Cancer Screening

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CRITERIA FOR EFFECTIVE SCREENING

- The disease is common and associated with serious morbidity or mortality
- Screening tests are accurate in detecting early-stage disease
- Screening Tests are acceptable to patients and are feasible in general clinical practice
- Treatment after early detection through screening has been shown to improve prognosis
- The potential benefits outweigh the potential harms and costs of screening

Screening Tests Must be Accurate

- False-Negatives- False sense of security, delay in cancer diagnosis
- False Positive-Anxiety, Unnecessary Investigation or Over Treatment

SCREENING TESTS ARE ACCEPTABLE AND FEASIBLE

- Colonoscopy accurate for screening of colorectal cancer , but may not be acceptable to most patients
- CT-scan or MRI-accurate for lung cancer, but expensive and not feasible for mass screening

PROGNOSIS

- True for Colorectal Cancer
- Not true for Leukemia, Lymphoma.

BENEFITS OUTWEIGH THE POTENTIAL HARMS AND COSTS OF SCREENING

- Number of patients screened to save one person.
- Cost of screening to save one patient

Population Based Screening

- General Population Versus High Risk patients

Cancer screening Guidelines

- *Screening* for the most common major cancers has been straight forward for years
- – women should get an annual mammogram and Pap smear
- men should get a PSA test annually
- Both sexes should get colonoscopies
- there was no accepted screening for lung cancer. Now these standards have been turned on their heads

- The effectiveness and public benefit of colorectal cancer screening is not considered to be a controversy any longer

Screening of Colorectal cancer大腸癌/ 結腸癌

- Beginning at age 50, both men and women should follow one of these testing schedules:
- **Tests that find polyps and cancer**
- Flexible sigmoidoscopy every 5 years*, or
- Colonoscopy every 10 years, or
- Double-contrast barium enema every 5 years*, or
- CT colonography (virtual colonoscopy) every 5 years*
- **Tests that primarily find cancer**
- Yearly fecal occult blood test (gFOBT), or
- Yearly fecal immunochemical test (FIT) every year

ANNUAL FECAL OCCULT BLOOD TESTING便潛血/ 大便隱血

- Randomized controlled trials showed that
- Annual Fecal occult blood testing
- 3 consecutive stools samples (dual testing on each stool sample)
- colonoscopy if occult blood is present
- reduced the risk of death from colorectal cancer by up to 33%

*N Engl J Med*1993;328:1365-71. *Lancet* 1996;348:1472-7.

Flexible sigmoidoscopy乙狀結腸鏡檢查

- Flexible sigmoidoscopy less effective than colonoscopy but still decrease the incidence of colon cancer by about one half. Might be more acceptable to some individuals
- The addition of flexible sigmoidoscopy every 5 years to annual fecal occult blood testing has been recommended as a more effective strategy than one using either test alone.

Colonoscopy結腸鏡檢查

- Gold standard
- most cancers arise from polyps. Polypectomy prevents cancer.
- Not everyone is willing, able or can afford
- Virtual colonoscopy using CT scanning is effective but costly

Cost Effectiveness

- The computer-simulated model predicted that fecal occult blood testing could save 12 325 life-years per 100 000 people screened annually.
- All colorectal cancer screening strategies cost less than $20 000 per life-year saved.

Compliance

- Fecal occult blood testing-compliance rates range from 59% to 90%
- A successful screening program requires considerable public education.

乳癌檢查
Breast Cancer Screening

- Yearly mammograms are recommended starting at age 40 and continuing for as long as a woman is in good health
- Clinical breast exam (CBE) about every 3 years for women in their 20s and 30s and every year for women 40 and over
- Women should know how their breasts normally look and feel and report any breast change promptly to their health care provider. Breast self-exam (BSE) is an option for women starting in their 20s.
- Some women – because of their family history, a genetic tendency, or certain other factors – should be screened with MRI in addition to mammograms. (The number of women who fall into this category is small: less than 2% of all the women in

Mammogram乳房X光線照片/ 乳房X光檢查

- Absolute mortality benefit for women screened annually starting at age 40 years is 4 per 10,000 at 10.7 years
- The comparable number for women screened annually starting at age 50 years is approximately 5 per 1,000.

PREVENTING 1 DEATH FROM BREAST CANCER

requires screening

- 1,904 women aged 40 to 49 years
- 1,339 women aged 50 to 59 years
- 377 women aged 60 to 69 years.

Ann Intern Med ,2009 151:716-726;
Ann Intern Med, 2009 vol. 151 738-747

Potential harms of Mammogram

- Treatment of insignificant cancers (over diagnosis) can result in breast deformity, lymphedema, thromboembolic events, new cancers, or chemotherapy-induced toxicities

Potential harms of Mammogram

- Radiation-induced mutations can cause breast cancer, especially if exposed before age 30 years. Latency is more than 10 years, and the increased risk persists lifelong.

SCREENING BY BREAST SELF-EXAMINATION

- Based on fair evidence, teaching breast self-examination does not reduce breast cancer mortality.
- No difference in breast cancer mortality was seen after 10 years in Shanghai factory workers randomly assigned to receive breast self-examination instruction and reinforcement, compared with the control group

J Natl Cancer Inst 94 (19): 1445-57, 2002

SCREENING BY BREAST SELF-EXAMINATION乳房自我檢查

- leads to more breast biopsies and to the diagnosis of more benign breast lesions
- Biopsy rate is 1.8% among the study population compared with 1.0% among the control group

SCREENING BY BREAST SELF-EXAMINATION (BSE)

- Cochrane Reviews and other evidence have failed to find routine regular BSE saves lives
- For ages 40-49-15% reduction in breast cancer mortality, ages 60-69- 32% reduction
- However, given the lower incidence of breast cancer in the younger age range and the higher chance of false positives and over diagnosis, the absolute number of lives saved is much smaller and comes at a higher cost.

Newest Evidence

- Women who have screening mammography die of breast cancer less frequently than women who do not have it
- Benefits increase as women age and their risk for breast cancer increases
- The benefits minus harms are small for women aged 40 to 49 years.
- The potential harms of mammography include anxiety, procedures, and costs due to false-positive results and receiving a diagnosis and treatment of a cancer that never surface on its own within a woman s natural life time.
- Mammography every 2 years is nearly the same as that of doing it every year, but only half the harms
- No evidence that self- or clinical breast examination reduces breast cancer death rates.

Newest Recommendation -THE US PREVENTIVE SERVICES TASK FORCE (UPSTF)

- Against routine screening mammography in women aged 40 to 49 years
- biennial screening mammography for women aged 50 to 74 years. (Grade: B recommendation.
- insufficient data for women 75 years or older. (Grade: I Statement.)
- Recommends against teaching breast self-examination (BSE). (Grade: D recommendation.)
- Insufficient data clinical breast examination (CBE) in women 40 years or older. (Grade: I Statement.)
- Insufficient data regarding either digital mammography or magnetic resonance imaging (Grade: I Statement.)

THE GUIDELINES ARE FOR

- Asymptomatic women at ***average*** risk for breast cancer
- **Not** for women judged to be at high risk
- **Not** for symptomatic women

High Risk Group

- Strong family history of breast or ovarian cancer (particularly first-degree relatives, on either the mother's or father's side);
- Early age at menarche and late age at first birth (reflecting estrogen exposure)
- A history of proliferative breast disease
- A personal history of invasive breast cancer
- Menopausal hormone use, obesity, and alcohol intake are associated with an increased risk of breast cancer.

Cervical Cancer Screening子宮頸癌

Old Recommendation

Annual Pap smear screening

- **Cervical cancer screening (testing) should begin at age 21.** Women under age 21 should *not* be tested.
- **Women between ages 21 and 29** should have a Pap test every 3 years. HPV testing should *not* be used in this age group unless it is needed after an abnormal Pap test result.
- **Women between the ages of 30 and 65** should have a Pap test plus an HPV test (called “co-testing”) every 5 years. This is the preferred approach, but it is also OK to have a Pap test alone every 3 years.
- **Women over age 65** who have had regular cervical cancer testing with normal results should *not* be tested for cervical cancer. Once testing is stopped, it should not be started again. Women with a history of a serious cervical pre-cancer should continue to be tested for at least 20 years after that diagnosis, even if testing continues past age 65.
- **A woman who has had her uterus removed (and also her cervix)** for reasons not related to cervical cancer and who has no history of cervical cancer or serious pre-cancer should *not* be tested.
- **A woman who has been vaccinated against HPV** should still follow the screening recommendations for her age group

New Guidelines

- women no longer be screened before their 21st birthdays
- women with clear screenings need not continue them after they turn 65.
- For healthy women in their 20s-a Pap test every three years.
- For women 30 and older, -continued testing every three years with the Pap smear or testing every five years with the Pap and a test for human papillomavirus

- women screened on the new calendar have identical rates of cervical-cancer death to those screened annually. But women who are screened more often had a higher rate of false positive tests, cervical procedures, and, ultimately, premature delivery and other complications in pregnancy related to damage done as a result of procedures.

Prostate Cancer Screening前列腺

Old Guidelines

- Annual PSA

New evidence

- Serial PSA screening has at best a modest effect on prostate-cancer mortality during the first decade of follow-up. This benefit comes at the cost of substantial over-diagnosis and overtreatment. It is important to remember that the key question is not whether PSA screening is effective but whether it does more good than harm.

- The report on the ERSPC trial appropriately notes that 1410 men would need to be offered screening and an additional 48 would need to be treated to prevent one prostate-cancer death during a 10-year period
- The PLCO trial showed harm through overdiagnosis.

ERSPC Study

- 20% reduction in prostate-cancer mortality
- Absolute reduction in prostate-cancer mortality -7 deaths per 10,000 men after 9 years of follow-up
- 73,000 men in the screening group underwent more than 17,000 biopsies
- A substantially higher cumulative risk of diagnosis of prostate cancer in the screening group (820 vs. 480 per 10,000 men). Diagnosis led to more treatment-277 versus 100 per 10,000 men undergoing radical prostatectomy and 220 versus 123 per 10,000 undergoing radiation therapy with or without hormones,

- One third of men aged 40-60 years have cancer cells in their prostate yet very few are aggressive and need treatment. Yet when found, most men are treated - with the risk of surgery or radiation and the development of side effects such as incontinence or impotence which develop in 20 to 30 percent of these treated men.

- Prostate specific antigen (PSA) should no longer be a routine test for detecting the possibility of prostate cancer. PSA–based screening results in small or no reduction in prostate cancer–specific mortality and is associated with harms related to subsequent evaluation and treatments, some of which may be unnecessary

Lung cancer Screening

- No accepted screening for lung cancer.

Lung cancer Screening

- And now there is evidence that low dose CT scanning of high risk individuals can detect early lung cancer at an operable stage