


Breast Carcinogenesis: Environmental Perspective

“Road Map”

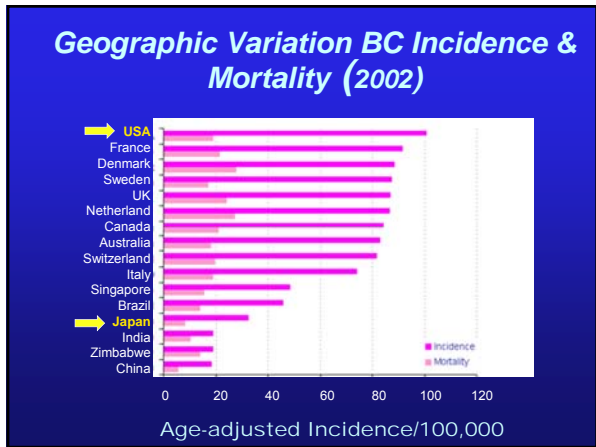
- How our BC epidemic is linked to our western industrialized life style/environment: What epidemiology is telling us
- The decades that it takes for a cancer to establish itself: **A window of opportunity for prevention**
- My laboratory's contribution: What is going on during those decades- the role of chronic oxidative stress
- Culprits and suspects
- What we can do about our BC epidemic: **Prevention**

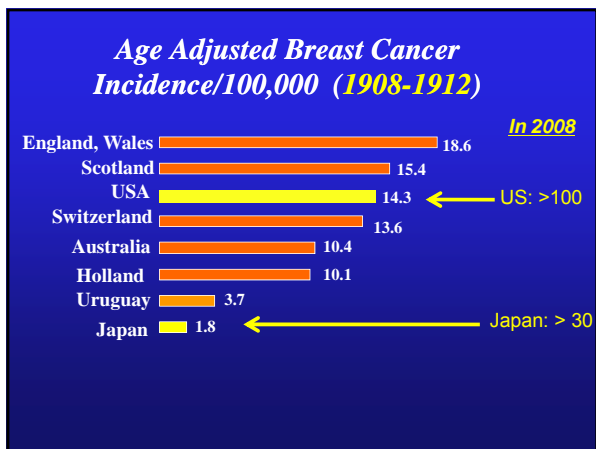


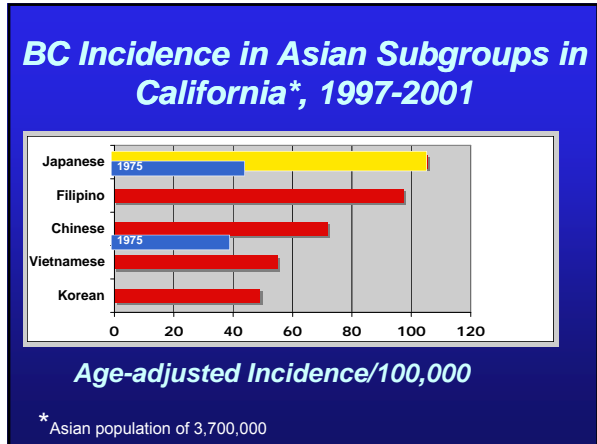
Two sides of the coin

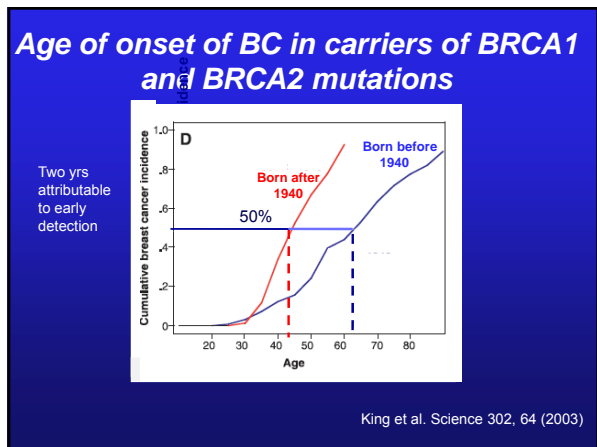
- Percent of women expected to be diagnosed with BC in their lifetime is only 1% less than % of smokers expected to be diagnosed with lung cancer in their lifetime (14% vs. 15%)!
- **But >85% resist our pro-carcinogenic environment**

**What is the Evidence?
What epidemiology is telling us**










Western Industrialized Environment/lifestyle?

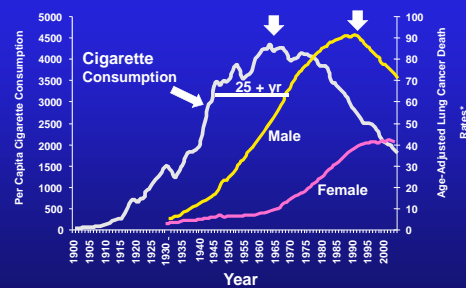
- Reproductive factors/hormones
- Chemicals (xenobiotics)
- Industrialization of food production
- How we process and cook the food we eat

The elephant(s) in the room 

How long does it take for a BC to establish itself?

- Atom bomb – (< 20 yr old more vulnerable)
- Tobacco and Industrial exposure
- Laboratory animal studies: Stage can be set *in utero*

Tobacco Use and Lung Cancer Death Rates in the US, 1900-2004



Age-adjusted to 2000 US standard population.

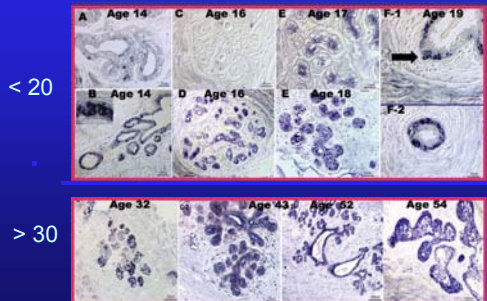
Window of opportunity for prevention, for stopping the clock

What's going on during the decades it takes for a BC to become established?

My laboratory's contribution

Breast epithelial cells are subject to chronic oxidative stress starting at an early age

Breast cells Subjected to Chronic Oxidative Stress



Thanks to PA BCC

Culprits and Suspects

- Chemicals (xenobiotics)
- Industrialization of food production
- How we process and cook the food we eat

Chemical Tsunami



OP-ED COLUMNIST

New Alarm Bells About Chemicals and Cancer

By NICHOLAS D. KRISTOF
Published: May 5, 2010

The President's Cancer Panel is the Mount Everest of the medical mainstream, so it is astonishing to learn that it is poised to join ranks with the organic food movement and declare: chemicals threaten our bodies.



The cancer panel is releasing a landmark 200-page report on Thursday, warning that our lackadaisical approach to regulation may have far-reaching consequences for our health.

I've read an advance copy of the report, and it's an extraordinary document. It calls on America to rethink the way we confront cancer, including much more rigorous regulation of chemicals.

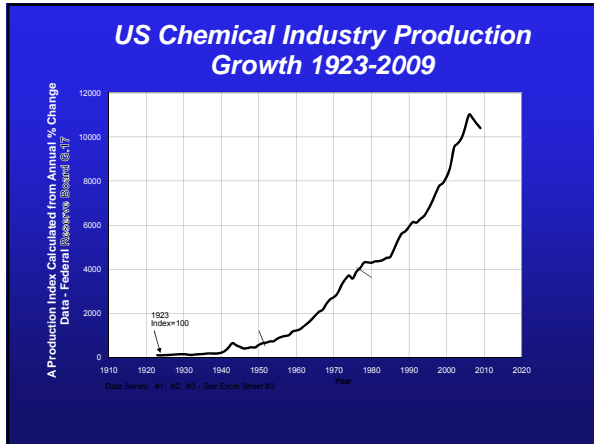
- SIGN IN TO RECOMMEND
- TWITTER
- COMMENTS (200)
- SIGN IN TO E-MAIL
- PRINT
- SHARE

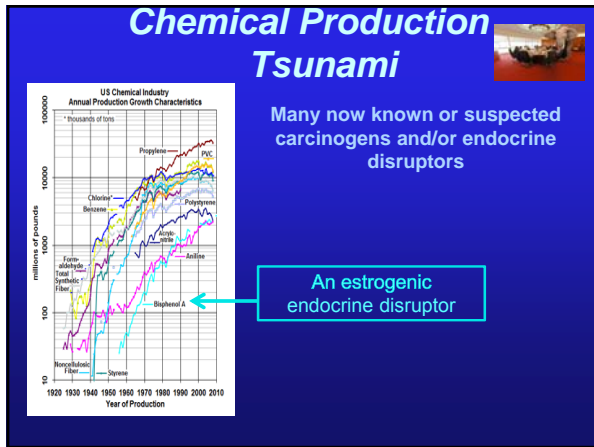


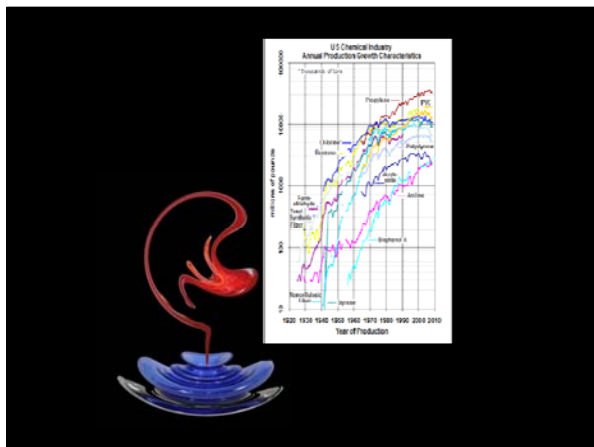
Chemicals Production (1997-1998)

- ▶ **85,000 chemicals produced in US**
 - 15,000 in quantities >10,000 lbs/yr
- ▶ **High Production Volume Chemicals: >1 million lbs/yr**
 - 2,863 in US
 - 78% no toxicological information * -
 - 716 High production volume chemicals in consumer products

Dr. Tracy Woodruff, Program on Reproductive Health and the Environment. UCSF.







**Spread via the food chain:
Selected examples**

- Plastic containers/packaging (styrenes, bisphenol A)
- Additives –Nutrasweet (10% Methanol)
- Pesticides, Herbicides
- Metals (Cadmium, Arsenic...)



Ants Know Better?



Yuk –Aspartame
10% metanol

Corn Syrup is Addictive and Leads to Obesity



We received him from a lab in the USA

What is on the label



What is not on the label: e.g., Cadmium

- Persistent, toxic heavy metal – accumulates

Is a carcinogen - causes oxidative stress and is an estrogenic endocrine disruptor

Food is one of the chief sources of exposure to Cadmium

What is not on the label

Environ Geochem Health, 2010 Feb;32(1):1-12. Epub 2009 Aug 18.

Cadmium levels in Europe: implications for human health.

Pan J, Plant JA, Voulvoulis N, Oates CJ, Ittenfeldt C.
Imperial College London, London, UK.

- Soil contaminated with Cd from use of rock phosphate (ground up rocks) in intensive arable agriculture
- Correlation between Cd levels and age adjusted breast and prostate cancer

Cadmium from unsuspected sources

- Flax seed!
- High protein sports drinks – with other metal contributors to oxidative stress



Are toxicology tests relevant to carcinogenesis?

Tests are limited to observing toxic effects of single agents administered acutely – and in large and increasing amounts.

But,

breast cancer is caused by chronic exposure of breast epithelial cells to low levels of multiple agents acting additively and/or synergistically over decades.

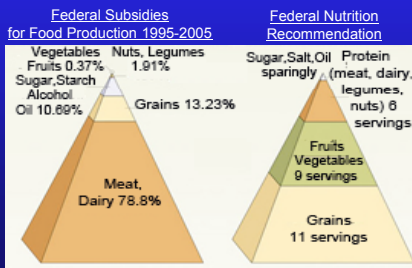
What can we do about it?

Individual action: -

Group actions (NGO):

- Insist on;
 - more prompt response to red flags from science
 - a much more rigorous testing of chemicals and foods
 - developing tests relevant to how cancers actually come about -i.e., result from chronic exposure to low levels of multiple agents acting in concert
 - A rational food subsidy policy

Why Does a Salad Cost More Than a Big Mac?



I see my job to be to do rigorous science, to give you brave folks, the stakeholders, information needed to bring about the changes that cancer prevention requires
