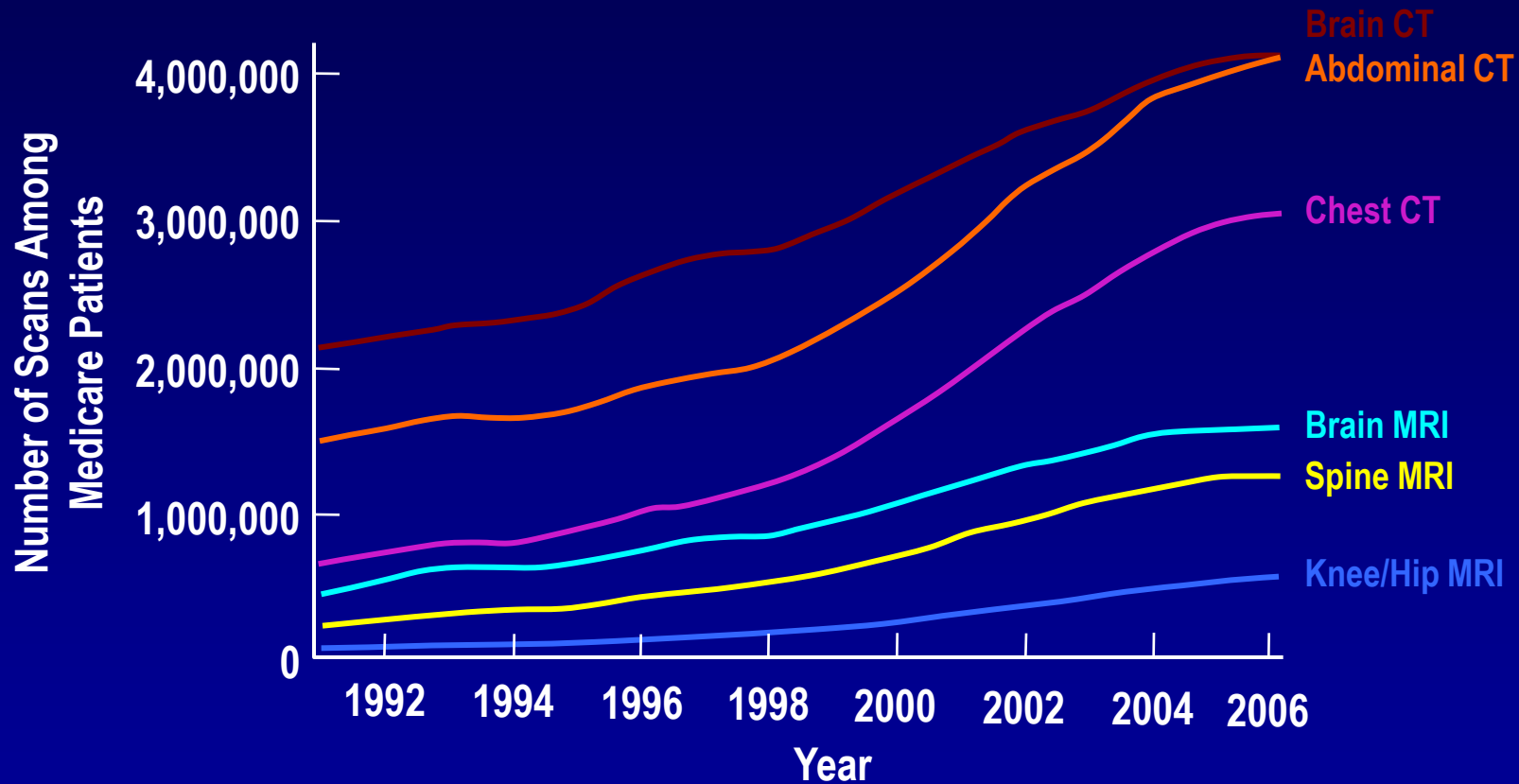


# Training for Uncertainty

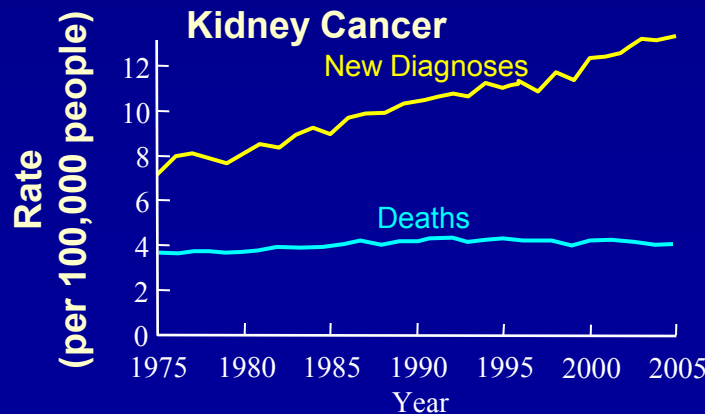
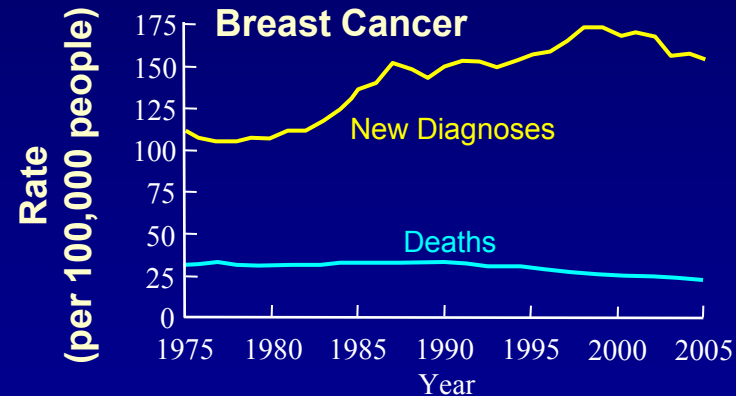
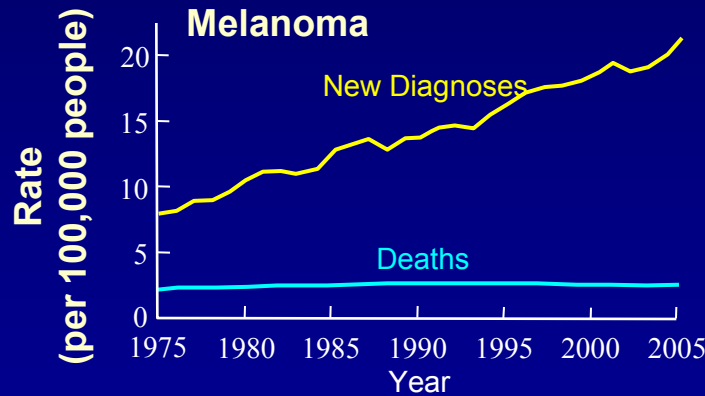
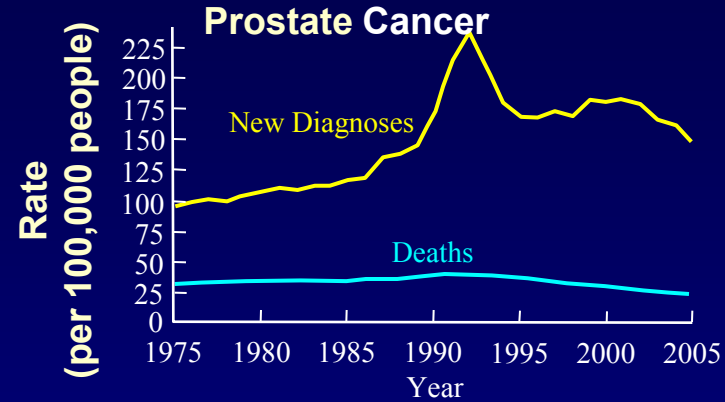
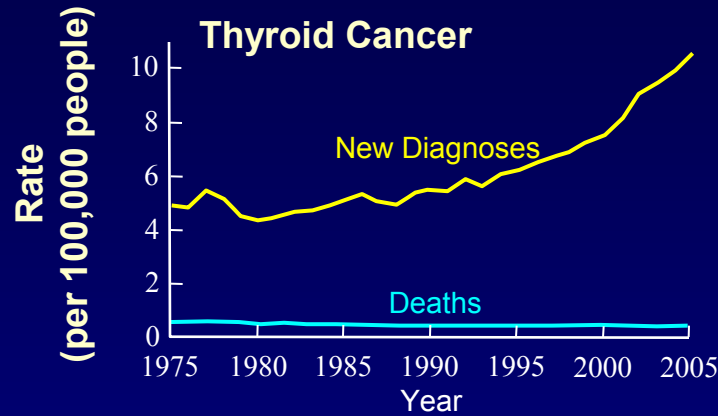
**“The greatest deficiency of medical education throughout the twentieth century.....was the failure to train learners properly for clinical uncertainty, which led to the systematic overuse in clinical practice of tests, procedures, and treatments.”**

**Kenneth Ludmerer, *Time to Heal*, 1999**

# Trends in Radiology Scans in the U.S. (1991-2006)



# Incidence and Mortality of Five Cancers: (Surveillance, Epidemiology, and End Results: SEER)



Source:  
HG Welch,  
JNCI 2010

## Patient and Physician Guide: National Lung Screening Trial (NLST)

### What is the purpose of this guide?

To explain the benefits and harms of low-dose computed tomography (CT) screening for lung cancer in people at high risk for the disease. The NLST showed a reduction in deaths from CT screening compared to chest X-ray screening. The Prostate, Lung, Colorectal, and Ovarian (PLCO) Cancer Screening Trial recently showed that chest X-ray screening (compared to no screening) did NOT reduce the chance of dying from lung cancer.

### Who participated in the NLST?

Current or former cigarette smokers within the past 15 years, 55 to 74 years of age, with at least 30 pack-years of smoking [Pack-years = packs per day x number of years smoking]. Participants must have had no symptoms or signs of lung cancer or other serious medical conditions, and be medically fit for surgery.

## Study Findings: Low-dose CT versus Chest X-ray screening

53,454 current and former smokers were randomly assigned to be screened once a year for 3 years with low-dose CT or chest X-ray. Here's what happened after an average of 6.5 years:

	Low-dose CT 26,722 people		Chest X-ray 26,732 people
<b>Benefit: How did CT scans help compared to chest X-ray, an ineffective screening test?</b>			
4 in 1,000 fewer died from lung cancer	13 in 1,000	versus	17 in 1,000
5 in 1,000 fewer died from all causes	70 in 1,000	versus	75 in 1,000
<b>Harm: What problems did CT scans cause compared to chest X-ray?</b>			
223 in 1,000 more had at least one false alarm	365 in 1,000	versus	142 in 1,000
18 in 1,000 more had a false alarm leading to an invasive procedure, such as bronchoscopy, biopsy, or surgery	25 in 1,000	versus	7 in 1,000
2 in 1,000 more had a major complication from invasive procedures	3 in 1,000	versus	1 in 1,000

## "Take home" messages

Lung cancer screening with CT scans is the only screening test shown to lower the chance of dying from lung cancer. The effect of screening may vary depending on how similar you are to the people who participated in the study. The benefit of screening may be bigger if your lung cancer risk is higher. The harm may be bigger if you have more medical problems (like heart or severe lung disease), which could increase problems from biopsies and surgery.

For perspective, the reduction in deaths from lung cancer with CT screening is larger than the reduction in deaths from the target cancers of other common screening tests, such as mammograms for breast cancer.

There is a tradeoff: CT screening decreases your chance of death but increases your chance of having a false alarm.

If you choose to have CT screening, it is important to have it done at a medical center with special expertise in lung cancer screening and treatment.

## Most important thing you can do

**DON'T SMOKE.** Regardless of your screening decision, avoiding cigarettes is the most powerful way to lower your chance of dying overall or suffering or dying from a variety of diseases, such as lung cancer, emphysema, heart or vascular disease. For example, at age sixty-five, 89 in 1,000 male current smokers will die of lung cancer in the next 10 years versus 4 in 1,000 never smokers. For women, the corresponding figures are 55 in 1,000 versus 5 in 1,000.

For help quitting, call 1-800-QUIT-NOW.

**Illusions of knowledge are the  
obstacles to discovery.**

**Daniel Boorstin, 1983**

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