CANCER SCREENING 2010: LETTING THE EVIDENCE GUIDE OUR PRACTICE

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SELECTED CONTROVERSIES

- Breast Cancer Screening
  - Who should be screened
  - Digital Mammography
  - MRI
- Colorectal Cancer
  - What test and how often?
  - Are there new screening options?
- Ovarian Cancer
  - Should we screen?

SELECTED CONTROVERSIES

- Prostate Cancer
  - Should we screen?
- Lung Cancer
  - Does screening work?
  - What about CT screening?
Maggie Graham is a 50 year old woman with no family history of breast cancer. She has been reading news articles about the “increased accuracy” of screening ultrasound and MRI.

You perform a clinical breast examination which is normal.

What to you recommend to Maggie Graham?
- Add ultrasound
- Add breast MRI
- Mammogram alone
- Add ultrasound and MRI

Breast cancer is the most commonly detected cancer in women and the second leading cause of cancer death.

Several studies have shown that screening mammography can reduce mortality.

Younger women have lower breast cancer risk.

Increased density of pre-menopausal breast tissue leads to decreased sensitivity.
USPSTF NEW GUIDELINES

Mammography

- Age 50-74: screening mammography every 2 years
- Age 40-49: individualize decision to begin biennial screening according to patient's context and values
- Age ≥75: no recommendation (insufficient evidence)

Breast Exam

- Clinical breast examination alone – insufficient evidence
- Recommend against teaching women to perform routine breast self-examination
  - No mortality benefit
  - Higher rates of benign breast biopsies

Age and Mammography


<table>
<thead>
<tr>
<th>Age</th>
<th>Trials Included, n</th>
<th>RR for Breast Cancer Mortality (95% CI)</th>
<th>NNE to Prevent 1 Breast Cancer Death (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59 y</td>
<td>18</td>
<td>0.96 (0.87-1.06)</td>
<td>1/14,762 (1222-74,656)</td>
</tr>
<tr>
<td>60-69 y</td>
<td>24</td>
<td>0.86 (0.74-0.99)</td>
<td>1/279,235-105,033</td>
</tr>
<tr>
<td>70-74 y</td>
<td>18</td>
<td>0.82 (0.73-1.2)</td>
<td>Not available</td>
</tr>
</tbody>
</table>

Screening Results in Women of Different Ages

<table>
<thead>
<tr>
<th>Age Group</th>
<th>60-69 y</th>
<th>60-74 y</th>
<th>65-74 y</th>
<th>75-84 y</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammography + ultrasound</td>
<td>5.3</td>
<td>4.0</td>
<td>3.9</td>
<td>3.3</td>
</tr>
<tr>
<td>Mammography alone</td>
<td>5.2</td>
<td>4.0</td>
<td>3.9</td>
<td>3.3</td>
</tr>
<tr>
<td>Screening-detected cancers</td>
<td>1.8</td>
<td>1.5</td>
<td>1.5</td>
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</tr>
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<td>1.5</td>
</tr>
</tbody>
</table>
ACS RECOMMENDATIONS: AVERAGE RISK WOMEN

- Begin mammography at age 40
- Clinical breast exam
  - At least every three years for women in their 20s and 30s
  - Annually for women age 40 and over
- Women should be informed about the benefits and limitations of breast self examination (BSE)
  - Prompt reporting of any breast symptoms
  - Technique should be reviewed, but it is acceptable not to do it
- Women should become informed about benefits, limitations and potential harms of routine screening

ACS RECOMMENDATIONS: OLDER WOMEN

- Screening decisions should be individualized by considering benefits and risks of mammography within the context of current health status and life expectancy
- If a woman is in good health and is a candidate for treatment, she should continue to be screened

ACS RECOMMENDATIONS: HIGH RISK WOMEN

- Women at high risk may benefit from additional screening strategies
  - Earlier initiation?
  - Shorter screening intervals?
  - Adding other screening modalities e.g. ultrasound or MRI
- Currently, no evidence to justify recommendations for these approaches
ACS

- "The American Cancer Society acknowledges the limitations of mammography, and we remain committed to finding better tests. And as scientists work to make mammography even more effective, the American Cancer Society’s medical staff and volunteer experts overwhelmingly believe the benefits of screening women aged 40 to 49 outweigh its limitations."

  - Dr. Otis Brawley, Chief Medical Officer, ACS

Mammography and Age

"Mammography screening at any age is a tradeoff of a continuum of benefits and harms. The ages at which this tradeoff becomes acceptable to individuals and society are not clearly resolved by the available evidence."

  - USPSTF

Frequency of Mammography

- Similar reduction in mortality with screening every one or two years
- Every two years (compared to annually) maximizes benefits of screening & minimizing harms

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- Every two years (compared to annually) maximizes benefits of screening & minimizing harms.

Magnitude of Benefit of Mammography

- Norwegian Study compared women in counties with breast cancer screening, women in counties without breast cancer screening and two historical-comparison groups.
- Overall reduction in mortality was 7.2/100,000 person in screening group:
  - 2.4 deaths/100,000 person years attributed to mammography
  - Advances in breast cancer awareness and treatment.

NEW TECHNOLOGIES

- Breast MRI
- Ultrasound and Mammography
MRI SCREENING

- Does MRI have a role for screening in high risk women?
- MRI is a very sensitive method of breast imaging and has been used as a diagnostic tool in women with breast cancer
  - Not influenced by breast density
- Specificity is variable
- Expensive

MRI SCREENING

- Two prospective studies of high risk women
- One included BRCA1 and BRCA2 carriers and one included women with a lifetime risk of breast cancer of 15% or more

SENSITIVITY AND SPECIFICITY OF BREAST CANCER SCREENING TESTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Sensitivity</th>
<th>Specificity</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI</td>
<td>77%</td>
<td>95%</td>
</tr>
<tr>
<td>Mammography</td>
<td>36%</td>
<td>99.8%</td>
</tr>
<tr>
<td>Ultrasound</td>
<td>33%</td>
<td>96%</td>
</tr>
<tr>
<td>Clinical Breast Exam</td>
<td>9%</td>
<td>99%</td>
</tr>
</tbody>
</table>
**IMPACT FOR CLINICAL PRACTICE**

- MRI may be useful in screening high risk women, although the effect of MRI screening on mortality is not yet known
- MRI is not currently recommended for screening average risk women

**Mammography plus Ultrasound**

- Screening ultrasound may detect small cancers not seen on mammography
- 2809 high risk women underwent mammography and ultrasound
- Mammography alone compared to mammography plus ultrasound
- Adding an ultrasound will find 1.1 to 7.2 more cancers per 1,000 but with a significant increase in false positives
  - Berg et al JAMA 2008

**What next?**

- Need better risk assessment tools for use in primary care
  - Correctly identify persons at all levels of risk
  - Allow for tailored recommendations for screening and prevention based on individual risk
- Integration into healthcare systems systematic approach to
  - assessing risk factors
  - calculating risk
  - reporting to women and clinicians in understandable format

**QUESTION**

What do you most commonly recommend for colorectal cancer screening?
- FOBT
- Sigmoidoscopy
- Colonoscopy
- FIT
- Virtual Colonoscopy

**QUESTION**

Which test do you think is best for colorectal cancer screening?
- FOBT
- Sigmoidoscopy
- Colonoscopy
- FIT
- Virtual Colonoscopy
- The test that gets done
COLORECTAL CANCER: EVIDENCE FOR SCREENING

- Second commonest form of cancer in the U.S.
- and second highest mortality rate
- Screening with fecal occult blood test (FOBT) or sigmoidoscopy is associated with a reduction in CRC mortality
- Recent case-control study showed that colonoscopy was associated with fewer CRC deaths
  - Left sided CRC
  - Baxter, 2009 Annals Internal Medicine

SCREENING TESTS

- Fecal occult blood test (FOBT)
- Sigmoidoscopy
- Colonoscopy
- Air contrast barium enema
- Virtual Colonoscopy
- Fecal DNA
- Fecal immunochemical Test (FIT)

NEW JOINT GUIDELINE

- Joint guideline by American Cancer Society, US Multi-society Task Force on CRC and the American College of Radiology
- Guidelines for the early detection of CRC and adenomatous polyps
- Screening tests are grouped into two categories
  - Those that detect cancer early (stool tests)
  - Those that can also detect adenomatous polyps
  - Structural exams
### NEW JOINT GUIDELINE

- FOBT annually
- Fecal immunochemical test annually
- Flexible sigmoidoscopy every 5 years
- DCBE every 5 years
- CT colography every 5 years
- Colonoscopy every 10 years
- Stool DNA testing (interval uncertain)
  
  Levin, Gastroenterology 2008

### JOINT GUIDELINE RECOMMENDATION

- Clinicians should make patients aware of the full range of screening options
- Offer patients a choice between a screening test that is effective at both early cancer detection and cancer prevention through the detection and removal of polyps and a test that is primarily effective at cancer detection
- CRC prevention should be the primary goal of screening

### JOINT GUIDELINE RECOMMENDATION

- Providers and patients should understand the limitations and requirements of noninvasive tests
  - Less likely to prevent cancer than the invasive tests
  - Must be repeated at regular intervals to be effective
  - If test is abnormal, invasive test (colonoscopy) will be needed
USPSTF Recommendation

- Screen with FOBT, sigmoidoscopy or colonoscopy in individuals aged 50-75
  - Risks and benefits of each method vary
- No routine screening for individuals age 76-85
- Do not screen individuals aged 85 and over
- Evidence is insufficient for CT colonography or fecal DNA


TEST ISSUES

- FOBT
  - Good evidence for reducing mortality
  - Trials repeated FOBT every 1-2 years
  - Positive test requires evaluation of the entire colon
  - Digital FOBT is a poor screening method
    - Collins, 2005
- Sigmoidoscopy
  - Fair evidence for reducing mortality
  - Proximal neoplasia can be missed, therefore positive test should be followed by colonoscopy

SCREENING COLONOSCOPY

- More sensitive than FOBT/sigmoidoscopy
- More specific than FOBT
- Higher risk
  - (1/2,000 perforation rate for diagnostic colonoscopy)
- More costly
- Presumed to save lives because used in FOBT trials
- Feasibility depends on insurance coverage and gastroenterologist availability
### NEWER TESTS

- Virtual Colonoscopy
- Stool-based molecular testing
  - Fecal DNA
- Fecal immunochemical tests

### Computed Tomographic Colonography (Virtual Colonoscopy)

- Non-invasive radiological technique allows visualization of the entire colon
  - Radiation dose similar to barium enema
- Bowel preparation similar to conventional colonoscopy
  - Prep-less technique is being evaluated
- Does not require sedation
- Colon distended with carbon dioxide or air
- Breath holding for 20-50 seconds
- 2D and 3D images interpreted by radiologist
- Colonoscopy to remove polyps

### Potential benefits

- Polyps can be detected which can be removed
- Accuracy approaches that of colonoscopy
- Less invasive than colonoscopy
- May be more acceptable than invasive screening tests
  - Studies have been mixed
  - If abnormal, still need colonoscopy
CT COLONOGRAPHY VS COLONOSCOPY

- Parallel screening programs
  - 3120 got CT colonography
  - 3163 got colonoscopy
- Diagnostic yield of each approach compared
  - Similar numbers of advanced neoplasms
  - 7.9% of patients in the CTC group referred for colonoscopy
  - Fewer complications in the CTC group
  - Kim et al. NEJM 2007

Multi-center ACRIN study

- Evaluated in 2531 asymptomatic average risk adults
- Used commonly available 2 D technology
- Test characteristics
  - Sensitivity
    - > 90% for polyps 10 mm or more
    - > 78% for polyps ≥ 6 mm
  - Specificity
    - > 86% for polyps 10 mm or more
    - > 88% for polyps ≥ 6 mm
  - Johnson, NEJM 2008

Potential Harms

- Radiation Exposure
  - Median dose estimate of 8.8 to 10.2 mSv per CT examination
  - 1/1000 could develop solid cancer or leukemia with exposure to 10mSv above background
- Procedure related harms
  - Perforation rate low- slightly higher with diagnostic CTC
- Extra-colonic findings
Extra-colonic findings

- Extra-colonic findings are common
  - 27-69% of individuals
- “High” clinical significance require surgical or medical treatment or intervention or further investigation
  - 4.5-11%
- “Moderate” clinical significance require further investigation or treatment but not immediate medical treatment
  - 27% of individuals
- 7-16% of individuals need additional evaluation for extra-colonic findings, but very few abnormalities ultimately required definitive treatment
- Follow-up has been short (maximum of 2 years)

Fecal DNA testing

- PCR test for DNA mutations in the stool
- Potential advantages
  - Non-invasive
  - No preparation
  - Detection along entire length of the colon

Evaluated as a screening test in multi-center study
- Fecal DNA test (23 mutations), Hemoccult, Hemoccult Sensa and colonoscopy
- 4482 average risk adults
- Fecal DNA detects more neoplasms than Hemoccult or Hemoccult Sensa, but with more false positive results
  - Relatively low sensitivity, high specificity
**Fecal DNA: Remaining Questions**

- Are health outcomes improved?
  - Even if we assume benefit based on FOBT trials, how much?
- Do the benefits outweigh the risks?
  - Public expectations about accuracy of DNA testing?
- Frequency of testing?
- Acceptability and availability?
- Cost
  - $400 to $800 vs $3 to $40 for FOBT

**Fecal Immunochemical Testing (FIT)**

- Uses labeled antibodies that attach to antigens of any human globin present in the stool
- Globin does not survive passage of the upper GI tract
- No dietary restrictions
- Newer FIT can use brush sampling of toilet water rather than spatula scraping of the stool

**Fecal Immunochemical Testing**

- FIT is more sensitive in detecting CRC and large adenomas (>1 cm) than Hemoccult II
- FIT is a little less specific than Hemoccult II (higher false positive rates)
HOW ARE WE DOING?

- FOB in past 2 years
  - 27%
- Ever had a sigmoidoscopy or colonoscopy
  - 53%

BRFSS, 2004

COLORECTAL CANCER SCREENING: CONCLUSIONS

- Any screening is better than no screening for reducing colorectal cancer mortality
- Increase awareness of the importance of colorectal cancer screening
- Virtual colonoscopy and fecal DNA testing are included as options in the new joint guidelines but not in USPSTF guidelines

OVARIAN CANCER
<table>
<thead>
<tr>
<th>Question</th>
</tr>
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<tbody>
<tr>
<td>Ms. O. is a 52 year old woman whose best friend was recently diagnosed with ovarian cancer. She is concerned about ovarian cancer and wants “whatever test you can give her” for it. What do you recommend?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ovarian Cancer: What Test?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Bimanual pelvic examination</td>
</tr>
<tr>
<td>- CA-125</td>
</tr>
<tr>
<td>- Transvaginal ultrasound</td>
</tr>
<tr>
<td>- Bimanual examination and CA-125</td>
</tr>
<tr>
<td>- Bimanual examination, CA-125 and transvaginal ultrasound</td>
</tr>
<tr>
<td>- None of these tests</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OVARIAN CANCER: SHOULD WE SCREEN?</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lifetime risk of ovarian cancer</td>
</tr>
<tr>
<td>- No affected relatives 1.2%</td>
</tr>
<tr>
<td>- One affected relative 5%</td>
</tr>
<tr>
<td>- 2 affected relatives 7%</td>
</tr>
<tr>
<td>- Hereditary syndrome 40%</td>
</tr>
<tr>
<td>- Ovarian cancer limited to the ovaries is associated with a much higher survival rate</td>
</tr>
</tbody>
</table>
### OVARIAN CANCER

#### RISK FACTORS
- Advancing age
- Nulliparity
- North American or Northern European
- Personal history of endometrial, colon or breast cancer
- Family history of ovarian cancer
- Fertility drugs?

#### PROTECTIVE FACTORS
- More than one full term pregnancy
- Breast feeding
- Oral contraceptive use

### OVARIAN CANCER: SCREENING TECHNIQUES

- Serum CA-125 assay
- Trans-vaginal ultrasound
- Serum CA-125 plus ultrasound

### PLCO TRIAL

- Partridge E et al. Results from four rounds of ovarian cancer screening in a randomized trial. Obstet Gynecol 2009:113: 775-82.
- AIM: To determine whether annual screening with CA-125 and transvaginal sonography can reduce ovarian cancer mortality
### PLCO

- 34,261 women aged 55-74 randomized to screening vs usual care
- Annual CA 125 plus ultrasound
  - CA 125 >35 or abnormal sono was positive
- Follow-up of positive screens by patients’ physicians
- Four annual screens so far

### Results

- 89 invasive ovarian or peritoneal cancers diagnosed
  - 60 screen detected
- CA-125 positive
  - 1.4-1.8% per round
- Ultrasound positive
  - 2.0-4.6% per round

### PLCO Results

- PPV for combination of tests
  - 1.0-1.3%
- Cancer yield per 10,000 women screened
  - 4.7-6.2
- 19.5 surgeries for each screen detected cancer
- Most screen detected cancers were late stage
**OVARIAN CANCER SCREENING: CONCLUSIONS**

- Many women must be screened to detect a few cases – PPV 1-1.3%
- To detect one cancer, many surgeries have to be done
- Effect on mortality is not known

**OVARIAN CANCER: SCREENING**

- NIH Consensus Conference: “There is no evidence available yet that the current screening modalities of CA-125 and transvaginal ultrasound can be effectively used to widespread screening to reduce mortality from ovarian cancer nor that their use will result in decreased rather than increased morbidity and mortality”
- Some organizations recommend annual pelvic examination
  - No evidence

**OVARIAN CANCER: SCREENING**

- A woman with two or more relatives should be referred to a gynecologic oncologist for counseling
- Although there are no data regarding screening in high risk women, annual screening with rectovaginal pelvic examination, CA-125 and transvaginal ultrasound are recommended
## PRIMARY PREVENTION

- Oral contraceptives – 37% risk reduction
- Pregnancy
- Breast feeding

## QUESTION

What is your usual practice for PSA screening for men aged 50-70?
- Usually order PSA
- Sometimes order PSA
- Rarely order PSA
- Never order PSA

## PROSTATE CANCER: SHOULD WE SCREEN?

- Disease has high prevalence
  - 10% lifetime risk
  - 30% of men have prostate cancer at autopsy
- Disease has serious consequences
  - Sometimes but may be a benign disease for many men
- Detectable preclinical phase- ?? PSA
- Treatment for preclinical disease is more effective?
  - Complications of prostate cancer treatment
    - 0.4% incontinence
    - 60% impotence
- Prostate Cancer Outcomes Study 24 month follow up Screening
- Screening reduces cancer mortality?
SCREENING TESTS: DIGITAL RECTAL EXAMINATION

- One-third of prostate cancers occur in areas which can be reached
- Higher sensitivity performed by urologists
- An abnormal digital rectal examination increases the likelihood of prostate cancer somewhat
- A negative examination does not change the likelihood of a clinically significant prostate cancer
  - Low sensitivity

SCREENING TESTS: PSA

- PSA testing has increased dramatically since 1988
- Observational studies have had conflicting findings about the benefits of screening
- Two large randomized controlled trials of PSA screening and mortality

PLCO Cancer Screening Trial

- Prostate, Lung, Colorectal and Ovarian
- 76,693 men randomized to annual PSA for 6 years plus rectal examination for four years vs usual care
- High rates of screening in the control group
- No significant difference in death between the two groups at 7 year follow-up
  - 2.0 deaths per 10,000 person years in the screening group
  - 1.7 deaths per 10,000 person years in the controls
- Similar results after 10 years
  - Andriole, NEJM 2009
European Randomized Study of Screening for Prostate Cancer (ERSPC)

- 182,000 men aged 50-74 in seven European countries
- PSA screening at least once every four years vs no screening
  - Protocols differed in the 7 countries
- During 9 year follow up, incidence of prostate cancer was higher in the screening group
  - 8.2% vs 4.8%
- Mortality lower in the screened group
  - 7 fewer prostate cancers per 10,000 screened men
- To prevent one death
  - 1,410 men needed to be screened
  - 48 additional prostate cancers treated

Schroder NEJM 2009

PSA SCREENING: CONCLUSIONS

- PSA screening may lead to a modest reduction in mortality
- To achieve this mortality reduction, there is a substantial amount of over-diagnosis and over-treatment

PROSTATE CANCER SCREENING: USPSTF RECOMMENDATIONS

- The evidence is insufficient to recommend for or against routine screening for prostate cancer using PSA or DRE in men younger than 75.
  - PSA can detect early prostate cancer, but inconclusive evidence about whether early detection improves health outcomes.
  - Harms include frequent false positives and unnecessary anxiety, biopsies and potential complications of treatment of some cases of cancer that may never have affected a patient’s health.
  - Grade "I" recommendation
- USPSTF recommends against screening men aged 75 and older
  - 2008

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Men with at least a 10 year life expectancy should have an opportunity to make an informed decision with their health care provider about whether to be screened.

Screening should not occur without an informed decision making process.

Men at average risk should receive the information beginning at age 50.

Information should be provided at age 45 for men at higher risk:
- Age 40 for very high risk

American Cancer Society, 2010

For men unable to decide, the decision can be left to the discretion of the health care provider.

Men with less than a 10 year life expectancy should not be offered screening.

At age 75, only half of men have a life expectancy of 10 years or more.

Men without access to regular care should be tested only if high quality informed decision making is available through community-based programs.

- Follow-up and counseling

ACS 2010

For those who choose to be screened:
- PSA with or without DRE
  - Screening yearly for men whose PSA is 2.5 ng/ml or greater.
  - If PSA <2.5 ng/ml, screening can be extended to every 2 years.
  - PSA of 4.0 ng/ml or greater: referral
  - PSA of 2.5-4.0 ng/ml individualized risk assessment
    - Age, African American, family history, previous negative biopsy

ACS 2010
New American Urological Association Guidelines

- Men who choose to be screened should have both DRE and PSA
- The decision to use PSA testing should be individualized
  - Inform men of the potential benefits and risks
- Early detection and risk assessment for prostate cancer should be offered to all men aged 40 and older who wish to be screened and who have an estimated life expectancy of more than 10 years
  - American Urological Association, 2009

Prostate Cancer Screening: Summary

- PSA testing may reduce prostate cancer mortality
- Risks of early detection and treatment
- Shared decision making is key

QUESTION

- Mr. Nico Teen is a 69 year old man with COPD. You have previously been unsuccessful in encouraging him to quit. He comes in for a check-up, is worried about developing lung cancer and wants to know what test you think he should have. What do you recommend?
  - Chest X ray
  - Sputum cytology
  - Spiral CT
  - None of these tests
LUNG CANCER SCREENING

- Does the disease have high prevalence?
  - 213,380 cases in 2007
- Does the disease have serious consequences?
  - Lung cancer is the number one cause of cancer mortality in both men and women
- Is there a detectable preclinical phase?
- Is treatment of preclinical disease more effective than waiting for symptoms to develop?
  - 5-year survival much better in Stage 1 than in more advanced
- Are health outcomes improved as a result of screening?
  - Do any screening tests reduce lung cancer mortality?

LUNG CANCER SCREENING: SYSTEMATIC REVIEW

- Does screening for lung cancer reduce lung cancer mortality
- Included 7 trials of lung cancer screening
- Frequent screening with chest x-rays was associated with an increase in mortality
  - RR 1.11 (95% C.I. 1.00-1.23)
- No difference in chest X-ray plus cytology vs chest X-ray alone

LOW DOSE SPIRAL COMPUTED TOMOGRAPHY

- Helical volumetric studies
- Scans entire lung in <20 seconds (single breath hold)
- No IV contrast
- More radiation exposure than CXR but less than conventional CT
- Can detect much smaller lesions than chest X-ray
LDCT STUDIES

- 8 published studies of LDCT screening for lung cancer
  - 4 were high risk (smokers, former smokers)
  - 4 mixed risk populations (46-86% smokers)
- LDCT can detect lung cancer
  - More early stage cancer
- In high risk populations
  - 1.2% prevalence of lung cancer on LDCT
  - 0.6-2% incidence on annual or follow up screens

LDCT SCREENING

- International Early Lung Cancer Action Project (I-ELCAP)
  - N=31,556
  - 83% smokers
  - Detailed protocol for follow up of all abnormalities
  - Longitudinal cohort
  - All screened at baseline and most got follow up screening
  - No comparison group

LDCT SCREENING FOR LUNG CANCER

- At baseline, (N=31,567) screened
  - 4,186 positive tests
  - 405 (1.3%) lung cancers
- Annual Screen (N=27,456)
  - 1,480 positive
  - 74 (0.27%) lung cancers
  - 5 interim cancers
- 85% of those detected were stage I cancers
COMPUTED TOMOGRAPHY SCREENING

- Can Spiral CT diagnose early disease?
  - Yes
- Does the ability of spiral CT to detect early lung cancers matter?
  - ??
  - Overdiagnosis?
- Do the benefits outweigh the risks?
  - ??
  - Detection and evaluation of benign nodules

USPSTF RECOMMENDATIONS

- Evidence is insufficient to recommend for or against screening asymptomatic persons for lung cancer with low-dose computerized tomography, chest X-ray, sputum cytology or a combination of these tests
  - Grade "I" recommendation
- Screening with these modalities can detect lung cancer early, but there is no evidence that any screening strategy reduces lung cancer mortality.

PRIMARY PREVENTION OF LUNG CANCER

- Smoking cessation
- Smoking cessation
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- Smoking cessation
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- Smoking cessation
### SUMMARY OF RECOMMENDATIONS

- Women aged 50 to 74 should undergo mammography every 2 years.
- Screening decisions for women in their forties and for women aged 75 and older should be individualized.
- MRI screening for breast cancer may be useful in high-risk women.
- All men and women aged 50 and older should be screened for colorectal cancer.
  - Any screening is better than no screening.

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### SUMMARY OF RECOMMENDATIONS

- Many women must be screened for ovarian cancer to find one case.
  - Effect on mortality is not known.
- Screening for prostate cancer may reduce mortality but there are significant risks and harms to early detection and treatment.
  - A shared decision-making approach to screening is recommended.
- There is no evidence that screening for lung cancer reduces mortality.