Imaging Update for Primary Care

Bruce A. Wolf, DO, FAOCR
Assistant Professor
Interventional Radiology
Michigan State University

• No conflicts of interest.
• No off-label uses.

Objectives
• Understand the up to date information about prostate cancer evaluation and mammography
• Understand when to use IV contrast in CT and MRI exams
• Understand where to locate the ACR Appropriateness Criteria
PSA Screening and Treatment

- 2010 AUA – screen by PSA in “well-informed” men age 40+
- 2012 NEJM Radical Prostatectomy versus observation for localized Prostate cancer
  - Compared to observation, prostatectomy did not significantly improve overall or cancer specific survival over a 12yr period in localized low risk prostate ca.
- 2012 USPSTF – recommends against PSA based screening
- 2013 AUA – consider PSA screening after “shared decision-making” every 2yrs for men 55-69 only
- 2017 USPSTF Recommendation Statement – PSA screening
  - Small possibility of benefit outweighs the known risk of harms.
  - Grade C recommendation – age 55 to 69 (February 2017 draft)
  - Grade D recommendation – age 70 and older

Role of Prostate Imaging

- Address the central challenges in Prostate cancer (PCa)
  - Improve detection of clinically significant PCa – reduce mortality
  - Increase confidence in benign diseases and dormant malignancies
  - Reduce unnecessary biopsies and treatment

- Multiparametric MRI
  - Anatomy
  - Biology
  - vascularity

Active surveillance for PCa

- Planned monitoring
- Well defined selection criteria
- Identification of PCa progression
- Curative intent
Role of prostate MRI in active surveillance

- Baseline MRI after TRUS-guided biopsy proven PCa
  - Risk stratification
  - Treatment selection
- Baseline prior to biopsy in typical AS protocol

PI-RADS: lesion risk assessment

- PI-RADS 1 – Very low (clinically significant cancer is highly unlikely)
- PI-RADS 2 – Low (clinically significant cancer is unlikely)
- PI-RADS 3 – Intermediate (clinically significant cancer is equivocal)
- PI-RADS 4 – High (clinically significant cancer is likely)
- PI-RADS 5 – Very high (clinically significant cancer is highly likely)
Breast Cancer and Screening

Cancer Rates per 100,000 Women

<table>
<thead>
<tr>
<th></th>
<th>New Diagnosis</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast</td>
<td>123.9</td>
<td>20.5</td>
</tr>
<tr>
<td>Lung</td>
<td>50.8</td>
<td>34.7</td>
</tr>
<tr>
<td>Colorectal</td>
<td>32.8</td>
<td>11.9</td>
</tr>
</tbody>
</table>


The American Cancer Society’s estimates for breast cancer in the United States for 2018 are:
- About 268,120 new cases of invasive breast cancer will be diagnosed in women.
- About 63,960 new cases of carcinoma in situ (CIS) will be diagnosed (CIS is non-invasive and is the earliest form of breast cancer).
- About 40,820 women will die from breast cancer.
Screening and Treatment for Breast Cancer Mortality

2000-2012

- Models: Cancer Intervention and Surveillance Network (CISNET)
- Baseline Rate: 64 deaths/100,000 women in 2000
- 2000: 37% reduction in overall cancer mortality
  - 44% of reduction from screening
  - 56% of reduction from treatment
- 2012: 49% reduction in overall cancer mortality
  - 37% of reduction from screening
  - 63% of reduction from treatment

Source: JAMA. 2018;319(2):154-164
MSU Women’s Imaging Center Experience

- 100 consecutive breast cancer diagnoses.
- 25 women were less than 50 years old.
- Why not look for 25% of the breast cancers?
Breast Update

- Digital breast tomosynthesis – “3-D” Mammography
- Abbreviated breast MRI
- Breast density
- Whole breast ultrasound
- Contrast enhanced mammography
- Breast specific gamma imaging
- Artificial intelligence
- Risk assessment
- Seeds/reflectors for surgical localization
Advanced Imaging

- MRI
  - Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Neck
  - W/O MRA brain
- MRA Neck

- Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Neck

- Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Neck

- Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Neck

- Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Neck

- Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Neck

- Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Brain
  - Stroke, memory loss, mental status changes, dementia
  - Sleep disorders, insomnia, restless leg syndrome
  - Brain metastasis, secondary malignancy
  - Pituitary, sinus, IAC’s, orbit
- MRA Neck
Choosing Wisely

1. No imaging for uncomplicated HA.
2. No F/U for incosequential adnexal cysts.
3. No CT for appendicitis in kids until US considered.
4. Avoid admission or pre-op CXR with unremarkable Hx and exam.
5. Don’t image for suspected PE unless mod or high pre-test probability.
10 y/o M Lower Abd Pain
Mild elev WBC and low grade temp

• A. MRI Abdomen
• B. US Abdomen Attn RLQ
• C. CT Abdomen Limited
• D. X-ray

If unable to see appendix then CT scan.

33 y/o F R neck swelling
Normal thyroid labs, non-tender

• A. CT neck w/ contrast
• B. MRI neck w/ contrast
• C. X-ray soft tissue neck
• D. US neck/thyroid
• A. CT neck with contrast

• If there is pain over the parotid or submandibular region consider CT neck w/o contrast to assess for salivary Ca++.

40 y/o F Fell c/o persistent HA

• A. MRI Brain w/o contrast
• B. MRI w/ contrast
• C. CT scan w/o contrast
• D. CT scan w/ contrast

• C. CT scan w/o contrast
65 y/o M cough and SOB
chest pain, elevated d-Dimer

- A. CXR
- B. CT chest w/o contrast
- C. CT chest w/ contrast PE protocol
- D. VQ scan

60 y/o M LLQ pain
Constipated, no fever

- A. Abdominal x-ray
- B. CT abdomen and pelvis w/ contrast
- C. CT abdomen and pelvis w/o contrast
- D. MRI abdomen
• B. CT abdomen and pelvis w/ contrast
  • Needs oral contrast to assess the colon, (CA vs diverticular dz)

75y/o F c/o LLE pain relatively new-onset, DM, GFR 35
• A. MRA Abdomen, Pelvis, Runoff w/contrast
• B. Duplex B/L LE arteries
• C. CTA Abdomen, Pelvis, Runoff w/ contrast
• D. Arteriogram

• D. Arteriogram.
• Less contrast can be used than CTA.
• Doubt MRA due to the low GFR.
• Intervention can be performed at the same time.
• If GFR >40 and SX more remote then CTA or MRA
66 y/o M c/o HA and poor balance  
Hx Lung Cancer

- A. CT scan brain w/o contrast
- B. CT brain w/ contrast
- C. MRI w/ and w/o contrast
- D. MRI brain w/ contrast

Blooper
- An intern working the night shift was supposed to deliver a stool sample to the lab.
- He inadvertently sent down an empty container.
- The report came back only flatus received.