UCSF
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Precision Spine Imaging: What the Future Holds

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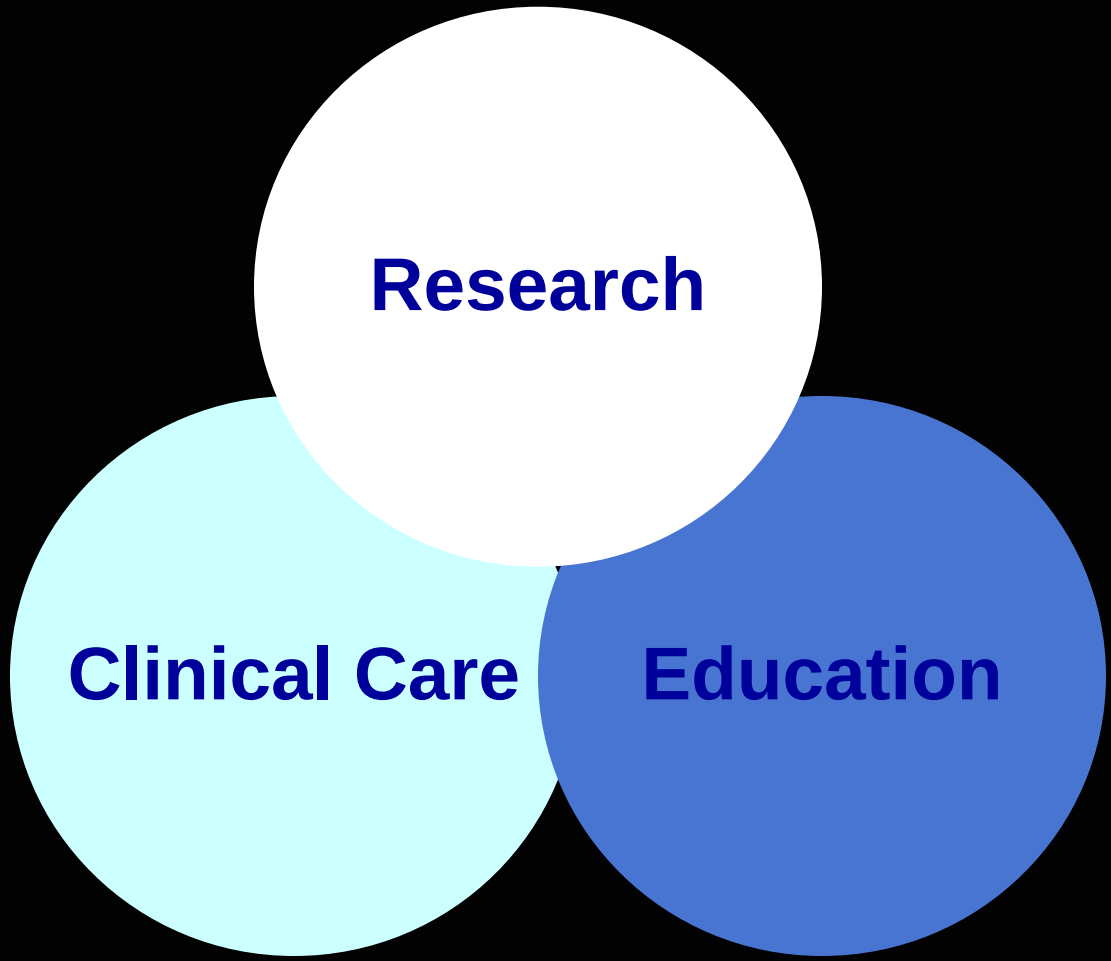
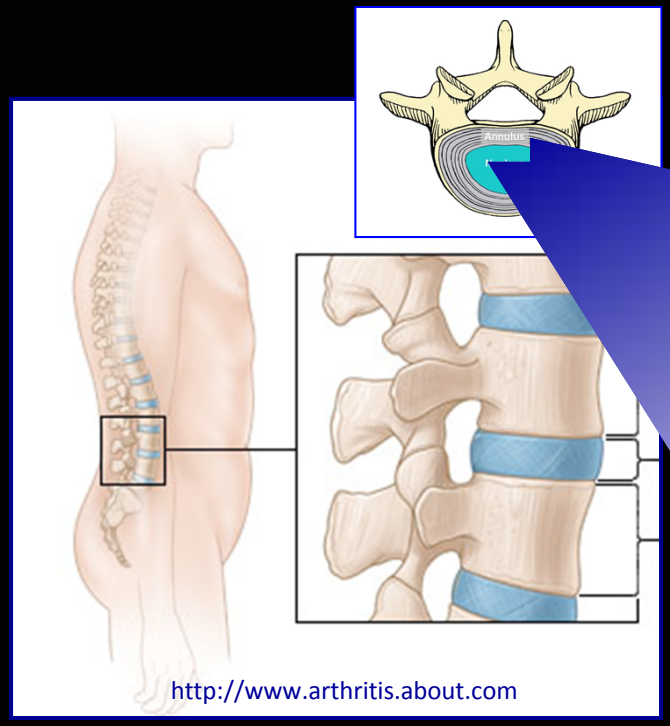


Research Opportunities

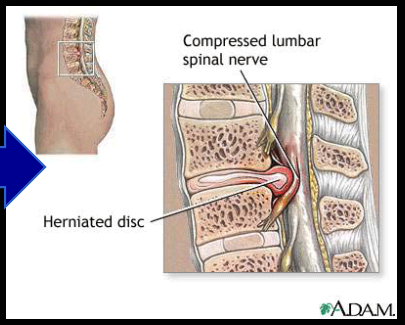
- Imaging biomarkers for spinal pain
  - Disk related pain
  - Facet joint mediated pain
- Outcomes-based research
- Image-guided molecularly selective pain therapies

Imaging Biomarkers of Disc Disease



Early Stage:
Changes

Late Stage:
Morphologic Changes

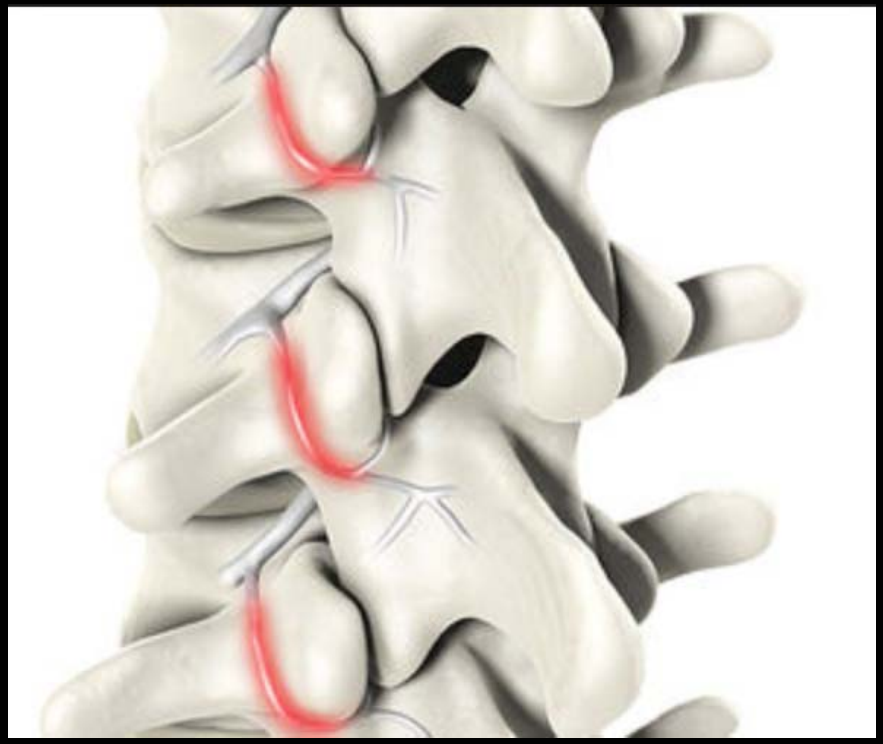


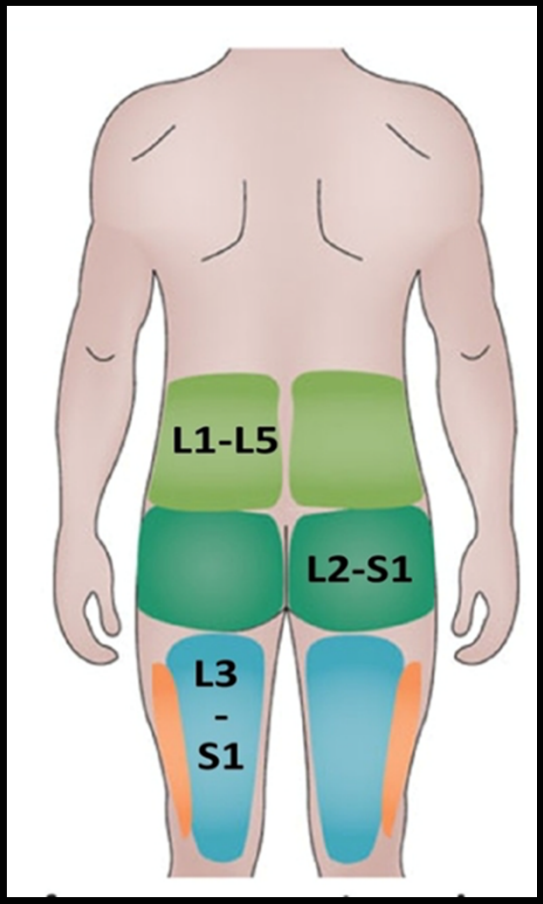
Clinical MRI **cannot** assess early biochemical changes

UCSF Researchers are studying novel imaging methods to detect early changes in discs

Slide courtesy Dr. Sharmila Majumdar and Dr. Jason Talbott

Imaging Biomarkers of Facet Pain



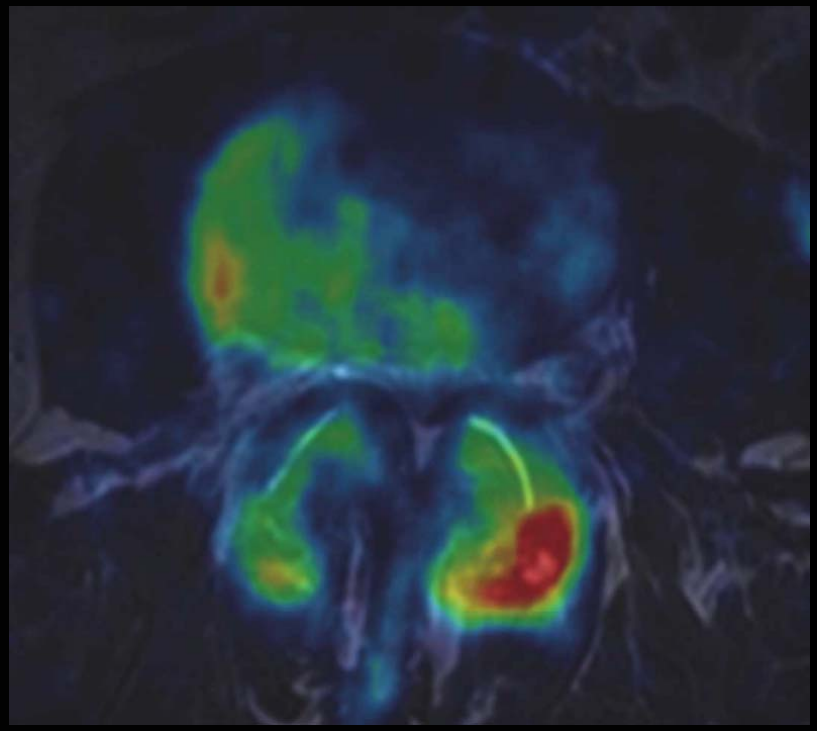


http://www.back-in-action.net

UCSF Radiology PET-MRI

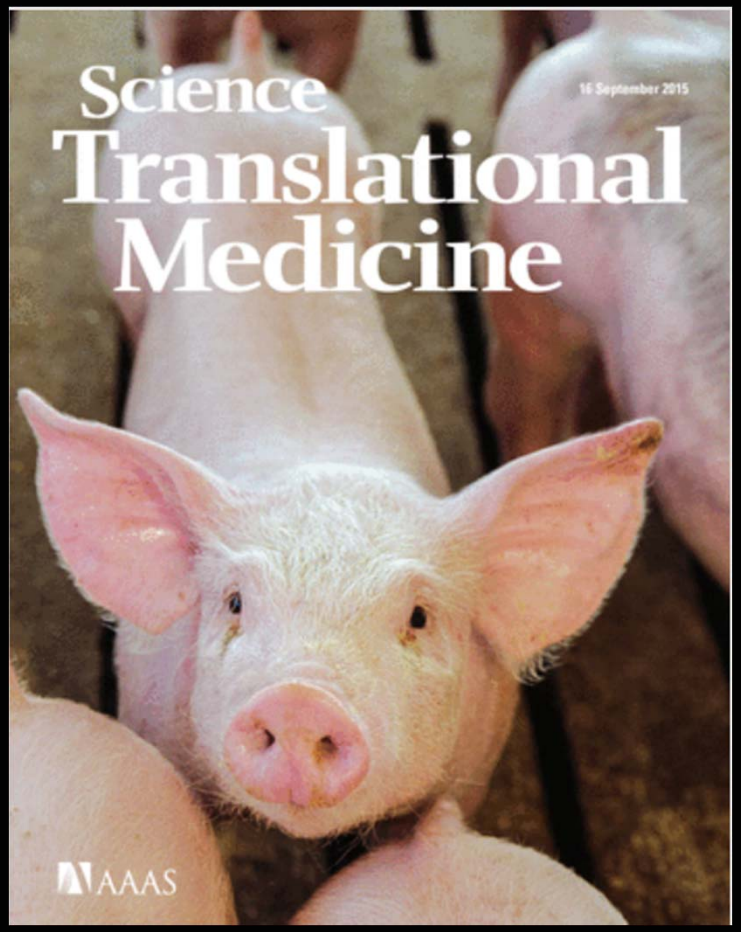
^{18}F-NaF PET-MRI for identifying pain generator

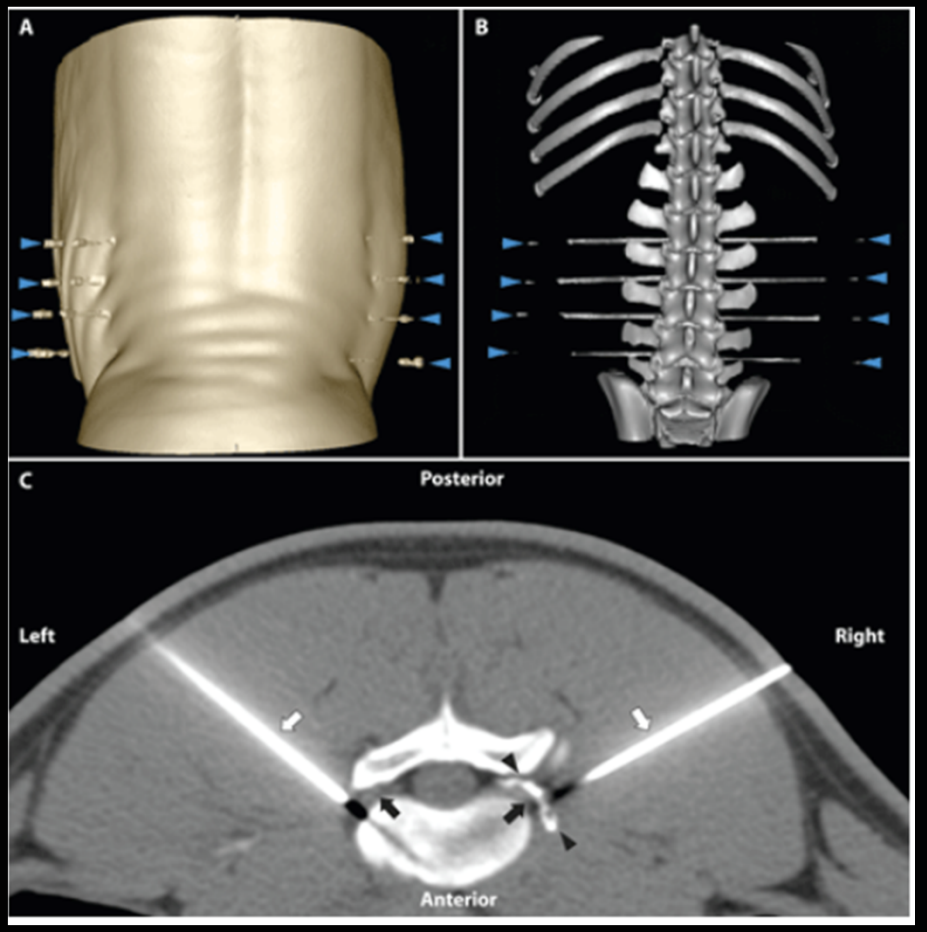
PET-MRI



Talbott, et al. *AJNR* In Press

Pain Free Pigs



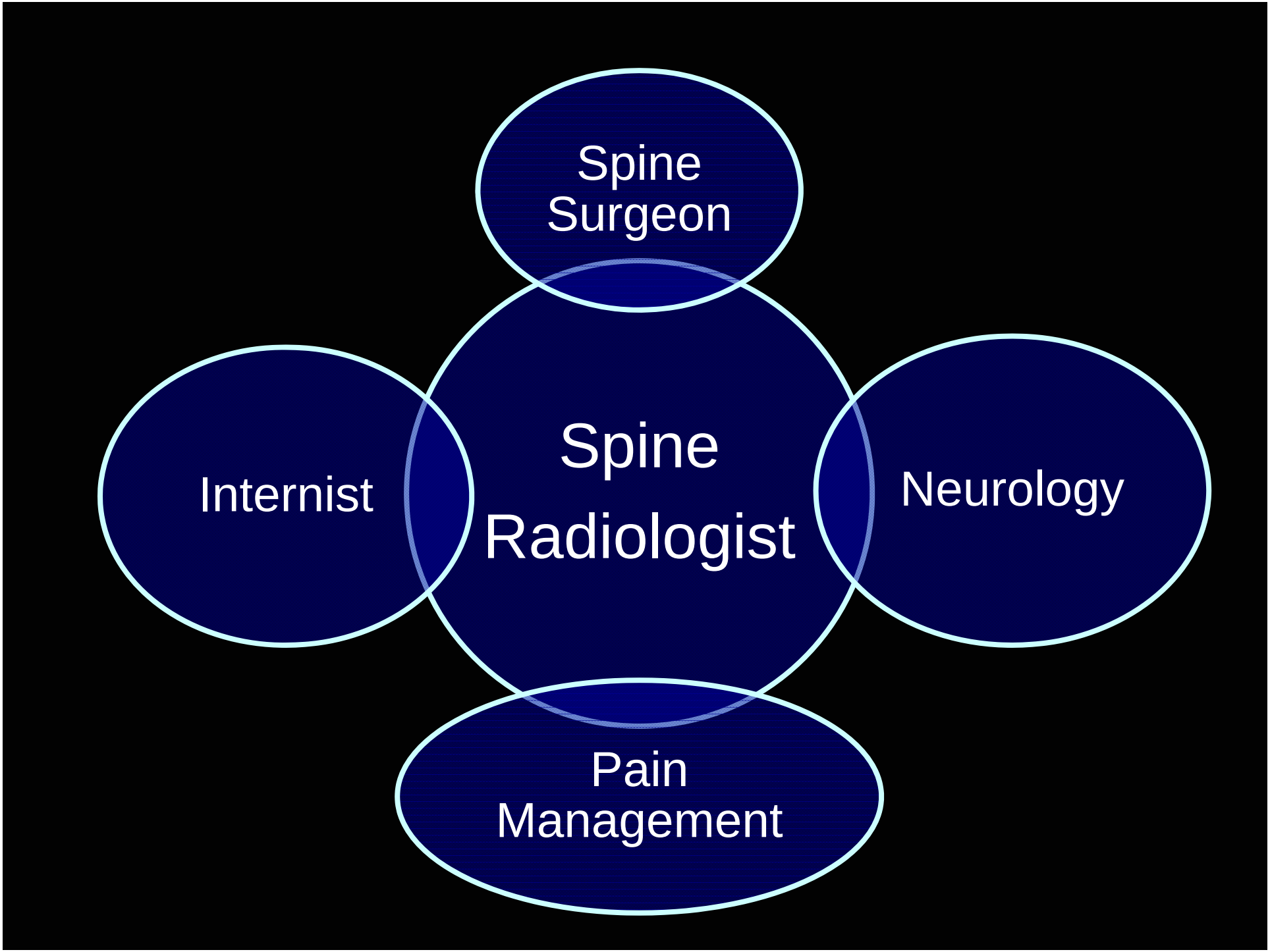


Brown J.D., et al. *Science Translational Medicine*. 2015

Next Steps

- Biochemical imaging measures have been shown to correlate with conventional MR measures of disc & facet disease
- Additional work—particularly longitudinal and prospective studies—are needed
- Further studies assessing role of novel pain agents in treating chronic pain

MUSCULO-SKELETAL AND QUANTITATIVE IMAGING RESEARCH (MQIR)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