

EARLY CANCER DETECTION

**DOES IT MAKE A DIFFERENCE IN
SURVIVAL TO CATCH CANCER EARLY?**

&

**COROLLARY: SHOULD YOU BE
TESTED IF A TEST EXISTS?**

Editorial Disclaimer:

This presentation is the personal opinion of Dr. J. R. Wiener, and does not reflect the opinions of A-B Tech Community College or any employee therein.

In other words, Jon now gets on his soapbox about this topic. ☺

Biology and therapy with biologic agents in gynecologic cancer

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Growth of epithelial ovarian cancer is influenced by several factors including transforming growth factor- α and transforming growth factor- β , macrophage colony stimulating factor, tumor necrosis factor- α , interleukin-1 and interleukin-6, *c-erb B-2 (HER-2/neu)*, and mutant *p53*. Continued expression of the epidermal growth factor receptor, new expression of *c-fms*, and overexpression of *HER-2/neu* are associated with a poor prognosis. A number of cytokines have been used to treat patients with ovarian cancer, including interferon- α , interferon- γ , tumor necrosis factor- α , and interleukin-2. Judging from preclinical models, interferon- γ may be more active than interferon- α against human ovarian cancer. Although tumor necrosis factor- α can stimulate proliferation of some ovarian cancers, the cytotoxic activity of tumor necrosis factor- α has been amplified *ex vivo* by inhibitors of protein synthesis. Similar heterogeneity exists with regard to interleukin-1 where stimulation or inhibition of cell proliferation has been observed. Tumor-infiltrating lymphocytes from ascites fluid contain cells capable of major histocompatibility complex-restricted and major histocompatibility complex-nonrestricted cytotoxicity. Tumor-infiltrating lymphocytes and interleukin-2 have been combined with cytotoxic chemotherapy to treat advanced or recurrent disease. Bispecific monoclonal antibodies that react both with T cells and ovarian tumor cells have produced tumor inhibition in human tumor xenografts. Immunotoxins that contain OVB3 and pseudomonas exotoxin have been evaluated in a phase I clinical trial. Dose-limiting central neurotoxicity has been observed without tumor regression. A monoclonal antibody designated OVX1 has been developed against a high-molecular-weight mucinlike molecule associated with ovarian cancers. The therapeutic potential of this antibody is not known, but levels of OVX1 antigen are elevated in a substantial fraction of patients with normal CA125 levels despite the presence of persistent disease. The use of the bifunctional chelator 1,4,7,10-tetraazacyclododecane-N,N',N'',N'''-tetraacetic acid (DOTA) for radioimmunoconjugate preparation resulted in the development of more stable immunoconjugates, but with coincident immune responses to the DOTA moiety.

Standard operating procedure for 1992...indeed until the mid 2000s....
how to treat late stage recurrent cancers & how to kill cancer cells, but NOT how to find cancers early.

Ovarian Cancer growth is often silent, and thus unfortunately first diagnosed in 65-75% of cases at Stage 3 or 4, when the disease has already considerably metastasized. Until recently, most of these women were lost to the cancer within 2 yrs..

BUT....

If diagnosed in stage 1 or 2, most of these women can live 5+ years...unfortunately we have no consistently reliable test to catch it early.

Stage 1: limited to ovary(ies) or Fallopian tube(s)

Stage 2: spread to organs within the pelvis, not to lymph nodes or distal sites

Stage 3: spread to the abdomen or lymph nodes in the back of the abdomen

Stage 4: spread to organs outside of peritoneal cavity (systemic metastasis)

Quick quiz:

*What percent of the National Cancer Institute Annual Budget is used to investigate **cancer prevention and early detection?***

Answer later....

The Lifetime Probability of Developing Cancer for Men, 2009-2011*

Site	Risk
All sites [†]	1 in 2
Prostate	1 in 7
Lung & bronchus	1 in 13
Colon & rectum	1 in 21
Urinary bladder [‡]	1 in 26
Melanoma of the skin [§]	1 in 34
Non-Hodgkin lymphoma	1 in 42
Kidney & renal pelvis	1 in 49
Leukemia	1 in 59
Oral cavity & pharynx	1 in 65
Pancreas	1 in 66

* For those free of cancer.

[†] All sites exclude basal cell and squamous cell skin cancers and in situ cancers except urinary bladder.

[‡] Includes invasive and in situ cancer cases

[§] Statistic for white men.

The Lifetime Probability of Developing Cancer for Women, 2009-2011*

Site	Risk
All sites†	1 in 3
Breast	1 in 8
Lung & bronchus	1 in 16
Colon & rectum	1 in 22
Uterine corpus	1 in 37
Non-Hodgkin lymphoma	1 in 52
Melanoma of the skin‡	1 in 53
Thyroid	1 in 60
Pancreas	1 in 67
Ovary	1 in 75
Leukemia	1 in 84

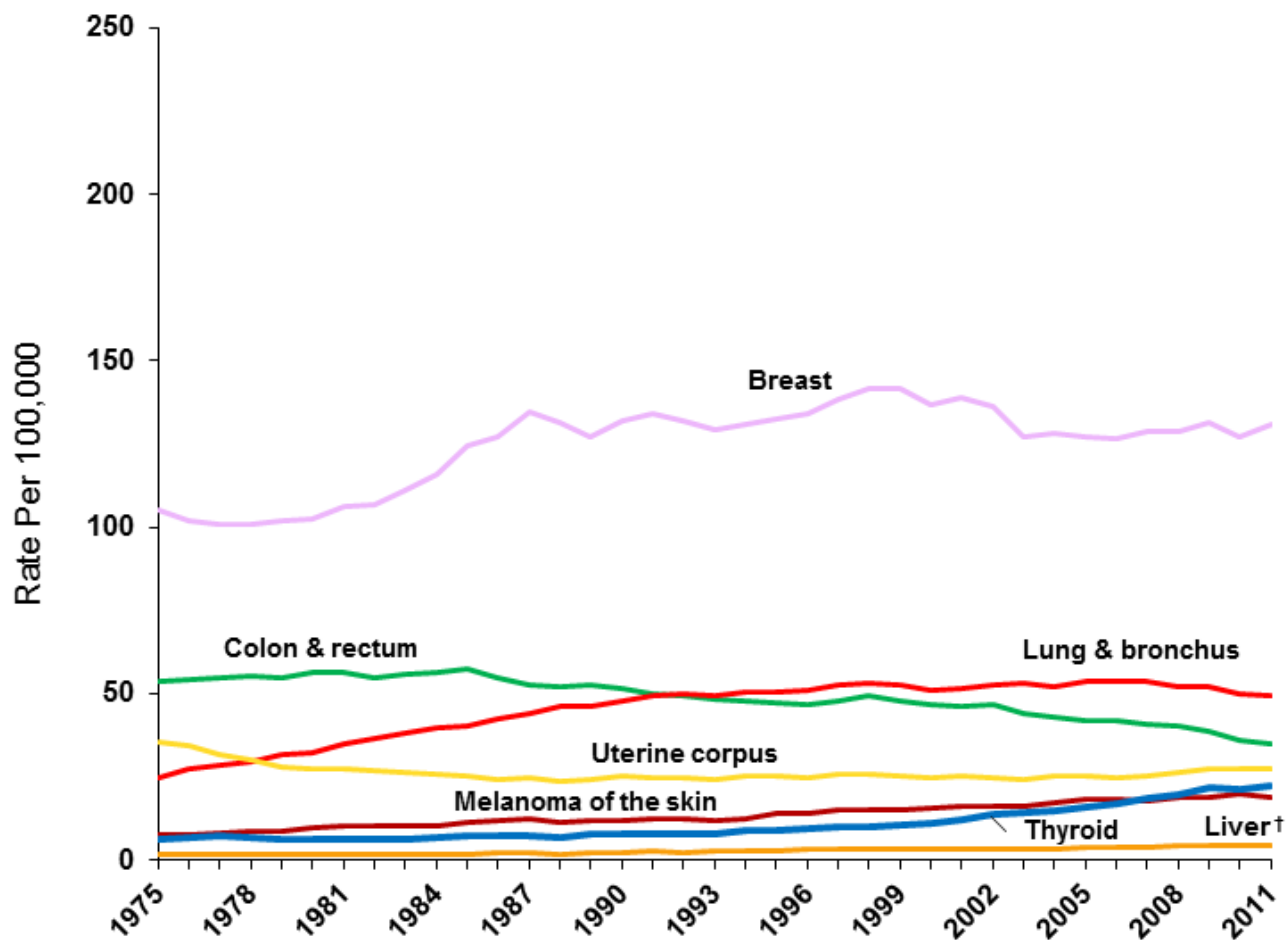
* For those free of cancer.

† All sites exclude basal cell and squamous cell skin cancers and in situ cancers except urinary bladder.

‡ Statistic for white women.

Source: DevCan: Probability of Developing or Dying of Cancer Software, Version 6.7.1 Statistical Research and Applications Branch, National Cancer Institute, 2014.

Trends in Cancer Incidence Rates* Among Women, US, 1975-2011

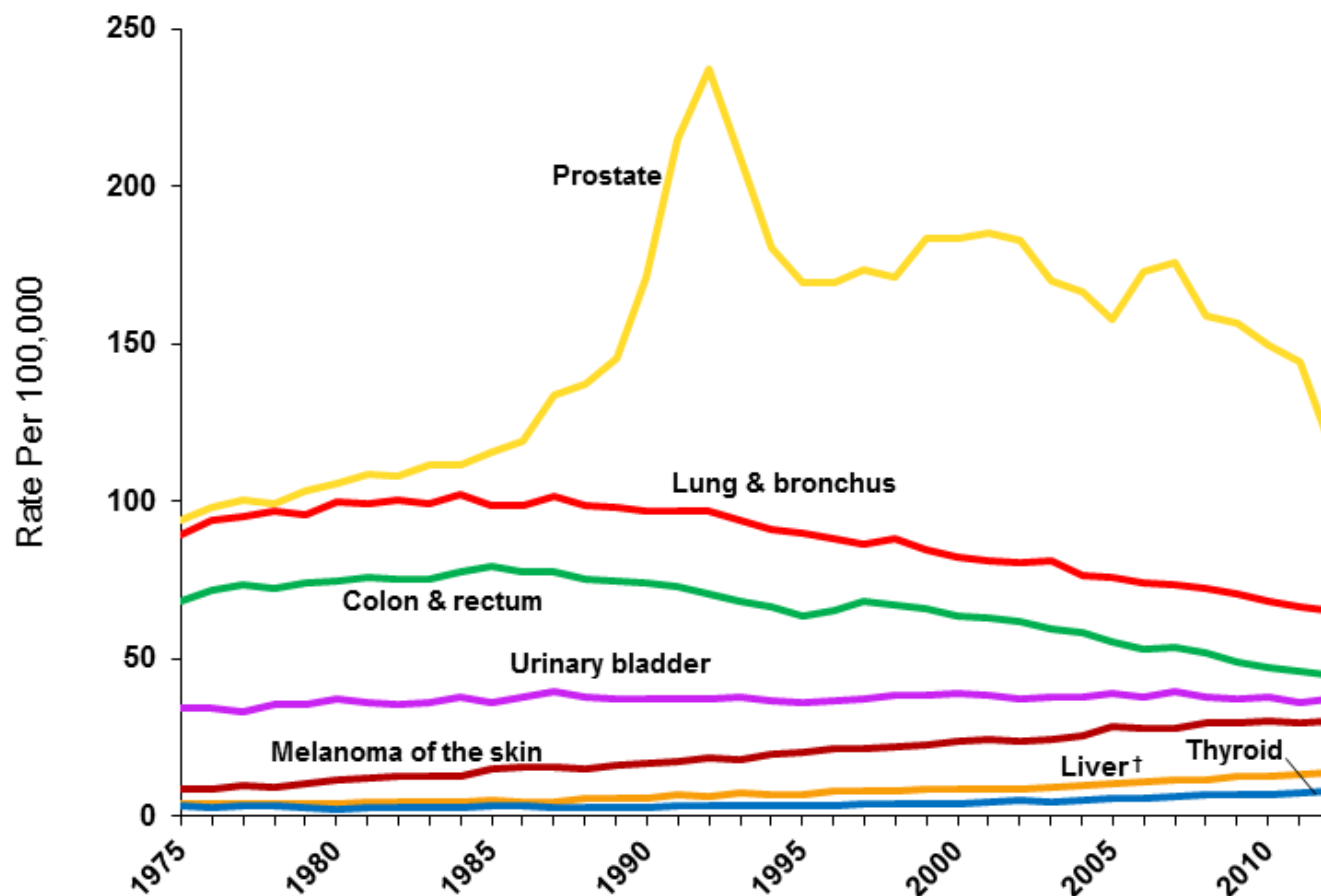


*Age-adjusted to the 2000 US standard population and adjusted for delays in reporting.

†Includes the intrahepatic bile duct.

Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2014.

Trends in Cancer Incidence Rates* Among Males, US, 1975-2012



*Age-adjusted to the 2000 US standard population and adjusted for delays in reporting. †Includes the intrahepatic bile duct.
Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2015.

Number of Peer-Reviewed Publications

since 1960s concerning:

Prostate Cancer: 133,393

Breast Cancer: 313,918

Ovarian Cancer: 93,452

Pancreatic Cancer: 79,351

Colon Cancer: 113,232

Melanoma: 104,990

Lung Cancer: 264, 603

(as of 02/02/2016)

Have they made a difference?

Trends in Five-year Relative Cancer Survival Rates (%), 1975-2010

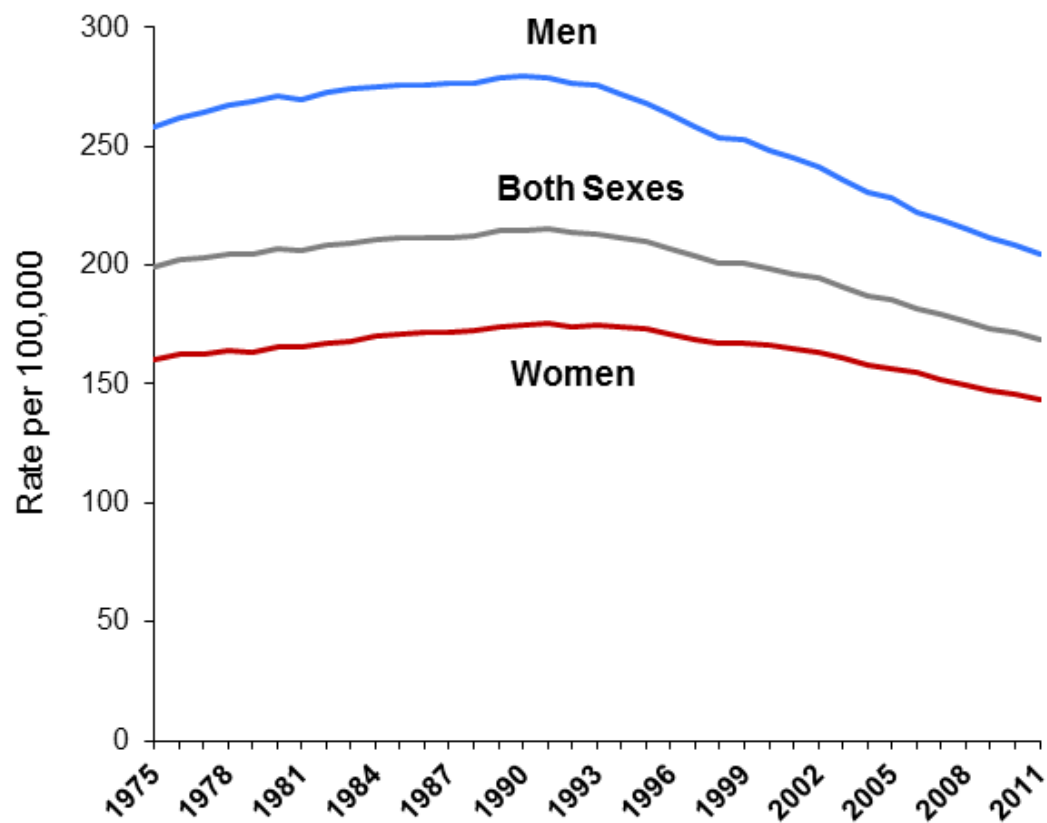
Site	1975-1977	1987-1989	2004-2010
All sites	49	55	68
Breast (female)	75	84	91
Colon	51	60	65
Leukemia	34	43	60
Lung & bronchus	12	13	18
Melanoma of the skin	82	88	93
Non-Hodgkin lymphoma	47	51	71
Ovary	36	38	45
Pancreas	3	4	7
Prostate	68	83	100*
Rectum	48	58	68
Urinary bladder	72	79	79

5-year relative survival rates based on patients diagnosed in the SEER 9 areas from 1975-1977, 1987-1989, and 2004-2010, all followed through 2011.

*99.6%

Source: Surveillance, Epidemiology, and End Results (SEER) Program, National Cancer Institute, 2014.

Trends in Cancer Death Rates* by Sex, US, 1975-2011



*Age-adjusted to the 2000 US standard population.

Source: National Center for Health Statistics, Centers for Disease Control and Prevention, 2014.

Prostate Cancer

5-year relative survival by stage at the time of diagnosis

Stage	5-year relative survival rate
local	nearly 100%
regional	nearly 100%
distant	28%

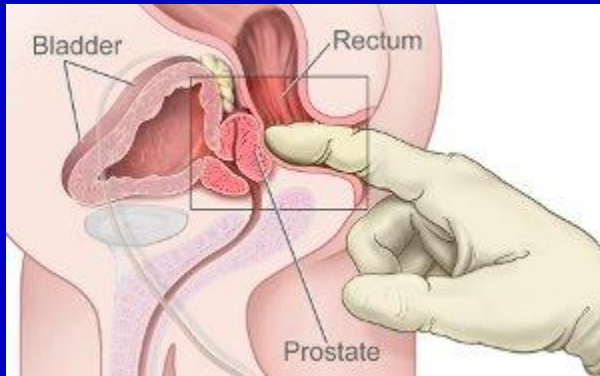
If found limited to prostate gland, 99+% chance of 10+ year survival (and most live beyond 15 yrs)

<https://urology.ucsf.edu/research/cancer/prostate-cancer-risk-assessment-and-the-ucsf-capra-score>

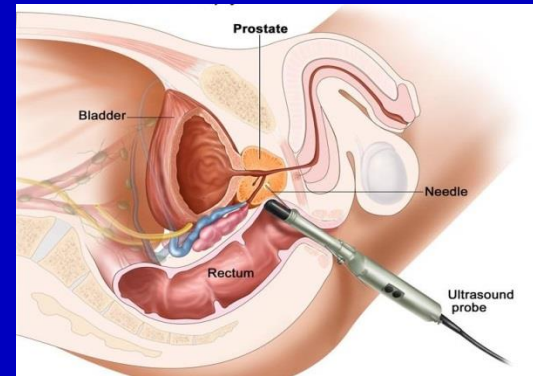
What is the PSA test?

- Measures quantity in the blood of Prostatic Specific Antigen (PSA), a protein produced solely by the Prostate gland.
- Used in conjunction with a digital rectal exam (DRE) to test men for Prostate cancer.

DRE
→



And btw,
the biopsy
is done
from same
entry
→



- Re the PSA test: false positives and negatives occur; caused by benign conditions: prostatitis, benign prostatic hypertrophy.
- Normal <4.0 ng/mL. "Grey" area: 4-10. High > 10.
- If 4-10 then amount of 'free' PSA becomes critical.
- Only ~25% of men who have an elevated PSA and then a biopsy actually have cancer, but worth checking...isn't it??

**Probability of finding pCa based on % free PSA in men
with a total PSA between 4-10 ng/ml**

<u>% free PSA</u>	<u>Probability of PCa</u>
0%–10%	56%
10%–15%	28%
15%–20%	20%
20%–25%	16%
Greater than 25%	8%

**SOURCE: *Journal of the American Medical Association*,
May 20, 1998.**

Female Breast Cancer Survival Rates and Stage Distribution 2005-11

5 Yr Survival Rates by stage at Diagnosis:

Localized 99%

Regional 85%

Distant 26%

Take Home Points

1. Early detection optimal for long term survival.
2. Metastasis is the cause of death ~85% of cancer patients.
(Metastasis = secondary malignant growths at a distance from a primary.)
3. Something odd? Run to the physician. **Procrastination LETHAL**
4. Some tests (e.g. PSA) are criticized as having too many 'false positives' or not worth causing an invasive biopsy... but isn't a **FALSE** positive good news? I realize this is controversial...perhaps too much testing to catch too few???

Mine was caught early enough. I hope you never ever get cancer, but if you do, I hope you do everything you can to catch it....**EARLY. Just my \$0.01, but GET TESTED!**

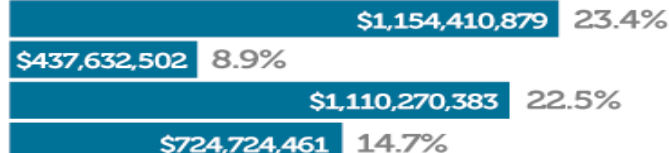
NATIONAL CANCER INSTITUTE PROGRAM STRUCTURE FISCAL YEAR 2014



RESEARCH

Cancer Causation
Detection & Diagnosis Research
Treatment Research
Cancer Biology

69.5% | \$3,427,038,225



RESOURCE DEVELOPMENT

Cancer Centers Support
Research Manpower Development
Buildings & Facilities

14.2% | \$701,486,305



CANCER PREVENTION & CONTROL



6.6% | \$323,809,715



PROGRAM MANAGEMENT & SUPPORT

9.7% | \$480,033,980

TOTAL NCI BUDGET FY 2014*

\$4,932,368,225

*Excludes projects awarded with Stamp Out Breast Cancer funds as well as Royalty income

Answer:
15.5% (8.9
+ 6.6) of
total NCI
research
expenditure

Sources of data and
graphs:
American Cancer
Society & National
Cancer Institute