

# Does Everything Really Cause Cancer?

## The Truth Behind Cancer Myths

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*Spring FLEX Week 2020*

Which of these could contain the most potent carcinogen ever discovered?



Peanuts (& Soy) are often contaminated with the *Aspergillus* mold. *Aspergillus* secretes A toxin called **aflatoxin B1**. It is the strongest cancer-causing substance ever discovered!



# Today's Learning Objectives

1. Define cancer, carcinogens, & genetic mutations
2. Explore research methods used to identify carcinogens
3. Compare and contrast the 5 categories of carcinogens
4. Discuss the importance of exposure & threshold dose
5. Evaluate various risk factors to determine if they are a cancer fact versus a cancer myth

# What is Cancer?

- A family of more than 100 different related diseases
- An accumulation of **genetic mutations** that cause the body's **cells to become abnormal** and to **divide out of control**.
- #1 cause of death individuals 45-65, #2 COD overall in the US
- Lifetime risk 1:2 (men) 1:2.8 women

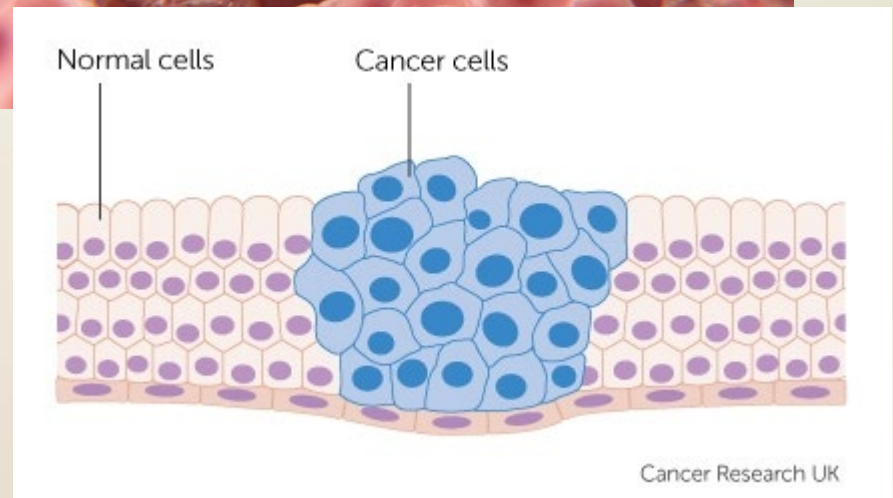
1991 → 2015

THE OVERALL  
CANCER DEATH RATE  
IN THE UNITED STATES

**FELL**

↓ 26%

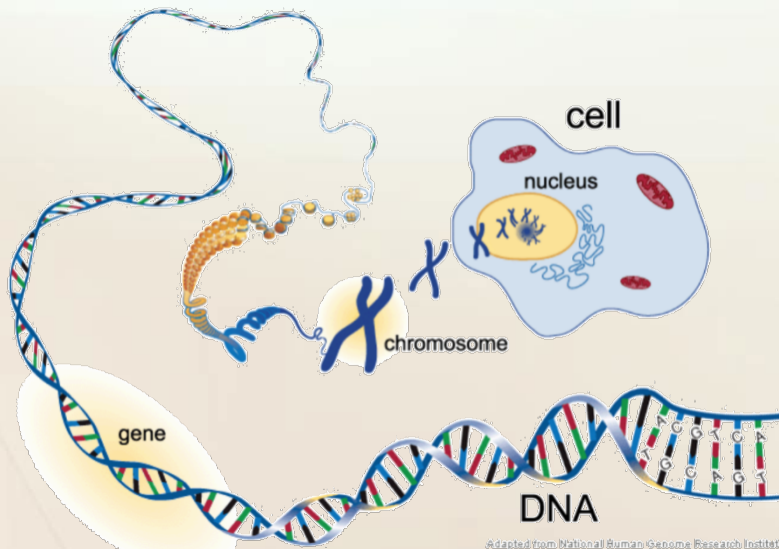
SEER Cancer Statistics Review, 1975-2015  
cancer.gov



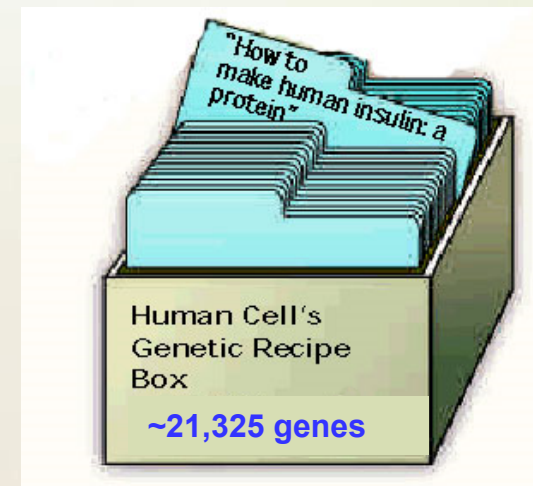
# What are Genetic Mutations?

- Damage to DNA, the “blueprint” or “instruction manual” of a cell
- The **root cause of EVERY cancer**
- **Every patient** has a **unique combination of mutations** and thus a **UNIQUE** disease (over 1000 mutations identified)

Our genetic instructions are stored on long chromosomes that are kept inside the nucleus of each cell



Humans have 21,325 genes  
That act as “recipes” for building  
proteins



\* specifically, initiators

# What Causes Cancer?

- **10% of cancer is inherited** (family history): meaning the genetic mutations have been passed down through the bloodline
- **90% of cancer is sporadic** (spontaneous): meaning the genetic mutations occur in that person's lifetime following exposure to various DNA damaging agents (mutagens)

Family History



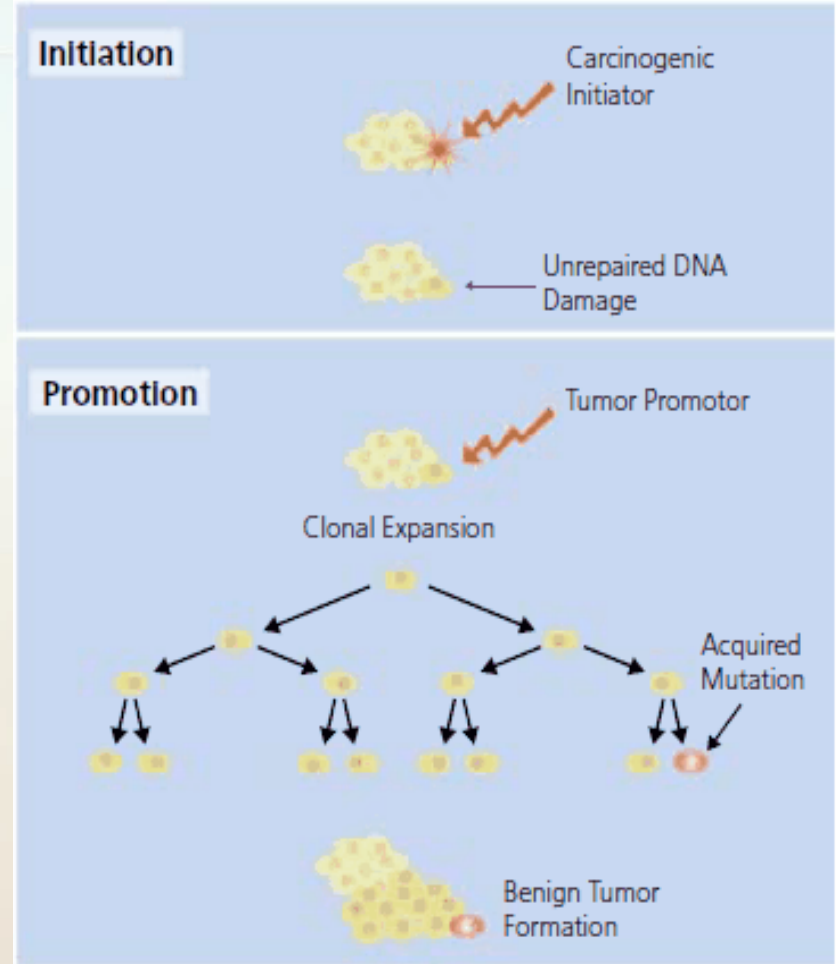
Exposure to Agents



# What are Carcinogens?

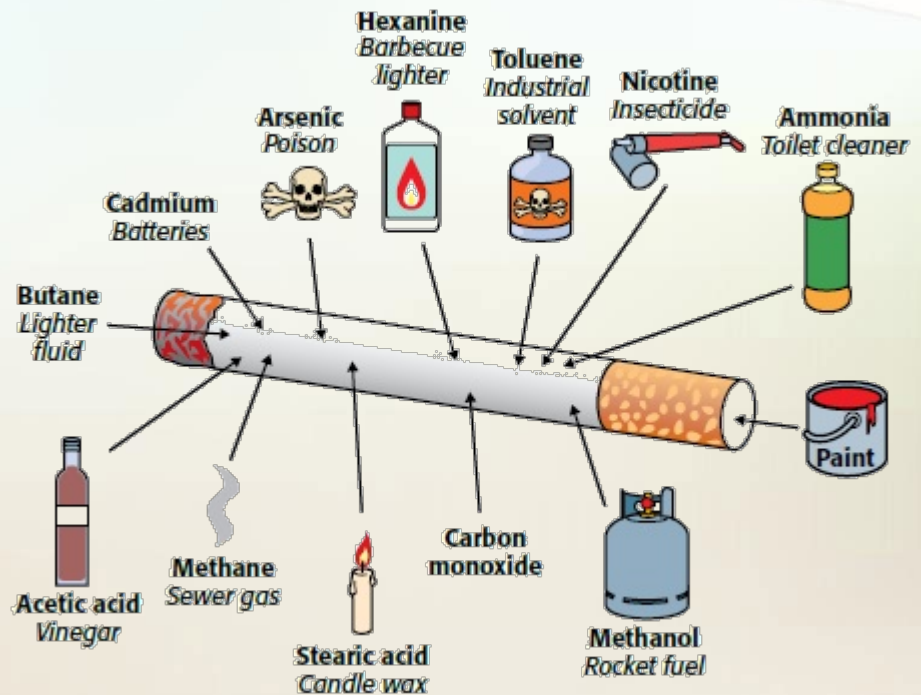
Carcinogens are any substance or infectious agent that can cause cancer (two categories: initiators and promoters)

- **tumor initiators:** substances that damage DNA and initiate the growth of abnormal cells (majority of carcinogens are in this category)
- **tumor promoters:** substances that promote the growth of abnormal cells (exposure is only dangerous IF exposed to an initiator first!)



# Example Carcinogens Tobacco Contains Tumor Initiators and Tumor Promoters

Tobacco contains 70 confirmed carcinogens including numerous Tumor initiators (arsenic, polonium, benzene, methanol) and Tumor promoters (nicotine, acetic acid).

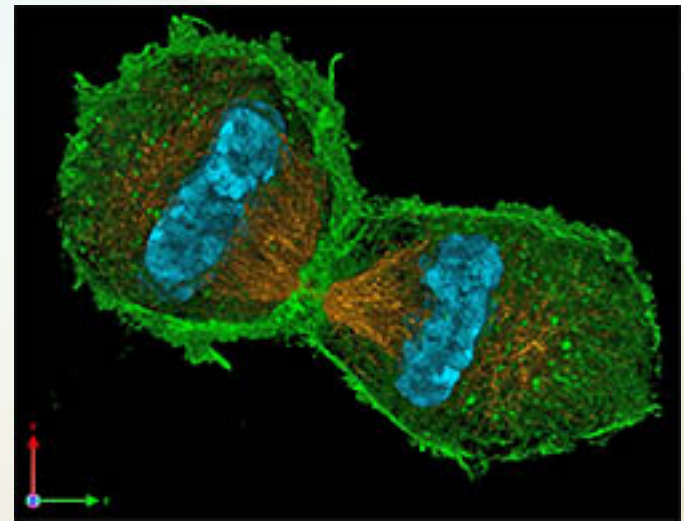
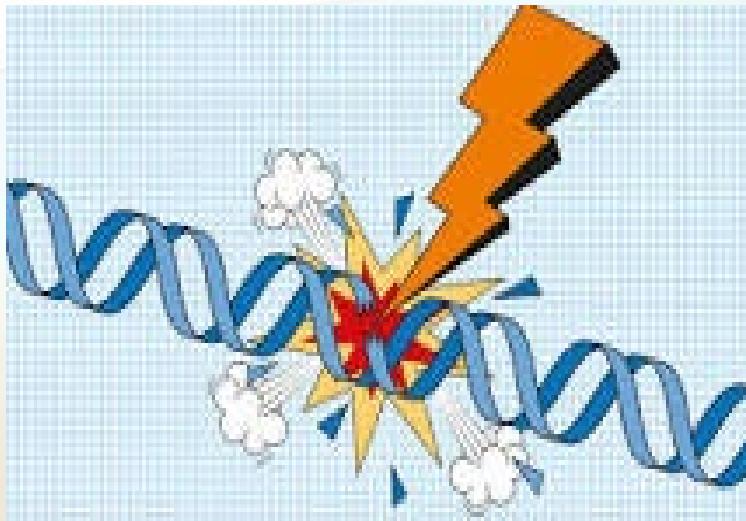


Source: <http://sciencemags.blogspot.com/2011/01/contents-of-cigarette-smoke.html>



# What must be TRUE for a Substance to be Classified as a Carcinogen?

Agent must Damage DNA or Promote Cell Division in Damaged Cells



**\*\*Other important questions to ask\*\***

What dose of the agent is necessary to be cancer causing (threshold dose) *\*almost always requires an occupational exposure*

# How do Scientists Identify Carcinogens?

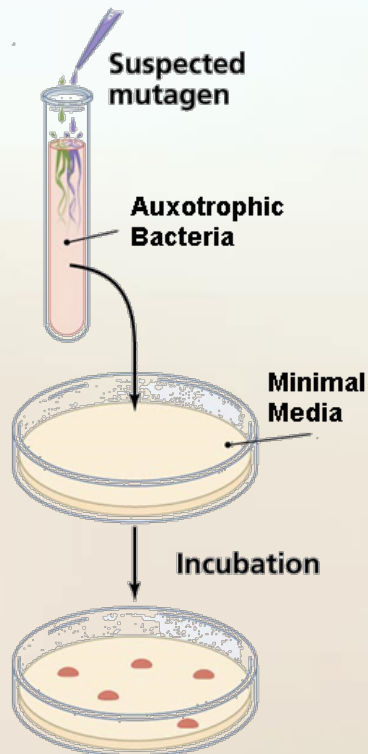
- AMES Test in Bacteria
- COMET Assay in Human Cells
- Tests in Animals (usually rats or mice)
- Epidemiology: Patterns in human populations



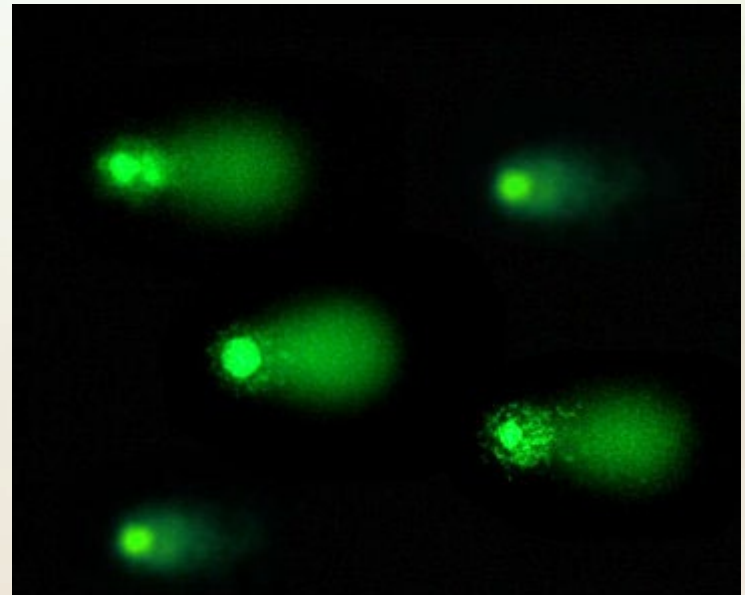
# Experiments Analyzing DNA damage

Advantage: Can test different doses to determine the threshold

**AMES test (bacteria):** if bacteria grow, test substance can damage DNA



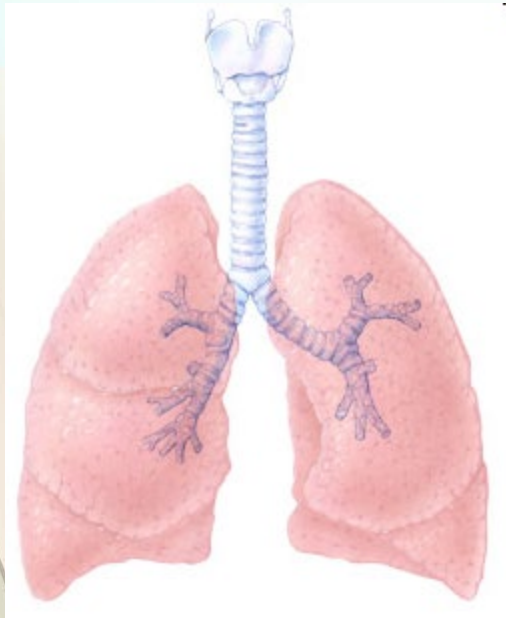
**COMET assay (human):** if a “comet tail” forms, substance can damage DNA



# Studies in Mice/Rats Used to Confirm Carcinogenicity in Animals

Animals models can determine the **timeframe for exposure** (acute vs. chronic doses) and **route of exposure** (inhalation, ingestion, topical)

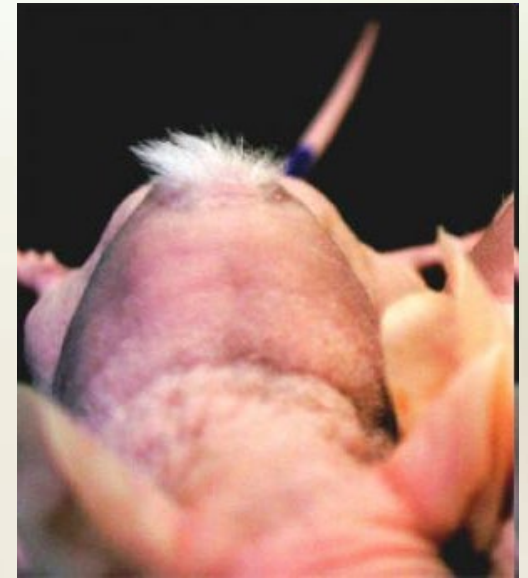
Inhalation



Ingestion



Topical



# Epidemiology Studies are used to Confirm Carcinogenicity in Humans

**EXTREMELY DIFFICULT** because people are genetically different from one another, have different eating/lifestyle habits, and work/live in different places.

**Epidemiology:** surveys to identify potential exposures/habits that people with cancer have in common



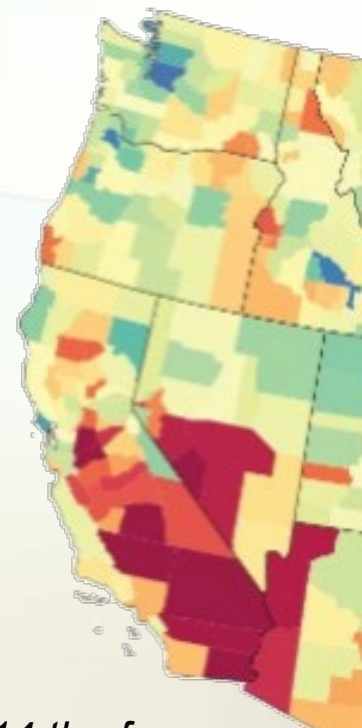
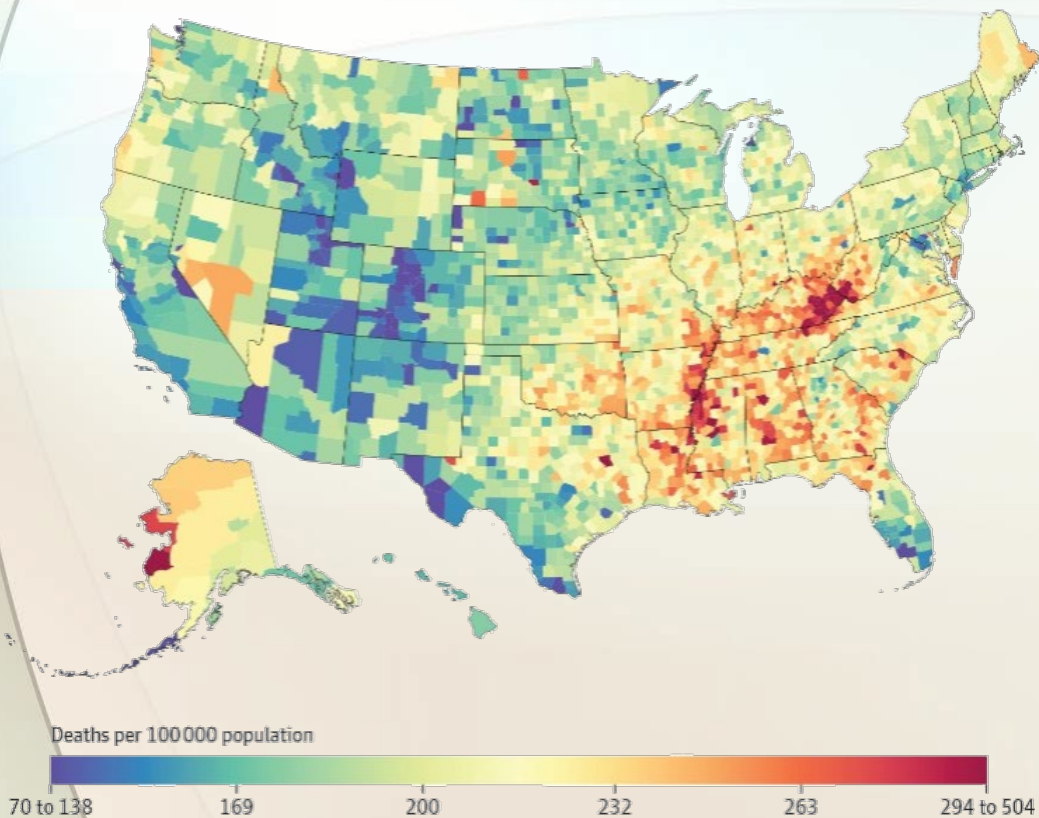
**Cancer clusters:** abundance of a rare cancer, overabundance of a common cancer, or cancer in the wrong population (prostate cancer in children)



# Cancer Clusters in Some Regions of the U.S.

1. *Along the Mississippi River (& South in General)*
2. *Kentucky-West Virginia Border*
3. *Alaska*

A Age-standardized mortality rate from neoplasms, both sexes, 2014



*In 2014 the from testicular cancer were highest In California and Nevada*

# Air Pollution to Blame for SoCal City having the Highest Cancer Risk in the Nation

According to a 2009 study by the EPA the SoCal city of Cerritos has the **highest cancer risk in the nation** at 1,200 per million people.... That is **34x the national average!**



The screenshot shows a news article from NBC 4 Los Angeles. The navigation bar includes 'Home', 'News', 'I-Team', 'Weather', and 'Entertainment'. The article title is 'SoCal City Ranks Worst in Nation for Cancer Risk'. The sub-headline reads 'Cerritos scores 34 times higher than national average'. The author is 'Olsen Ebright' and the article was published on July 16, 2009, and updated on January 7, 2010. Below the text are social media sharing icons for Facebook, Twitter, and email. The main image shows a doctor in a white coat pointing at a large screen displaying a chest X-ray. Below the image, there are two lines of text: 'Toxic air levels in Cerritos could lead to cancer, according to a new report.' and 'Residents in Cerritos may want to rethink their current locale.' On the right side of the page, there are promotional banners for 'See CSUN' and 'TRENDING' with small images.

# How many Carcinogens have been Identified thus far?

6 million chemicals → 50,000 in common contact → 1,013\* tested → 120 Group 1 carcinogens identified (\**Chemicals in workplace exposure and cancer clusters tested first*)



**6,000,000  
Recognized  
Chemicals**



**50,000 Chemicals  
Humans Commonly  
Contact**



**1,013**

**~~968~~ Chemicals  
Tested for  
Carcinogenicity  
in Humans**



# What Are the Different Carcinogen Classifications?

Not all carcinogens are created equal

GROUP	WHAT DOES IT MEAN?	#	<u>Examples</u>
<b>GROUP 1</b>	<b>CARCINOGENIC TO HUMANS</b> Sufficient evidence in humans. Causal relationship established.	120	cigarette smoke, X-rays, HPV, alcohol, smoked/cured meat, sunlight/UV, aflatoxin
<b>GROUP 2A</b>	<b>PROBABLY CARCINOGENIC TO HUMANS</b> Limited evidence in humans. Sufficient evidence in animals.	82	red meat, working night shifts, frying foods/acrylamide, hot beverages, hair dyes
<b>GROUP 2B</b>	<b>POSSIBLY CARCINOGENIC TO HUMANS</b> Limited evidence in humans. Insufficient evidence in animals.	311	aloe, gasoline, pickled vegetables, isoprene (rubber), ginko biloba, nickel
<b>GROUP 3</b>	<b>CARCINOGENICITY NOT CLASSIFIABLE</b> Inadequate evidence in humans. Inadequate evidence in animals.	500	coffee, tea, electromagnetic radiation/powerlines, caffeine, fluorescent lighting
<b>GROUP 4</b>	<b>PROBABLY NOT CARCINOGENIC</b> Evidence suggests no carcinogenicity in humans/animals.	1	caprolactam (synthetic fibers in carpet)

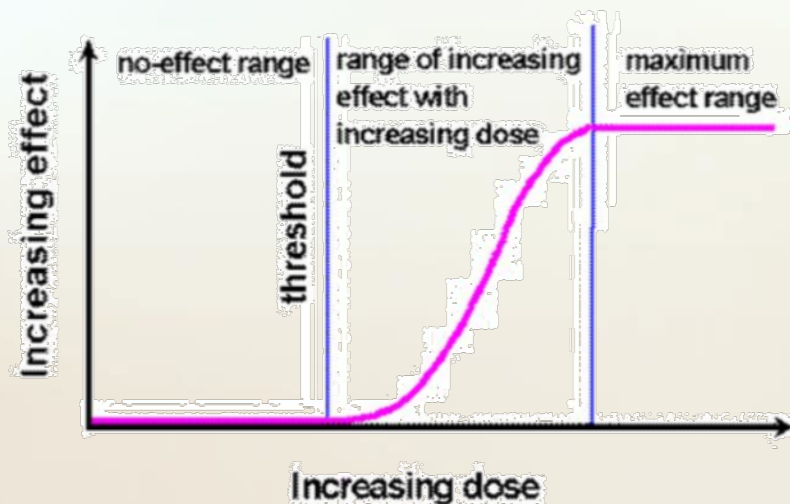
# The Importance of Dose!

*Just because something can cause cancer, does not mean it will.*

Is it possible/likely you will be exposed to the concentration necessary to cause cancer?—**most likely if an occupational exposure!**

## Dose-Response Curve

Dose –  
Chemical  
concentration  
per unit body  
weight



Response –  
Level of  
measured  
adverse  
effect

# Many Chemicals Only Cause Cancer Following Chronic Workplace Exposure



# Occupations with High Cancer Risks

## Construction/Painters



Types of Cancer:  
lung, mesothelioma

## Mechanics



Types of Cancer:  
leukemia, mesothelioma  
hematologic,

## Firefighters



Types of Cancer  
lung, mesothelioma, oral,  
esophageal, stomach,  
colon, kidney, & testicular

## Hair Stylist/Barber



Types of Cancer:  
bladder, larynx, and lungs

## Nail Salon Manicurist



Types of Cancer:  
lymphoma, multiple  
myeloma

## Life Guards



Types of Cancer:  
Skin cancer, melanoma

# Occupations with High Cancer Risks

## Plastic Manufacturers



Types of Cancer:  
liver, kidney, and larynx

## Pilots



Types of Cancer:  
malignant melanoma (skin)

## Metal Working



Types of Cancer:  
kidney, larynx, breast,  
pancreas, stomach,  
colon, esophagus

## Mining



Types of Cancer:  
lung, brain, thyroid  
mesothelioma, stomach

## Rubber Manufacturing



Types of Cancer:  
bladder, stomach, lung  
leukemia, lymphoma

## Agriculture/Farming



Types of Cancer: bladder,  
breast stomach, lung leukemia,  
skin lymphoma, brain, prostate,  
multiple myeloma

# Numerous **Cancer-Causing** Agents are Found in Both Natural and Processed Foods



- Nitrosamines
- Aflatoxins
- Hydrazines
- Allyl Isothiocyanate
- Pyrrolizidine Alkaloids
- Substances in Bracken Fern
- Safrole, Estragole, Beta Asarone, Isosafrole
- Tannins
- Psoralens
- Ethyl Carbamate
- Estrogenic Substances
- Coumarin
- Alcohol
- Diacetyl
- Quercetin, Kaempferol, Rutin

*Table 1. Components of food thought to be carcinogenic or mutagenic.*

# Numerous **Anti-Cancer** Agents are Found in Both Natural and Processed Foods

Category	Food	Active Principles
Beverages and drinks	Green tea, red wine	Stilbenoids (resveratrol), flavanols (catechins)
Fruits	Strawberries, blackberries, raspberries, blueberries, cranberries, apple, pineapple, cherries, oranges, grapefruit, lemons, red grapes, pomegranate	Carotenoids (lycopene), the most part of flavonoids and in particular glycosides of anthocyanidins (anthocyanins), stilbenoids (resveratrol), flavanones (hesperetin),
Vegetables and mushrooms	Soy beans, artichokes, tomatoes, garlic, kale, broccoli, cauliflower, Brussels sprouts, bok choy, lavender, maitake mushrooms, parsley, pumpkin	Flavones (apigenin), isoflavones (genistein), flavonols (quercetin), isothiocyanate (sulfurafane), glycosides of anthocyanidins (anthocyanins)



Carrots (*Daucus carota*)  
(carotenoids)



Grapes (*Vitis vinifera*)  
(resveratrol)



Tomato (*L. esculentum*)  
(lycopene)



Cranberry (*V. oxycoccos*)  
(myricetin)



Pomegranate (*Punica granatum*)  
(Ellagic acid)



Cloves (*S. aromaticum*)  
(eugenol)



Ginger (*Zingiber officinale*)  
(gingerol, shogaol)



Garlic (*Allium sativum*)  
(allicin)



Spinach (*Spinacia oleracea*)  
(natural antioxidant mixture)



Mustard (*Brassica juncea*)  
(sulphoraphane)



Rosemary (*R. officinalis*)  
(carnosol)



Vanilla (*V. planifolia*)  
(vanillin)



Cabbage (*Brassica oleracea var. Capitata*)  
(indole-3-cabinol)



Citrus fruits  
(Vitamin C)



Aloe (*Aloe vera*)  
(emodin)

# Living Downstream

<http://www.livingdownstream.com/trailer>

{ The Film }

▶ **LIVING DOWNSTREAM** { The Movement }

WALKING UPSTREAM

[About the Film](#) | [Reactions to the Film](#) | [Screenings and Events](#) | [Trailer and Video Clips](#) | [About the Team](#) | [About the Book](#) | [For the Media](#)

## Trailer and Video Clips

Watch the trailer and teasers for *Living Downstream*. New video clips are posted regularly. Check back often, or subscribe to our [YouTube channel](#).

**Watch the Trailer (4 min)**

Living Downstream - Trailer

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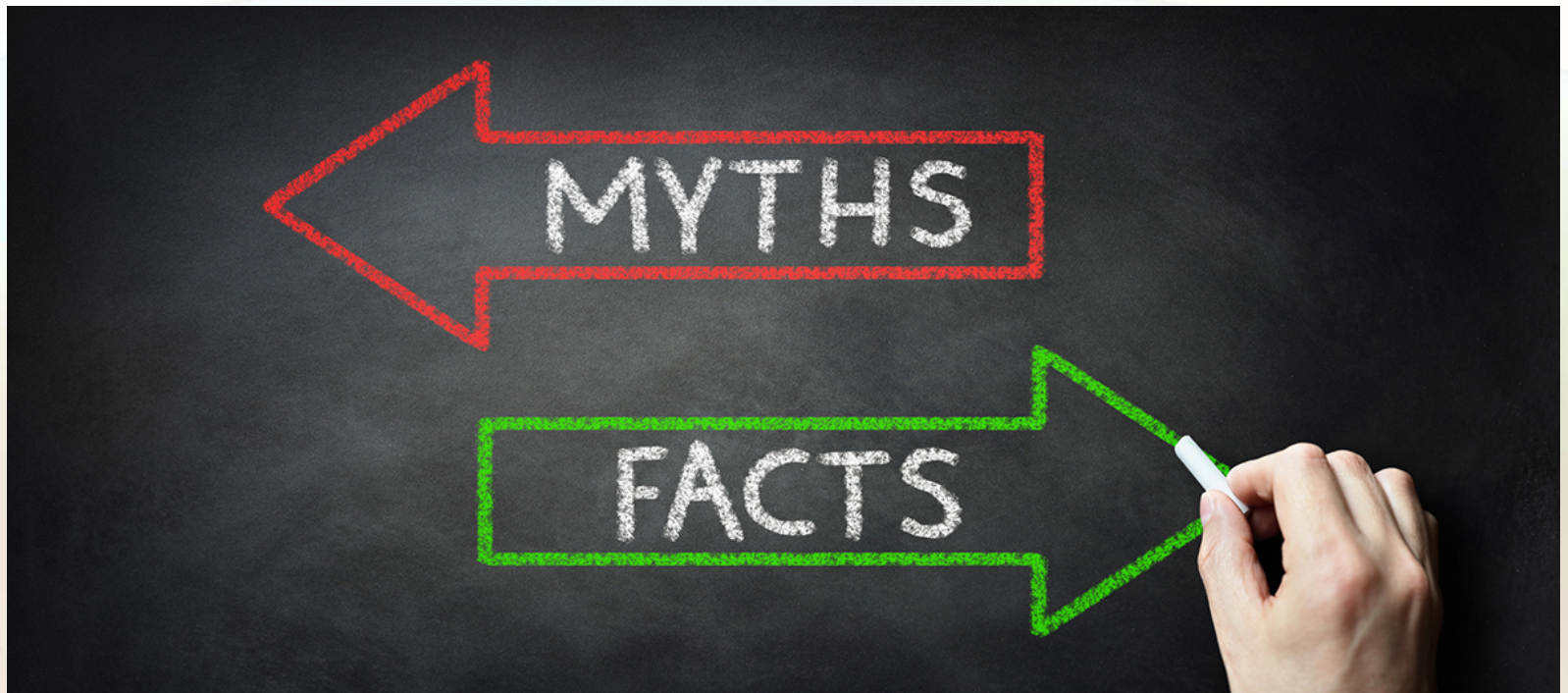
[Order the DVD](#)



# Does EVERYTHING Really Cause Cancer?



# Separating Myths from Facts

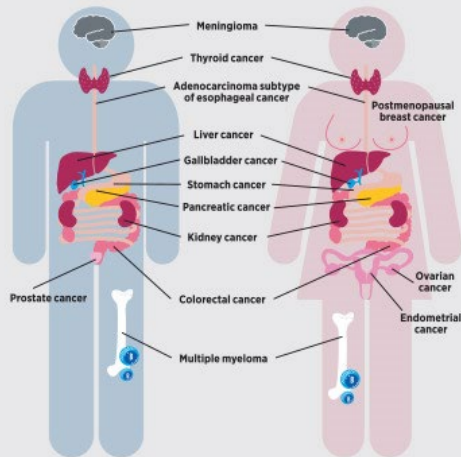


# MYTH: EATING SUGAR CAUSES CANCER

While cancer cells do consume sugar to “fuel” their relentless cell division, **ALL cells in the body** rely on glucose (sugar) for energy. There is no Evidence that removing sugar from the diet will help prevent cancer or shrink tumors.

**\*HOWEVER\*** A diet HIGH in sugar can lead to **obesity**, which is a risk factor for cancer!

## Cancers Caused by Obesity



American Association for Cancer Research (AACR) Cancer Progress Report 2017



# MYTH: All Dairy Products Causes Cancer

Like many foods, dairy products are a complex mixture of many different agents/chemicals. Some of these have anti-cancer properties, while others have cancer stimulating activity.



Several studies have linked LOW FAT milk, yogurt, and calcium consumption (500mg to 1000mg/day) with a LOWERED risk of colorectal cancer and fermented milk with a LOWERED risk of bladder cancer.

## ANTI-CANCER AGENTS IN DAIRY

- Calcium
- Vitamin D
- Lactic acid bacteria (yogurt)

Consumption of HIGH FAT dairy products (whole milk, butter, cheese) have been associated with an ELEVATED risk of breast, bladder, and prostate cancer.

## PRO-CANCER AGENTS IN DAIRY

- Saturated fats
- Insulin-like growth factor
- Estrogen hormones (secreted by pregnant cows)

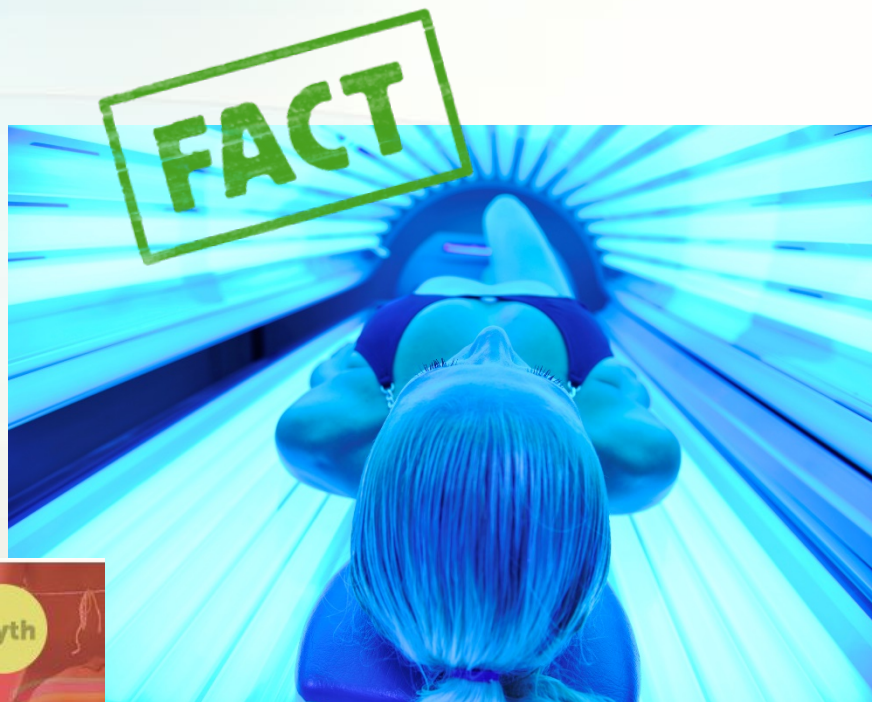
# FACT: UV from Tanning Beds Causes Cancer

There is no such thing as a safe or healthy tan. The ultra violet radiation used in tanning beds damage DNA and increase your risk of skin cancer and melanoma.

## INDOOR TANNING DANGERS

# 75%

increased risk of developing life-threatening melanoma from just one indoor tanning session before age 35.

An infographic with a red background. On the left, there is a faint sun icon. A green circle with the word "Truth" in white is positioned above the text "A TAN IS A SIGN OF DAMAGED SKIN." in white. A yellow circle with the word "Myth" in black is positioned above the text "“HAVING A GOOD ‘BASE TAN’ WILL PROTECT MY SKIN FROM THE SUN.”" in white. At the bottom, there is a dark grey bar with white text: "SOURCES: NATIONAL CENTER FOR CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION DIVISION OF CANCER PREVENTION AND CONTROL" on the left and "LIVESTRONG.COM THE GREAT LIFE POTENTIAL OF YOU" on the right.

**Truth**  
A TAN IS A SIGN OF DAMAGED SKIN.

**Myth**  
“HAVING A GOOD ‘BASE TAN’ WILL PROTECT MY SKIN FROM THE SUN.”

SOURCES: NATIONAL CENTER FOR CHRONIC DISEASE PREVENTION AND HEALTH PROMOTION  
DIVISION OF CANCER PREVENTION AND CONTROL

LIVESTRONG.COM  
THE GREAT LIFE POTENTIAL OF YOU

# MYTH: DIET SODAS CAUSE CANCER

Original studies found that rats fed high levels of either saccharin or aspartame frequently developed cancer. Studies had TWO FLAWS:

## DOSE NOT RELEVANT:

Later determined the aspartame dose necessary to cause cancer would be equivalent to 10-2083 cans every day ... According to the European Food Safety Agency, an adult weighing 132 lbs would have to drink **36 cans of a diet soft drink** (containing aspartame) every day to reach/exceed the acceptable daily intake (ADI).



## MECHANISM UNIQUE TO RATS:

Rats convert saccharin into a carcinogen during digestion, humans do NOT have the same enzyme



# TBD: Most Evidence Suggest the Use of Talc Does NOT Causes Ovarian Cancer

“The weight of evidence does not support an association between perineal talc exposure and an increased risk of ovarian cancer.” - National Cancer Institute

## CONCERN

For decades, many women have applied talc, of baby powder, to the genital area (against instructions on label). In the early 1970s, scientists discovered talc particles in ovarian tumors.

## DATA

Prospective study [on 61,000 women over 12 years](#) showed NO link between talc use and ovarian cancer risk (2014)

FDA continues to get “adverse event reports” involving talcum powder...more investigations are necessary.



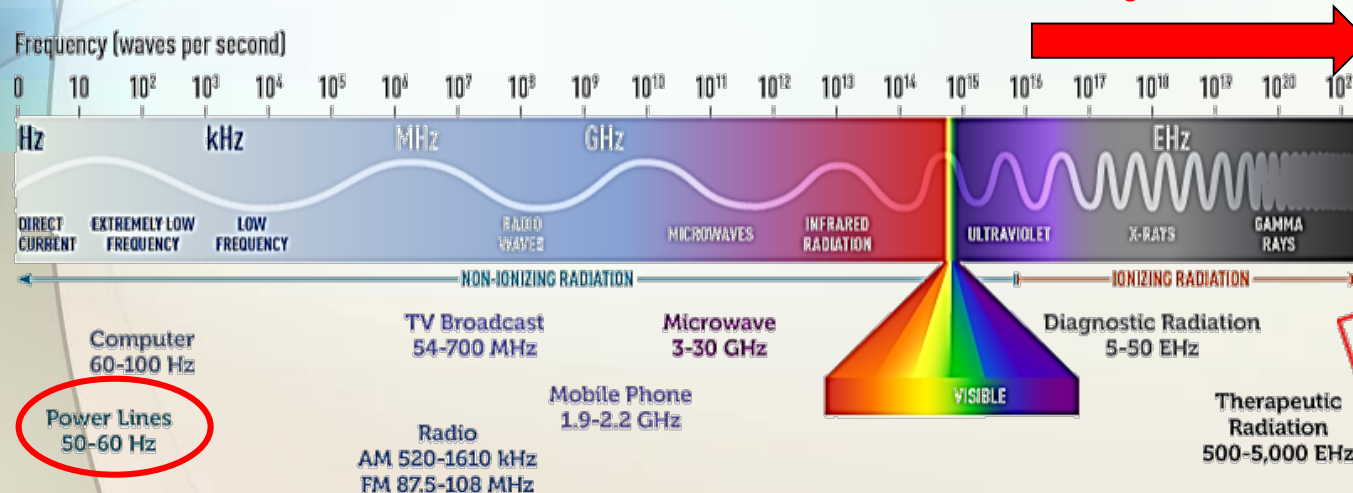
**TBD**

# MYTH: Living Under Powerlines Causes Cancer

Power lines emit both electric and magnetic energy.

- The **electric energy** is easily shielded/weakened by walls
- The **magnetic energy** emitted is a low energy form of radiation that does not damage genes.

## ELECTROMAGNETIC SPECTRUM



*Note: preliminary studies suggest children living in homes with extremely high levels of EMF radiation have an increased risk of leukemia. The dose is found in fewer than 1% of households and may be a combination of electronic appliances, WIFI, other EMF sources. Additionally, people who work on powerlines for long periods of time, have an increased cancer risk*



# MYTH: CELL PHONES CAUSE CANCER

People initially became concerned when male\* rats exposed to radio-frequency waves had a higher risk of developing Schwannomas (a rare nerve tumor)

## DOSE NOT RELEVANT

Rat Study used 2-3x the cell phone limit of RF energy  
Rat Study used 9-19 hours every day  
Humans mostly texting or hands-free headsets

## MECHANISM NOT VALID

Cancer is caused by genetic mutations, and cell phones emit a type of **low-frequency energy** that is not strong enough to damage DNA.

*Note: Radiofrequency from cell phones does not damage DNA. However, exposure does cause **heating** to the area of the body where a cell phone or other device is held (ear, head, etc) of unknown significance with respect to tissue damage/cancer risk*

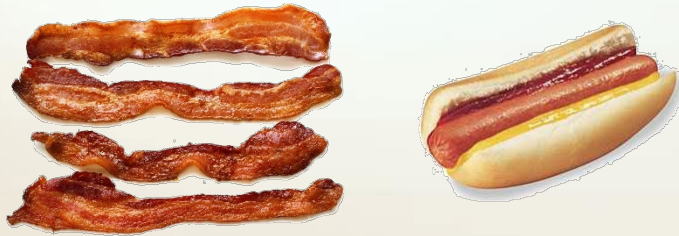


*Infamous  
"popcorn"  
experiment*

# FACT: Eating Bacon Increases Cancer Risk

Processed meats are those that are **cured, smoked, or salted** for preservation. Processed meat often contain **nitrosamines**, which mutate DNA.

Eating just 50 grams of processed meat each day can **elevate cancer risk by 18%**. (IARC)



*50 g = 4 strips of bacon or 1 hot dog*



## COLORECTAL CANCER

According to the IARC, each 50g (e.g. one to two slices of ham) portion of processed meat eaten daily increases the risk of colorectal cancer by 18 per cent.



## PROSTATE CANCER

Men preferring red meat, fat and processed grains were 2 ½ more likely to die from cancer-related cause.



## BREAST CANCER

Researchers at Harvard University analysed data, and scientists estimated that among women who ate the most amount of red meat, there were an extra 6.8 cases of breast cancer for every 1,000 women over 20 years of follow-up.

Source: BCC, CBC NEWS, THE GUARDIAN ST GRAPHICS

Eating bacon has been linked to pancreatic cancer

More than **34,000 cancer deaths** are caused around the world each year by diets high in **processed meat** (IARC)

# MYTH: DEODORANTS CAUSE BREAST CANCER

Originally circulated as a hoax email saying that using deodorants prevented the body from sweating out toxins, which then built up in the lymph nodes of the armpit

- **Parabens:** preservatives used in cosmetics that have a similar structure to estrogen but; however, parabens have activity level 1/10,000<sup>th</sup> as strong as endogenous estrogen
- **Aluminum:** Likely the result of confusion over women being told not to wear antiperspirants to a mammogram exam because it interferes with the imaging.



# FACT: Eating Peanuts\* Might Increase Cancer Risk

**Aflatoxin\***, produced by mold that frequently contaminates peanuts, soybeans, and corn, is the **MOST POTENT CARCINOGEN** known to man. FDA allows 20 ppb in human food, 300 ppb in animal feed

Aflatoxin contributes to up to 28% of all cases of liver cancer

In the US, the FDA routinely tests peanut butter and corn for the presence of unsafe levels of aflatoxin

Animals that consume aflatoxin-contaminated food can transfer the toxins to meat, milk and eggs resulting in human exposure to a health hazard.



**FACT**

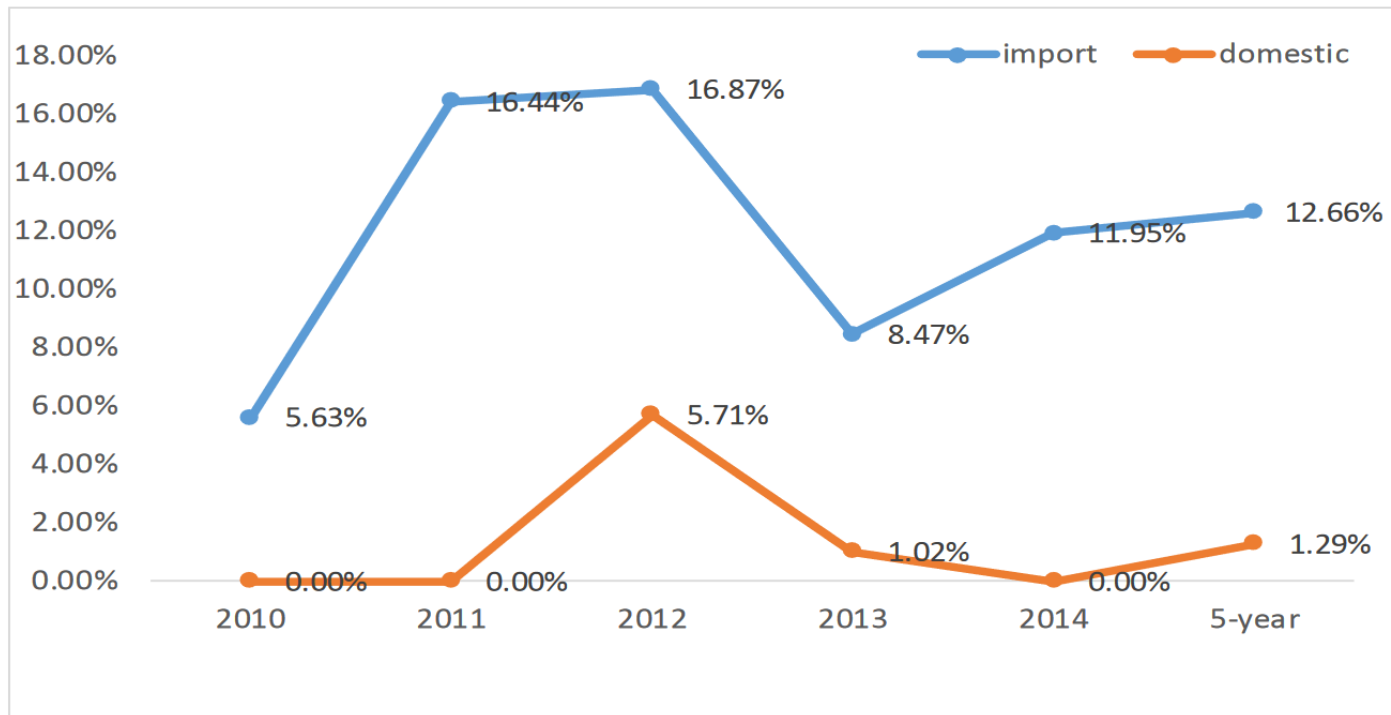


# Higher Aflatoxin Risk with Imported Peanuts and Organically Grown Peanuts

## Aflatoxins in peanuts



% of Crop in Violation of Aflatoxin Safety Standards



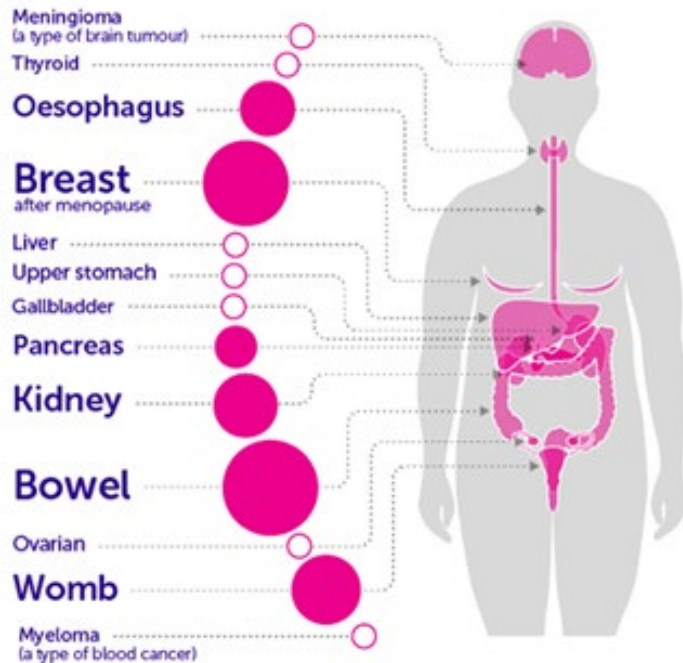
- Violation rate for domestic peanut products is generally lower than import peanut products

# Fact: Obesity Increases Cancer Risk

Nearly 1 in 3 cancer diagnoses are linked to obesity. In the US, obesity levels are on the rise, with nearly 66 % of the population categorized as overweight or obese.

## BEING OVERWEIGHT CAN CAUSE 13 TYPES OF CANCER

- Larger circles indicate cancers with more UK cases linked to being overweight or obese
- Number of linked cases are currently being calculated and will be available in 2017

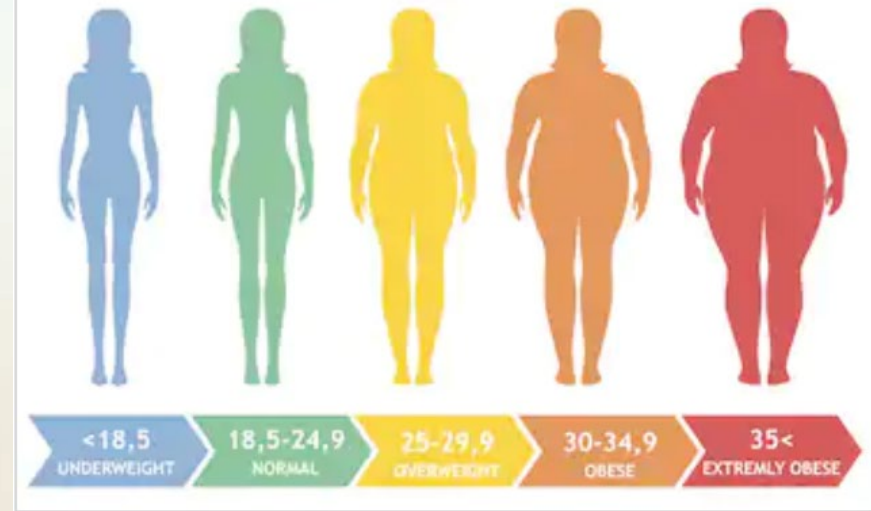


LET'S BEAT CANCER SOONER  
cruk.org



# FACT

## Body Mass Index



$$\text{BMI} = 703 \times \text{weight (lbs)} / [\text{height (in)}]^2$$

# MYTH: Eating Soy Products Causes Cancer

Soy (or soya) products such as tofu and soy milk are made from soybeans, and contain a group of chemicals called isoflavones.

## INITIAL CONCERN

Isoflavones are plant-based estrogens and elevated human estrogen is a known risk factor for breast cancer.

Isoflavones are **much weaker** than the estrogen produced by our bodies.

People with the **highest intake** of soy (Asians) do NOT have a higher risk of breast cancer (actually lower!)



# MYTH: PLASTIC WATER BOTTLES CAUSE CANCER

There are several unreliable and inaccurate social media posts warning about the alleged dangers of reusing plastic bottles, leaving them in hot cars or freezing water in them.

- **Dioxins:** are not found in plastic used in food/water containers
- **Bisphenol A:** not used in disposable water bottles. A review of hundreds of studies has found although BPA does leach into food/water, it does not cause cancer (TDI  $4\mu\text{g}/\text{kg}$ )





# MYTH: MICROWAVING PLASTICS CAUSES CANCER

Minute amounts of chemicals (like phthalates) can leach out of plastic when heated → no evidence linking this to cancer (*possible endocrine disruption*)

**Safety Tip:** Only use cookware that is specially manufactured for use in the microwave oven and are labeled as “microwave safe.”



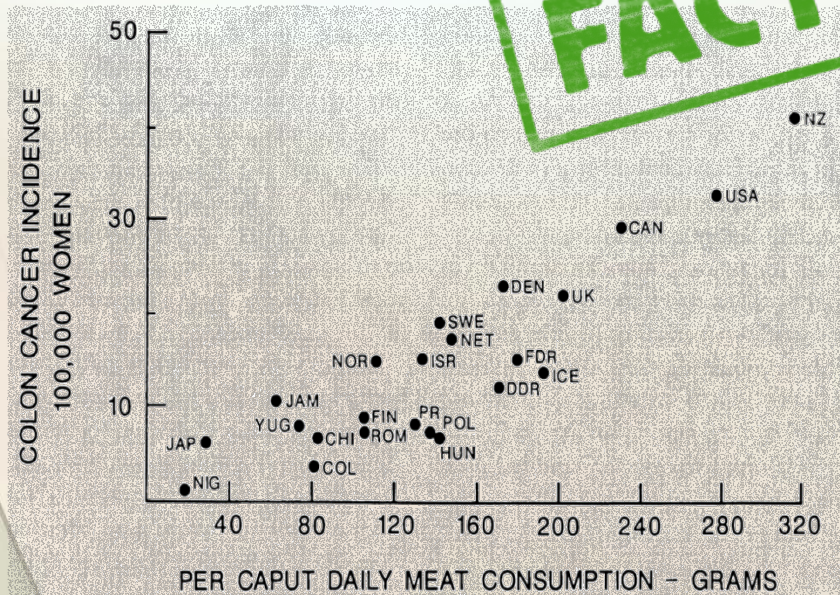
*Do not microwave one-time use plastic tubs*

# FACT: Red Meat Increases Cancer Risk

Red meat includes meat from mammals including beef, pork, lamb, mutton, and goat.

According to the American Institute for Cancer Research a **high intake** of red meat is defined as **more than three servings per week**

Meat consumption correlates with colon cancer risk



Red meat cooked over an open flame or at high temperatures creates **polycyclic aromatic hydrocarbons (PAH)** and **heterocyclic amines (HCA)**



# Examples of Red Meat Target Goals

## CANCERS CAUSED BY PROCESSED AND RED MEAT



OF BOWEL CANCERS

NO-ONE ATE ANY PROCESSED OR RED MEAT



Source: [cruk.org/cancerstats](http://cruk.org/cancerstats)

## HOW MUCH MEAT DO YOU EAT A DAY?

HOW YOUR PROCESSED AND RED MEAT CONSUMPTION CAN ADD UP OVER A DAY...

### ENGLISH BREAKFAST



Two sausages... 60g  
Three rashers of bacon..... 75g

### CUT IT DOWN

One sausage..... 30g  
One rasher of bacon..... 25g

### HAM SANDWICH



Two slices of ham..... 50g

### SWAP IT

Substitute ham for chicken or tuna..... 0g

### SPAGHETTI BOLOGNESE



Minced beef in a regular portion..... 100g

### BULK IT OUT

Use less meat and add beans or extra veggies... 15g

285g

TOTAL EATEN

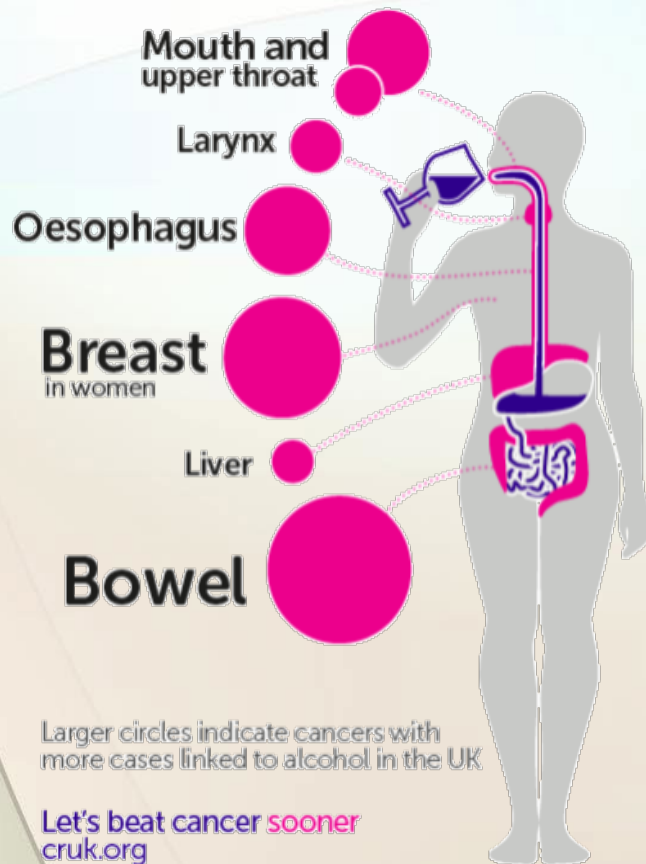
70g

RECOMMENDED DAILY LIMIT OF CONSUMPTION

# FACT: Alcohol Increases Cancer Risk

Alcohol is a Group 1 carcinogen when consumed in **excess of 1 drink per day** for women (2 drinks a day for men).

## 7 Cancers Caused by Alcohol



A standard alcoholic drink in the United States contains 14.0 grams (0.6 ounces) of pure alcohol. Generally, this amount of pure alcohol is found in

- 12 ounces of beer
- 8-9 ounces of malt liquor
- 5 ounces of wine
- 1.5 ounces, or a "shot," of 80-proof distilled spirits (liquor)



# Example Benefits of Drinking Red Wine

How do the popular beverages compare in antioxidant activity?

Antioxidant compounds are found in vegetables, fruits and many natural beverages like tea. Balanced diets are naturally-rich in antioxidants. Enjoy the variety, flavours and health potential in every serving!



**2** cups black tea = **1** glass red wine = **7** glasses orange juice = **20** glasses apple juice

**Source:** The Polyphenolic Content of Fruit and Vegetables and their Antioxidant Activities: What Does a Serving Constitute?, Paganga et al., Free Radical Research, Volume 30, February 1999

# MYTH: Astro turf Causes Cancer

Initially suspected when a soccer coach in Washington state, noticed a cluster of cancer cases among soccer players (mostly female goalies) who had spent time playing and diving on artificial turf (n = 53)

## NOT OBSERVED WITH LARGER SAMPLES

In 10 additional studies, there was no difference in risk observed between those playing on artificial turf vs. grass.

In the initial WA state “cluster” most woman Developed NHL & leukemia. This was no observed among soccer players in other states



# TBD: Drinking Hot Coffee/Tea Might Cause Cancer

The World Health Organization, in 2016, said drinking **coffee**, tea and other beverages at temperatures hotter than 149 degrees Fahrenheit "probably causes **cancer**." *\*especially oral and esophageal cancer\**

## INITIAL CONCERN

Link between hot beverages and esophageal cancer was observed in individuals drinking mate tea, which is generally served hotter (150°F) than standard coffee/tea (140°C)

## OTHER DATA

Drinking alcohol increased the effect: those who reported drinking burning hot tea daily and who also drank more than one alcoholic beverage every day had a **127 percent increased risk of esophageal cancer**

It is hypothesized that drinking scalding beverages may trigger excessive/abnormal wound repair in the throat/esophagus



# MYTH: GMOs Cause Cancer

130 research projects with collaboration between 500 independent lab groups have over a period of 25 years have found no risk to human health from GMOs

## INITIAL CONCERN

French study found that rats fed a lifetime diet of RoundUp ready corn suffered tumors and organ damage (not reproducible by independent research groups/flawed design)

## THE DATA

Countries that have banned GMOs have similar, if not HIGHER, rates of cancer and cancer deaths than the US, where GMOs are prevalent

Studies of Bt toxin at doses 500-2000x higher than in GMO corn showed zero toxicity (no LD 50) in animal studies. In addition, Bt toxin was completely degraded by stomach acid within 5 min @ 37°C





# TBD: Most Evidence Suggests Glyphosate does NOT Cause Cancer

Over a Dozen International Agencies Have Concluded that Glyphosate does NOT cause Cancer; however, the IARC recently re-classified it as a Group 2A carcinogen.

**Results: Over 35 Ames Tests were ALL negative**  
Conclusion: Glyphosate does NOT damage DNA

**Results: In 20 studies in rats and mice, 18 were negative, 2 were positive with cancer detected in some animals at the highest dose (equivalent dose = 0.5 lbs glyphosate per day).**

Conclusion: 90% of animal studies found no effect. 10% of animal studies found a correlation at the highest dose further investigation is required.



**TBD**



# Example: Cancer Rates and GMO Consumption & Production by Country

- The countries in the top ten come from Europe, Oceania and the Americas.

Rank	Country	Age-standardised rate per 100,000
1	Australia	363.0 #12 GMO use/produce
2	New Zealand	358.3 non-GMO
3	Hungary	330.6 non-GMO
4	Belgium	329.9 non-GMO
5	Canada	329.7 #4 GMO use/produce
6	Denmark	325.5 non-GMO
7	Ireland	322.9 non-GMO
8	US	321.2 #1 GMO use/produce
9	Netherlands	318.9 non-GMO
10	Norway	311.3 non-GMO

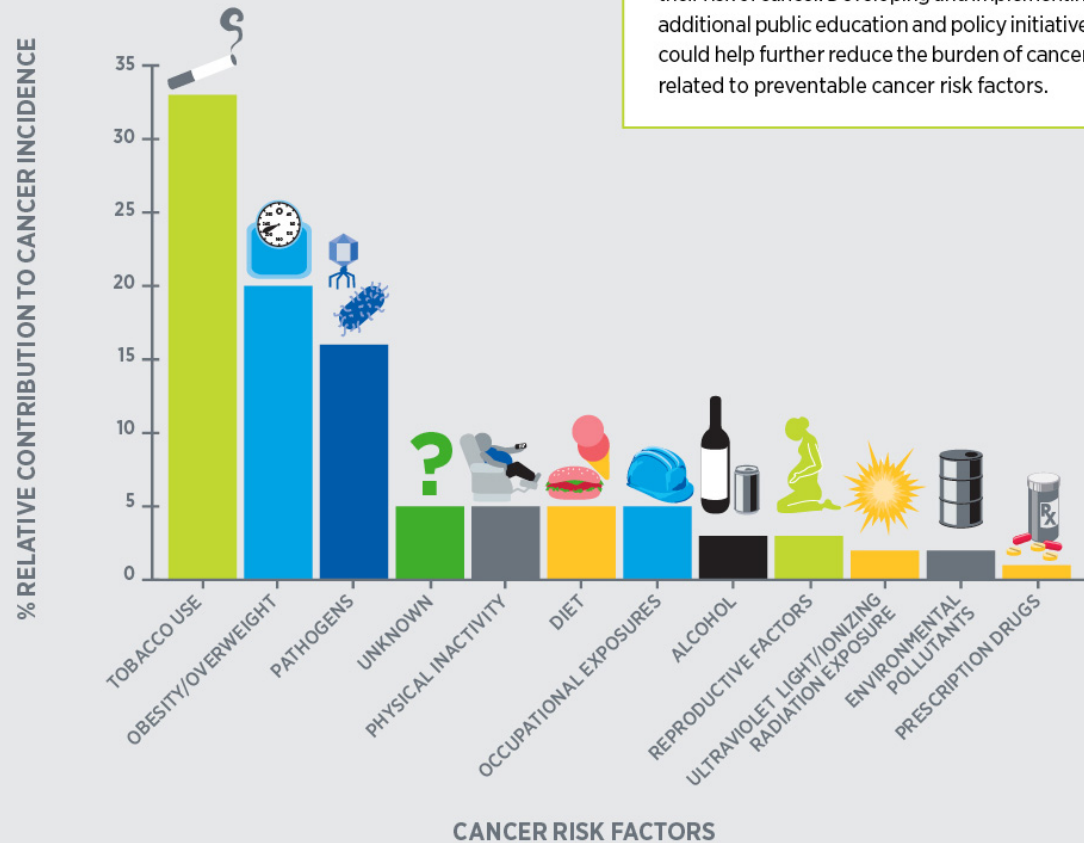
Several countries such as France, Germany, Austria, Greece, Hungary, the Netherlands, Latvia, Lithuania, Luxembourg, Bulgaria, Poland, Denmark, Malta, Slovenia, Italy, Croatia, and New Zealand have chosen a total ban [on GMO crops].

# Cancer Risk Factors Identified as of 2017

Figure 4

## Risky Business

Research has identified numerous factors that increase an individual's risk for developing cancer. By modifying behavior, individuals can eliminate or reduce many of these risks and thereby reduce their risk of cancer. Developing and implementing additional public education and policy initiatives could help further reduce the burden of cancers related to preventable cancer risk factors.

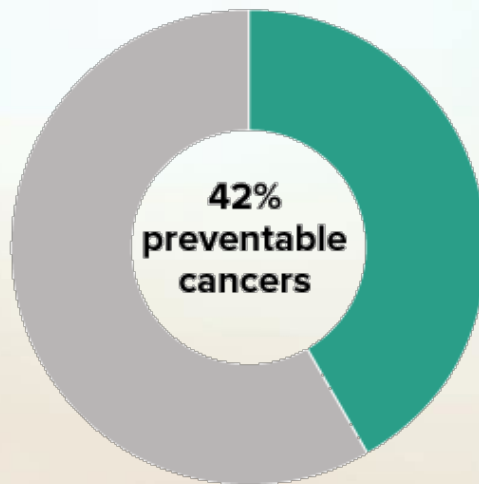


# You Can Lower Your Cancer Risk!

It is predicted that 42% of cancers are preventable.

## Preventable cancers

More than 40 percent of cancer cases can be prevented, the American Cancer Society finds in a new report. Here is a list of things people can change and their share of cancer cases:



Source: American Cancer Society



# Parting Thoughts...

- ❖ To date 120 carcinogens have been identified (but science is built on a continuum and more agents may be discovered with additional research)
- ❖ Because of chronic misinformation, it is important to get **information from valid sources** (peer-reviewed publications and websites):
  - *National Cancer Institute (NCI)*
  - *American Institute of Cancer Research (AICR)*
  - *American Cancer Society (ACS)*
  - *International Association of Cancer Research (IARC)*
  - *Cancer Research United Kingdom (CRUK)*
  - *Environmental Protection Agency (EPA)*
- ❖ Remember the **importance of DOSE**, just because something is a carcinogen, doesn't mean it is dangerous to you at the level in your environment



Questions?