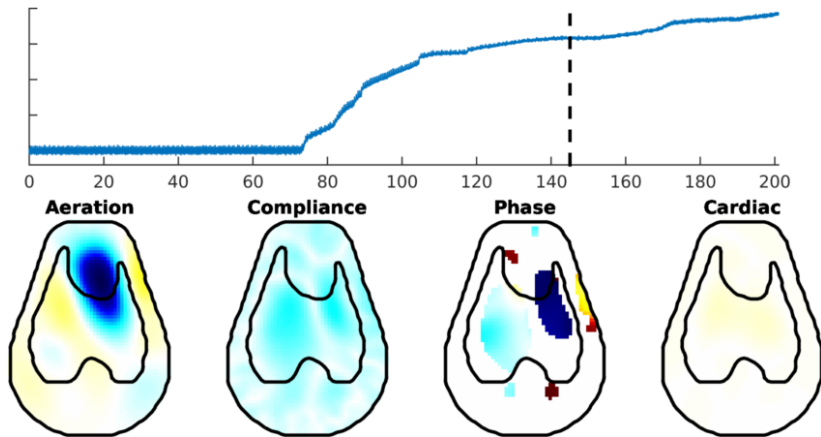
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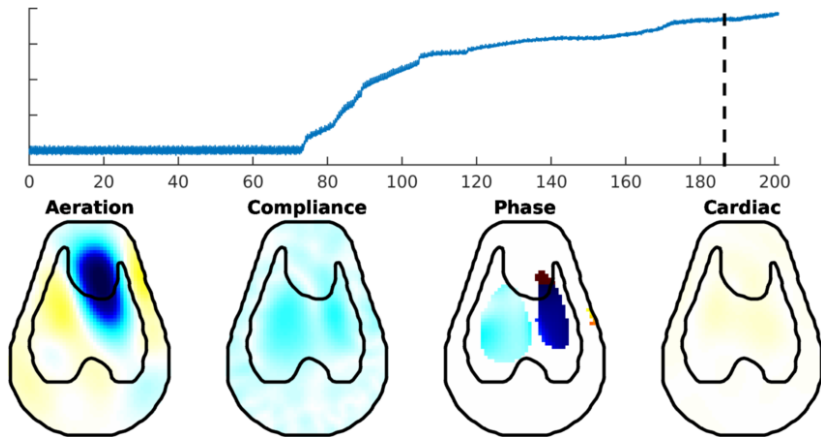
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