

Cancer Prevention

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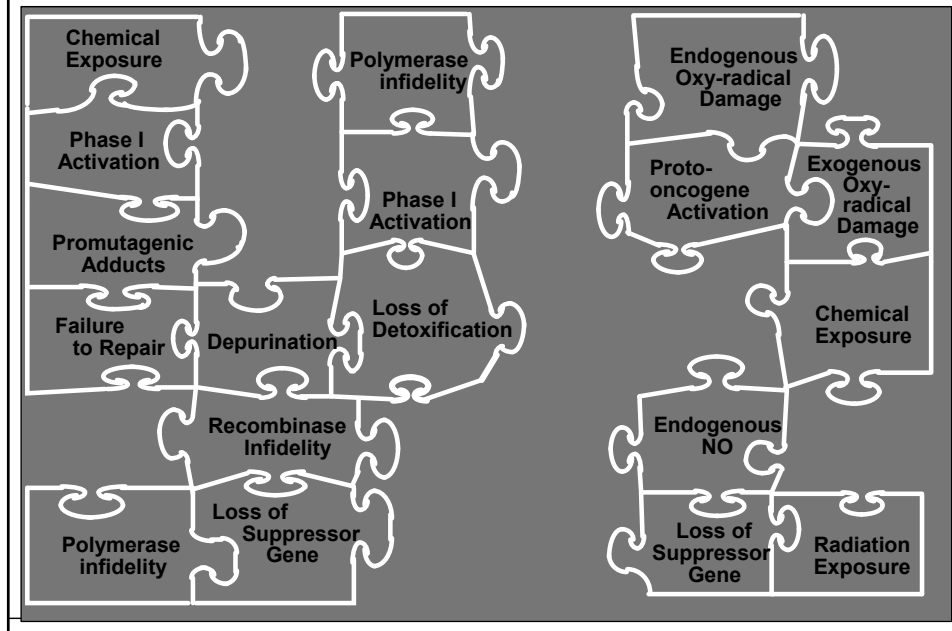
James Cancer Hospital

The Ohio State University Wexner Medical Center

Topics to be covered:

- **Carcinogenesis and Cancer Risk Assessment in the Clinic**
- **Unprecedented Opportunities for Tobacco Control**
- **Smokeless Tobacco and Electronic Cigarettes**
- **Cancer Prevention in Cancer Survivors**

THE ETIOLOGY OF CANCER



The New York Times

How is Cancer Causation Determined?
Conflicting studies are part of our lives.....

March 19, 2007

Study Hints at Cancer Link to Hormones

A new study added more weight to the link between hormone use and breast cancer, although the evidence was circumstantial.

Menopausal Women, HRT, hormone therapy

If Estrogen Causes Cancer, Where is the Epidemic?

By Dr. W. Gifford Jones

June 24, 2007

Can milk cause cancer?

Dr. Andrew Weil
For The Calgary Herald

Monday, July 23, 2007

Q: I've seen conflicting articles about milk consumption and the risk of cancer. What is the risk?

A: You raise an interesting question. Recently, a study from the University of Toronto, led by Dr. Ganmaa Davaasambuu, M.D., PhD, a native Mongolian, found a link between the consumption of cow's milk and the risk of prostate and testicular cancers in humans. All are cancers that need sex hormones to grow.

washingtonpost.com

Estrogen May Lower Younger Women's Heart Risk

By Amanda Gardner
HealthDay Reporter
Wednesday, June 20, 2007, 12:00 AM

WEDNESDAY, June 20, 2007
Women in their 50s who have lower levels of estrogen have more deposits in their arteries, a study says, which may reduce heart disease risk.

washingtonpost.com

Another Study Sees Heart Risks in Hormone Replacement Therapy

Gardner
Reporter
July 11, 2007, 12:00 AM

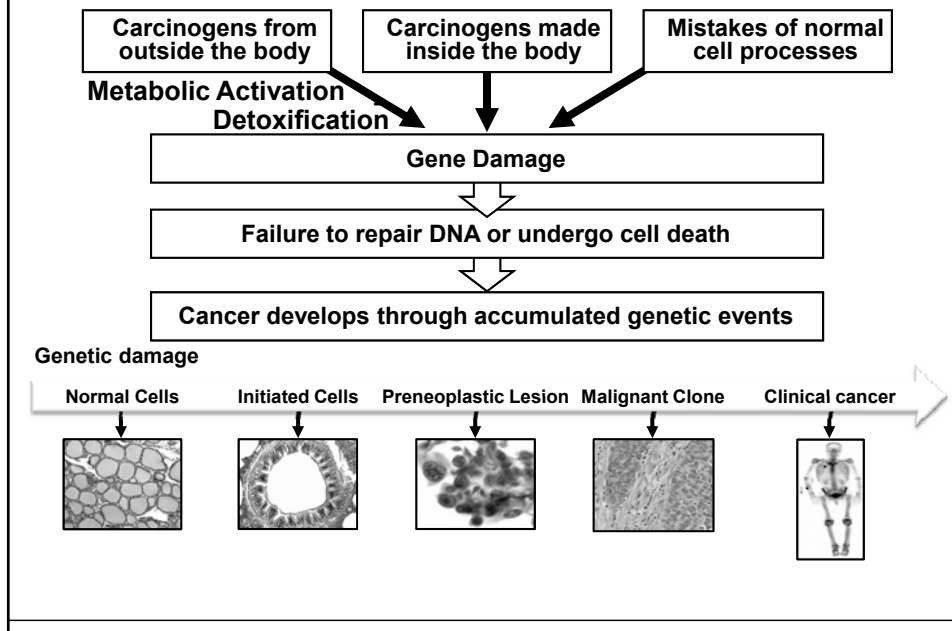
PHILADELPHIA (HealthDay News) -- A new study confirms that hormone replacement therapy should not be used in women to help prevent heart disease, although it appears to be safe and effective in some women.

Birth control pills cut risk of heart disease, cancer

Associated Press
Oct. 20, 2004 11:20 AM

PHILADELPHIA - The same huge federal study that led millions of women to abandon use of hormones after menopause now provides reassurance that another hormone concoction - the birth control pill - is safe.

How cancer develops



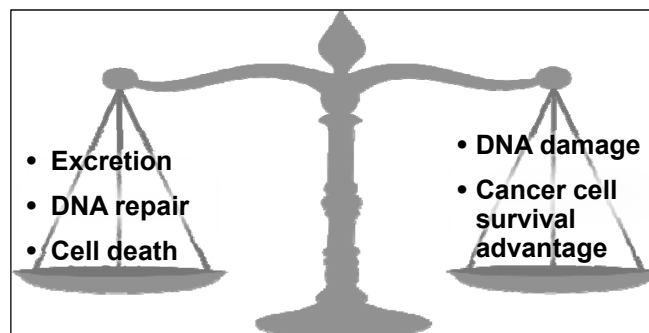
Life Is A Complicated Balance of Living and Getting Cancer

In the Cell

- Metabolism
- Defense mechanisms
- Inflammation
- Immunity

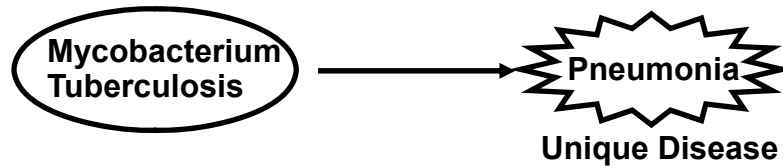
As a whole being

- Energy Balance: diet and exercise
- Nutrients
- Risky Behaviors: Alcohol and smoking

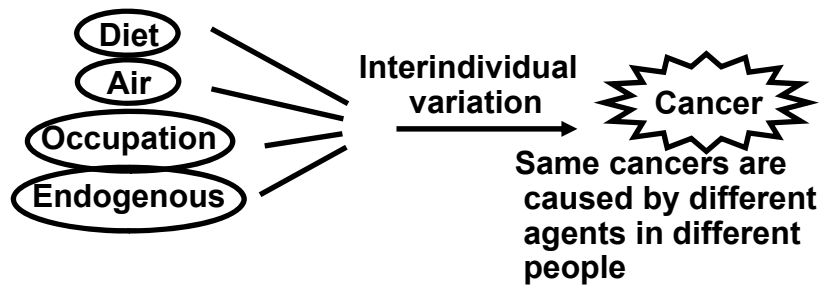


CANCER EPIDEMIOLOGY

- Traditional Epidemiology (Single Agent)



Molecular Epidemiology (Multiple Agents)



What are some ways we can assess cancer risk in the clinic?

- Medical History
 - Autoimmune diseases, medications, pre-malignant conditions, cirrhosis, Barrett's, transplants, radiation treatments, prior cancer history and treatments, HRT
- Family History and genetic testing in family members
- Social History: Diet, exercise, BMI, tobacco, alcohol, sunlight
- Occupation, e.g., asbestos, benzene, coal mine, diesel exhaust
- Infection: HPV, HIV, H Pylori, HBV, HCV, EBV
- But not blood tests for almost all patients

Preventing Cancer Guidelines

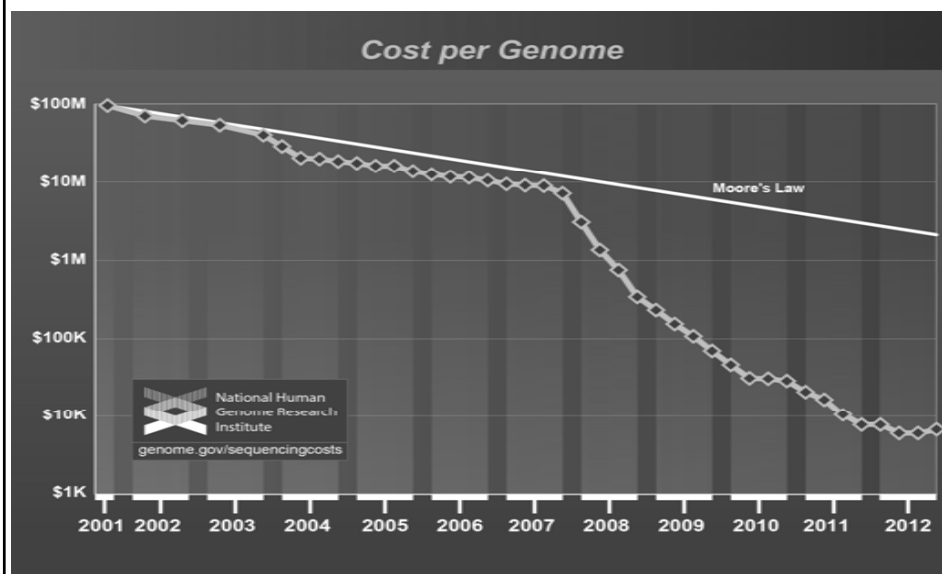
- **Do not smoke**
- **Eat a variety of healthful foods**
- **Eat 9 or more vegetables and fruits per day**
- **Eat whole grains rather than refined grains**
- **Limit consumption of red meats**
- **Choose foods that maintain a healthful weight**
- **Be physically**
- **Limit alcohol consumption**

Cancer myths that are not true

- **What someone does as a young adult has nothing to do with getting cancer**
- **Electrical devices, like cell phones and microwaves cause cancer**
- **Organic foods must reduce cancer risk**
- **Taking vitamins must reduce cancer risk**
- **Injuries, like broken bones and cuts, cause cancer**
- **Living in a polluted city is worse than smoking**
- **Cancer is more common today**

What's Next For Cancer Risk Assessment

The cost of genomics is decreasing fast



Source: genome.gov/sequencingcosts

Prevention and Personalized Medicine

Current Cancer Timeline and Conventional Practice

Healthy → Pre-Clinical Abnormality → Detected Abnormality → Cancer → Death

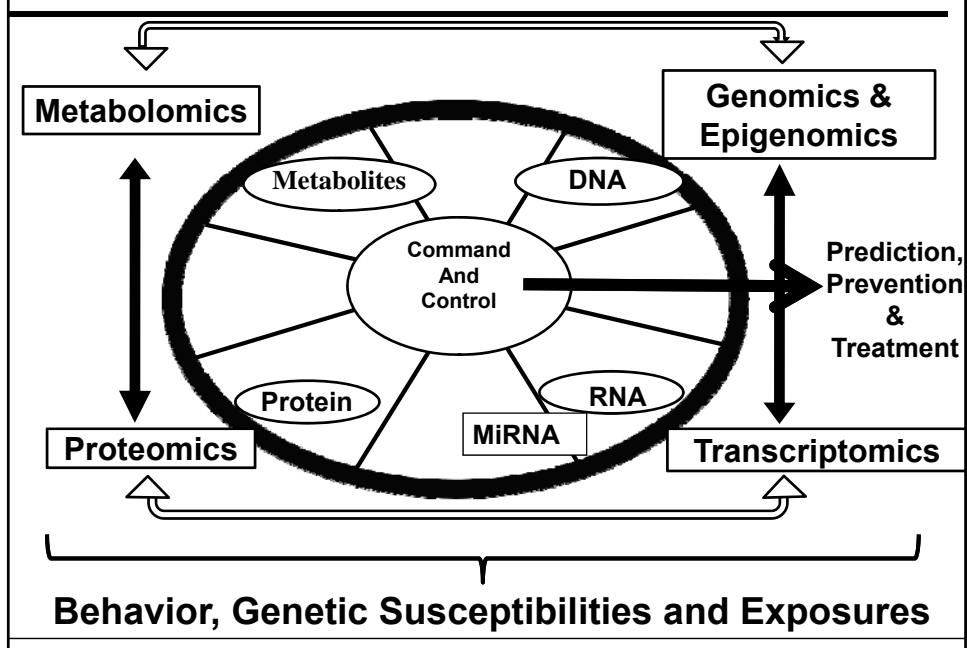
Observation	Treatment
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Future Cancer Timeline and The Evolved Systems Medicine Approach

Healthy → Pre-Clinical Abnormality → Detected Abnormality → Cancer → Death

Predictive	Preventive Interventions	Minimize Treatment Through Early Detection
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Cancer risk: What the Prevention Paradigm Really Looks Like



Hypothesis/Commentary

Bigger, Better, Sooner—Scaling Up for Success

Michael J. Thun¹, Robert N. Hoover², and David J. Hunter^{3,4}

Abstract

Over the last twenty years, the field of epidemiology has seen a rapidly increasing interest in, and need for, addressing low-level risks, interactions as well as main effects, and simultaneous assessment of vast numbers of biomarkers. Multiple examples over this time have shown the necessity for very large, high-quality individual studies (e.g., biobanks) or consortia of studies for these efforts to be successful. The need for this will continue to increase in the foreseeable future. It will also be important to analyze and publish aggregated data much earlier in the discovery process than typical for past efforts. *Cancer Epidemiol Biomarkers Prev*; 21(4): 571–5. ©2012 AACR.

Unprecedented Opportunities in Tobacco Control



Desperately Seeking a Wisp of Fame


Stefan Sigmund, seeking a place in the Guinness Book of Records, tries to smoke 800 cigarettes in less than 5 minutes last week in Cluj, Transylvania. He once tried to eat 29 hard-boiled eggs in 4 minutes.

Nicotine is a Powerful Drug....

- Tobacco use is mostly driven by nicotine dependence
 - Dopamine – pleasure, appetite
 - Norepinephrine – arousal, appetite
 - Acetylcholine – arousal, cognitive
 - Vasopressin – memory
 - Serotonin – mood modulation, appetite
 - Beta-Endorphin – anxiety
- Can long term nicotine replacement therapy cause cancer?


Family Smoking Prevention and Tobacco Control Act (2009)

- Restricts tobacco advertising and promotion
- Further restricts illegal sales to minors
- Bans all flavorings except menthol
- May establish performance standards
- Evaluate of health claims about purported MRTTP
- Requires disclosure about designs and contents, and research about the health effects of the products
- Graphic warning labels for cigarettes and ST
- Prohibits “light” descriptors
- Investigate the impact for reducing nicotine in cigarettes
- CANNOT BAN CIGARETTES OR NICOTINE



**All the
fuss about
smoking
got me
thinking I'd either
quit or smoke True.**

**I smoke
True.**




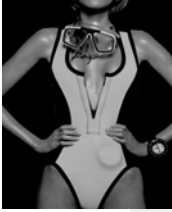
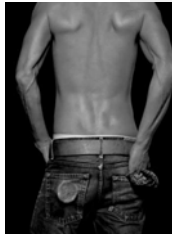
Ca. 1970


ing Regular: 11 mg. "tar", 0.6 mg. nicotine, 100's. Mild: 13 mg. "tar", 0.8 mg. nicotine, 100's. per cigarette. FTC Report Apr. 1970.

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

The low tar, low nicotine cigarette. Think about it.

Smokeless Tobacco



Philip Morris, Inc.

RJ Reynolds.

Liggett

Lorillard

Smokeless Tobacco Usage

- **About 7.6 million Americans use ST**
 - 3.3% of adults (aged 18 years and older)
 - 6.5% of men
 - 0.4% of women
 - 7.0% of American Indian/Alaska Natives
 - 4.3% of whites
 - 1.3% of Hispanics
 - 0.7% of African Americans
 - 0.6% of Asian Americans
- **Most commonly used by young adults up to the age of 25**
 - Young white males

http://www.cdc.gov/tobacco/basic_information/smokeless/

WORLD HEALTH ORGANIZATION
INTERNATIONAL AGENCY FOR RESEARCH ON CANCER



IARC Monographs on the Evaluation of Carcinogenic Risks to Humans

VOLUME 89 Smokeless Tobacco and Some Tobacco-specific N-Nitrosamines

LYON, FRANCE
2007

5.5 Evaluation

There is *sufficient evidence* in humans for the carcinogenicity of smokeless tobacco. Smokeless tobacco causes cancers of the oral cavity and pancreas.

There is *sufficient evidence* in experimental animals for the carcinogenicity of moist snuff.

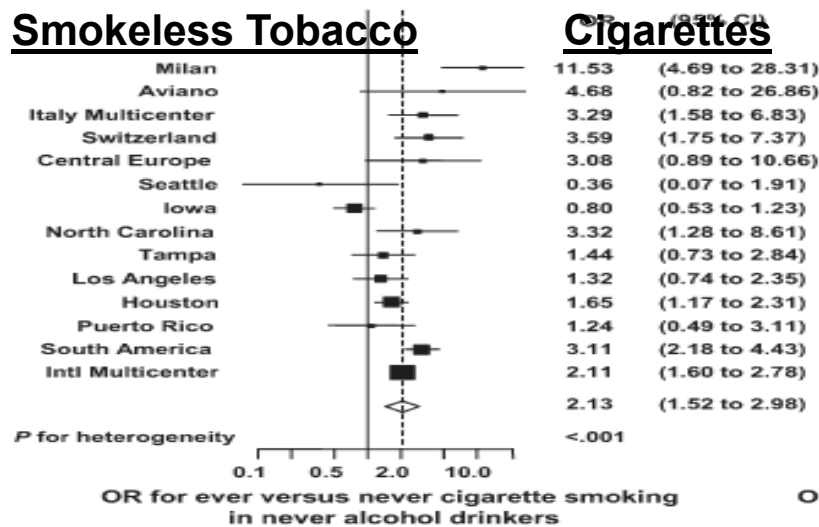
Overall evaluation

Smokeless tobacco is *carcinogenic to humans (Group 1)*.

Official ST Recommendations in U.S.

- 1986 – Surgeon General says that that ST is “is not a safe substitute for smoking cigarettes. It can cause cancer and a number of noncancerous conditions and can lead to nicotine addiction and dependence.”
- 1991 – National Cancer Institute recommends stopping use of all ST
- Developing consensus that ST is an alternative to smoking for smokers who cannot or will not quit???
 - Personal observations
 - Still, ST is not be safe for conventional products and may not be safe for Snus products

Oropharyngeal Cancer Risk



Hashbibe, et al., 2007

Smoking and Cancer Risk Swedish Construction Workers

	Number	Person-years	Oral cancer			Lung cancer			Pancreatic cancer		
			Cases	IR	RR (95% CI)	Cases	IR	RR (95% CI)	Cases	IR	RR (95% CI)
Never-users of any tobacco	87821	1751072	50	3.1	1.0 (ref)	136	8.6	1.0 (ref)	63	3.9	1.0 (ref)
Ever-smokers	154321	3153168	198	5.3	2.0 (1.4-2.7)	2062	54.7	7.2 (6.0-8.5)	385	10.2	2.8 (2.1-3.7)
Ex-smokers	51012	1069923	48	3.1	1.1 (0.8-1.7)	329	19.8	2.6 (2.2-3.2)	105	6.3	1.8 (1.3-2.4)
Current smokers	103309	2083245	150	6.9	2.5 (1.7-3.5)	1733	82.3	10.2 (8.6-12.2)	280	13.0	3.5 (2.6-4.6)

Combined use of snus and smoking tobacco was allowed in these analyses, but 37755 men who used snus only were excluded. IR=incidence rate per 100 000 person-years, standardised to age distribution of person-years experienced by all workers using 5-year age categories. *RR estimates obtained in models adjusted for attained age as time scale, BMI, and snus use.

Table 2: Relative risks of oral, lung, and pancreatic cancer in relation to tobacco smoking status at entry

Luo, et al, 2007

Smokeless Tobacco Cessation

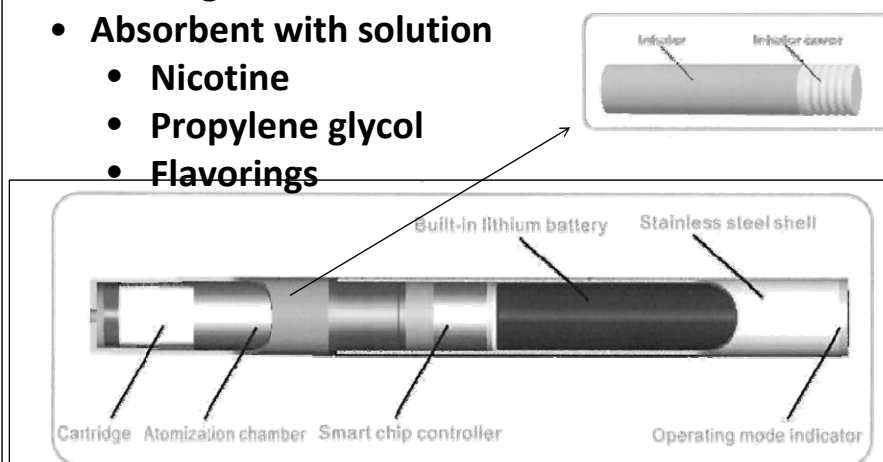
- **Utilize evidence-based treatment, counseling techniques and referral options for providers whose patients use smokeless tobacco**
 - **Target nicotine addiction**
- **Recommendations mimic smoking cessation guidelines**
 - **Develop the intent and reasons to quit**
 - **Choose a quit date, but not today, and work towards it by cutting down, identifying cues, etc.**
 - **Have a quit plan**
 - **NRT and Chantix – not approved by FDA for ST because of insufficient research**
 - **Have a plan for slips and slipping back to quit**

Are E-Cigarettes a Bridge Product to Quitting, smoking more or neither?



E-Cigs Common Components

- Battery
- Heating element
- Absorbent with solution
 - Nicotine
 - Propylene glycol
 - Flavorings



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SUBMIT

Home | Benefits

BENEFITS

CHEAPER THAN TOBACCO
NO SECOND-HAND SMOKE

It doesn't take a degree in rocket science to know that tar and a few thousand other ingredients in tobacco cigarettes are known carcinogens and poisons. These seem like a blessing. E-cigs don't involve combustion in their operation. The ingredients which are used in e-cigs are about the same as those found in tobacco cigarettes (nicotine and nitrosamines) as in FDA approved products.

Toxic Tobacco Smoke contains tar and Carbon Monoxide. Tar irritates the lungs, causing lung cancer and is a leading cause of preventable death. More than 5 million deaths each year are attributed to tobacco.

Carbon monoxide limits the amount of oxygen that can be easily inhaled when exercising.

Buying tobacco cigarettes is expensive. No7 rechargeable/refillable kits save the expense of traveling to the store to buy more.

There has never been a forest fire caused by a cigarette.

- “Lacks known carcinogens and poisons in cigarette smoke
- No combustion
- Contains ingredients found in food and beauty products
- Same amount of TSNA as NRT
- Lacks tar, which causes lung cancer
- Lacks CO that causes windedness during sex
- Cheaper than cigarettes
- No hot ash to cause fires”

Electronic Cigarettes Refill Process

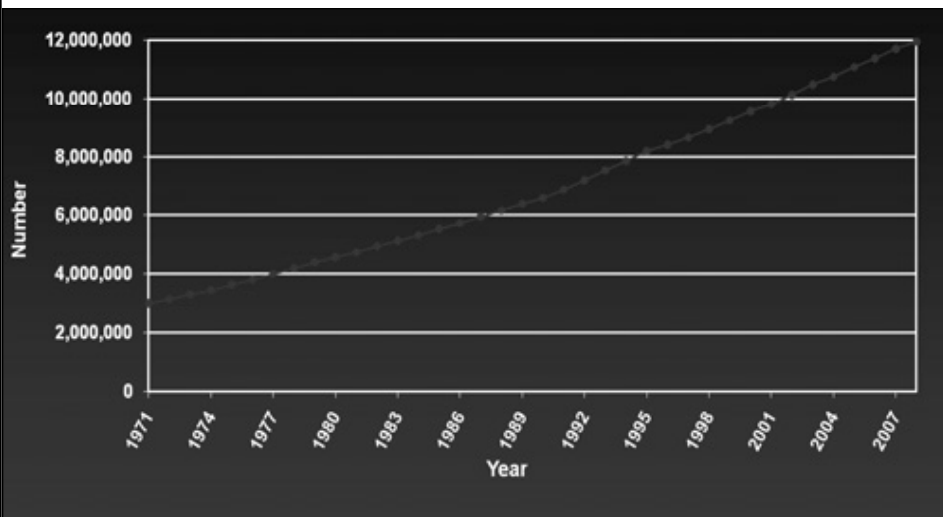


Questions about E-Cigs

- **Do they deliver nicotine?**
- **Enhancing, delaying or subverting smoking cessation**
- **Enticing former smokers to resume smoking**
- **Serving as a gateway for new smokers**
- **Exposure to harmful chemicals for the lung and cancer**

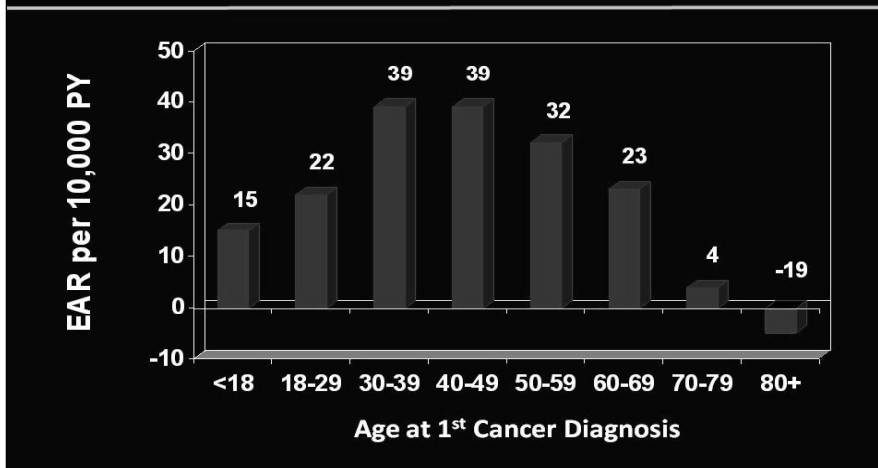
Cancer Survivorship

Numbers of US Cancer Survivors Are Increasing Rapidly



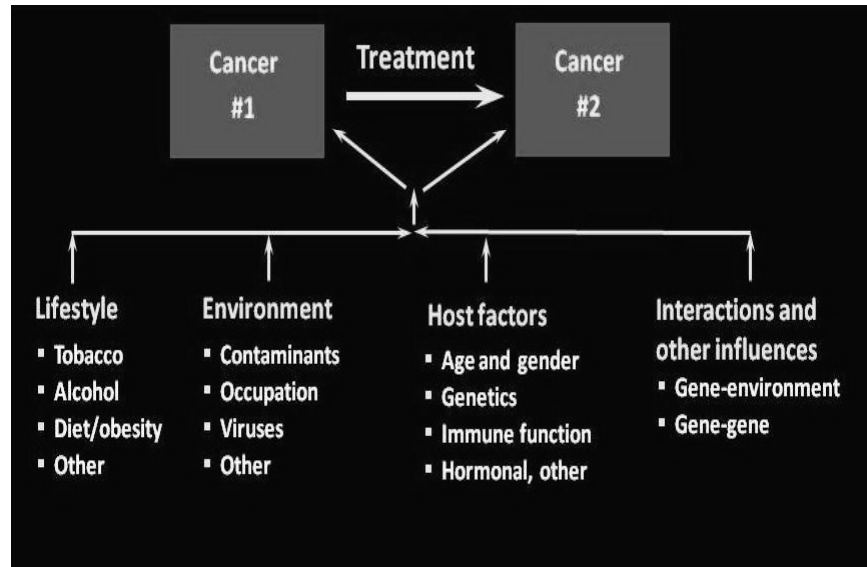
Source: CDC MMWR March 11, 2011 / 60(09);269-272

Excess Risk of Subsequent Cancer By Age at Diagnosis



Source: Travis at ASCO 2012 Reporting on Seer Analysis

More Survivorship = More Second Primary Tumors



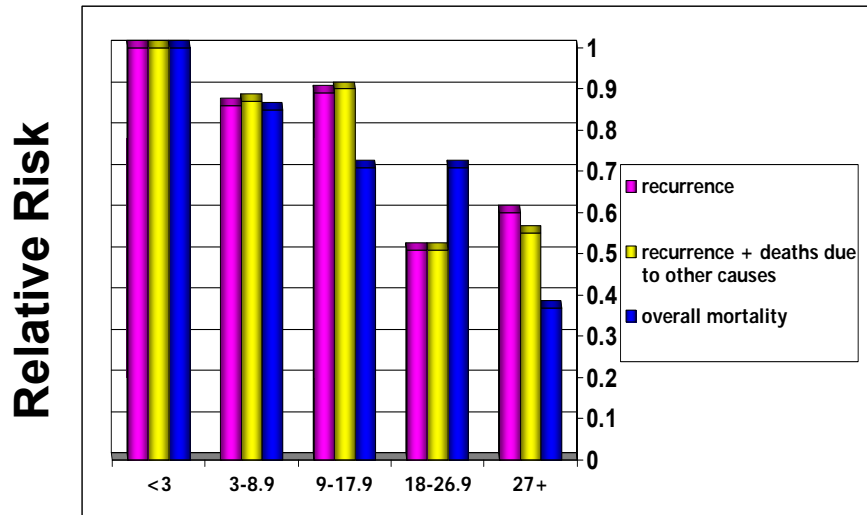
Source: Travis at ASCO 2012

Lifestyle Affects Second Primary Cancers

Team (yr)	Primary CA	Results HR (95%CI)
Tobacco Smoking		
Kinoshita et al. (2000)	Gastric CA	Smoke at completion of Tx 1.82 (1.02-3.26)
Do et al. (2003)	HNSCC	Continued Smoking 2.1 (1.3-3.6)
Leon et al. (2009)	HNSCC	Continued Smoking 2.9 (1.8-4.1)
Li et al. (2009)	ER+ BreastCA	Current Smoking 2.2 (1.2-4.0)
Alcohol Drinking		
Knight et al. (2009)	Breast CA	Ever Reg Drank 1.3 (1.0-1.6) Post-dx Drinker 1.2 (0.9-1.5)
Do et al. (2003)	HNSCC	Continued Drinking 1.3 (1.0-1.7)
Leon et al. (2009)	HNSCC	Continued Drinking 5.2 (3.3-7.9)
Li et al. (2009)	ER+ Breast CA	Current Drinker 1.9 (1.1-3.2)
Body Mass Index		
Sanchez et al. (2009)	Breast CA	BMI ≥ 30 vs. <25 7.48 (1.25-44.88)
Li et al. (2009)	ER+ BreastCA	BMI ≥ 30 vs. <25 1.5 (1.00-2.11)
Majed et al. 2011	Breast CA	BMI ≥ 25 vs. <25 1.5 (1.21-1.86)

Source: Demark-Wahnefried, ASCO 2012

Exercise & Association with Recurrence & Survival - CALGB 89803 (Stage III CRC) N=832



Level of Exercise (MET hrs/week)

Source: Demark-Wahnefried, ASCO 2012; Meyerhardt et al. JCO 24:3535, 2006

Seize the Teachable Moment: 2012 American Cancer Society (ACS) Nutrition & Physical Activity Guidelines for Cancer Survivors

Achieve and maintain a healthy weight

If overweight or obese, limit high calorie foods & beverages increase physical activity to promote weight loss

Engage in regular physical activity

- Avoid inactivity; resume normal activities as soon as possible following dx
- Exercise ≥ 150 minutes/week
- Include strength training exercises at least 2 days/week

Achieve a dietary pattern that is high in vegetables, fruits and whole grains

- Follow ACS Guidelines on Nutrition & Physical Activity for Cancer Prevention
 - Choose foods & beverages in amounts that achieve/maintain a healthy weight
 - Limit processed and red meat
 - Eat ≥ 2.5 cups of vegetables & fruits/day
 - Choose whole grains instead of refined grain products
 - If you drink ETOH, drink ≤ 1 drink/day for ♀ & 2 drinks/day for ♂

Supplements

- Try to obtain nutrients through diet, first.
- Consider only if a nutrient deficiency is biochemically or clinically observed, or if intakes fall persistently below recommended levels as assessed by an RD.

CA CANCER J CLIN (2012) www.cacancerjournal.com

And, How to Prevent Cancer



Have a nice day.....