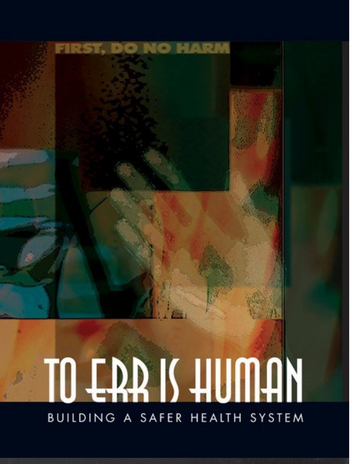
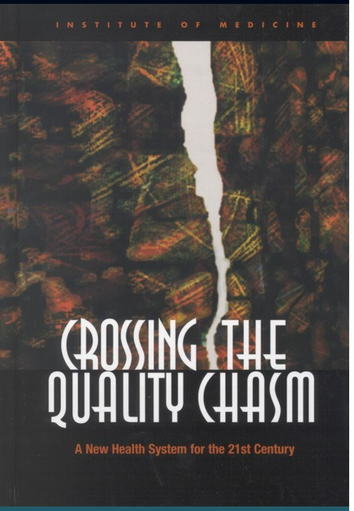
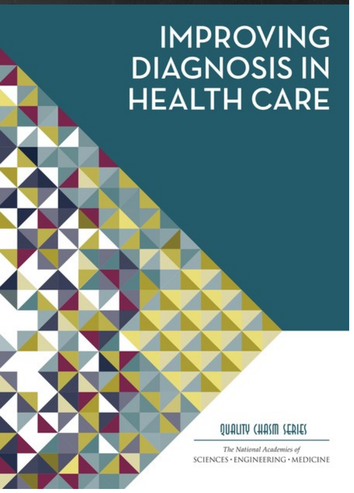




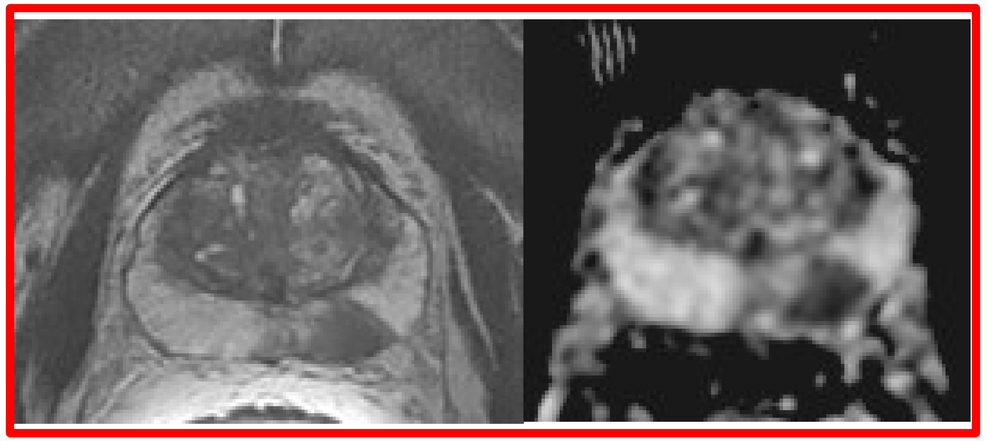


Improving Cancer Diagnosis and Care:

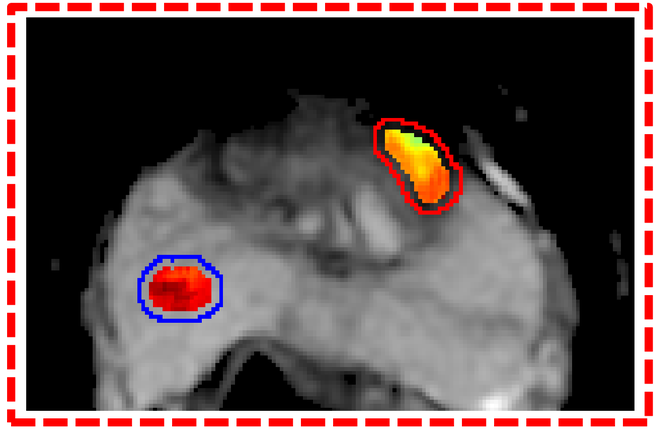
Patient Access to Oncologic Imaging and Pathology Expertise and Technologies

Imaging Prostate Cancer 2018

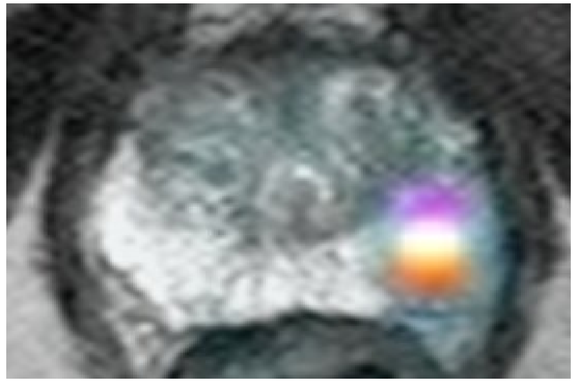
Clinical Care vs. Clinical Research



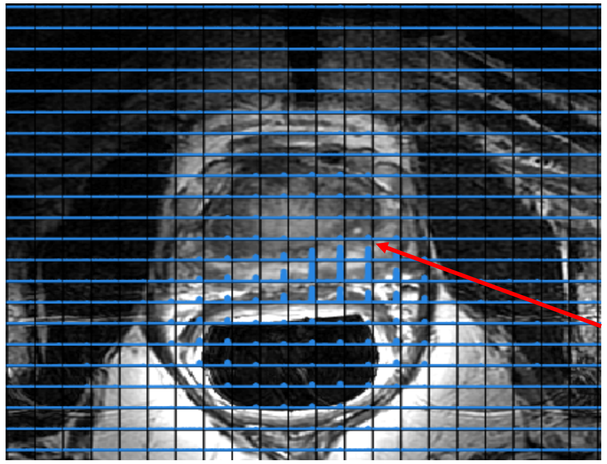
MRI – T2WI & DWI



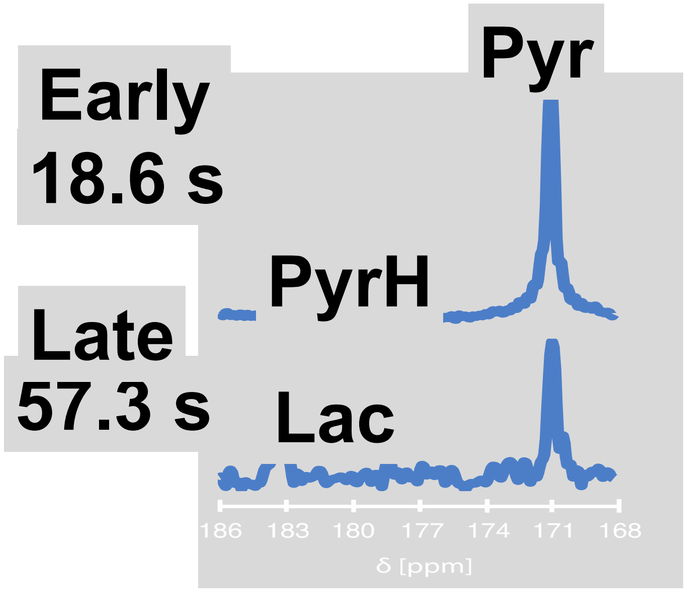
MRI - Radiomics

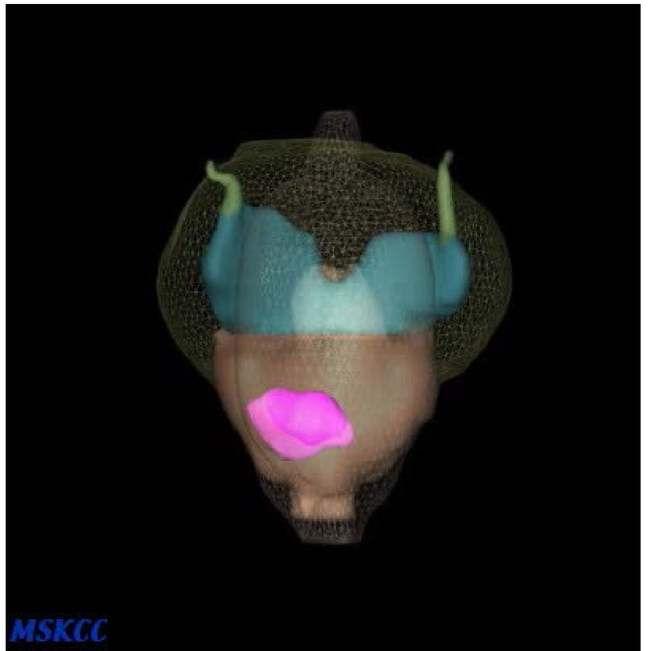


^{68}Ga-PSMA MRI/PET



HP^{13}C MRSI

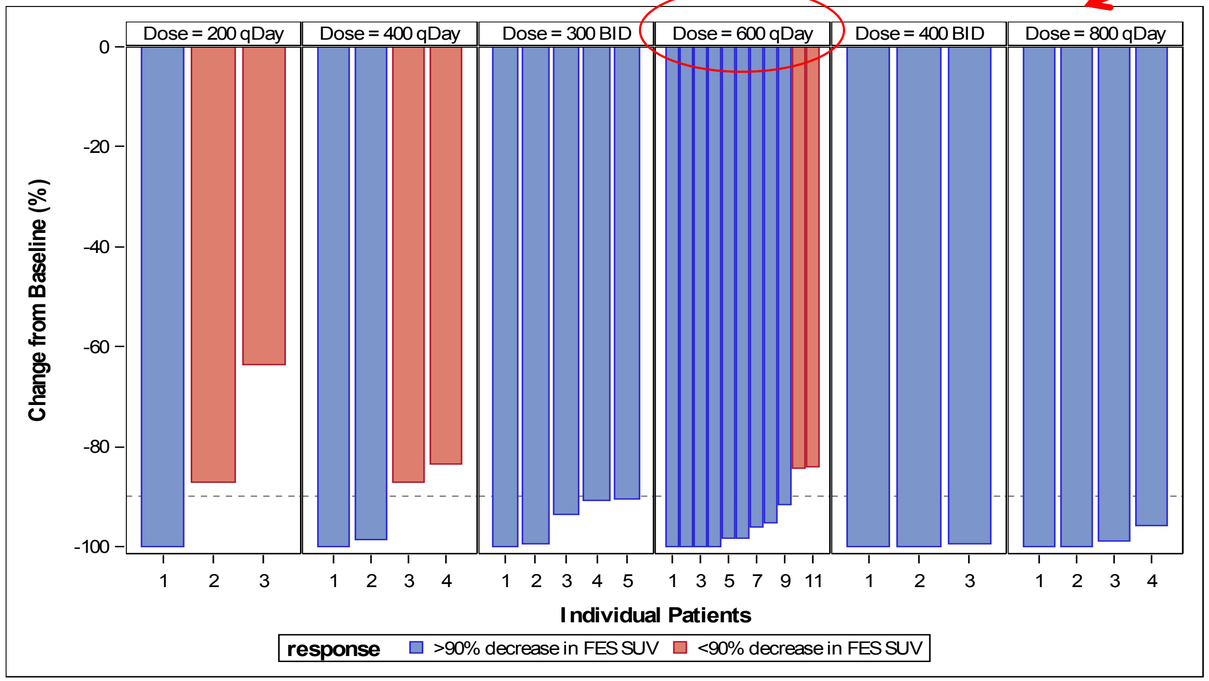


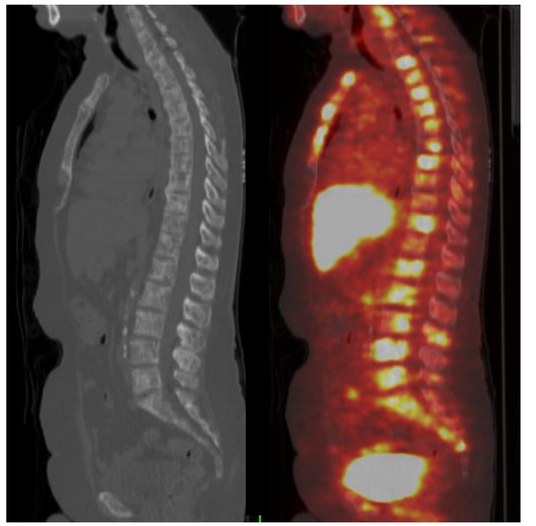


Phase I Study: GDC-0810 (ER antagonist) Targeted Imaging ^{18}F-FES PET/CT

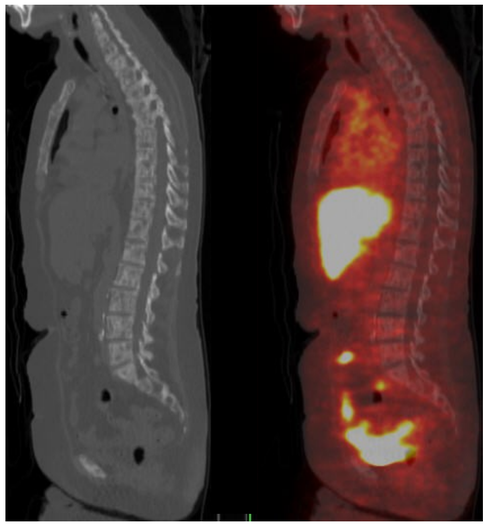
BRD

MTD





^{18}F-FES PET/CT Baseline



^{18}F-FES PET/CT GDC-0810 follow up

^{18}F-FES PET/CT used as a ***biomarker of ER suppression*** during Phase I dose escalation trial showed ER downregulation with >90% decrease in SUV for **BRD= 600mg/day – dose chosen for Phase II trial**

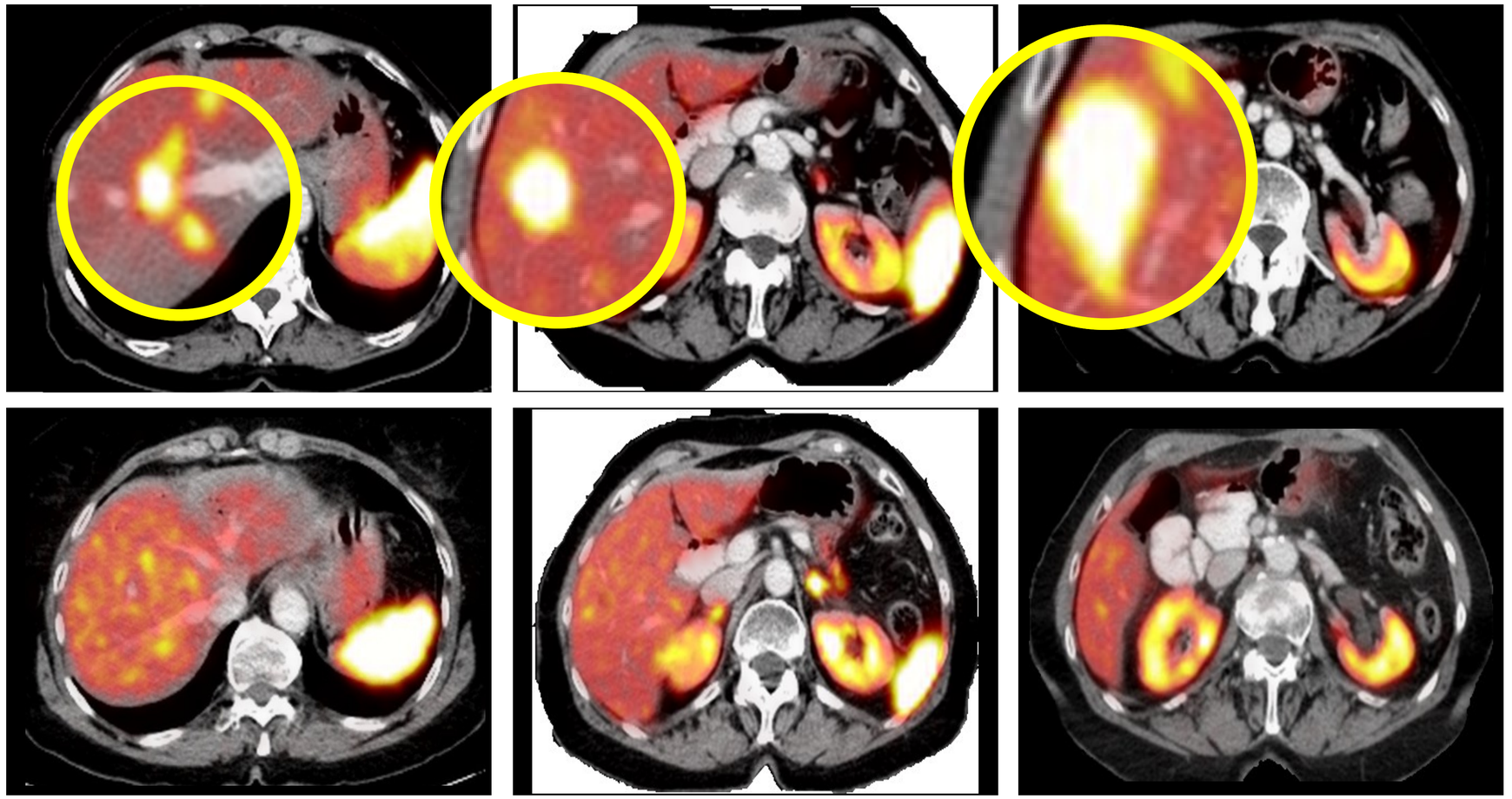
Wang Clin Cancer Res. 2017

Theranostics: Molecular *Imaging & Therapy*

Metastatic NET - *Targeting Somatostatin receptors*

Before therapy

After Lutetium -177 (177Lu) DOTA-TATE



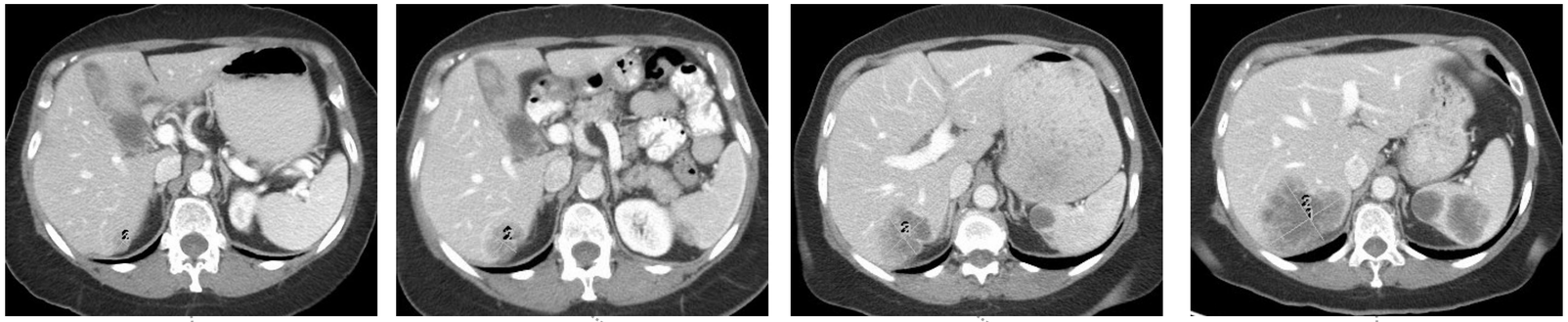
Imaging (^{68}Ga) DOTA-TATE

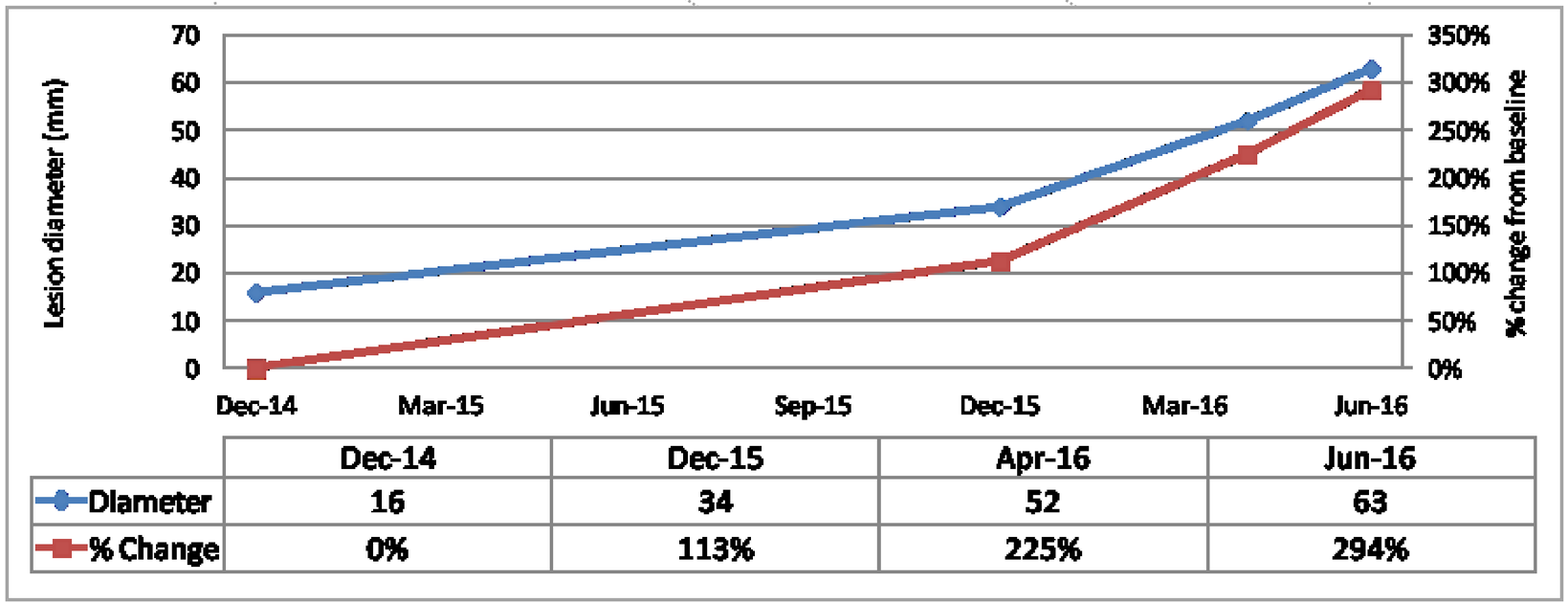
Therapy (^{177}Lu) DOTA-TATE

Hricak H: Beyond Imaging-Radiology of Tomorrow; Radiology 2018

Oncologic Imaging – CLINICAL CARE TODAY
Efficiency, Precision & Standardization

Automated Longitudinal Quantification of Tumor Burden





	Dec-14	Dec-15	Apr-16	Jun-16
Diameter	16	34	52	63
% Change	0%	113%	225%	294%

Tumor response measurements in clinical trials & treatment follow up.

Technology is available, but it is not evenly nor widely distributed!!!

Diagnostic Errors: Imaging Radiology (18%*) & Surgical Pathology (6%**)

Top Contributing Factors

FACTOR	% CASES*
Clinical Judgment	67%
Communication	23%
Technical	22%
Administrative	16%
Clinical Systems	16%

TOP CLINICAL JUDGMENT FACTORS
misinterpretation of dx studies 48% (639)

PROCEDURE	% CASES
CT scan (Abdomen, Head, Chest)	18%
Diagnostic radiography (CXR / Ortho)	13%
Mammography	10%
MRI (Magnetic Resonance Imaging)	10%
Diagnostic ultrasound	3%

*D Siegal, et al: The role of radiology in diagnostic error: a medical malpractice claims review; Diagnosis 2017

ADDITIONAL CLINICAL JUDGMENT FACTORS INCLUDE:
failure to appreciate / reconcile relevant sign/symptom/test result
narrow dx focus—failure to establish differential diagnosis

Lessons learned – Common Themes

- The **complexity of cancer diagnosis and treatment requires a multidisciplinary approach** - integrative teams of pathologists, radiologists, oncologists, primary care physicians, and biomedical informaticians.
- **Requirements for quality improvement** include:
  - Culture (constructive not punitive)
  - Infrastructure (data systems and analysts)
  - Leadership (clinical and operational)
  - Engagement (appropriate metrics)
  - Bandwidth (overwhelming extramural, non-patient-care requirements)
- **Governance:** Formal interdisciplinary governance structure within an organization is critical to set standards and monitor progress.
- **Measurement:** Measure outcomes frequently, and modify plans accordingly

Improving Cancer Diagnosis and Care

Session 1: Patient Access to Diagnostic Expertise in Oncology

- **Cancer care is multi-disciplinary** but not all members of the care team have formal training in oncology
- **All cancer patients** need access to a highly qualified workforce and accurate, timely diagnostic services
- How do we make this expertise available outside specialized care settings?
- Through training? Through consultation? Through Cancer Consortia?
- Case volume, experience, and time available influence quality of care
- **Lack of insurance**, cost sharing, pre-authorization schemes, and **self-referral prohibitions**, **narrow networks of providers** (often geographically dispersed) all add complexity and administrative burdens to care of patients, especially those least able to navigate barriers to care.

Improving Cancer Diagnosis and Care

Session 1: Patient Access to Diagnostic Expertise in Oncology

- Similar issues faced by pathology
- Should there be mandatory review of all new cancer diagnoses?
- Use of checklists for pathology sign out?
- Convergence of imaging and pathology on the horizon as pathology goes digital – **Integrated Diagnostics**
- Beware of dissemination of new technologies without an adequate evidence base & workforce training.
- Need for standardized display of meaningful data, data integration, timely communication of findings

Session 2A: *Developing and Supporting a Workforce for High-Quality Oncology Diagnosis and Care: Education and Training*

- Oncologic imaging needs to be fully **integrated into the curriculum of our residency programs.** - pursued through the APDR.
- **A certificate of special competency in oncologic imaging** should developed, based on achieving and demonstrating critical competencies. - pursued by the ACR
- Oncologic imaging may be added as **a clinical practice area for ongoing longitudinal assessment (OLA), as part of MOC -** ABR.
- **Peer learning must be promoted** throughout academic and community practices.
- **Deputize radiolo**gists as having oncologic expertise (fellowship training or CME ACR including it in the ‘RADLEARN’ tool.

Improving Cancer Diagnosis and Care

Session 2A: Workforce – Education and Training

- Focus of pathology training on reporting standards, communication and quality standards
- Standard AP/CP training needs to be augmented with mol dx. genomics, informatics within 4 yr residency
- Peer learning is an important aspect of quality improvement
- ABR transitioning to longitudinal life-long learning
- Pathology moving to competency-based medical education

Improving Cancer Diagnosis and Care

Session 2B: Workforce – CDS, Guidelines, Appropriate Use

- It takes 5-14 years for new knowledge to disseminate into practice
- CDS: expert system to improve performance of a non-expert clinician, reduce unwarranted variations in care, improve experience of care of patients, improve accuracy and quality of care
- CDS needs to be Efficient, Evidence-based, Educate, Encourage/Enforce adoption of evidence
- Are current Health IT systems able to support CDS?
- Barriers to acceptance of CDS: physician acceptance, coding, interoperability, cost
- Pathology reports not formatted to support CDS
- Incentive: “gold card” on pre-authorization

Improving Cancer Diagnosis and Care

Session 3: Systems Approaches and Care Modes

- Diagnostic management teams at Vanderbilt provide standard testing, comprehensive report, integrated diagnosis, saves time/money and improves quality – a role model for Pathology
- Project ECHO: telementoring is provider to provider; technology to deliver case-based learning, best practices, monitor outcomes. Move knowledge, not patients!
- Large employers paying for second opinions to reduce costs, improve outcomes
- New oncology care models moving to value-based payment built on high quality clinical pathways

Improving Cancer Diagnosis and Care
Session 3: Systems Approaches and Care Models

- **Requirements for quality improvement** include:
  - Culture (constructive not punitive)
  - Change in MD behavior requires measurement and feedback to clinicians
  - Infrastructure (data systems and analysts)
  - Leadership (clinical and operational)
  - Engagement (appropriate metrics)
  - Bandwidth (overwhelming extramural, non-patient-care requirements)
- **Governance:** Formal interdisciplinary governance structure within an organization is critical to set standards and monitor progress.
- **Measurement:** Measure outcomes frequently, and modify plans accordingly

Session 3: *Systems Approaches and Models of Care Delivery for Cancer Diagnosis*

- **Centralize services** where high volume is a perquisite for quality
- Use **tele-mentoring** to build community capacity and relationships
- **Work with employers** to provide prevention, second opinions and aids to literacy and activation
- **Adapt payment** to scale proven approaches

Session 4: *Computational Oncology and Integrated Diagnostics: Opportunities for New Technologies to Improve Diagnostic Information and Inform Cancer Care*

- **Genomics, pathomics, and radiomics** will become increasingly relevant to cancer care before, during, and after diagnosis
- **Data sharing** will enable the study of interrelationships between diagnosis, treatment, and outcomes at scale
- **Interoperability standards** will help solve challenges of data aggregation, labeling, and diagnostic data quality
- **Machine learning** will fundamentally change how cancer care is delivered, and will facilitate unified diagnostics and precision oncology.

Improving Cancer Diagnosis and Care
Session 5: Stakeholder Perspectives on the Path Forward

Potential Solutions

- **Build a specialized workforce**

  or

- **Support a less specialized workforce, via CDS, AI, etc**

  or

- **Enable better access to specialized expertise**

  or

- **Some combination of the above 3**

- **How do we do it and how to we pay for it**