

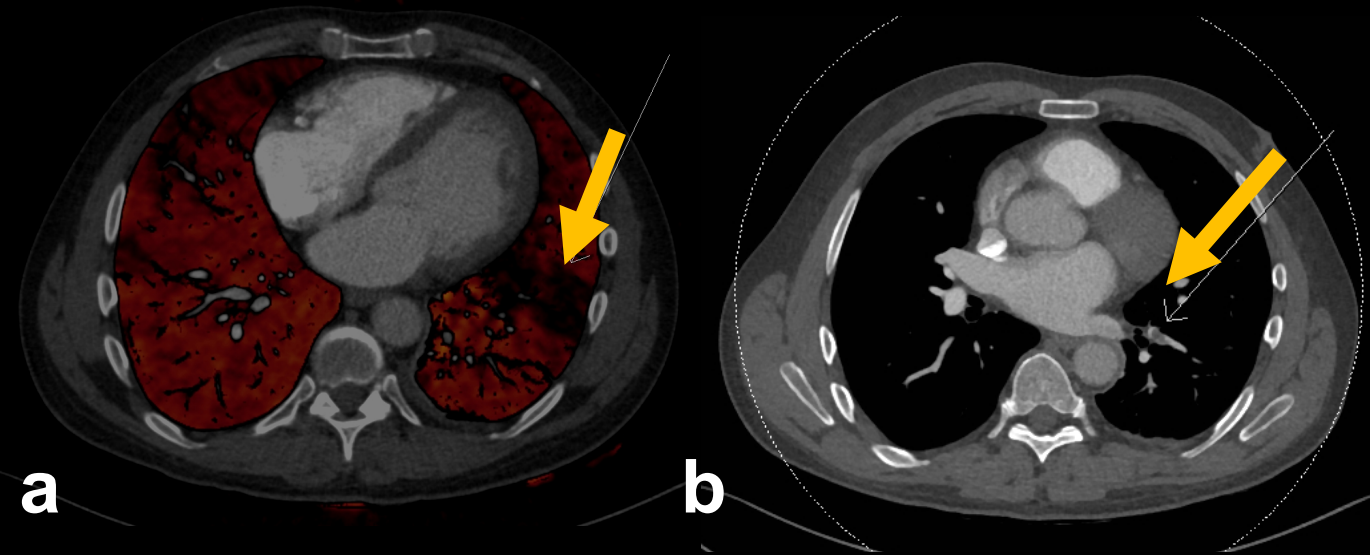


Dual-Energy CT of the Thorax: Emerging Applications

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UBC has a master research agreement with Siemens.

- OBJECTIVE: Discuss the unique qualities of dual-energy CT (DECT) and their thoracic applications in emergency imaging

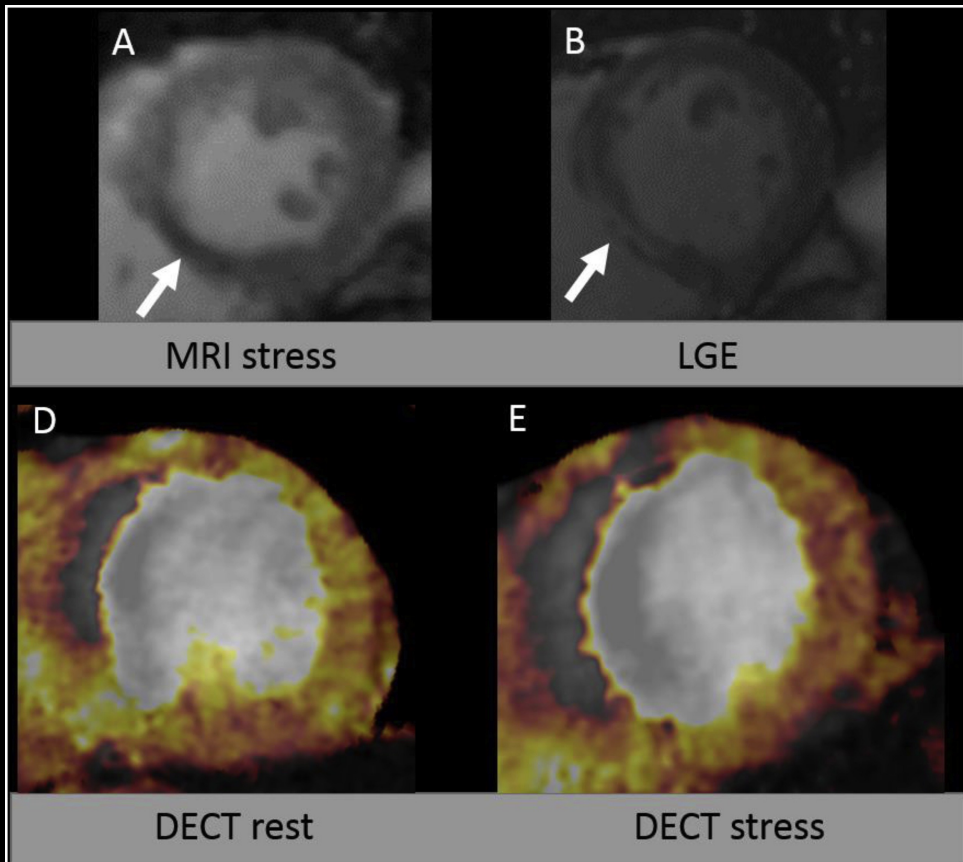
PULMONARY EMBOLISM



- (a) DECT iodine overlay map shows a perfusion defect (arrow)
- (b) Associated filling defect on conventional CTPA

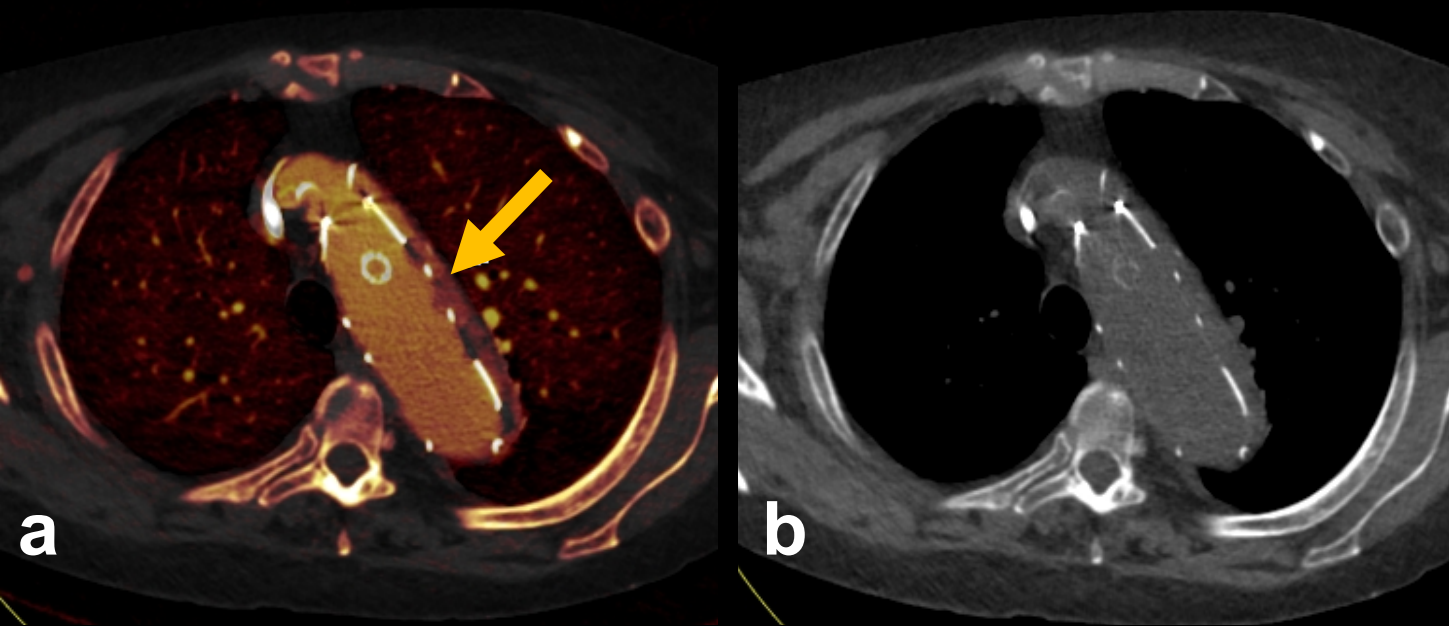
- In a recent study, 372 PEs were detected on 147 out of 1144 CT angiograms
- After DECT iodine maps were applied, a further 27 PEs were found:
 - 6 were segmental (22.2%)
 - 24 occlusive (88.9%)

MYOCARDIAL PERFUSION



- DECT iodine quantification has been shown to differentiate between normal, ischemic, and infarcted myocardium
- 67-year-old man with CAD. Stress perfusion CMR images show a perfusion defect in rest and stress (arrows).
- The same defect is seen on the DECT iodine maps, and is more pronounced during stress, indicating reversibility at the borders of the infarct.

TRAUMA AND BLEEDING



- 60-year-old female with an aortic stent graft presenting with SOB
 - (a) Iodine map shows contrast outside the graft (arrow)
 - (b) VNC removes the extra-luminal hyperdensity, suggesting an endoleak: a wall hematoma would remain hyperdense
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- DECT virtual non-contrast (VNC) images **can replace a non-contrast scan in multiphasic protocols, reducing radiation dose**
 - Iodine overlay maps can highlight active bleeding

ARTIFACT REDUCTION



Conventional CT



190 keV VMI

- 47 year-old male with suspected cord compromise
- Virtual monoenergetic image (VMI) reduces artifact, revealing a soft tissue mass encroaching on the spinal canal (arrow)

- **Beam hardening** occurs when lower energy photons of a polychromatic beam are preferentially absorbed – this **can be reduced by VMIs**, which represent an image produced by a monochromatic source
- VMIs tend to be **optimal at energy levels > 105 keV**