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Multi Modality Integration
Barriers to commercialization

Peter Luyten

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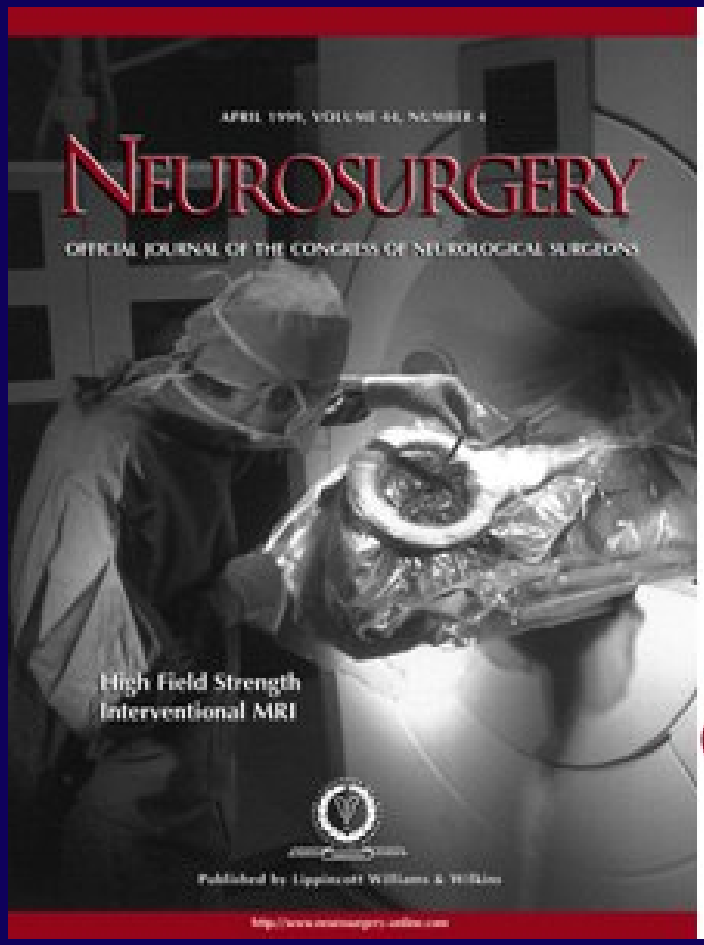
The Introduction of “XMR”

IMR suite at University of Minnesota, Minneapolis

MR-guided neurosurgery

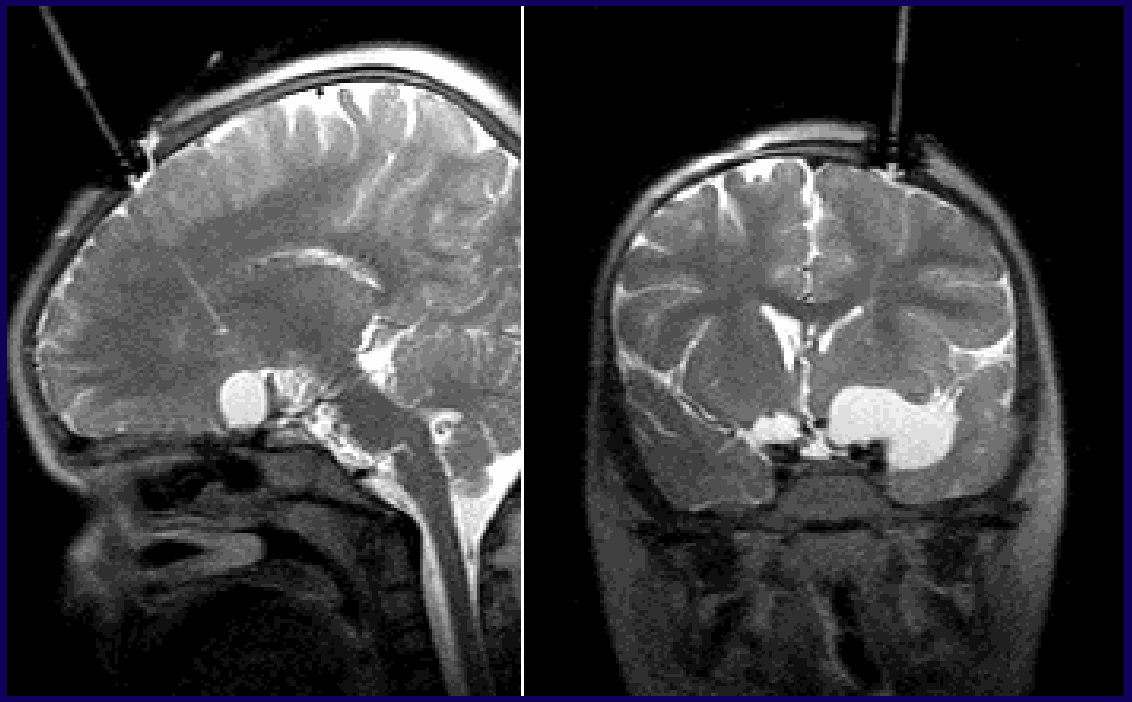


ON THE COVER:
A biopsy being performed through one of the elements of an interventional head coil. Interventional MRI suite, University of Minnesota (see Hall et al., pp 807-814)

Neurosurgery 44, 807- 814 (1999)

University of Minnesota: http://www.med.umn.edu/radiology/cmrgt/cmrgt.htm

Real-time interactive biopsy guidance
cyst drainage / P32 administration



interactive real time scanning (0.6 sec single-shot TSE)

Courtesy: University of Minnesota, Minneapolis

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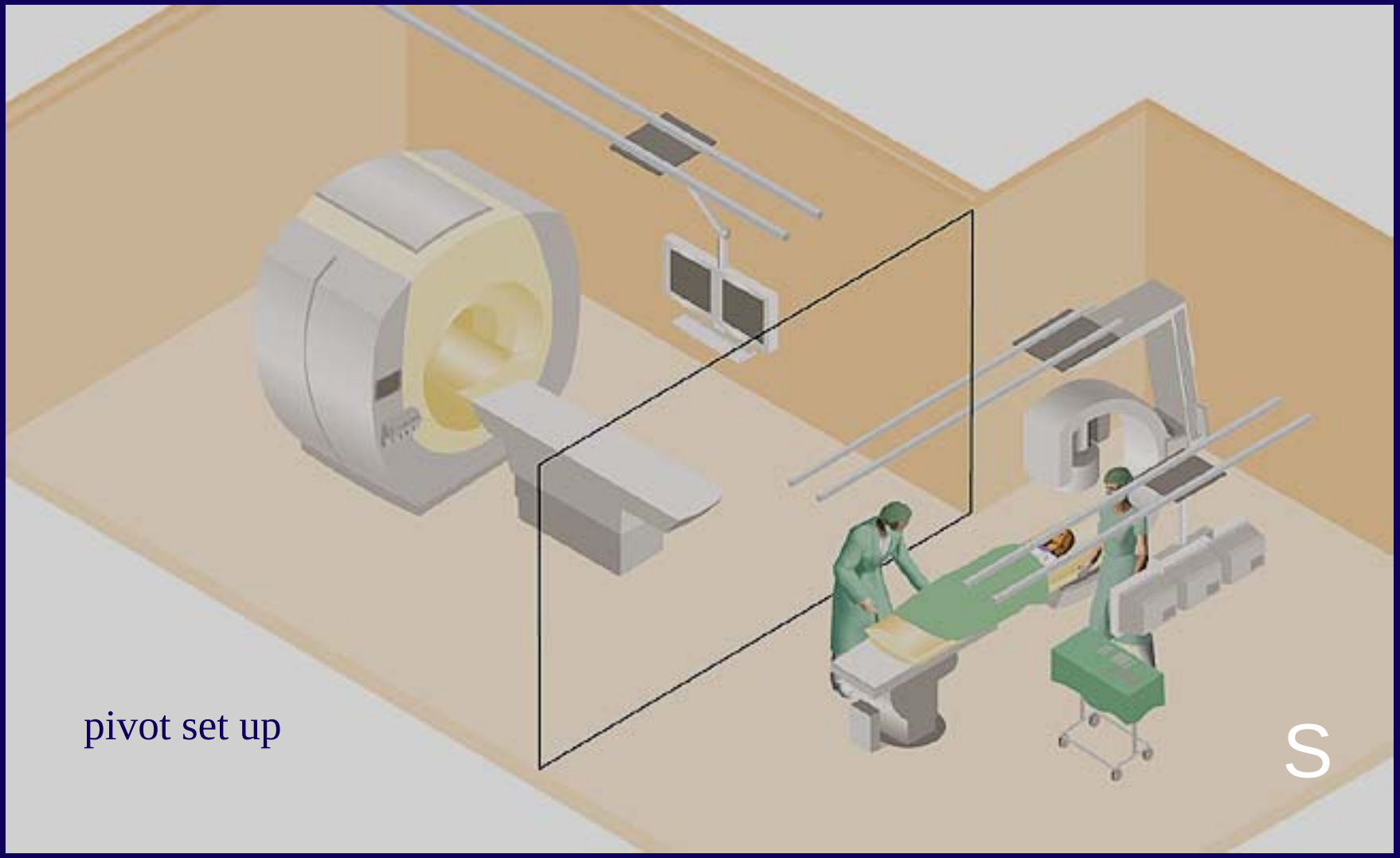
The XMR suite



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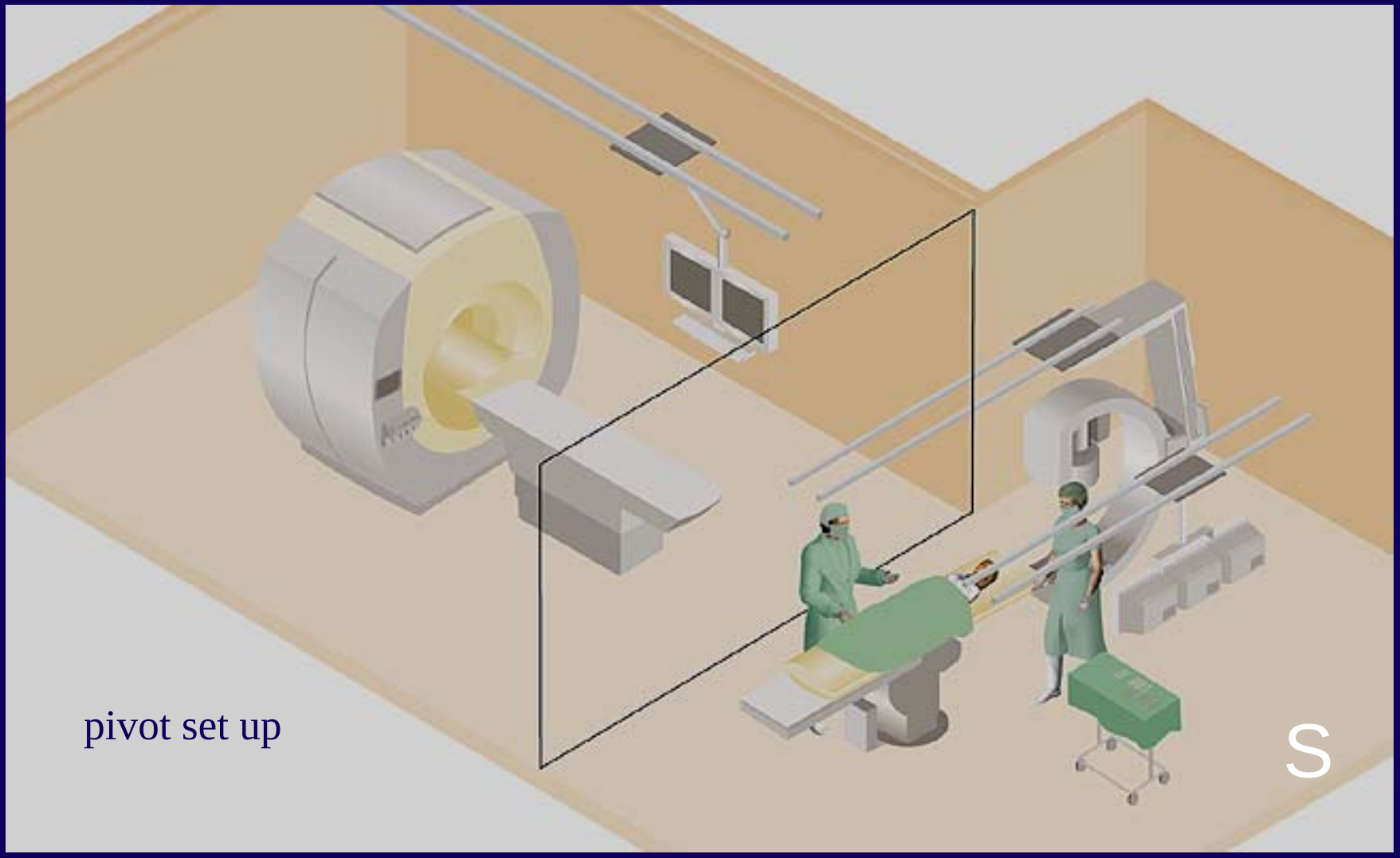
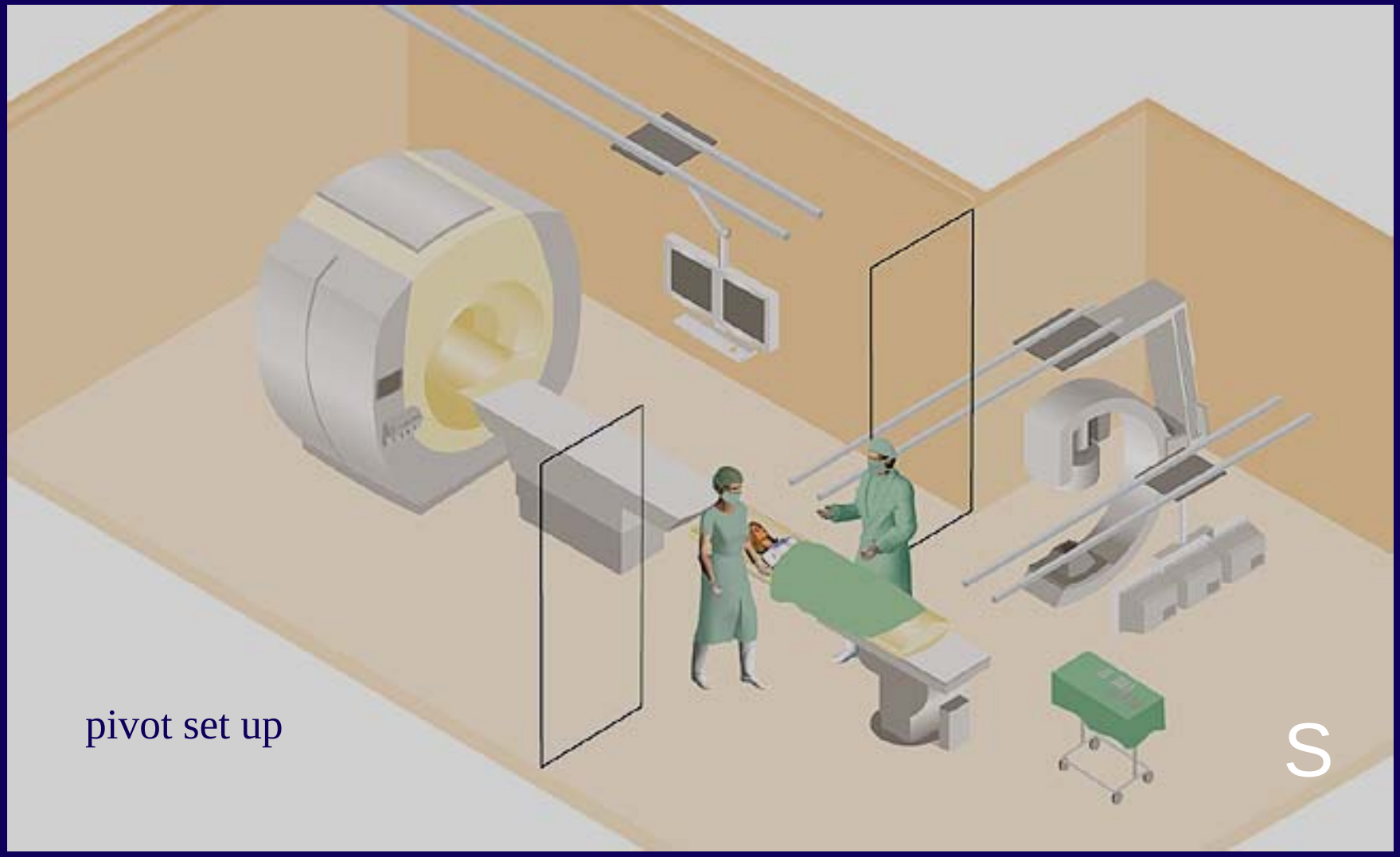
The XMR suite



The XMR suite



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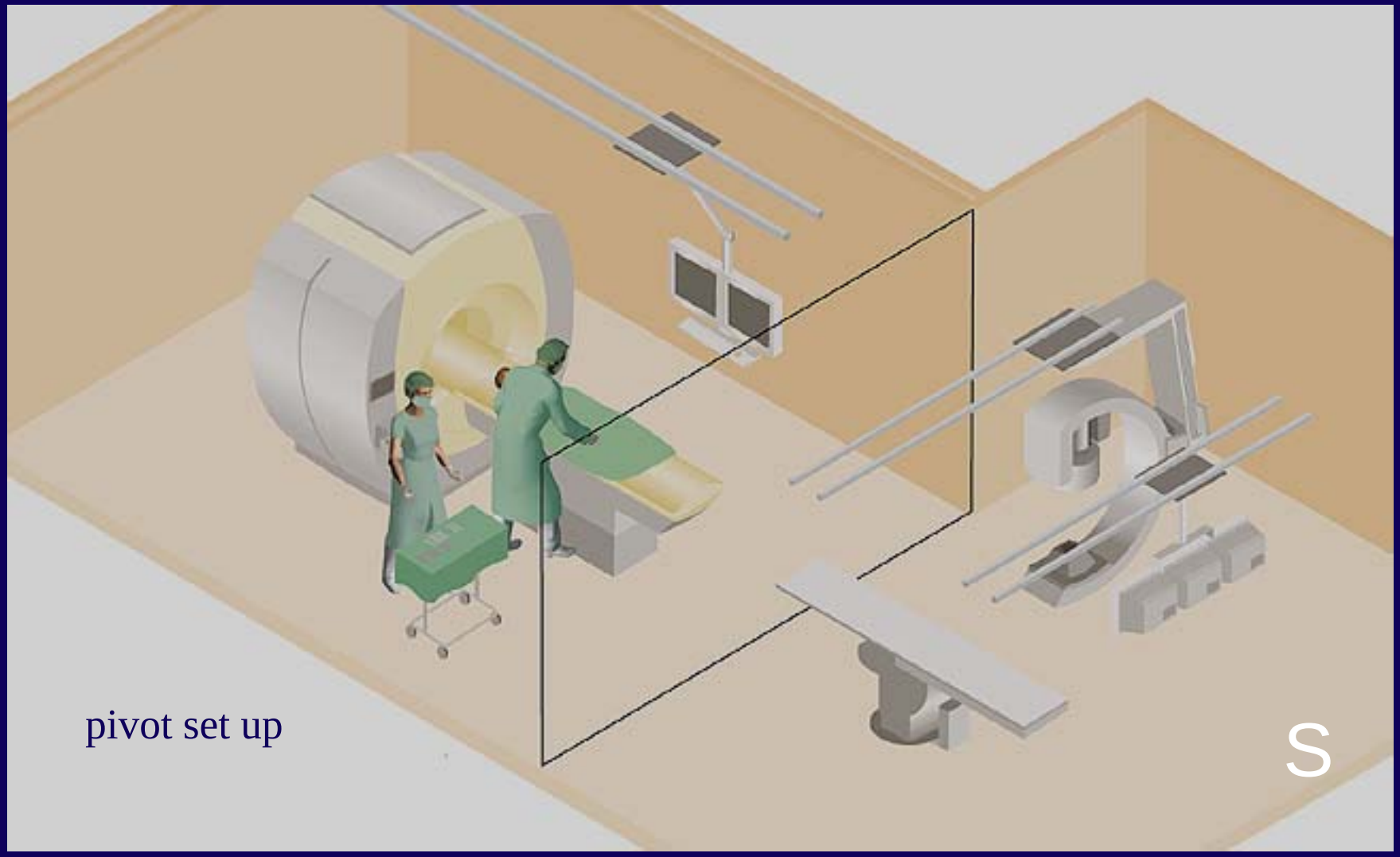
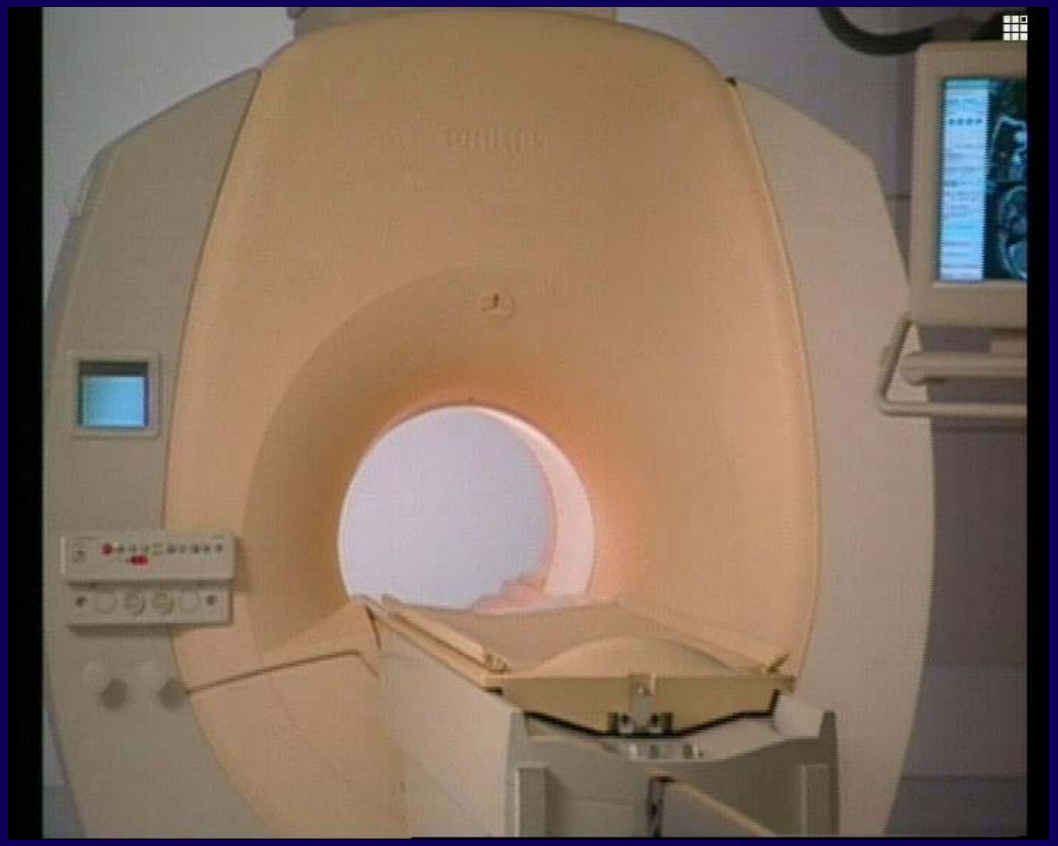
The XMR suite



XMR: Combined Therapy



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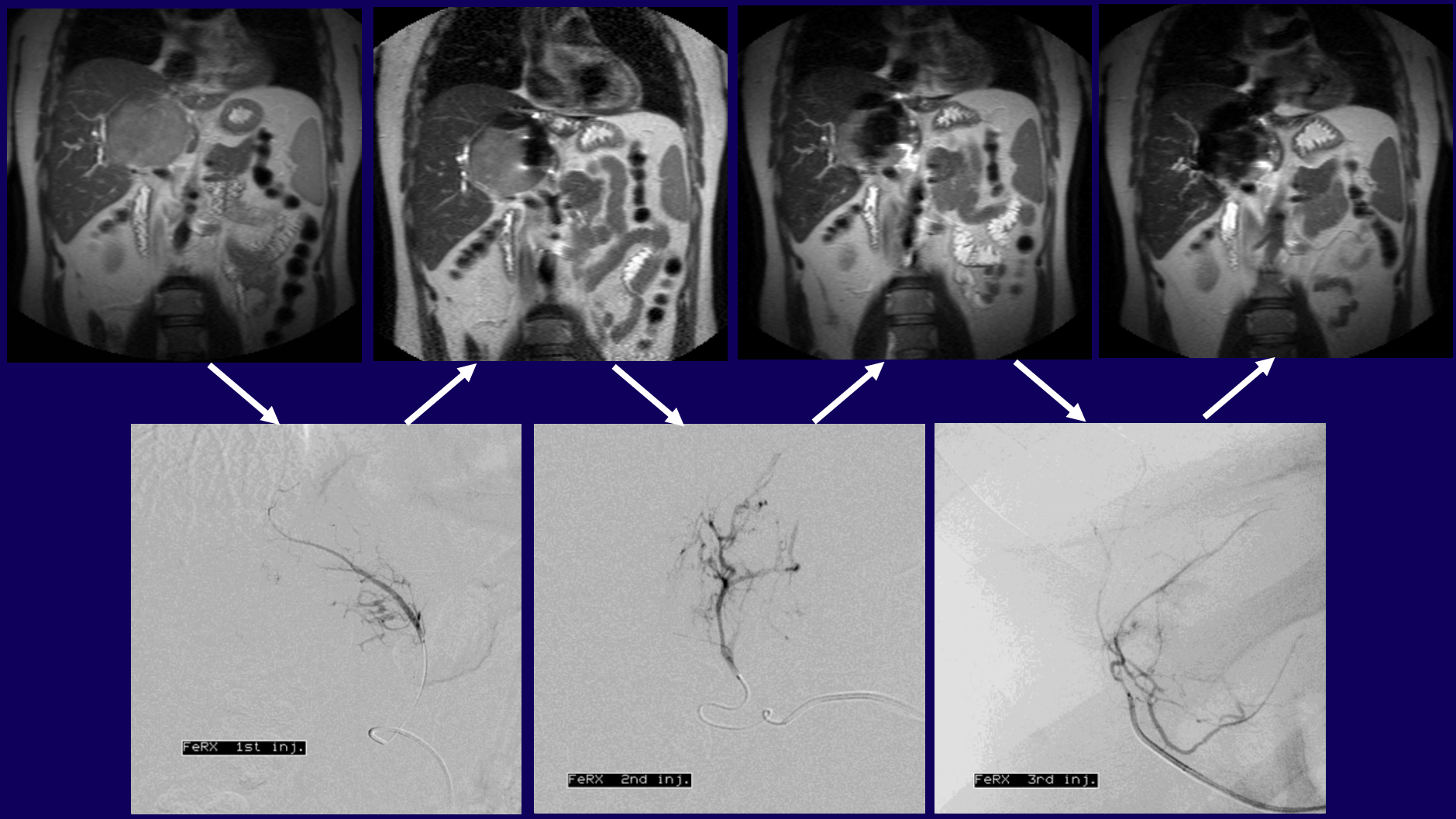
Therapy delivery: FeRx



Courtesy: UCSF Dr Mark Wilson

XMR: Intera I/T Cardiovascular with Pulsera

Guy's Hospital, London

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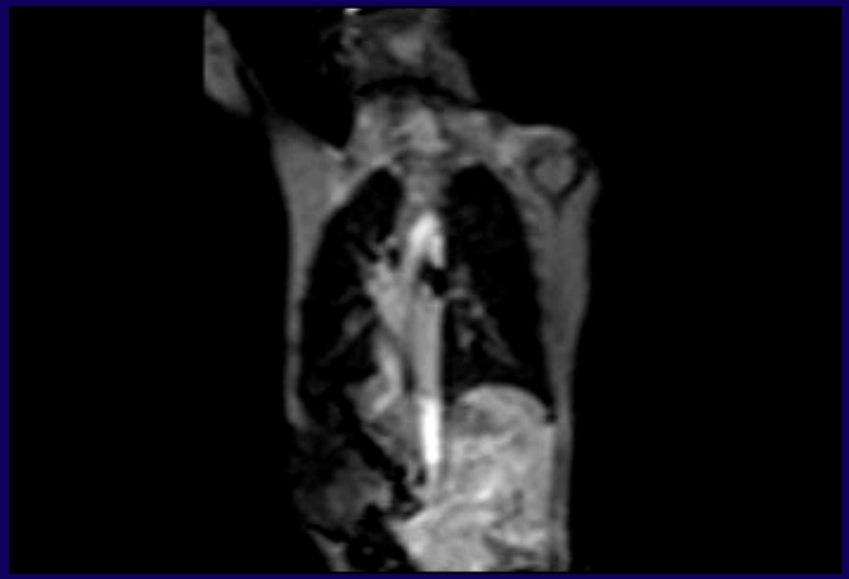
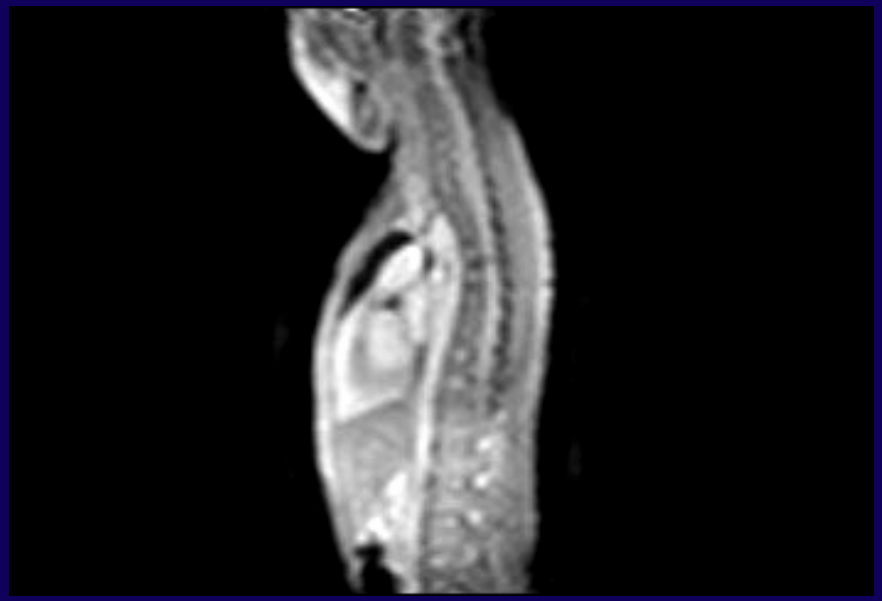
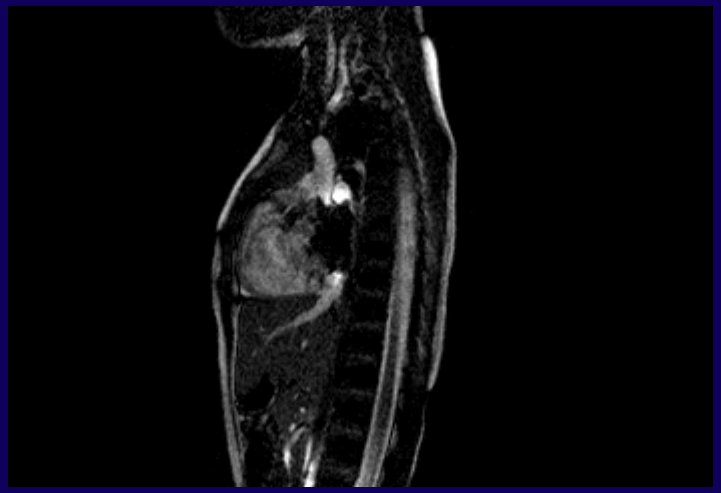
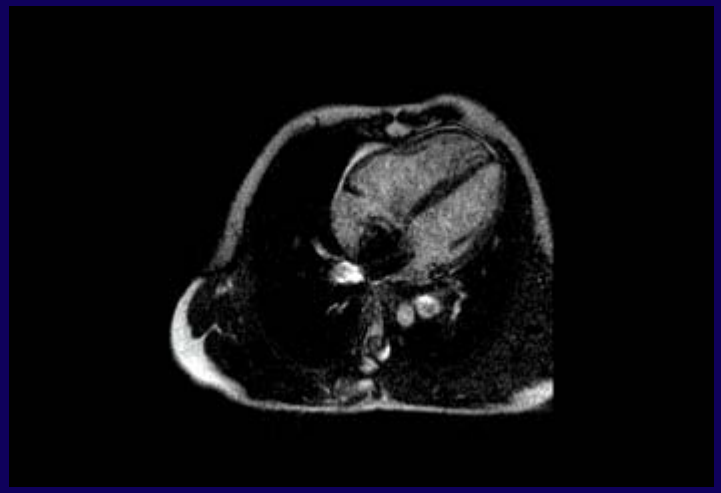
Visualizing catheters

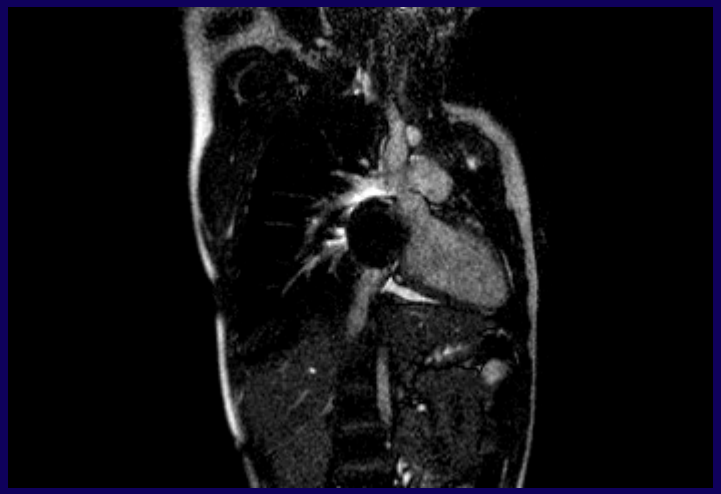




Implanted ASD closure device







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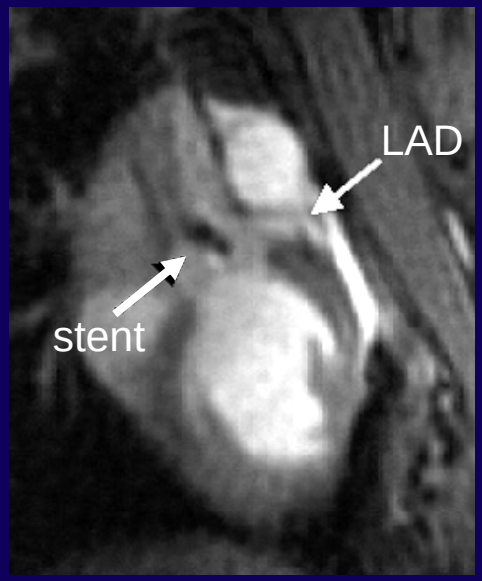
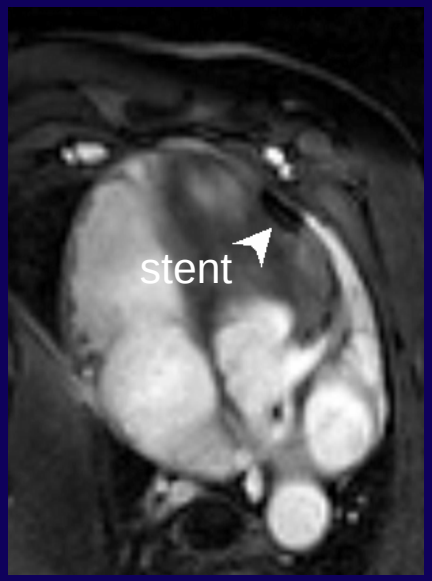
MR-guided coronary artery stenting

Positioned under real-time 15 fps MR-guidance



Stainless steel stent placement in the LAD

Nitinol 0.0035 inch guidewire in the LAD



LAD after MR-guided stent placement

Circulation 105, 874-879 (2002)

Courtesy: RWTH University, Aachen

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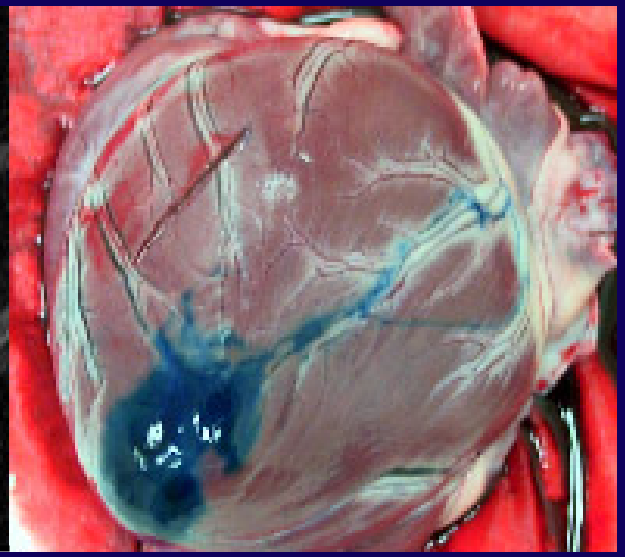
Molecular imaging: MR-guided delivery

Targeted drug delivery (e.g. VEGF) into myocardium

Real-time 10 fps catheter visualization

MR-guided drug delivery in apex



Excellent histological correlation

Courtesy: UCSF

X-MR: Potential applications/costs benefits

- Neurosurgery: outcomes
- Pediatrics: dose management
- Stroke
- (Vascular) Drug delivery system
- Additional costs: approximately 20%

Multi Modality Integration / XMR Barriers to commercialization

- Bridging the diagnosis – therapy gap: fusion of imaging modalities
- Challenges for the device industry to keep up with improved diagnostic imaging capabilities
- Matching new imaging technology with new interventional/therapeutic strategy (no such thing as just substituting one modality for another)