

# **Elder Academy**

**How food can affect  
your health!**

## **Part 4: Food & Health**

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**Greg Mulligan**

**mulligan@uvic.ca**

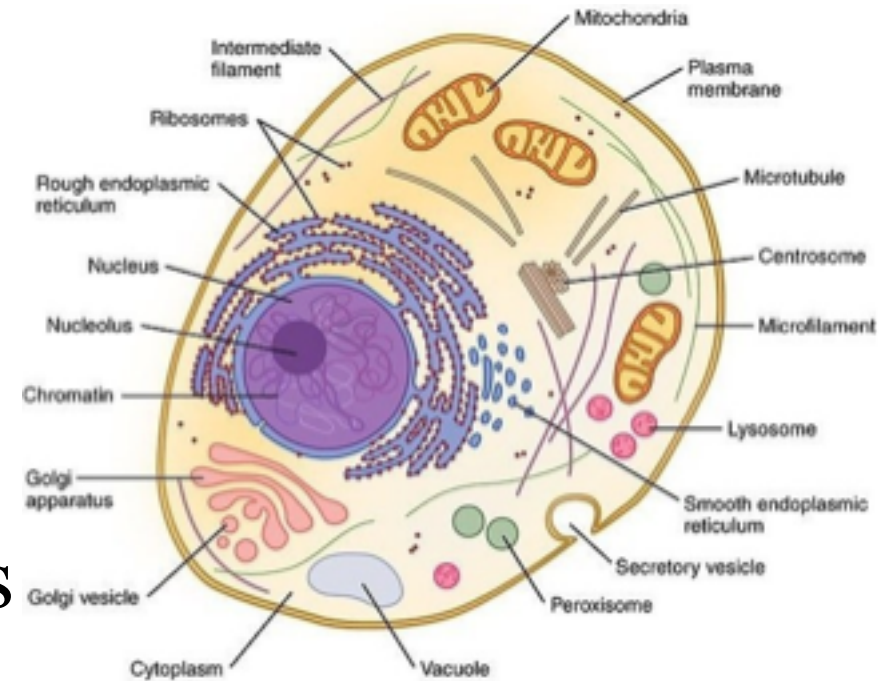
**<https://onlineacademiccommunity.uvic.ca/elderacademy>**

# Topics for the Day

- Recap from Part 3
- Food to Human Cells
- Nutrients for Your Brain
- Nutrients for Your Muscles
- What Works for Weight-Maintenance?
- Example of a Healthful Diet
- Effects of Cooking
- Nutrition Supplements

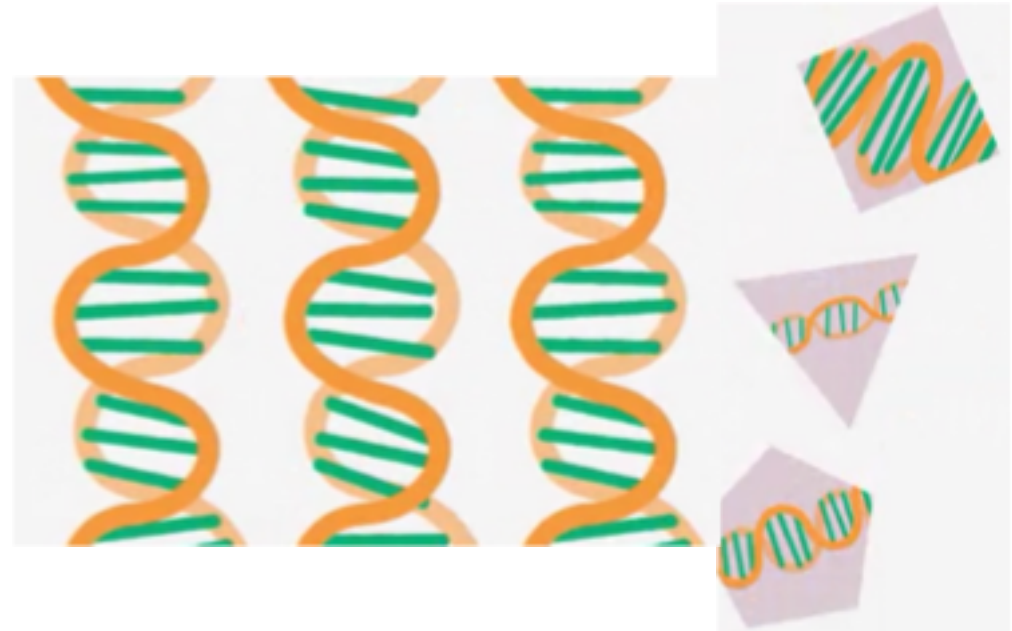
# Nature & Nurture

- The foods you eat changes the function of your cells.
- Exercise changes how your cells function.
- Likely nearly 40 trillion cells of 200 types in your body.
- All influenced by nutrients & exercise.



# Nature & Nurture

- About 50% of inter-individual differences are attributable to genetics.
- Your DNA holds the ‘blue prints’ for making any protein you need to live
  - This is how cells are repaired and replaced every day.
- Your environment, or ‘Nurture’, determines how those genes are expressed
  - i.e. the types and amounts of proteins created.



# Nutrients that Help with Cell Function

- Vitamins & Minerals from plants
- Omega fats from fish & flax/chia/etc
- Phytochemicals in richly coloured plants
  - e.g.
    - glucosinolates in brassicas plants
    - Lycopene in tomatoes
    - Resveratrol in grapes/wine/berries
    - Etc, etc



- *What does this look like on a whole diet level?*

# Nutrients Used by Your Brain

- What is your brain made of?
- By weight, most of your brain is:
  - Fats
- But also:
  - Proteins
  - Amino acids
  - Vitamins & minerals
  - Glucose (sugar)



# Nutrients Used by Your Brain

- Omega-3 and Omega-6 fats are the superstars of brain maintenance by repairing cell walls
  - *Can you recall food sources?*

# Omega-3 Fats

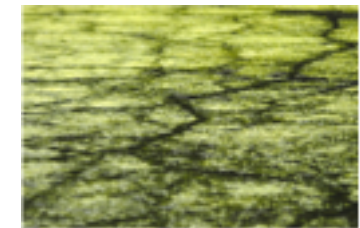
- 3 types of omega-3

- ALA is present in plant oils, such as:
  - flaxseed, soybean, canola oils, chia seeds, walnuts
- DHA and EPA are present in:
  - fish, fish oils, and krill oils
  - The fats are originally synthesized by microalgae, not by the fish.
  - When fish consume phytoplankton that consumed microalgae, they accumulate the omega-3 in their tissues



- How much is recommended?

- 1.1 grams per day for women, 1.6 for men





# Nutrients Used by Your Brain

- Some fats like trans-fats and large amounts of saturated fats (from animal meats/products) can compromise brain health
  - Earlier cognitive decline
  - More cardiovascular disease risk
    - i.e. heart attacks & strokes



# Nutrients Used by Your Brain

- Proteins and amino acids
  - Building blocks of neurons in the brain
  - Enzymes & hormones that regulate function
    - This can effect how you feel & behave



# Nutrients Used by Your Brain

- Amino acids
  - Precursors to neurotransmitters
    - These are the chemical messengers that relay signals between neurons
    - Affects things like mood, sleep, attentiveness, etc
- Variety of food choices maximizes the chances that we get everything we need.



# Nutrients Used by Your Brain

- Vitamins & Minerals
  - Prevent cell damage by acting as antioxidants
  - For the brain specifically, vitamins B6, B12, and folic acid.
    - Diets high in these have less brain diseases and slower cognitive decline.



# Nutrients Used by Your Brain

- Vitamins & Minerals
  - Prevent cell damage by acting as antioxidants
  - For the brain specifically, minerals iron, zinc, copper, sodium
    - Overall brain health and cognitive development

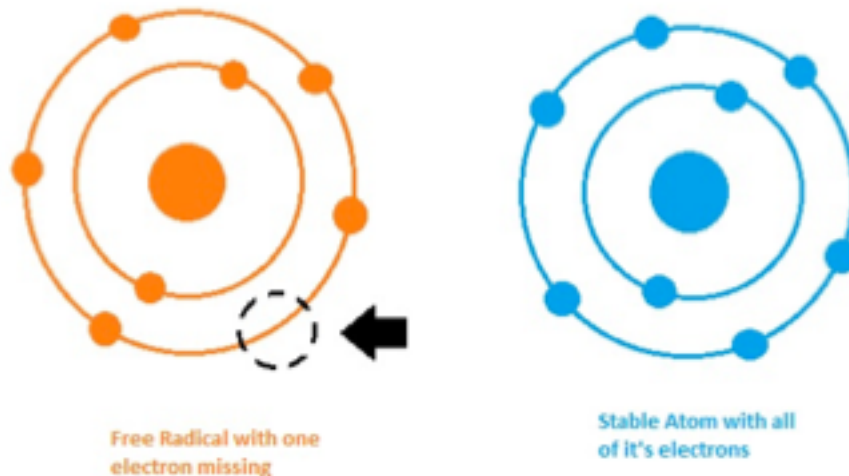


# Oxidation

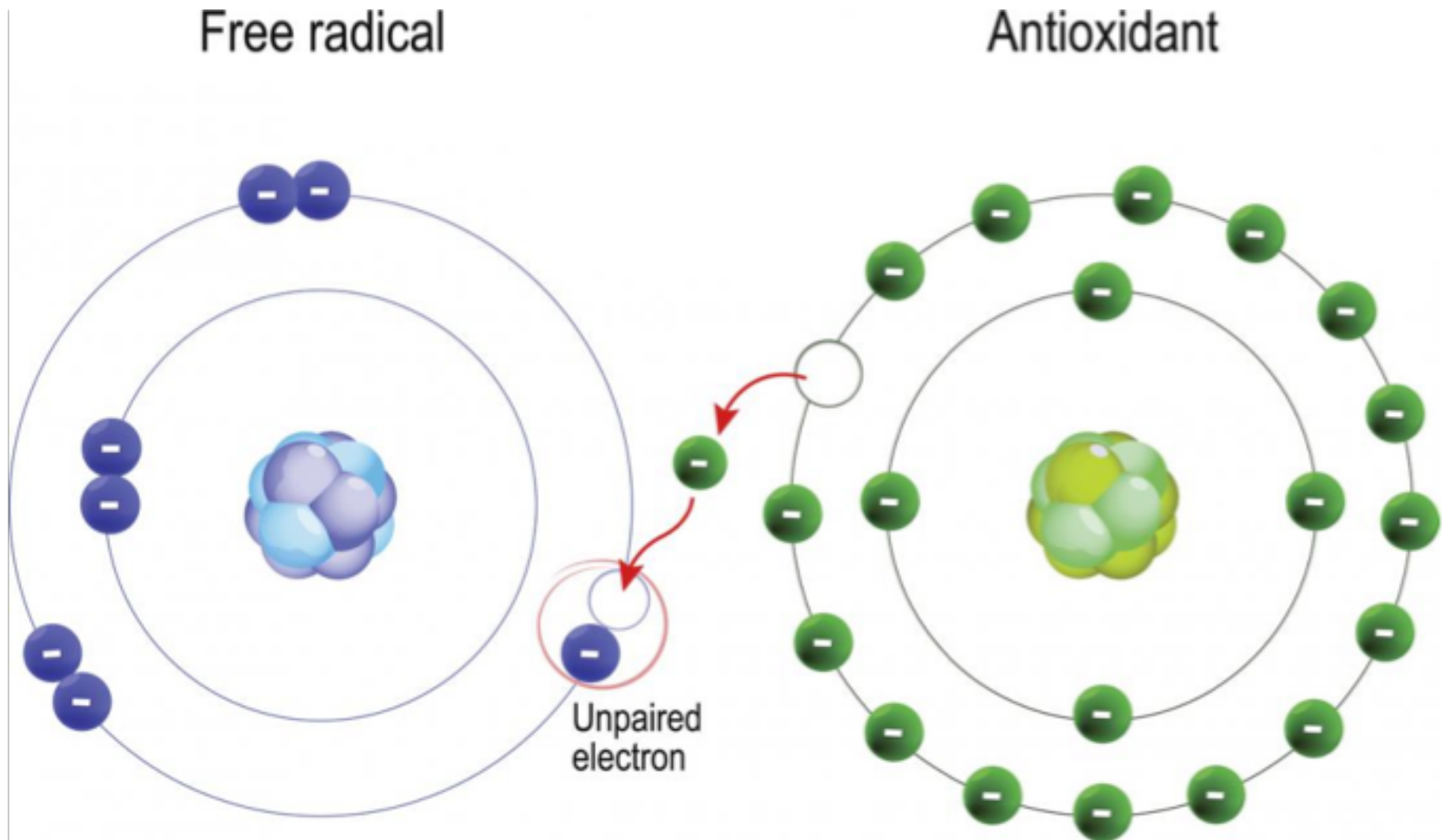
Stable atoms contain an even number of paired electrons.

**Free radical:** an atom that has lost an electron and is left with an unpaired electron.

Free radicals are highly reactive and can cause damage to molecules in the cell.



# Formation of Free Radicals



Oxygen with an extra electron

# Formation of Free Radicals

• Many metabolic processes involve oxidation reactions and can produce free radicals.

• Free radicals are also produced by

- Pollution
- Ultraviolet light
- Toxic substances
  - Drugs
- High sugar intake

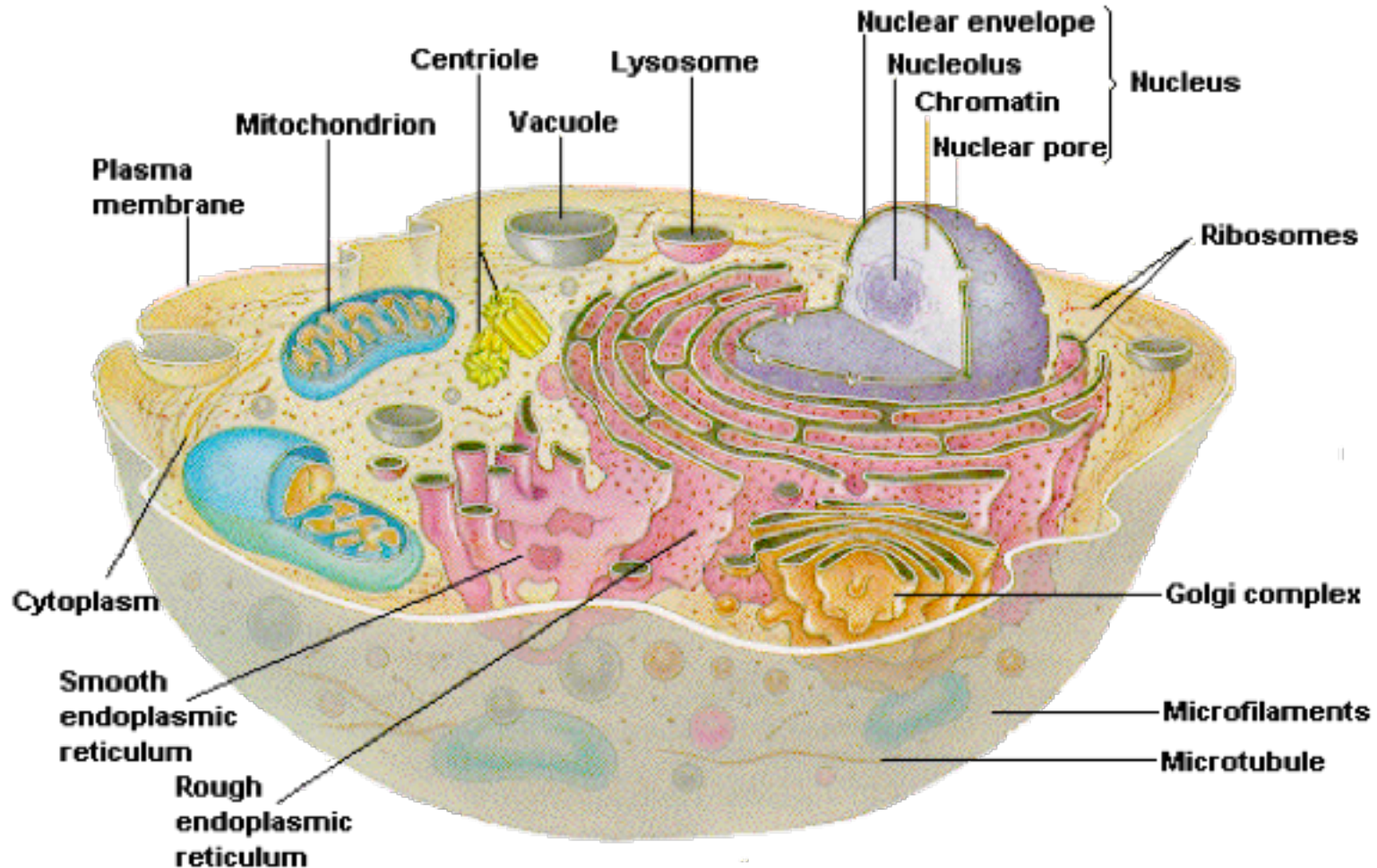
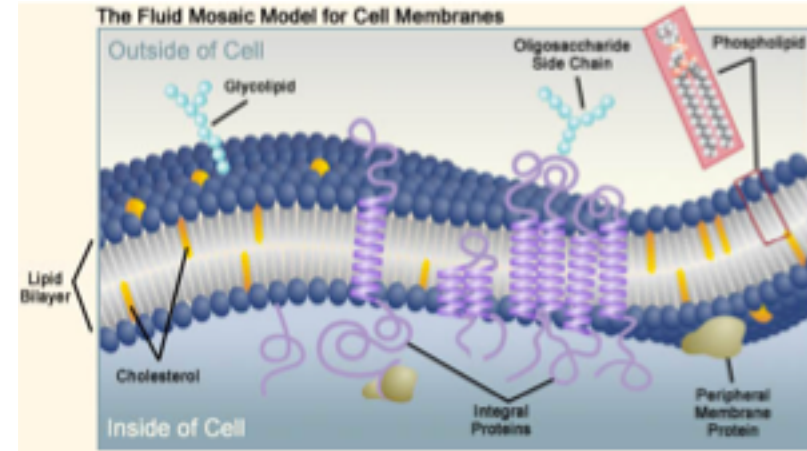




# Formation of Free Radicals

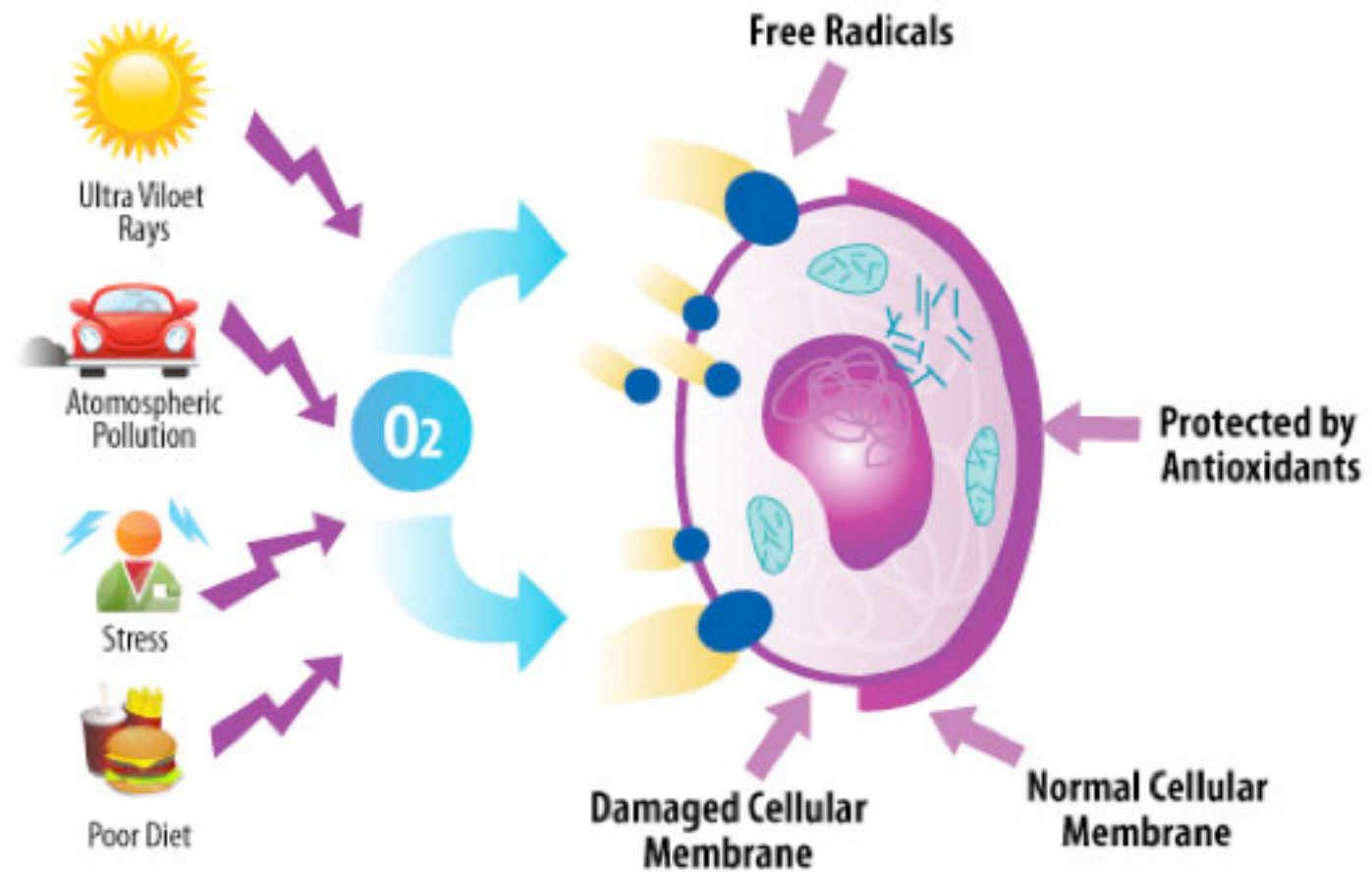
Free radicals cause damage to

- Cell membranes
- Proteins in the cell
- DNA



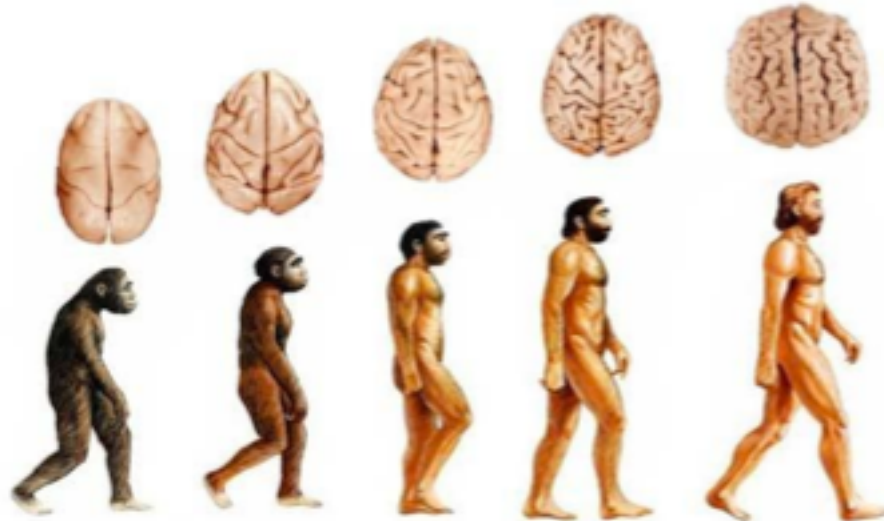
# Many diseases linked to free radical production

- Cancer
- Heart disease
- Diabetes
- Arthritis
- Cataracts
- Kidney diseases
- Alzheimer's
- Parkinson's



# Nutrients Used by Your Brain

- To make use of all these nutrients your brain needs its preferred fuel, glucose.
- Your brain is only about 2% of your body weight but uses about 20% of your nutrients.
- Fibrous fruits and vegetables give a slow release of glucose unlike sugary foods that hit the blood very fast.



# Nutrients Used by Your Muscles

- Adults generally lose muscle mass as they age
- Maintaining muscle function is a key to independent living
- Muscles need three things to grow
  - Exercise
  - Protein from lean sources
  - Glucose made by your liver from complex carbohydrates (starches)
    - From whole grains and fibrous vegetables/fruits



# Nutrients Used by Your Muscles

- Muscles also require vitamins and minerals
  - For antioxidant qualities
  - For energy systems
  - Iron, vitamin E, B vitamins (B6 & B12)



Olive Oil



Coconut Oil



Sunflower Oil



Broccoli



Kale



Spinach



Avocado



Almonds



Peanuts

# Questions?

*We have 10 minutes for questions.*

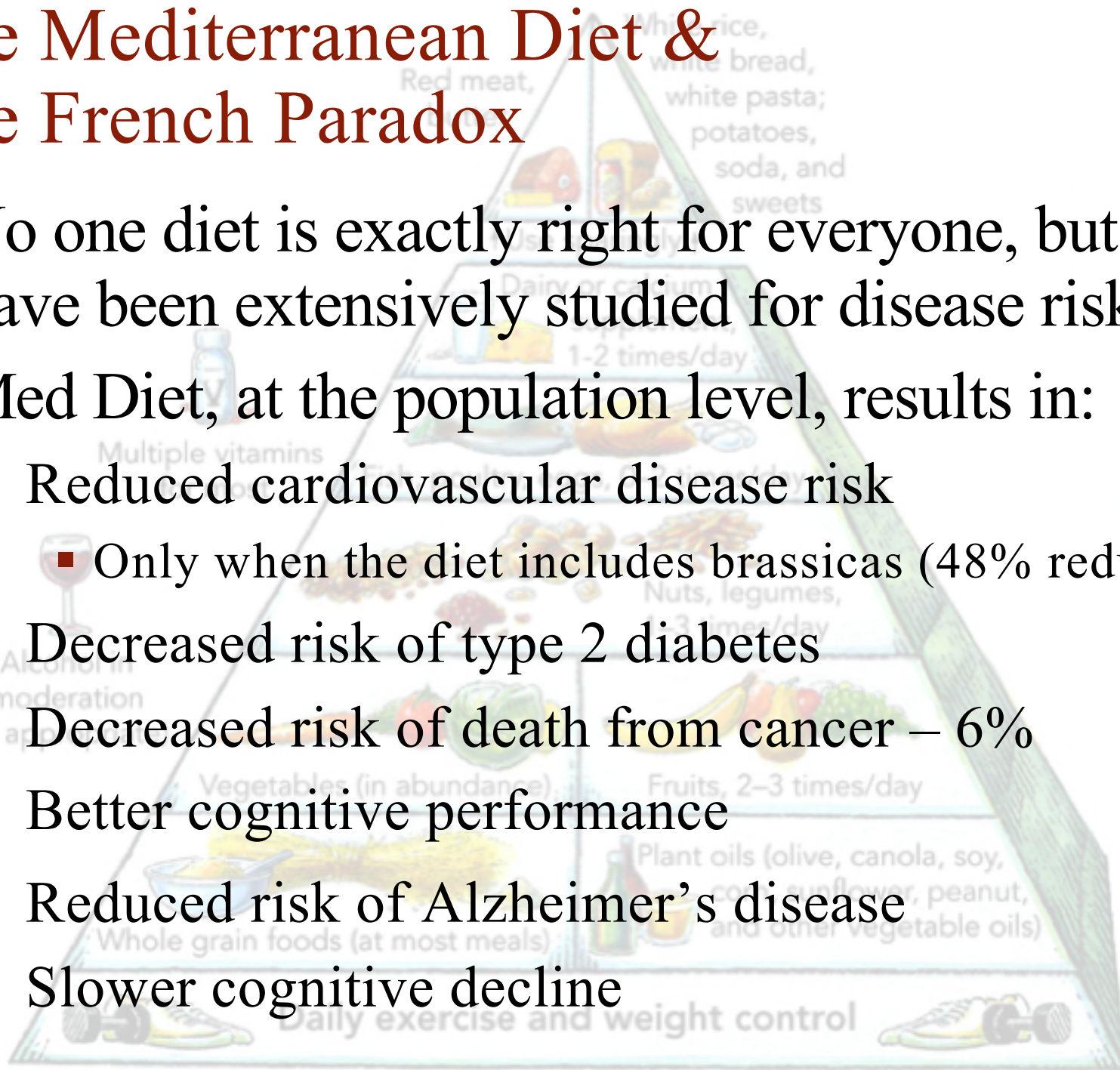
*We will start the second half of this session at 3:00 pm if you want to step out for a short break.*



Photo of the  
“fermentation wall” at  
Agrius Restaurant  
by Andrew Hendrickson

# The Mediterranean Diet & The French Paradox

- No one diet is exactly right for everyone, but some have been extensively studied for disease risk
- Med Diet, at the population level, results in:
  - Reduced cardiovascular disease risk
    - Only when the diet includes brassicas (48% reduction)
  - Decreased risk of type 2 diabetes
  - Decreased risk of death from cancer – 6%
  - Better cognitive performance
  - Reduced risk of Alzheimer's disease
  - Slower cognitive decline



# Brassicas (Cruciferous) Vegetables

- The 2015-2020 Dietary Guidelines for Americans recommend that adults consume 1.5-2.5 cups of dark green vegetables a week
- Including cruciferous vegetables such as
  - Broccoli
  - Cabbage
  - Brussel sprouts
  - Cauliflower
  - Arugula
  - Bok choy
  - Radishes
  - Kale





# The Mediterranean Diet & The French Paradox

- Inspired by the eating habits of Greece, Southern Italy, and Spain in the 1940s and 1950s



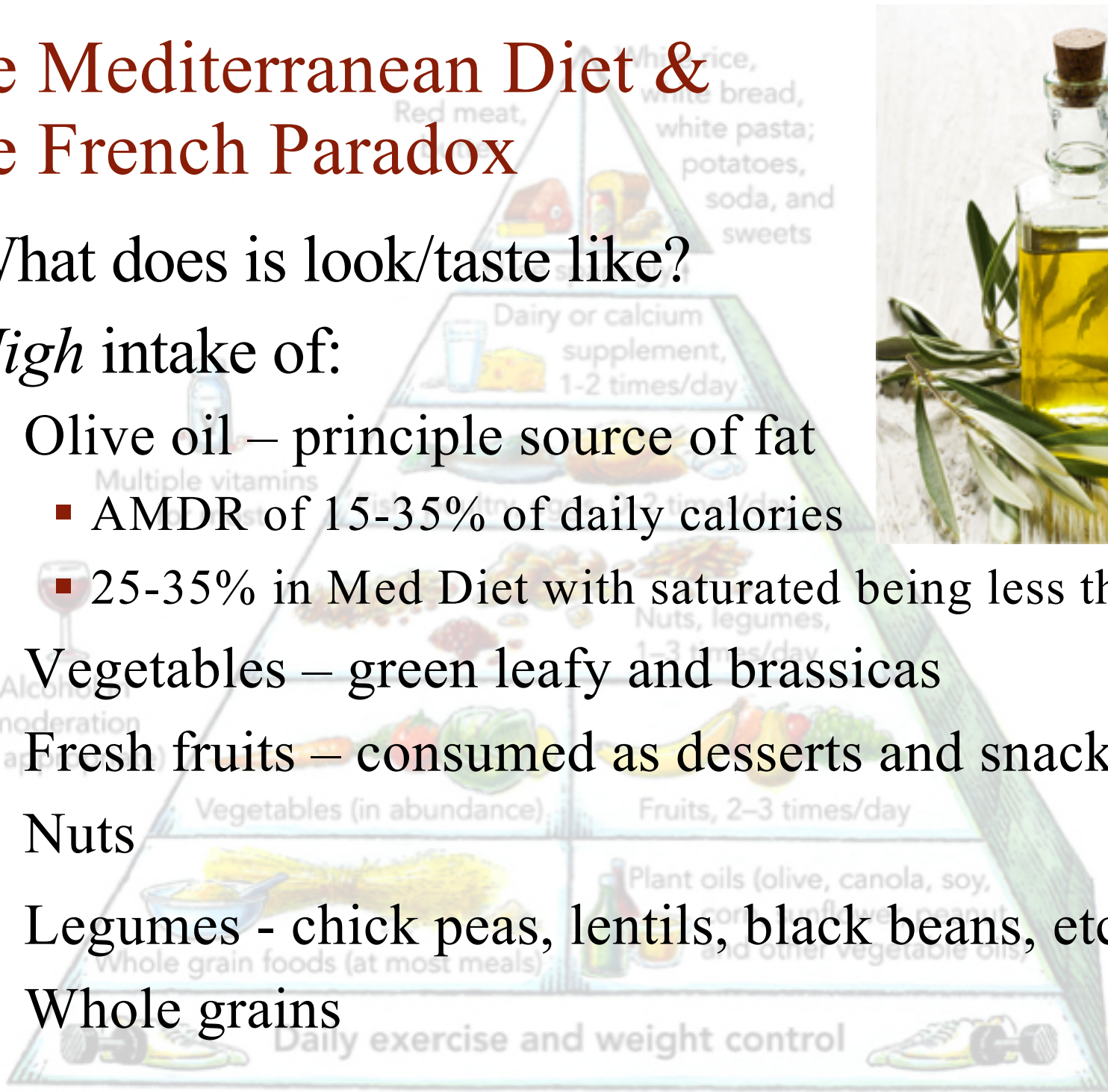
# The Mediterranean Diet & The French Paradox

- UNESCO *Representative List of the Intangible Cultural Heritage of Humanity* of Italy, Spain, Portugal, Morocco, Greece, Cyprus, and Croatia.
  - *"The Mediterranean diet involves a set of skills, knowledge, rituals, symbols and traditions concerning crops, harvesting, fishing, animal husbandry, conservation, processing, cooking, and particularly the sharing and consumption of food."*



# The Mediterranean Diet & The French Paradox

- What does it look/taste like?
- *High* intake of:
  - Olive oil – principle source of fat
    - AMDR of 15-35% of daily calories
    - 25-35% in Med Diet with saturated being less than 8%
  - Vegetables – green leafy and brassicas
  - Fresh fruits – consumed as desserts and snacks
  - Nuts
  - Legumes - chick peas, lentils, black beans, etc
  - Whole grains



# The Mediterranean Diet & The French Paradox

- What does it look/taste like?
- *Moderate* intake (1-4 per day) of:
  - Fish and seafood
  - Poultry
  - Dairy products – mostly cheese & yogurt
  - Red wine



# The Mediterranean Diet & The French Paradox

- What does it look/taste like?
- *Low* intake (0-3 per week) of:
  - Eggs
  - Red meat
  - Processed meat
  - Sweets – pastries, candy, cookies, etc.



# The Mediterranean Diet & The French Paradox

- Olive Oil

- Regular consumption may:
  - Lower risk of all-cause mortality
  - Lower risk of cardiovascular disease
  - Lower risk of cancer
  - Lower risk of neurodegeneration disorders
  - Lower risk of several/most chronic diseases
- The only monounsaturated fat to show this effect
- Why?
  - Oleic acid (a type of monounsaturated fat)
  - Polyphenols – phytochemicals



# The Mediterranean Diet & The French Paradox

- Olive Oil

- Problem with authenticity & extraction

- Look for “cold-pressed” or “cold-extracted”

- Look for production dates

- Look for “Extra Virgin” olive oil (EVOO)

- While not a guarantee it should mean it wasn't heat or chemical extracted.

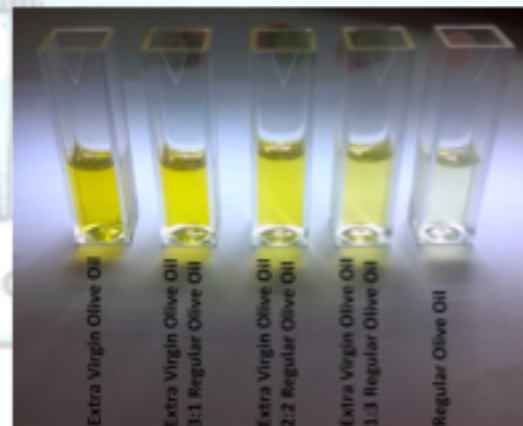
- It should smell and taste ‘fresh’, some combination of:

- Green

- Peppery

- Earthy

- Grassy



# A timeline of the human diet

## 3.2 million years

- “*Lucy*” – our most ancient human ancestor
- Essentially similar anatomy to modern human

## 1.2 million years

- Oldest direct evidence of diet
- Mostly plants & meat, all raw

## 0.8 million years

- Oldest evidence of cooking
- Smaller mammal & birds, plants & seeds

## 25000 years

- Cultivating crops & livestock

## 15000 years

- Fermentation of grains (bread, alcohol, etc) & milk (yogurt, cheese, etc)

## 100 years (1850s to 1950s)

- Industrialized foods & “*fast-food*”

***Human  
anatomy  
evolved to eat  
food –  
specifically, a  
mixed-diet***



# Effects of Cooking on Food

Cooking food *increases* nutrient availability

- Depends on method
- Can have negative effects

In controlled-trials, humans and animals *prefer cooked foods*

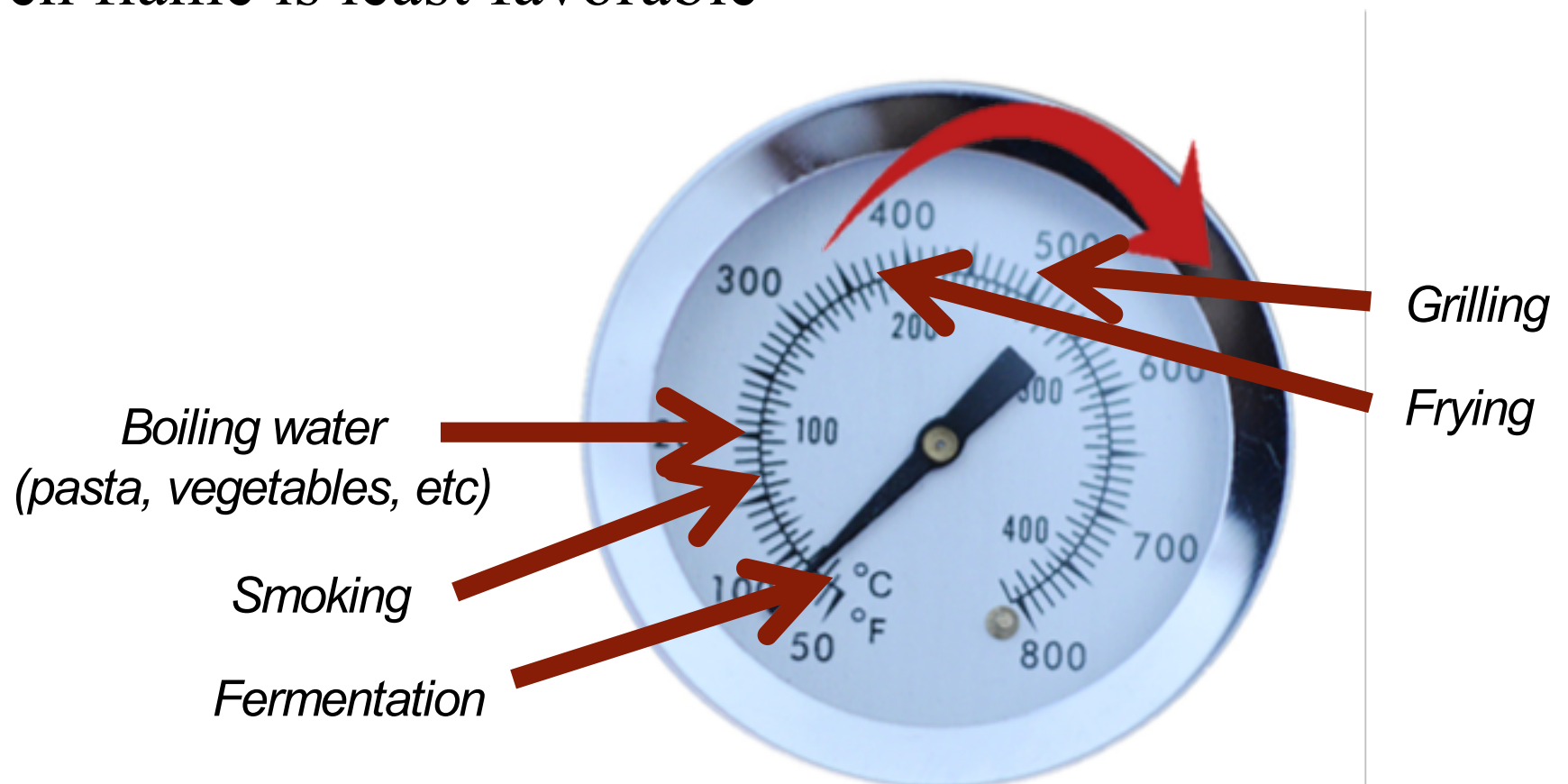
- Preferred taste
- Preferred texture



# Effects of Cooking on Food

## Depends on Method

- Lightly steaming is best
- Pan-frying, deep-frying, and grilling on open flame is least favorable



# Effects of Cooking on Food

High-temperature, contact cooking of meat including beef, pork, fish, poultry creates:

- Heterocyclic amines (HCAs) and
- Polycyclic aromatic hydrocarbons (PAHs)
- These compounds become carcinogenic in the enzyme systems of your body

*Can you see a paradox?*



# Effects of Cooking on Food

Safest is lightly steaming in a microwave oven

- Must be in the absence of plastic

“Micro” waves are like radio waves but smaller

- 300 MHz to 300 GHz
- Microwave ovens use 2.54 GHz at home
  - 915 MHz commercially
- Cell phones mostly use 1900 MHz
- The difference? Power!
  - Ovens use ~900-1600 Watts
  - A phone ~0.5 Watts



# Nutrition Supplements

- A 2010 [survey](#) shows that 73% of Canadians *regularly* take natural health products (NHPs) like **vitamins and minerals, herbal products, amino acids and homeopathics**.
- People often use several supplements *simultaneously & in high doses*
- Few nutrition supplements have proven benefits in terms of *health, performance, recovery, or effects on body weight / composition*



# Reasons Canadians Use NHPs

■ Completely agree (9,10) ■ Somewhat agree (6,7,8) ■ Neutral (5) ■ Somewhat disagree (2,3,4) ■ Completely disagree (0,1)



7A. On a scale from '0' to '10', where '0' means you completely disagree and '10' means you completely agree, do you agree or disagree with each of the following statements about why you decided to use natural health products?

Base: Users of natural health product n=1,416

Government of Canada survey, 2010;

<http://epe.lac-bac.gc.ca/100/200/300/pwgsc-tpsgc/por-er/health/2011/135-09/report.pdf>

# Regulations in Canada

- Supplements such as sport drinks, protein powders, energy bars, & meal replacement products are '*regulated*' by **Health Canada's Canadian Food Inspection Agency (CFIA)**
- Energy drinks, vitamin/mineral, & herbal supplements, vitamin-enhanced water & amino acid supplements fall under the **NHP Regulations**



# Regulation of Supplements

2004 → NHP regulations came in Canada

- Manufacturing, packaging, labeling, storage, importation, distribution and sale of NHPs are now under federal regulation
- *No requirement for verification of ingredients or health claims*





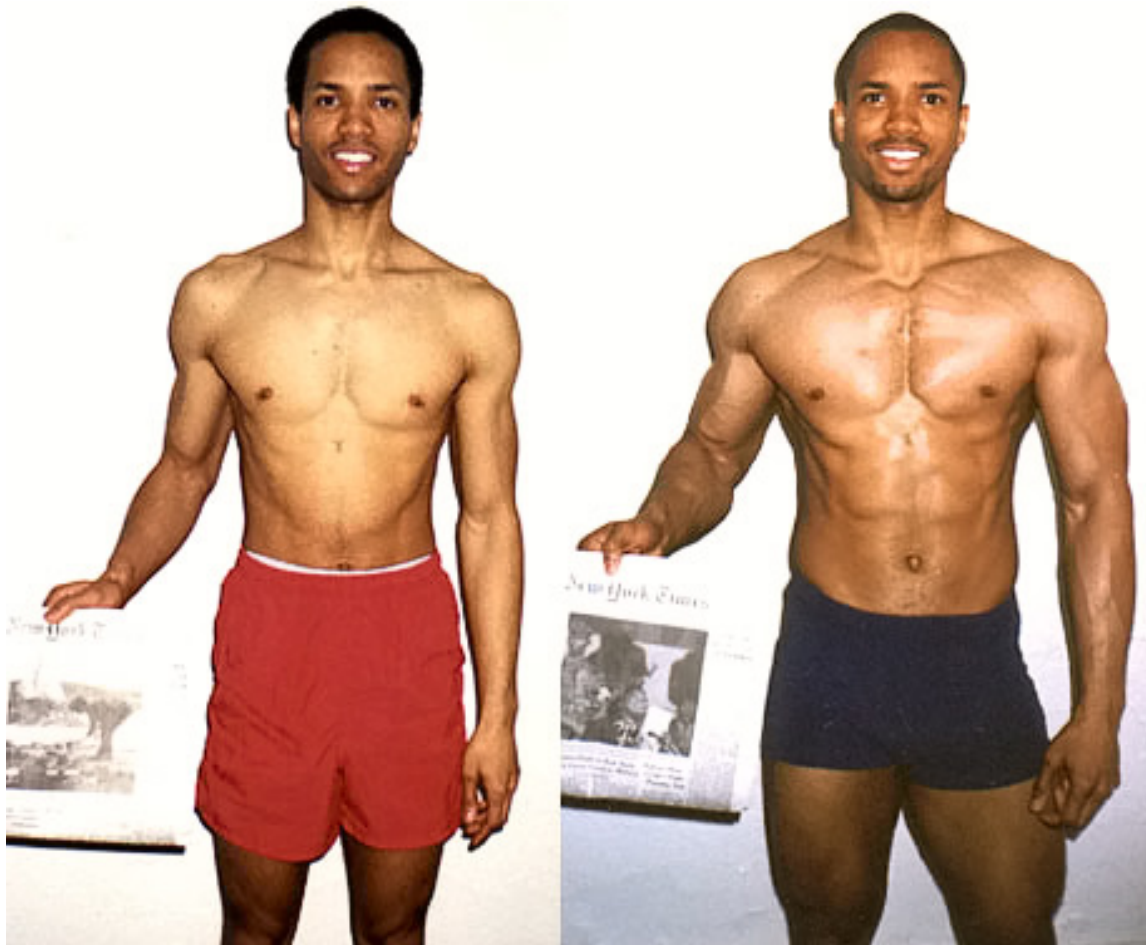
# Regulations in the US

*Dietary Supplements Health and Education Act* claims that nutritional supplements that do not claim to **diagnose, prevent or cure** disease are **not subject to regulation** by the FDA.

- No requirement to prove claimed benefits
- No requirement to show safety for acute & chronic intake
- No requirement for quality control
- No requirement for stringent labeling regulations

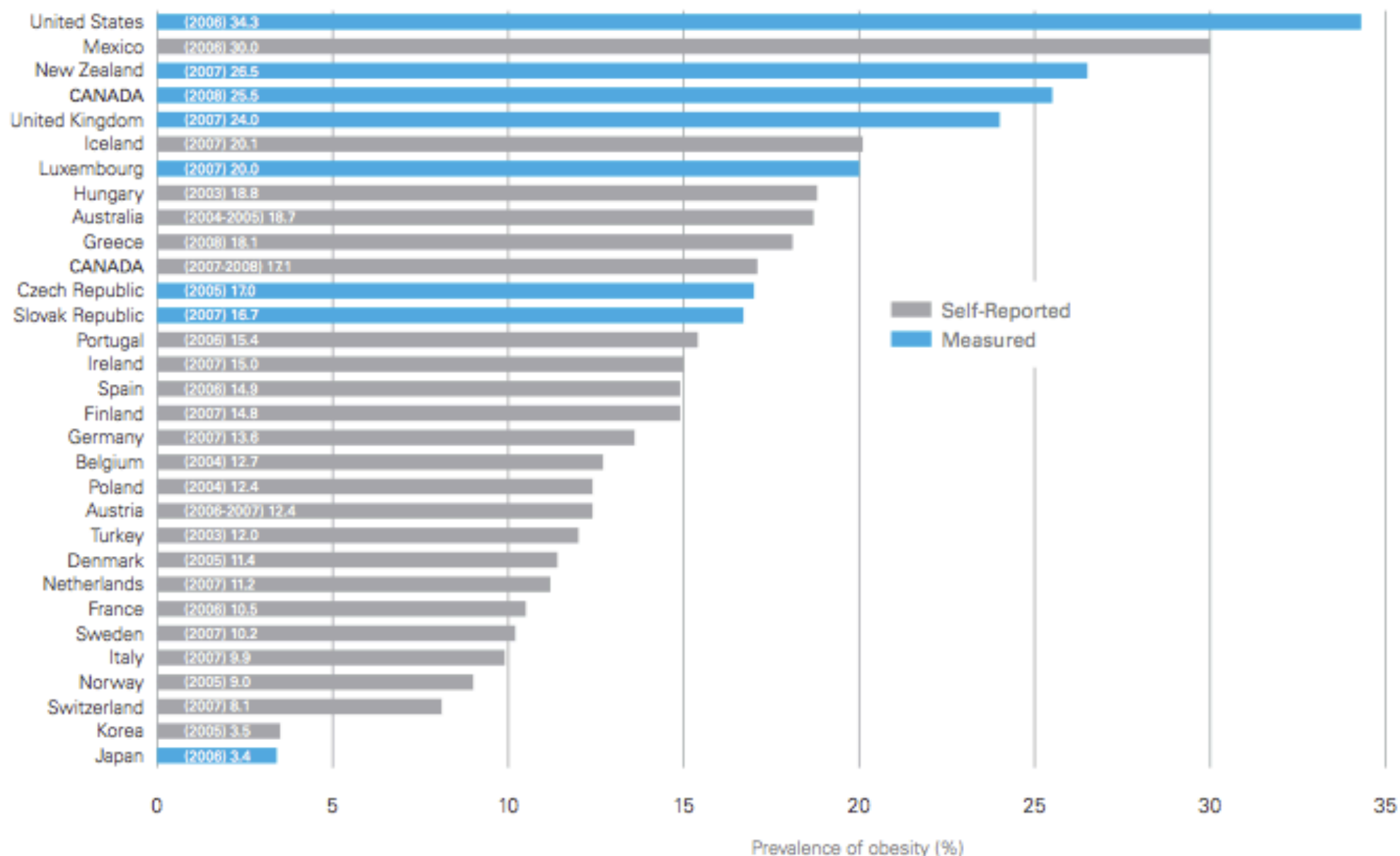


Bigly \$ ... sad ...



**In 2017 in US:  
\$66 Billion+  
Diet & Weight  
Loss Industry!**

**FIGURE 6.** Prevalence of Obesity in OECD Countries, 2004-2008



NOTES: The definition of adult population differs by country. The year listed for each country represents the year in which the data were collected.  
SOURCE: Organisation for Economic Co-operation and Development (OECD) Health Data 2009.

# Do you *need* a supplement?

- Analyze your total diet
- Check with your dietician or medical doctor
- *Some supplements can interfere with medications*



# Safety & Efficacy of Vitamin Supplements

*“the present evidence is insufficient to recommend either for or against the use of MVMs by the American public to prevent chronic disease”*

National Institutes of Health  
Expert Panel Report 2015

# Safety & Efficacy of Vitamin Supplements

A comprehensive evaluation of research by the  
**World Cancer Research Fund** and the **American  
Institute for Cancer Research**:

*“recommended against the use of dietary  
supplements for cancer prevention by the public  
because of the unpredictability of potential benefits  
and risks, as well as the possibility of unexpected  
adverse events.”*

# Safety & Efficacy of Vitamin Supplements

- Ironically, the populations at highest risk of nutritional inadequacy are the least likely to take vitamin supplements
  - Flip side?
- Considering only published, randomized, controlled clinical trials, the NIH found that use of MVMs:  
*“did not reduce the risk of any chronic disease.”*

# Turn to Food!

- Canadian food supply is not void of nutrients
- Foods contain a *diverse combination of compounds* that are critical to our health



- Vitamin and mineral supplements don't contain the same amount or variety → not food substitutes
  - Some supplements (e.g. omega-3) show no or negative effects when the whole food (fish) shows positive effects



*Your body evolved to eat food.*

*Your body is what you ate.*

*Eat where & when you live.*

# Questions?

## *Thank you!*



Photo of the  
“fermentation wall” at  
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