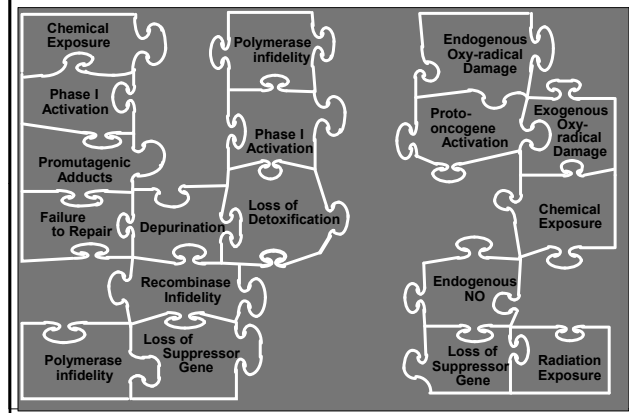


# Cancer Prevention

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James Cancer Hospital  
The Ohio State University Wexner Medical Center

## THE ETIOLOGY OF CANCER



## 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

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

**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. Gattford Jones  
June 24, 2007

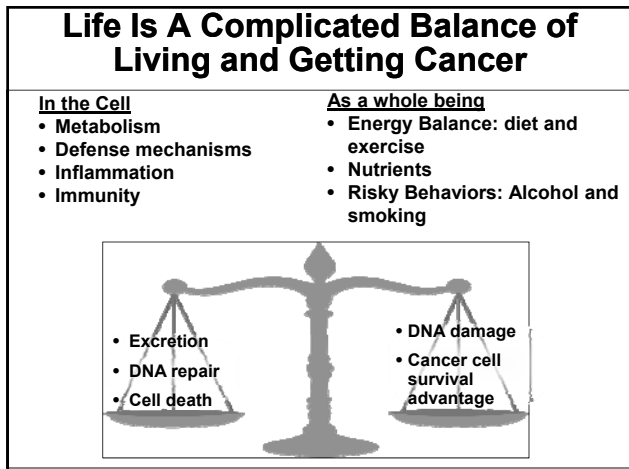
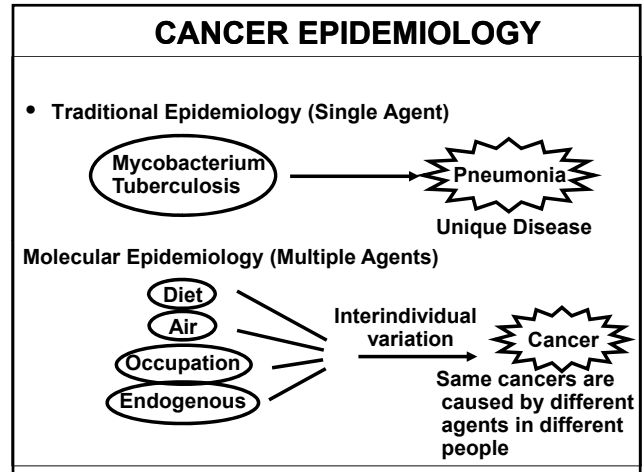
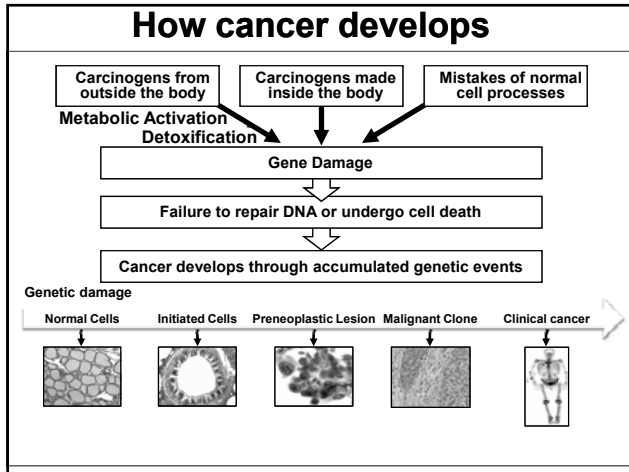
**Another Study Sees Heart Risks in Hormone Replacement Therapy**  
Gardner  
Reporter  
July 11, 2007; 12:00 AM

**Estrogen May Lower Younger Women's Heart Risk**  
By Amanda Gardner  
HealthDay Reporter  
Wednesday, June 20, 2007; 12:00 AM

**Can milk cause cancer?**  
Dr. Andrew Weil  
For The Calgary Herald  
Monday, July 23, 2007

**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.



- ### 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

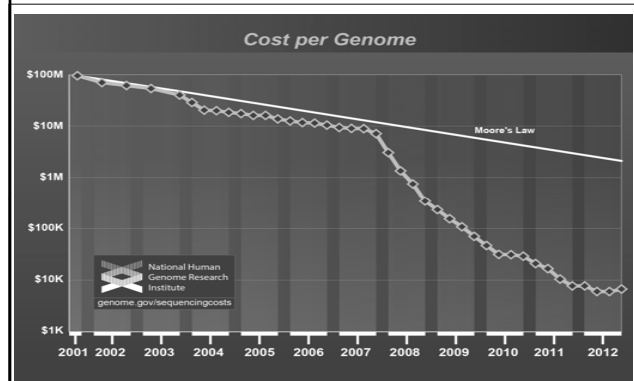
- Do not smoke
- Eat a variety of healthful foods
- Eat 9 or more vegetables and fruits per day
- Eat whole grains rather than refined grains
- Limit consumption of red meats
- Choose foods that maintain a healthful weight
- Be physically
- Limit alcohol consumption

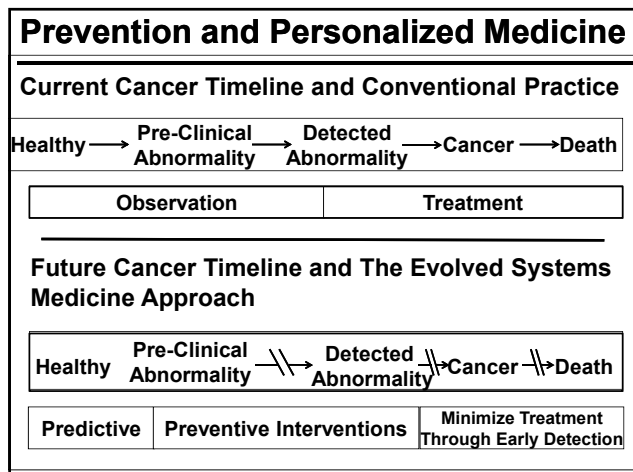
## What's Next For Cancer Risk Assessment

## 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

## The cost of genomics is decreasing fast





Published OnlineFirst February 28, 2012; DOI:10.1158/1055-9965.EPI-12-0191

**Cancer Epidemiology, Biomarkers & Prevention**

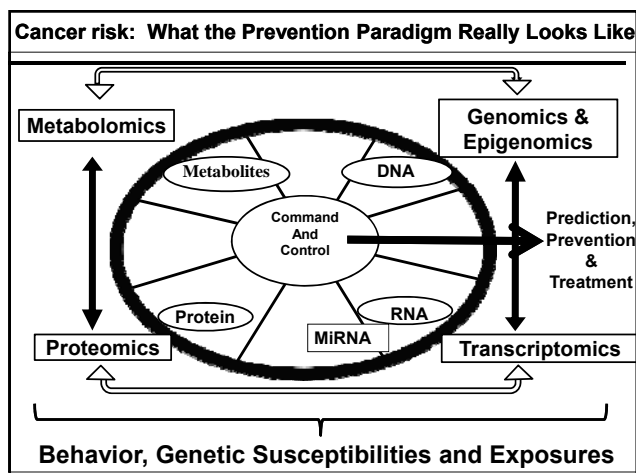
*Hypothesis/Commentary*

### Bigger, Better, Sooner-Scaling Up for Success

Michael J. Thun<sup>1</sup>, Robert N. Hoover<sup>2</sup>, and David J. Hunter<sup>3,4</sup>

**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.



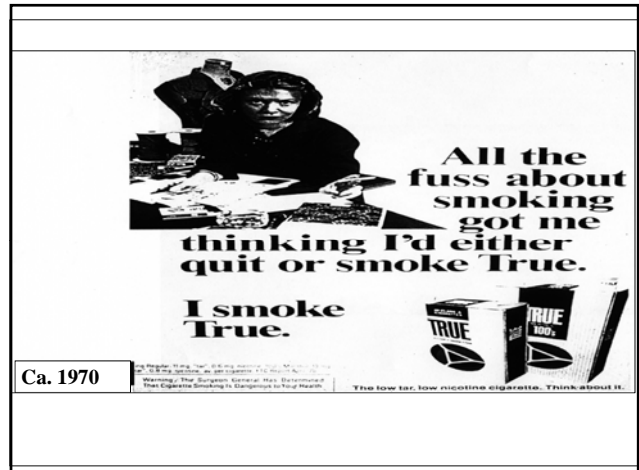
### Unprecedented Opportunities in Tobacco Control

**Desperately Seeking a Wisp of Fame**

Stefan Bismund, 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 MRTD
- 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



## 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/](http://www.cdc.gov/tobacco/basic_information/smokeless/)

## 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

## 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.

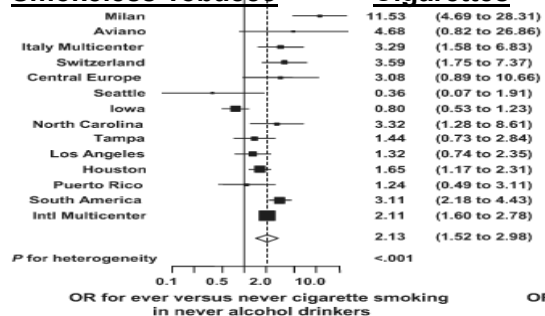
#### Overall evaluation

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

## Oropharyngeal Cancer Risk

### Smokeless Tobacco

### Cigarettes



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	87 821	1 751 072	50	3.1	1.0 (ref)	136	8.6	1.0 (ref)	63	3.9	1.0 (ref)
Ever-smokers	154 321	3 153 168	193	5.3	2.0 (1.4-2.7)	2062	54.7	7.2 (6.0-8.5)	385	10.2	2.8 (2.3-3.7)
Ex-smokers	51 012	1 069 932	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	103 309	2 083 245	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 37 755 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

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

### Original Pack

The pack that started  
the e-cig revolution.

- Charges your batteries on the go
- Sleek design is easy to carry
- Holds 5 cartridges

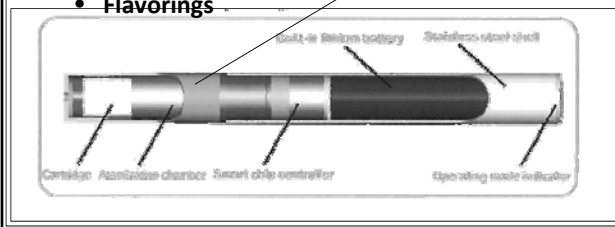


## Smokeless Tobacco Cessation

- 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

## E-Cigs Common Components

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



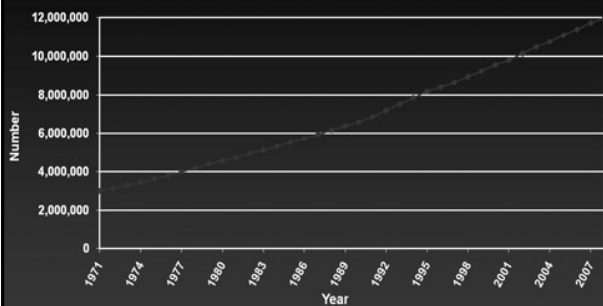
<p><a href="#">Get Help</a>   <a href="#">Gift Certificates</a>   <a href="#">Sending Cigarettes</a></p> <h1>E-CIGARETTES CHOICE</h1> <p><a href="#">HOME</a>   <a href="#">HOW IT WORKS</a>   <a href="#">BENEFITS</a>   <a href="#">TESTIMONIALS</a></p> <p>BROWSE OUR CATEGORIES</p> <ul style="list-style-type: none"> <li><a href="#">Starter Kits</a></li> <li><a href="#">Starter Kit Bundles</a></li> <li><a href="#">Disposable E-Cigs</a></li> <li><a href="#">Refill Cartridges</a></li> <li><a href="#">E-Liquid</a></li> <li><a href="#">Batteries &amp; Chargers</a></li> <li><a href="#">E-Cigarette Stems</a></li> <li><a href="#">Accessories</a></li> <li><a href="#">Vaporizers</a></li> </ul> <p>E-CIGARETTE ORDERS/EMAILS</p> <p>CHECK YOUR ORDER See order status, track shipment, provide us your Feedback, make a change, cancel items &amp; more. <a href="#">View Order Details</a></p> <p>RECEIVE COUPON CODES Receive new Coupon Codes, Submit your email &amp; enjoy Offers.</p>	<p>ORDER TOLL FREE 877.771.5196</p> <p><a href="#">Advanced Search</a> <a href="#">Search Tips</a></p> <hr/> <p><a href="#">My Account</a>   <a href="#">Order Status</a>   <a href="#">Wish Lists</a>   <a href="#">View Cart</a>   <a href="#">Sign In / Create an account</a></p> <hr/> <h2>"Lacks known carcinogens and poisons in cigarette smoke"</h2> <ul style="list-style-type: none"> <li>• No combustion</li> <li>• Contains ingredients found in food and beauty products</li> <li>• Same amount of TSNA as NRT</li> <li>• Lacks tar, which causes lung cancer</li> <li>• Lacks CO that causes windedness during sex</li> <li>• Cheaper than cigarettes</li> <li>• No hot ash to cause fires"</li> </ul>
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## Questions about E-Cigs

## Electronic Cigarettes Refill Process

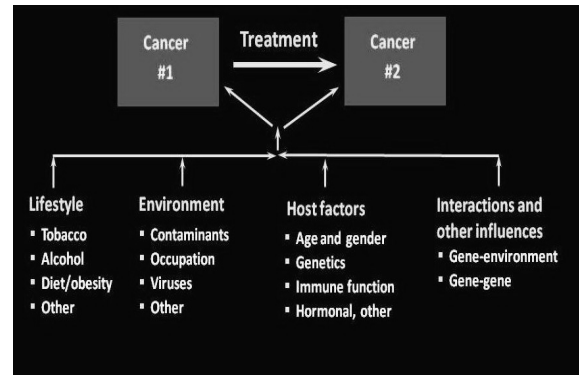


## Numbers of US Cancer Survivors Are Increasing Rapidly



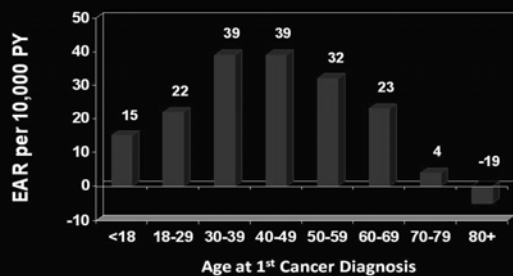
Source: CDC MMWR March 11, 2011 / 60(09);269-272

## More Survivorship = More Second Primary Tumors



Source: Travis at ASCO 2012

## Excess Risk of Subsequent Cancer By Age at Diagnosis



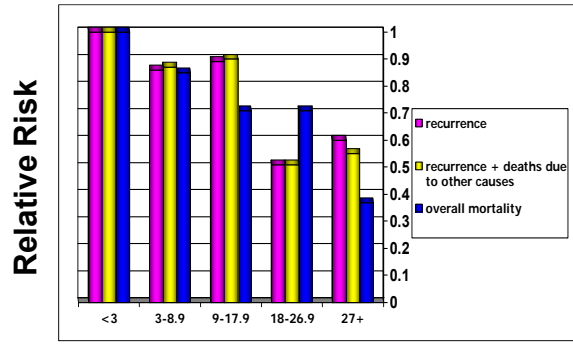
Source: Travis at ASCO 2012 Reporting on Seer Analysis

## Lifestyle Affects Second Primary Cancers

Team (yr)	Primary CA	Results HR (95%CI)
<b>Tobacco Smoking</b>		
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)
<b>Alcohol Drinking</b>		
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)
<b>Body Mass Index</b>		
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

### And, How to Prevent Cancer



Have a nice day.....

### 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  $\geq 150$  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  $\geq 2.5$  cups of vegetables & fruits/day
  - Choose whole grains instead of refined grain products
  - If you drink ETOH, drink  $\leq 1$  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