OBJECTIVES

- Rationale and evidence for LDCT for lung cancer screening
- Review guidelines for when to order LDCT

LUNG CANCER

- 75% present with Stage III/IV disease
- Only 10% are asymptomatic and early stage
TREATMENT (in one slide!)

- **Stage I/II**
  - Operable: Surgery
  - Inoperable: SABR (stereotactic ablative radiotherapy) or standard fractionated EBRT +/- chemo for N1
  - Local failure rate 10%

- **Stage III**
  - Chemoradiotherapy → durvalumab x 12 months
  - Local failure rate >50%

- **Stage IV**
  - Palliative treatment (chemo/targeted therapy or radiation)
  - Best supportive care

CASE 1

60 y/o male with 80 pack smoking history presents with 7 months of cough and increasing SOB

Noted a 30 pound weight loss in past 2 years
DEFINITIVE CHEMORADIATION

6 MONTHS LATER...

Started having balance difficulties and frequent falls
CASE 2

- 53 year old female with 40 pack smoking history
- Felt a “popping” sensation in her rib → ED

14 MONTHS LATER...

She noted increasing SOB and facial swelling
# LUNG CANCER SCREENING: RATIONALE

- High morbidity and mortality
- Significant prevalence (2%)
- Identifiable risk factor allowing for targeted screening
- More effective treatment for early stage disease

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# LUNG CANCER SCREENING

<table>
<thead>
<tr>
<th>Potential benefit</th>
<th>Potential harm</th>
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<tbody>
<tr>
<td>Increase cure rate</td>
<td>Increase in invasive procedures</td>
</tr>
<tr>
<td>Increase local control</td>
<td>Radiation exposure</td>
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<tr>
<td>Limit extent of surgery</td>
<td>Anxiety with following nodules long term</td>
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<td>Overdiagnosis</td>
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PLCO Cancer Screening Trial

- Prostate, Lung, Colorectal, and Ovarian Cancer screening trial
  - Men and women ages 55-74
  - Not specifically high risk (50% current or former smokers)
- Screening group: Single PA CXR baseline and annually x 3 years
- Control group: Routine care

Results
- No difference in lung cancer incidence rates after 13 years f/u
- No difference in lung cancer mortality

NATIONAL LUNG SCREENING TRIAL

53,454 persons at high risk (2002-2004)
LDCT screening x 3 years CXR screening x 3 years
Primary Analysis: Comparison of lung cancer mortality
Secondary Analysis: Rate of death from any cause and the incidence of lung cancer in the two groups

JAMA 2011
NLST

- High risk patients
  - 55-74 years old with at least 30 pack smoking history
  - If prior smoker, cessation within 15 years
- Excluded
  - Prior lung cancer
  - Chest CT within 18 months
  - Hemoptysis
  - 15 pound weight loss in prior year

Tuesday, January 09, 2018

LDCT

- Multidetector scanner
- Noncontrast study obtained during a single maximal inspiratory breath-hold (<25 seconds)
- Average effective dose of ~1.5 mSv (0.15 cGy)
  - Diagnostic Chest CT 7-8 mSv
  - Transatlantic flight 0.08 mSv

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RESULTS NLST: + SCREEN

- Higher rate of positive screening tests in LDCT group
  - T0: 27% vs 9%
  - T1: 28% vs 6%
  - T2: 17% vs 5%
- Diagnostic work up not part of trial and institutional dependent

LDCT: 96% were false positives for all three rounds
CXR: 94.5% were false positives for all three rounds

RESULTS NLST: ADVERSE EVENTS

- Major complications
  - 0.06% in positive LDCT that did not result in cancer Dx
  - 11.2% in positive LDCT that resulted in cancer Dx
  - 0.02% in positive CXR that did not result in cancer Dx
  - 8.2% in positive CXR that resulted in cancer Dx
RESULTS NLST: INCIDENCE LUNG CA

<table>
<thead>
<tr>
<th>LDCT</th>
<th>CXR</th>
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</thead>
<tbody>
<tr>
<td>1060 lung cancers</td>
<td>941 lung cancers</td>
</tr>
<tr>
<td>50% Stage I</td>
<td>31% Stage I</td>
</tr>
<tr>
<td>8% Stage II</td>
<td>9% Stage II</td>
</tr>
<tr>
<td>20% Stage III</td>
<td>25% Stage III</td>
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<tr>
<td>22% Stage IV</td>
<td>35% Stage IV</td>
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RESULTS NLST: LUNG CA MORTALITY

- 20% relative reduction in rate of death from lung cancer with LDCT
- Number needed to screen with LDCT to prevent one death: 320
US PREVENTIVE TASK FORCE GUIDELINES

- High risk
  - Age 55-80 and > 30 pack smoking history and smoking cessation < 15 years ago
  - LDCT: Annually for at least 2 years and suggest until 15 years out from smoking or limited life expectancy

NCCN GUIDELINES

- High risk
  - Age 55-74 and > 30 pack smoking history and smoking cessation < 15 years ago
  - Age > 50 and >20 pack smoking history with one other risk factor
    - Radon, Occupational exposure, COPD, pulmonary fibrosis
  - LDCT: Annually for at least 2 years and suggest until no longer eligible for definitive treatment
CONCLUSIONS

- LDCT decreases lung cancer mortality by 20% compared with screening CXR
- CXR screening does not work
- LDCT detects lung cancers at an earlier stage
- LDCT has high rate of false positives
- USPTFS and NCCN recommend annual LDCT for high risk patients