

Panacea or Peril:

*Can the foods you eat save you
or doom you?*

September 2018

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EatWhereYouLive.org

Topics for this Session

- History of Human Food
 - Ancient diet
 - Modern diet
- Popular fad-diets
- Vitamins & Supplements
- What works?
- Practical Considerations

What is Nutrition?

Nutrition is the science of food:

- How food *nourishes* our bodies
- How food *influences* our health

Nutrition is a ‘*new*’ science:

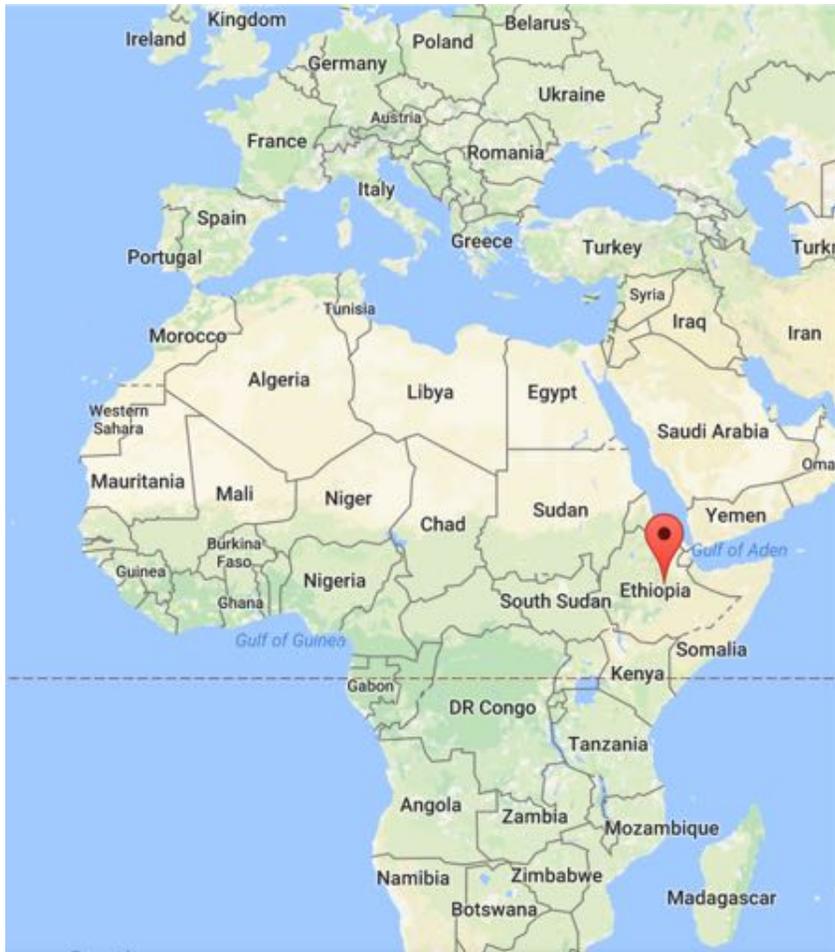
- The *Journal of Nutrition* est. 1928
- In the writings of *Aristotle (384-322 BC)*



3.2 million years ago

“Lucy” - Laetoli hominin

Species = *Australopithecus*,
A. afarensis



1.2 million years ago

Oldest direct evidence of diet

Mostly plants & some meat

All raw (some debate)



Triticeae grass & seeds



0.8 million years ago

Oldest evidence of cooking

Smaller mammals & (likely)
birds + plants & seeds



3000 to 25000 years ago

Cultivating crops & livestock



Ploughing with a yoke made of horns from horned cattle in Ancient Egypt. Painting from the burial chamber of Sennedjem, c. 1200 BC (~3200 years ago).

15000 years ago

Fermentation

- Neolithic development – 4000 to 17200 years ago
- Written about since 9000 years ago in Chinese literature



Neolithic era deer antler ploughs from the region that is now western Russia



Food and cooking items retrieved at a European Neolithic site: millstones, charred bread, grains and small apples, a clay cooking pot, and containers made of antlers and wood

~100 years ago

Industrialized food production & “*Fast-food*”

- 1850s-1950s



A typical modern grocery store has more than 50,000 items



McDonalds was founded in 1940 & in 1948 reorganized with a production line in the kitchen, then franchised in the 1950s

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, likely 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)

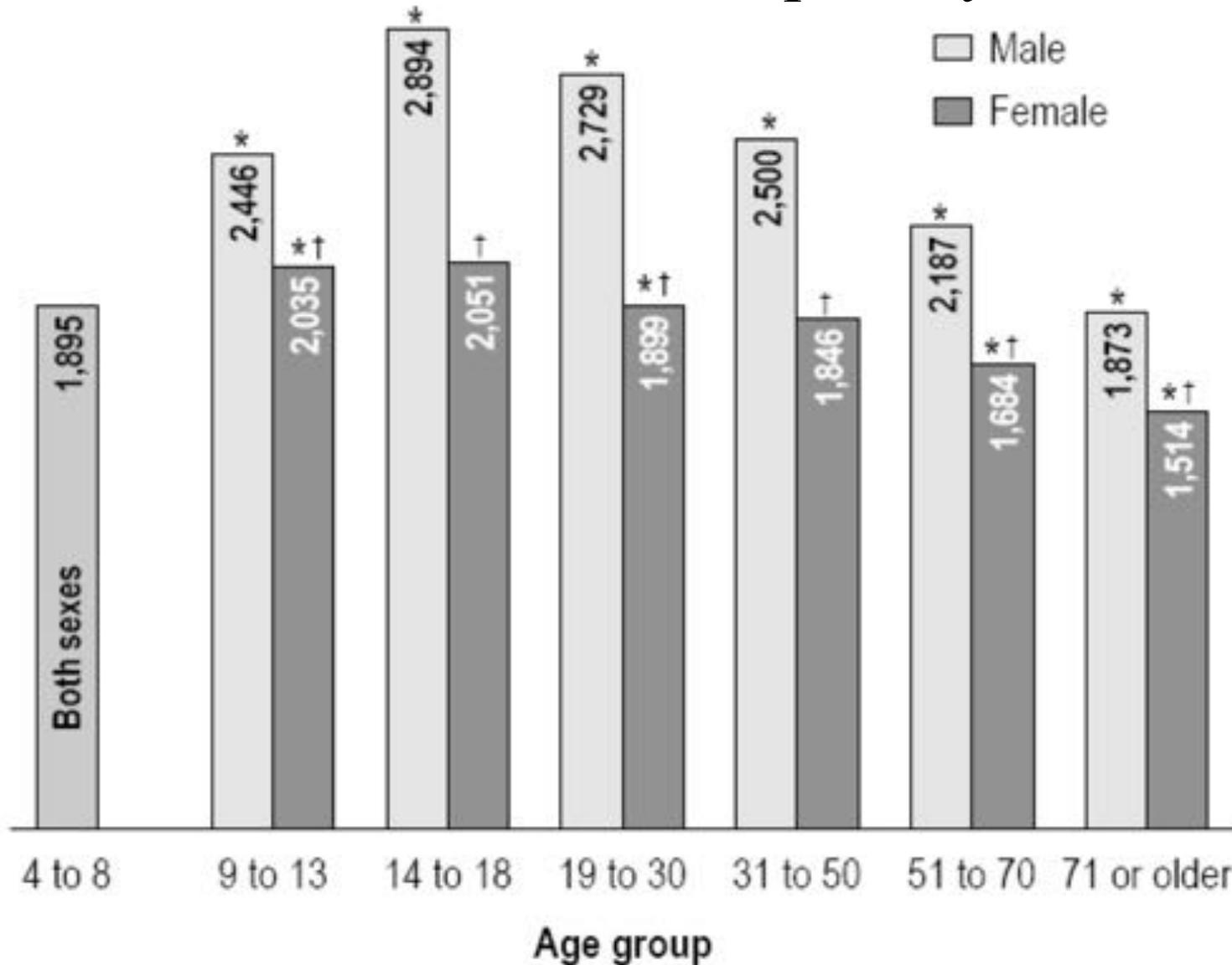
- Industrialized foods & “*fast-food*”

Human anatomy evolved to eat food – specifically a moderate and mixed-diet

Modern Canadian Diet

How many calories do you need each day?

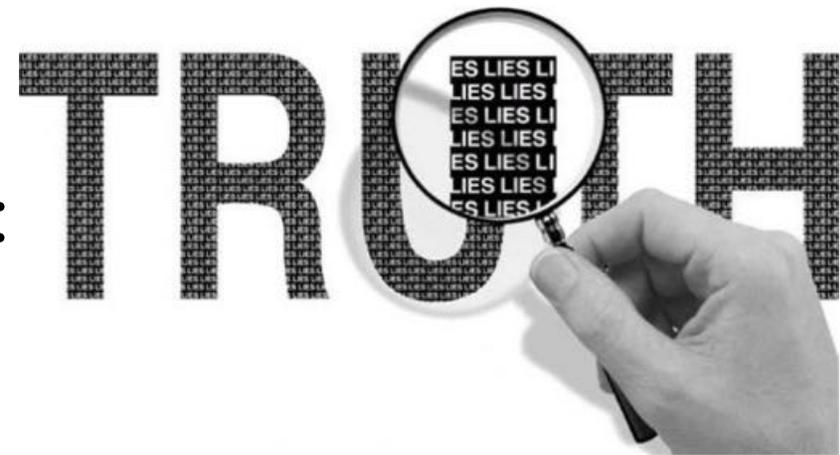
- Numbers are calories consumed per day



Tracking

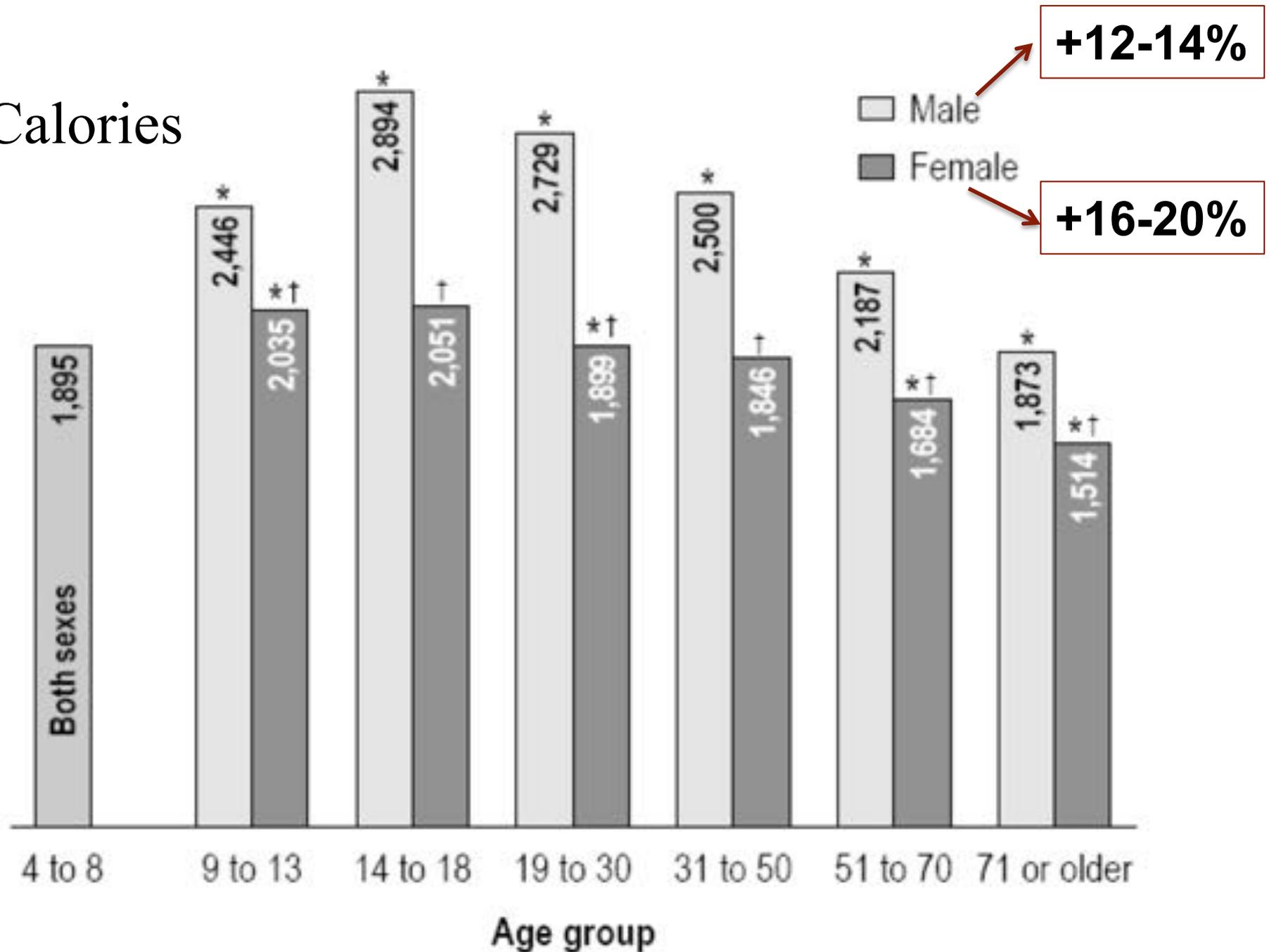
Most people lie about what they eat!

- Chronic under-reporting
- Social pressures/shame
- Results in under-reporting by:
 - 12-14% for men
 - 16-20% for women
- ‘*Health*’ messages may have increased under-reporting
- ‘*Away from home*’ meals is a major factor



Modern Canadian Diet

- Calories



Energy Expenditure (EE)

- Basal Metabolic Rate (BMR)
 - Minimal amount of energy needed to maintain **basic physiological functions**
- Resting Metabolic Rate (RMR)
 - Energy required to maintain basic physiological functions (BMR) in a **relaxed, awake, & reclined state**
- Total Daily Energy Expenditure (TDEE)
 - RMR + any physical activity
 - Gardening, house cleaning, exercise, etc.

How many calories do you need each day?



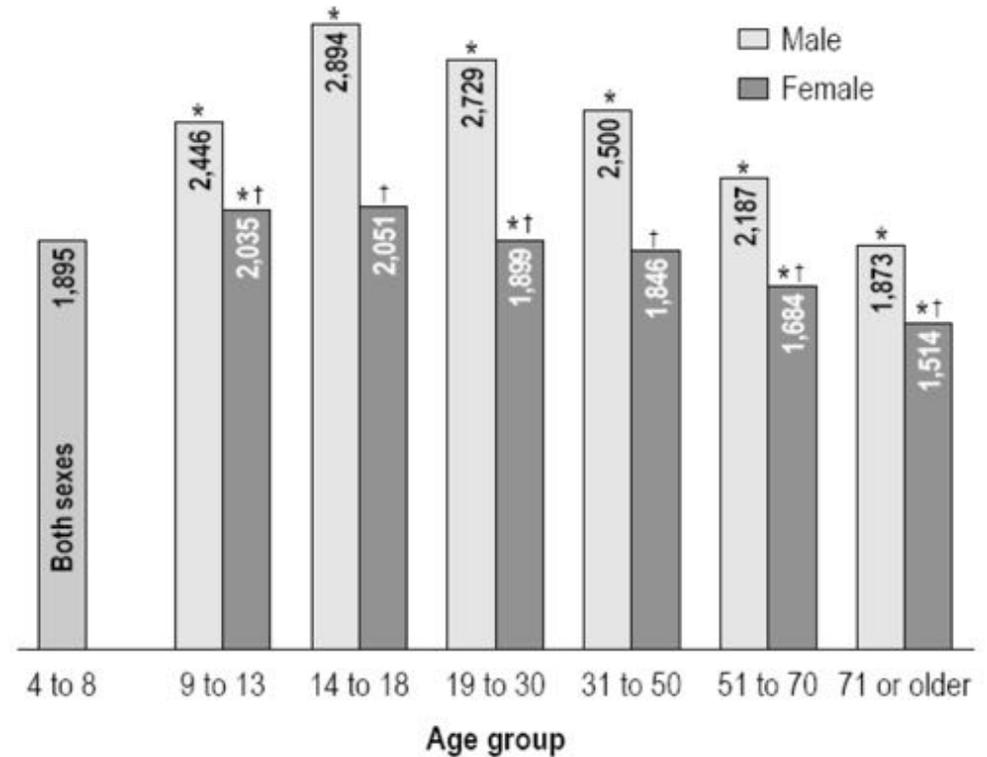
- Highly individual!
- Can estimate Resting Metabolic Rate (RMR) for:
 - *Females*, multiply body weight in pounds by 10
 - Example: $150 \text{ lbs} \times 10 = 1500$ calories per day
 - *Males*, multiply weight in pounds by 11
 - Example: $150 \text{ lbs} \times 11 = 1650$ calories per day

Modern Canadian Diet

How many calories do you need each day?

Calories

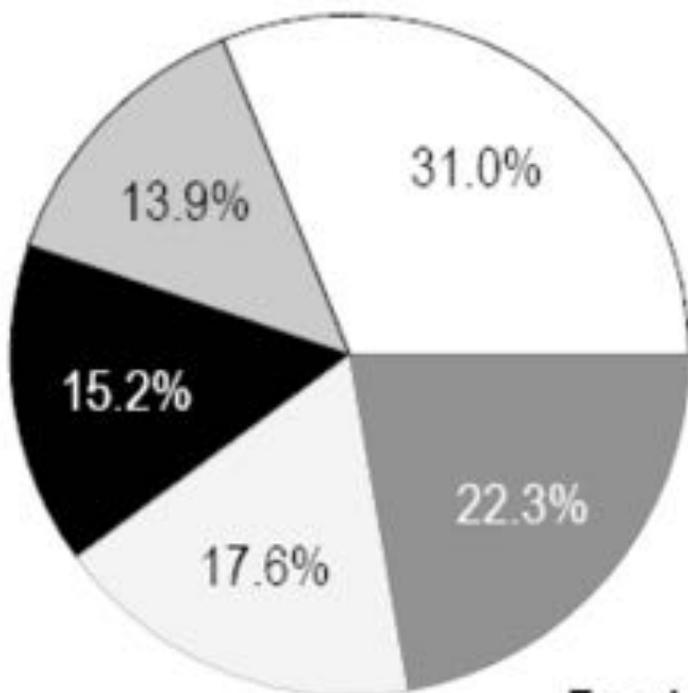
- Should be:
 - 10-35% protein
 - 20-35% fat
 - 45-65% carbohydrate



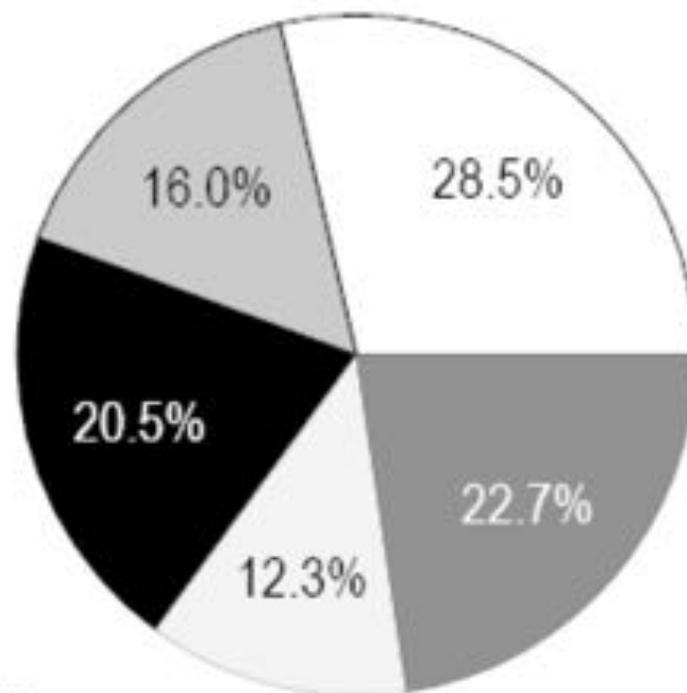
- Where:
 - Protein = 4 calories per gram
 - Fat = 9 calories per gram
 - Carbohydrate = 4 calories per gram
 - Alcohol = 7 calories per gram

Modern Canadian Diet

Ages 4 to 18



Age 19 or older



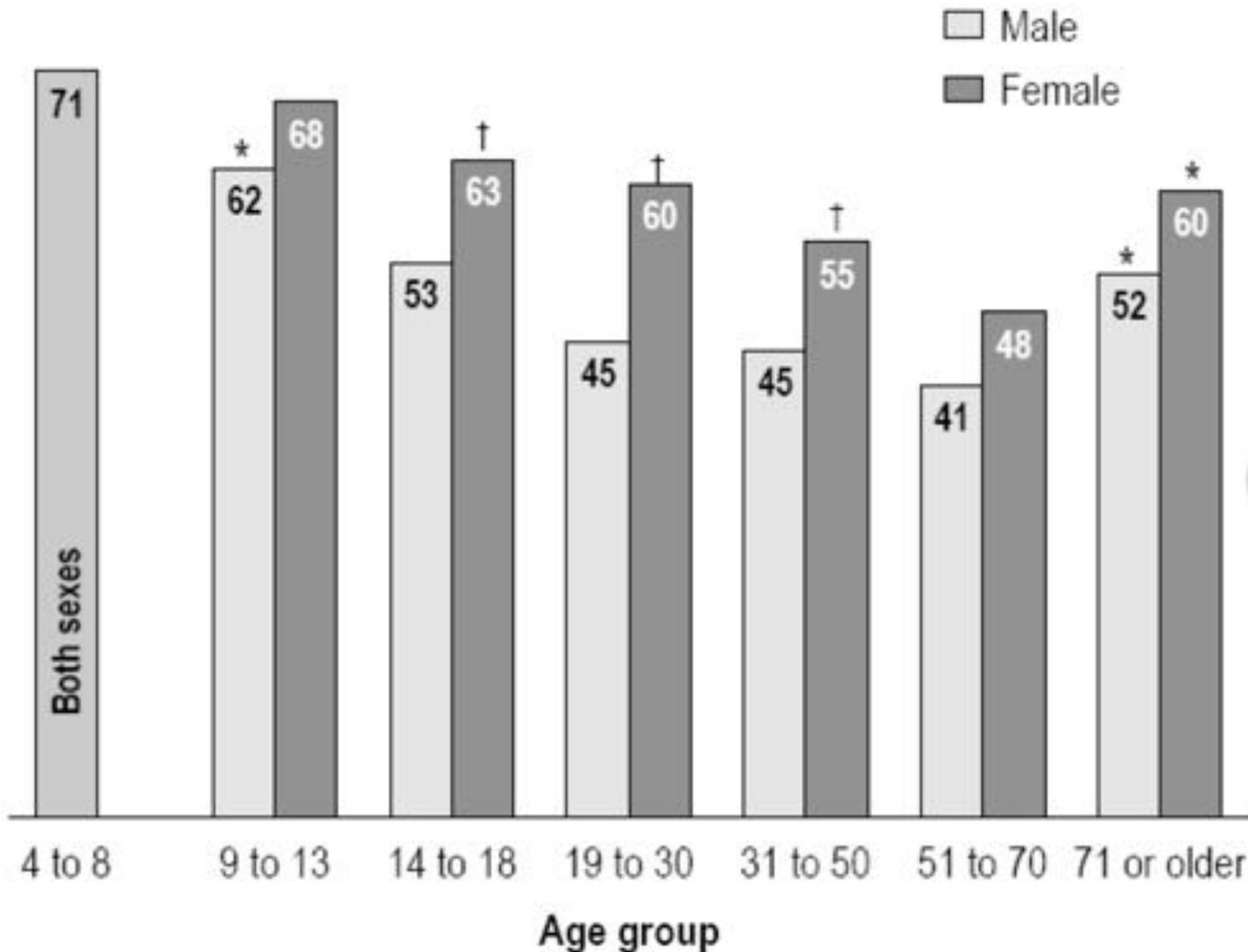
Food group

- Grain products
- Vegetables and fruit
- Meat and alternatives
- Milk products
- Other foods



Modern Canadian Diet

- Fruit and vegetable intake is low
- Numbers are % below recommended servings



Modern Canadian Diet

Meat and Alternatives

Average >200 g per day for *males* 14-70 yr

1 in 4 was over 300 g

136-174 g for *females* 14-70 yr

Younger and older were less



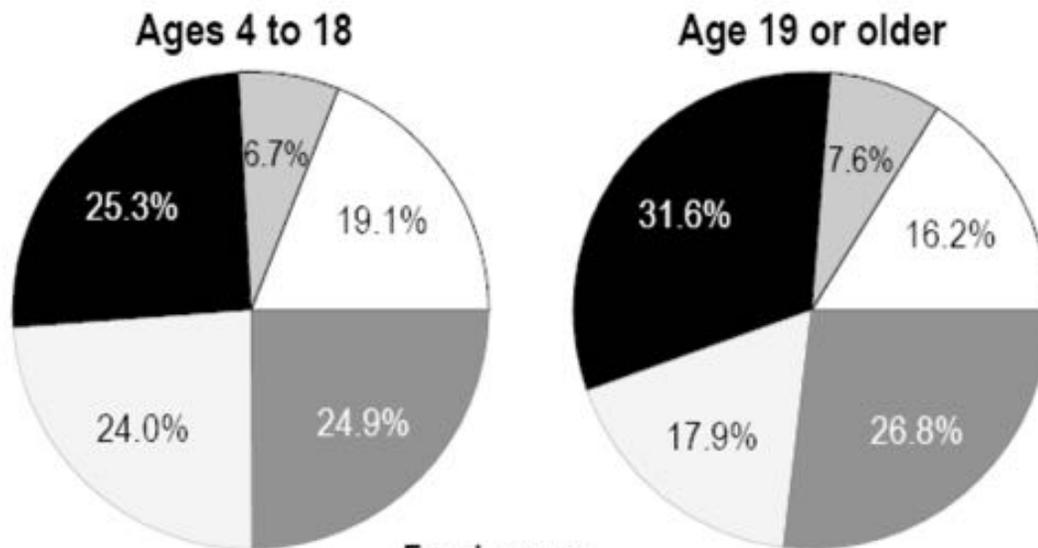
Most modern guidelines are for 1.2 g/kg body weight for older adults:

Example: 150 lbs = 68 kg = 82 g per day

Modern Canadian Diet

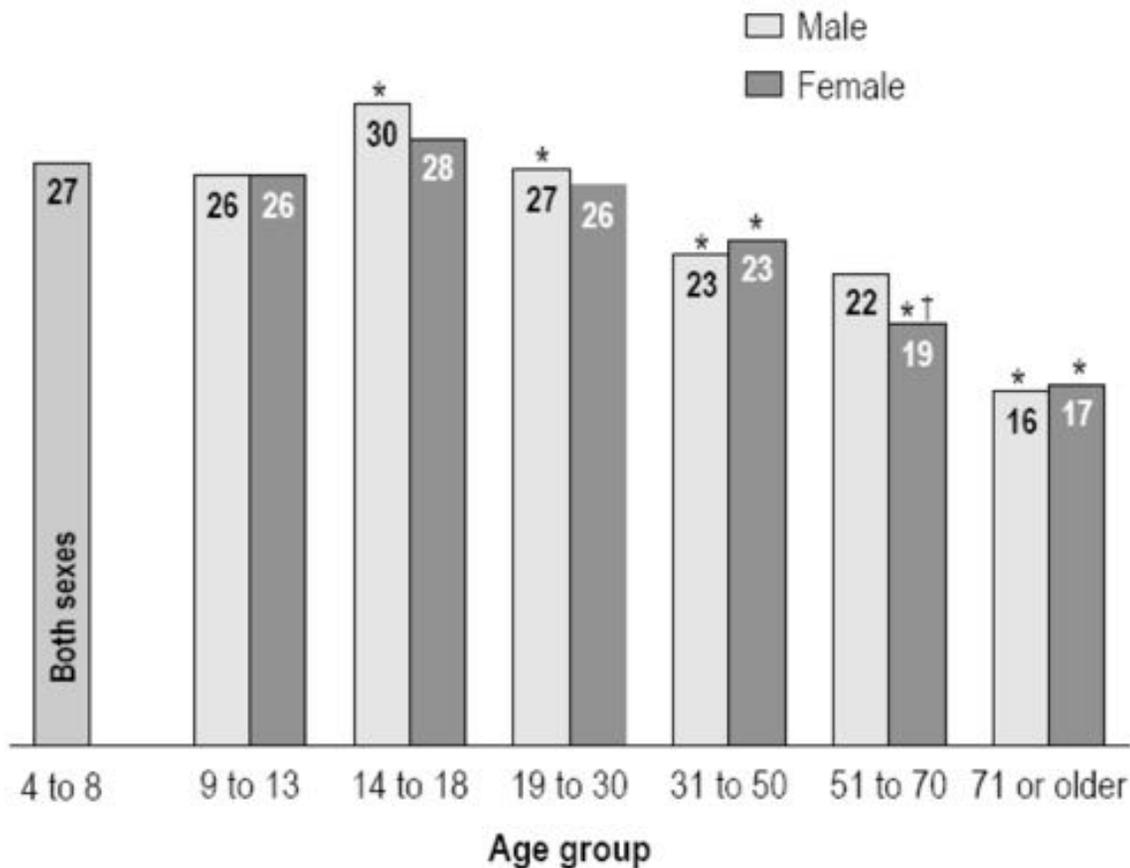
Fats

- Most people exceed recommended intake
- Greatest single source is meat



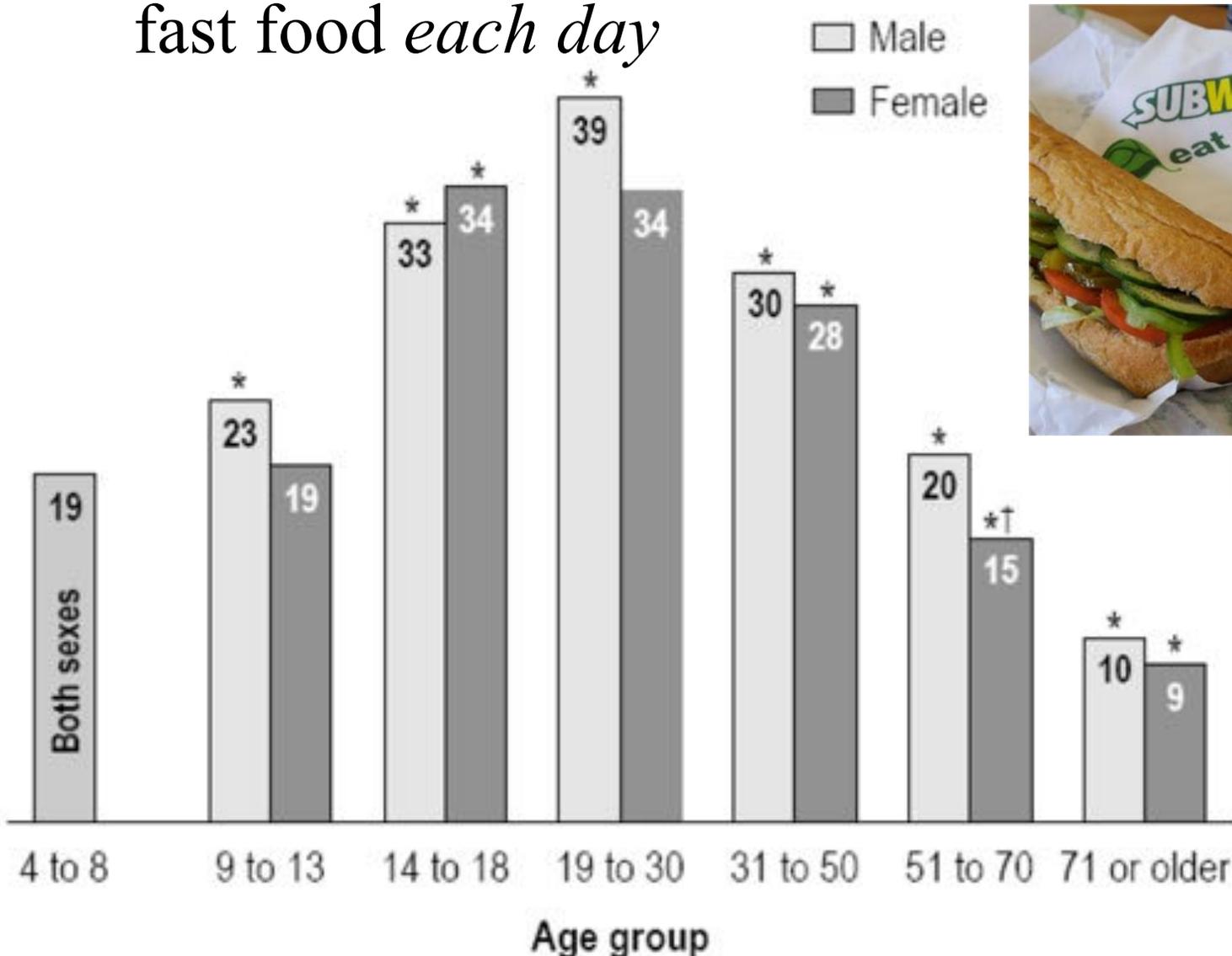
Modern Canadian Diet

- More calories from *snacks* than from *breakfast*
- Most snack calories are “other foods”
- Numbers are % of daily calories from snacks



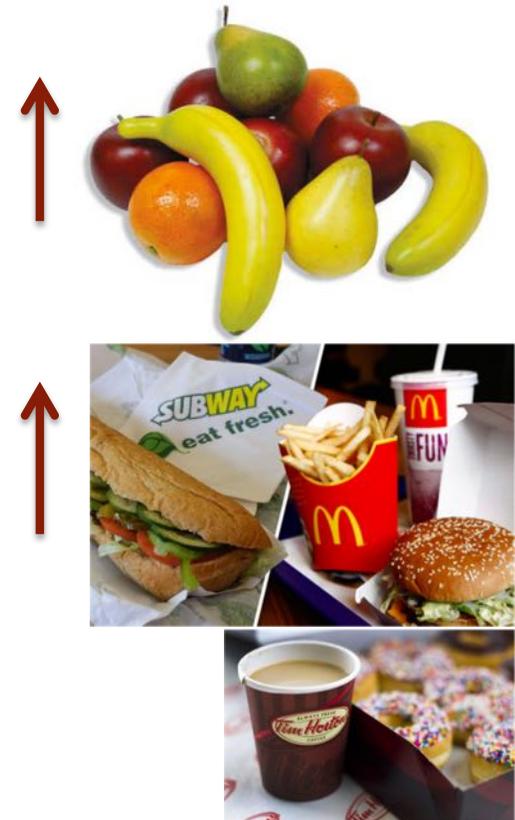
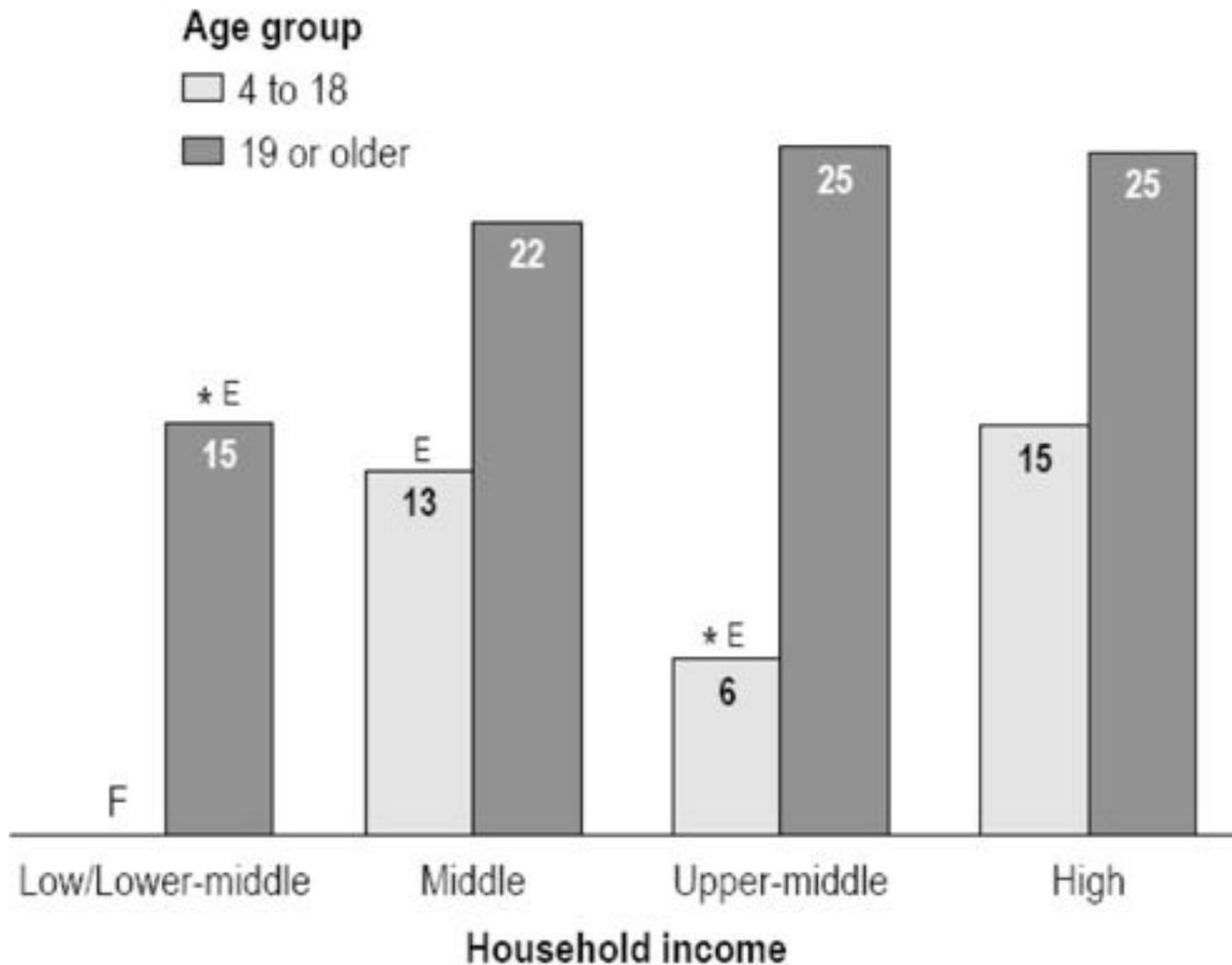
Modern Canadian Diet

- Fast-food consumption
- Numbers are % of population consuming fast food *each day*



Modern Canadian Diet

- Diet and income
- Numbers are % above upper end of recommended range of total calories from fat



Practically Speaking...

How can you track what you're eating?

- Volume versus Mass



or



- What are the advantages to weighing food instead of measuring volume?

- EatTracker.ca



- USDA Food Search Tool



USDA Food Composition Databases

Special K cereal

Original
Originales

✓ SOURCE OF 8 ESSENTIAL NUTRIENTS
SOURCE DE 8 ÉLÉMENTS NUTRITIFS ESSENTIELS

✓ EXCELLENT SOURCE OF IRON / EXCELLENTE SOURCE DE FER

✓ TRANS FAT FREE / SANS GRAS TRANS

Nutrition Facts
Valeur nutritive

Serving 1 cup (32 g)
Portion de 1 tasse (32 g)

Amount per serving	Cereal	With 1/2 Cup Skim Milk
Teneur par portion	Céréales	Avec 1/2 tasse de lait skimmé
Calories / Calories	120	170
% Daily Value / % valeur quotidienne		
Fat / Lipides 0.5 g ¹	1 %	1 %
Saturated / saturés 0 g		
+ Trans / trans 0 g	1 %	1 %
Cholesterol / Cholestérol 0 mg	0 %	0 %
Sodium / Sodium 230 mg	10 %	12 %
Potassium / Potassium 10 mg	0 %	6 %
Carbohydrate / Glucides 24 g	8 %	10 %
Fibre / Fibre 11 g	0 %	0 %
Sugars / Sucres 10 g		
Protein / Protéines 5 g		
Vitamin A / Vitamine A 0 %	0 %	8 %
Vitamin C / Vitamine C 0 %	0 %	0 %
Calcium / Calcium 0 %	0 %	15 %
Iron / Fer 30 %	30 %	30 %
Vitamin D / Vitamine D 20 %	20 %	45 %
Vitamin E / Vitamine E 15 %	15 %	15 %
Thiamine / Thiamine 50 %	50 %	50 %
Riboflavin / Riboflavine 6 %	6 %	20 %
Niacin / Niacine 15 %	15 %	20 %
Vitamin B6 / Vitamine B6 10 %	10 %	15 %
Folate / Folate 8 %	8 %	10 %
Pantothenate / Panthothénate 8 %	8 %	15 %

1. All other values are based on a diet of other people's secrets.

INGREDIENTS / INGRÉDIENTS:
MIX: WHEAT GLUTEN, SUGAR, WHEAT GERM, SALT, MODIFIED MILK INGREDIENTS, MALT FLAVOR (BARLEY FLOUR, MALTED BARLEY).
VITAMINS AND MINERALS: IRON, THIAMINE HYDROCHLORIDE, D-CALCIUM PANTOTHENATE, CHOLECALCIFEROL, (VITAMIN D), PYRIDOXINE HYDROCHLORIDE, FOLIC ACID.
CONTAINS WHEAT, MILK AND BARLEY INGREDIENTS.
MIX: GLUTEN DE BLÉ, SUCRE, GERME DE BLÉ, SEL, SUBSTANCES LAITIÈRES MODIFIÉES, MALT PRIMAIRE DE MALT, ORGE MALTÉE.
VITAMINES ET MINÉRAUX: FER, CHLORURE DE THIAMINE, A-PANTHOTHÉNATE DE CALCIUM, CHOLECALCIFÉROL, (VITAMINE D), CHLORURE DE PYRIDOXINE, ACIDE FOLIQUE.
CONTIENT DES INGRÉDIENTS DE BLÉ, DE LAIT ET DE L'ORGE.

Reported by / Informé par
Kraft Foods Canada Inc., Mississauga, Ontario L4W 9J1

Original
Originales

✓ SOURCE OF 8 ESSENTIAL NUTRIENTS
SOURCE DE 8 ÉLÉMENTS NUTRITIFS ESSENTIELS

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Nutrition Facts
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Amount per serving	Cereal	With 1/2 Cup Skim Milk
Teneur par portion	Céréales	Avec 1/2 tasse de lait skimmé
Calories / Calories	120	170

Questions?

We have time for a short break.

We will start the second half of this session at 7:00 pm if you want to step out for a short break.



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

Intermittent Fasting (IF)

- Most of the research that exists regarding IF are rodent studies.
- The most cited paper in support of IF used mice.
 - The authors reported that in mice, IF works as well as caloric restriction (CR)



Intermittent Fasting (IF)

- In humans, only four published randomized controlled trials (RCTs) have assessed whether IF may be equivalent or superior to an isocaloric CR diet for managing weight and metabolic risk among overweight or obese subjects ([1](#), [2](#), [3](#), [4](#)).
 - All report equivalent weight loss between IF and CR
 - Drop out rates as high as 40% in 5-days



Intermittent Fasting (IF)

- [A recent review](#) concludes that "*no studies to date have tested whether IF can prevent weight gain amongst normal weight subjects*" (Harvie & Howell, 2017).
- Bottom line
 - in rodents and in humans any effect of IF seems about equivalent to the effect of CR and
 - humans don't voluntarily sustain any caloric restriction (IF or CR) very well.

What is Gluten?

- Gluten (from Latin gluten, meaning "*glue*")
 - A group of proteins
 - It is found in wheat, barley, rye, oats, spelt, khorasan, emmer, einkorn, triticale, kamut.
 - Gluten gives elasticity to dough, helping it keep its shape and often gives the final product a chewy/elastic texture.
- Gluten is;
 - Gliadins and glutenin in wheat
 - Hordeins in barley
 - Secalins in rye
 - Avenins in oats



What is Gluten?

- In people with celiac disease, glutens cause an allergic response
 - 1-2% of the general population has celiac disease
- 20-30% of the North American population claims to be '*gluten sensitive*' or '*gluten intolerant*'
 - Dominant theory is that this is a sensitivity instead to FODMAPs
 - Fermentable – meaning they are broken down (fermented) by bacteria in the large intestine
 - Oligosaccharides – “oligo” means “few” and “saccharide” means sugar. These molecules made up of individual sugars joined together in a chain
 - Disaccharides – “di” means two. This is a double sugar molecule.
 - Monosaccharides – “mono” means single. This is a single-sugar molecule.
 - And
 - Polyols – these are sugar alcohols (however don't lead to intoxication!)

Ketogenic Diets (KD)

- Characterized by low CHO & high fat intake
 - LCHF
- Used since the 1960s as an therapy for epilepsy
- Popular since the 1990s in sport
- Popular in the last few years as a ‘fad’ diet for weight loss



keto diet

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About 3,060,000 results (0.61 seconds)

What Is The Ketogenic Diet? - The Truth Behind Ketogenic
Ad www.healthprep.com/Diet ▼
Learn when you should avoid doing this diet and what damage it can cause you.

A Ketogenic Diet for Beginners - Diet Doctor
<https://www.dietdoctor.com/low-carb/keto> ▼
A ketogenic diet is similar to other strict low-carb diets, like the Atkins diet or LCHF (low carb, high fat). These diets often end up being ketogenic more or less by ...

Ketogenic Diets (KD)

Recall:

Typical AMDR

10-35% protein

20-35% fat

45-65% carbohydrate

- “*Classical*” model;

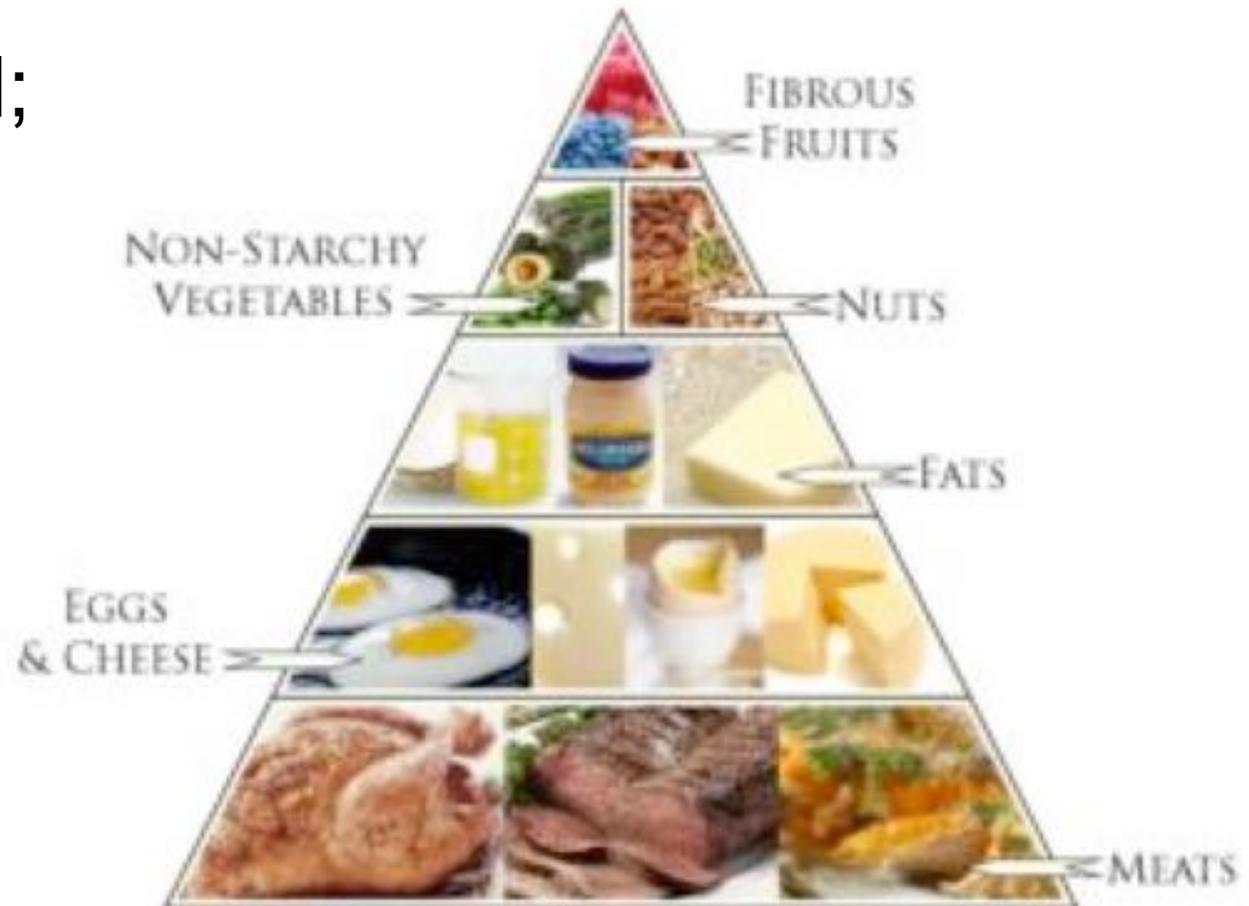
- 90% fat
- 7% CHO
- 3% protein

- “*Modern*” model;

- 60-70% fat
- 20-25% CHO
- 15-20% protein

- Lacks minerals (i.e. potassium, magnesium, etc)

- Lacks vitamins (i.e. C, A, etc)



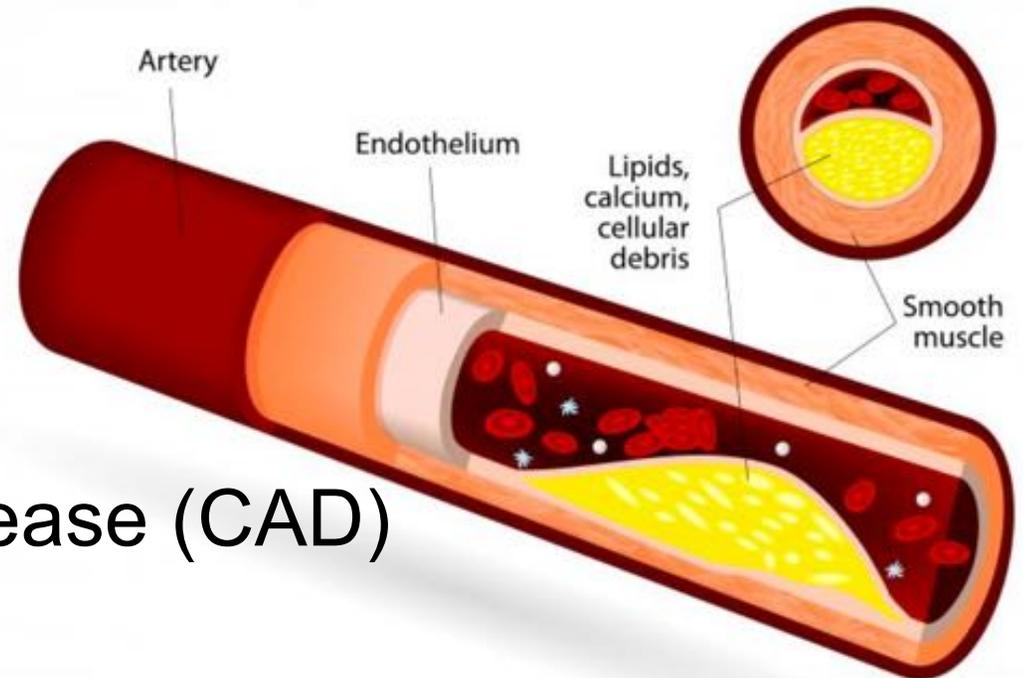
Ketogenic Diets (KD)

Well-established side effects

- known due to use in epilepsy research since the 1960s

Effects include;

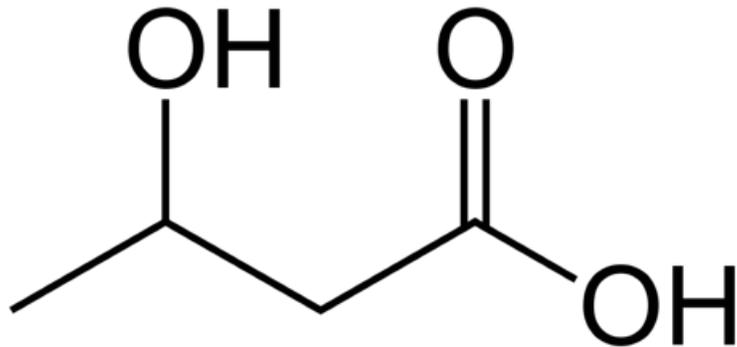
- Hyperlipidemia
- Coronary artery disease (CAD)
- Growth failure
- GI disorders
- Nephrolithiasis



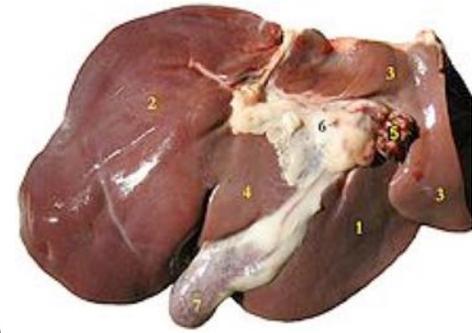
Ketogenic Diets (KD)

β -hydroxybutyrate (primary human ketone)

- Synthesized in the liver from *acetoacetate*
- Can be used as an energy source by the brain when blood glucose is low
- Diabetic patients can have their ketone levels tested via urine or blood to indicate *ketoacidosis*



Ketogenic Diets (KD)



β -hydroxybutyrate (primary human ketone)

- In *alcoholic ketoacidosis*, this ketone body is produced in greatest concentration

- Occurs if *oxaloacetate* in the liver cells is depleted, a circumstance created by
 - reduced carbohydrate intake (through diet or starvation),
 - prolonged, excessive alcohol consumption,
 - insulin deficiency

- In *epilepsy* patients on the ketogenic diet, blood β -hydroxybutyrate levels correlate best with degree of seizure control.

Ketogenic Diets (KD)

Efficacy for weight-loss?



Hall et al. 2016

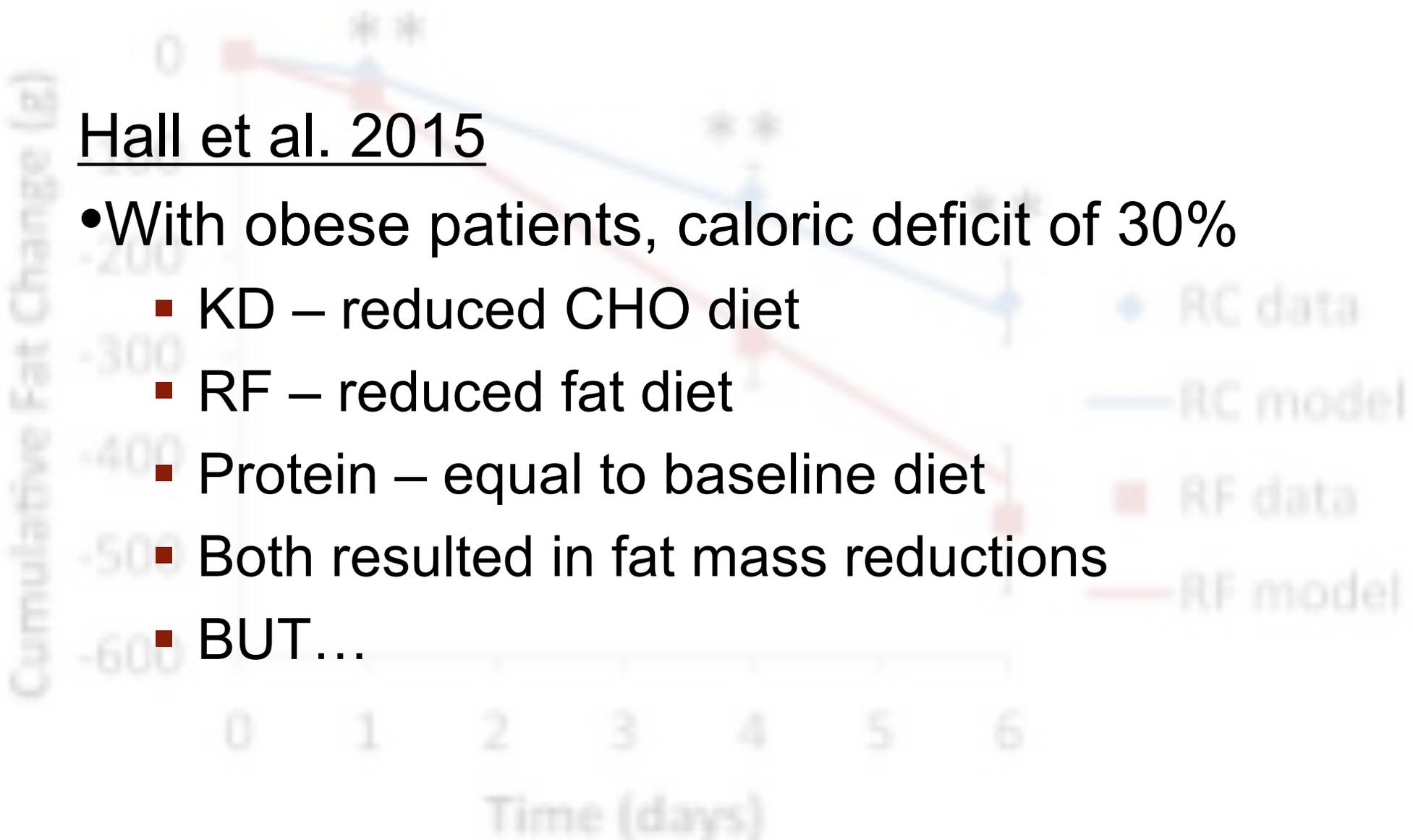
- With obesity, caloric deficit of 300 Cal/d
 - high-CHO baseline diet, followed by KD with equivalent protein
 - KD resulted in increased daily EE ~50-200 kcal
 - KD resulted in less body fat loss
 - KD resulted in increased loss of lean-mass
 - Increased protein oxidation

What works for weight-loss?

Hall et al. 2015

- With obese patients, caloric deficit of 30%

- KD – reduced CHO diet
- RF – reduced fat diet
- Protein – equal to baseline diet
- Both resulted in fat mass reductions
- BUT...

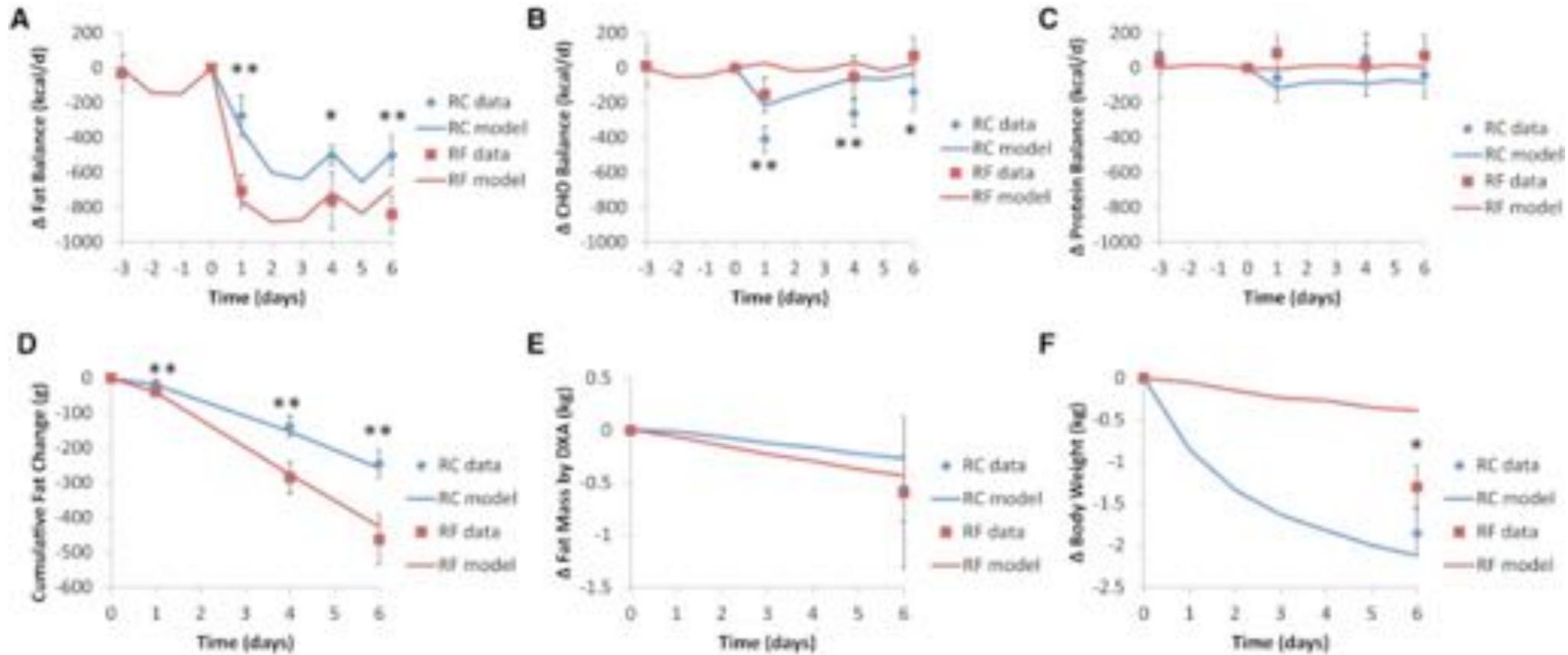


What works for weight-loss?

Hall et al. 2015

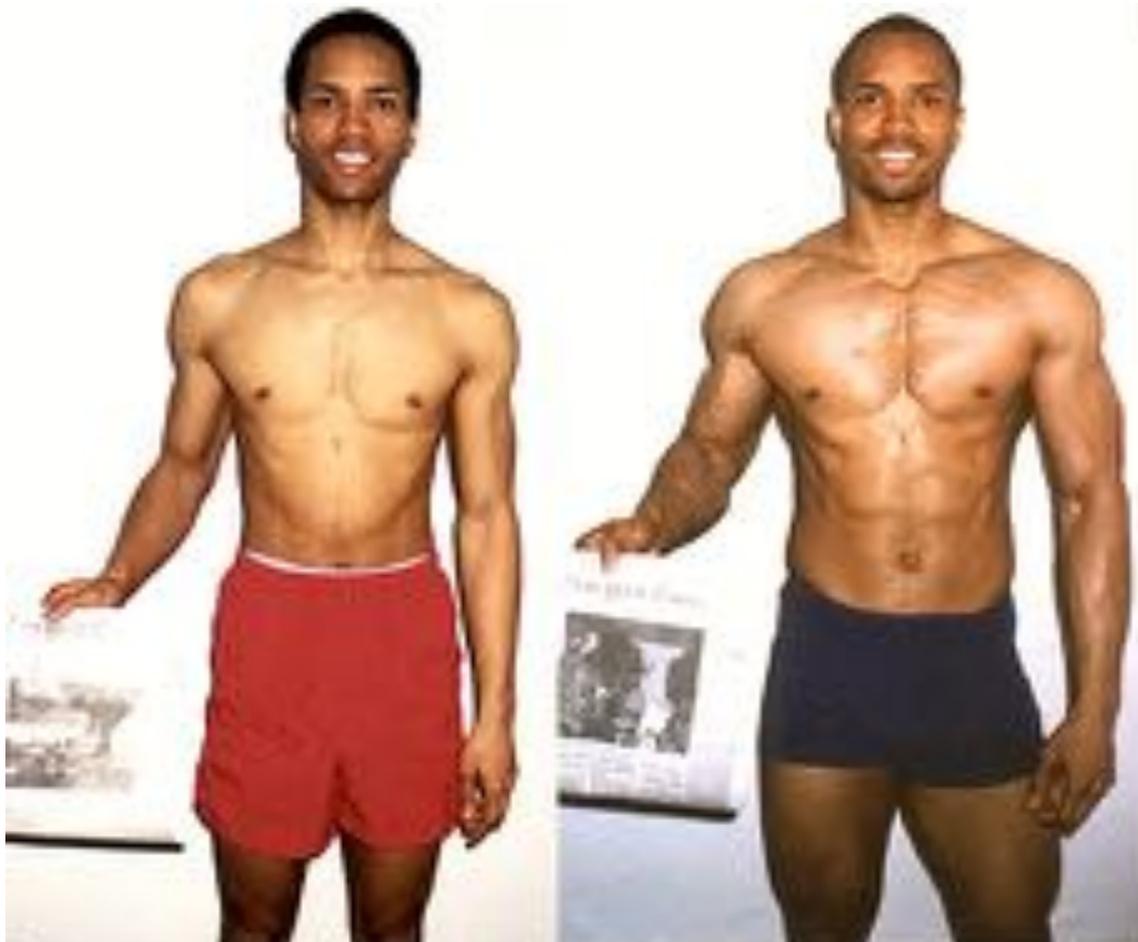
- With obese patients, caloric deficit of 30%
 - KD resulted in **more** weight lost, BUT...
 - KD resulted in **less** body fat loss
 - Then where did the weight loss come from?
 - Muscle glycogen (sugar/energy)
 - Body water losses
 - Muscle protein (used for energy deficit)
 - Reduced Fat (RF) diets and daily exercise are clinically the most effective body fat loss interventions.

What works for weight-loss?



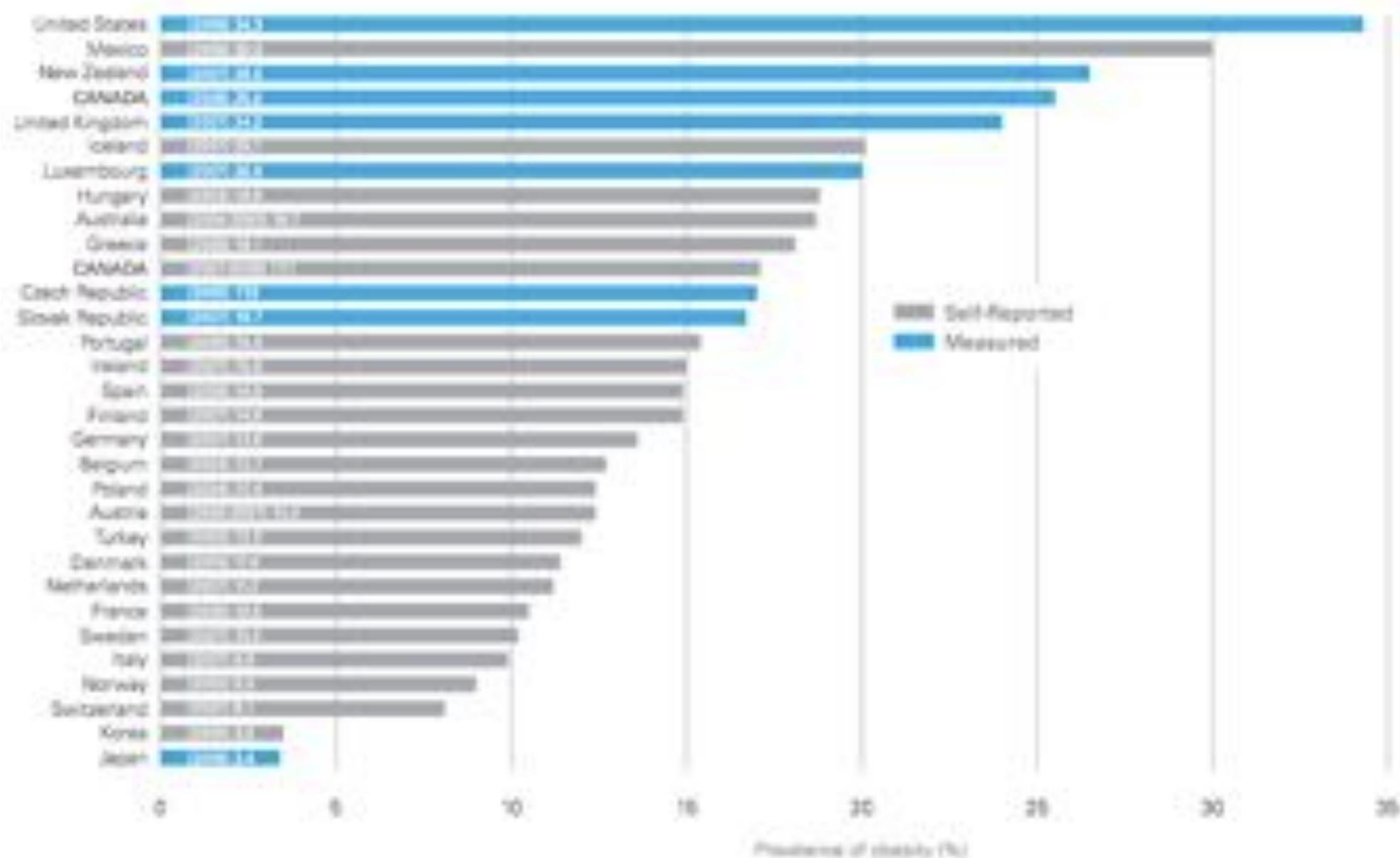
Hall et al. 2015

Bigly spending \$... sad ...



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

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



NOTE: 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, July 2008.

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 Multivitamin/mineral Supplements (MVMs)

“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 Multivitamin/mineral Supplements (MVMs)

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 Multivitamin/mineral Supplements (MVMs)

- 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.”

Contamination of Nutritional Supplements

- 22/44 *did not contain the main ingredient* claimed on the label
- 30/44 of *products available in Canada* tested had substituted ingredients
- 15/44 herbal products contained *contaminants* and or *fillers* not listed on the label



Herbal products available to consumers in the marketplace may be *contaminated* or *substituted* with alternative plant species and fillers that are not listed on the labels



- WHO lists this as a “*global concern*”

Turn to Food!

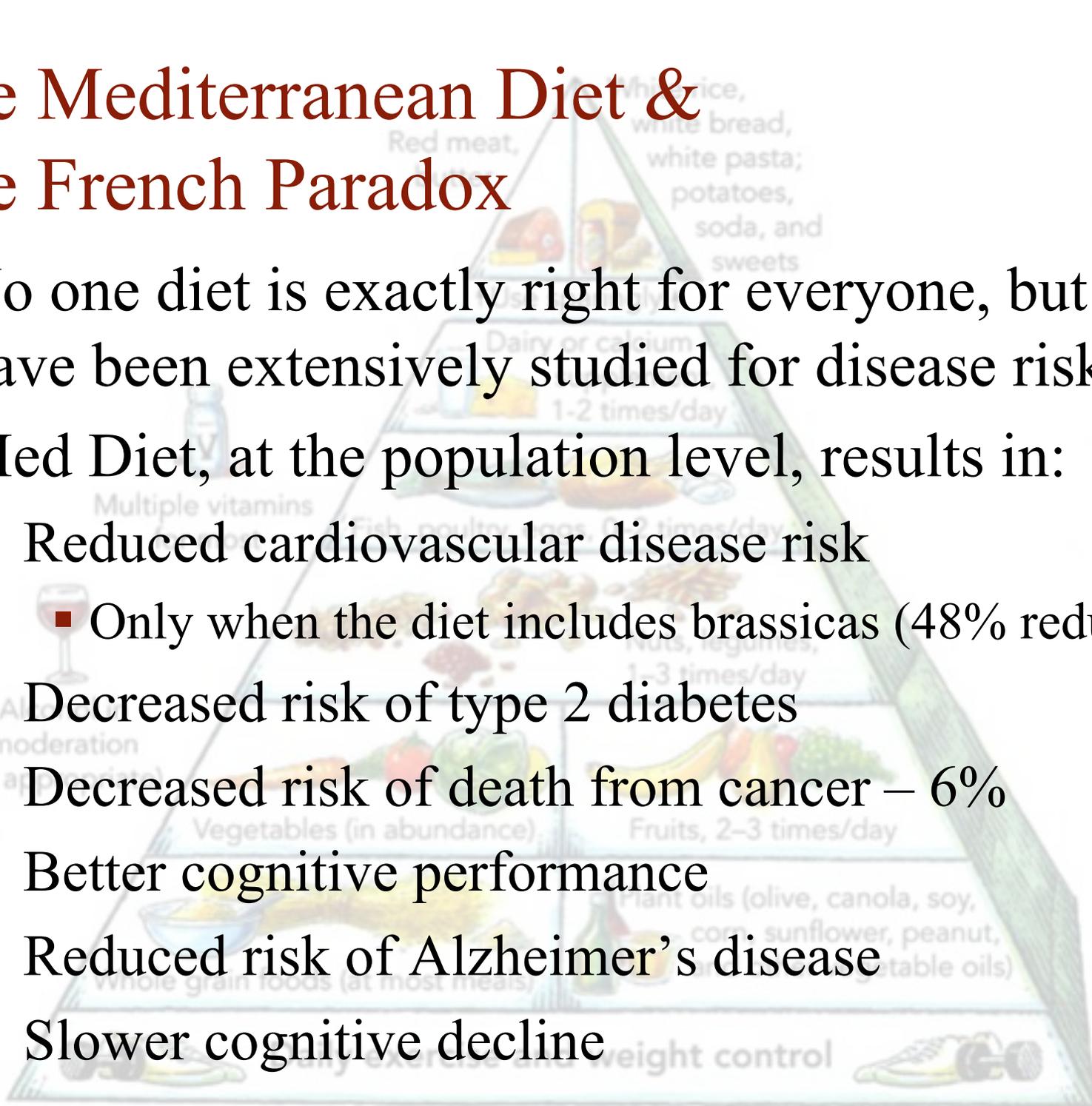
- Canadian food supply is not void of nutrients
- Foods contain a *diverse combination of compounds* that are critical to our health



- 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

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



Cruciferous Vegetables

- Excellent source of disease-preventing nutrients, including;

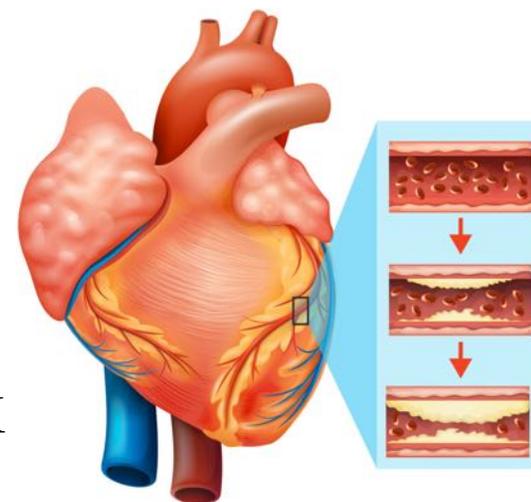
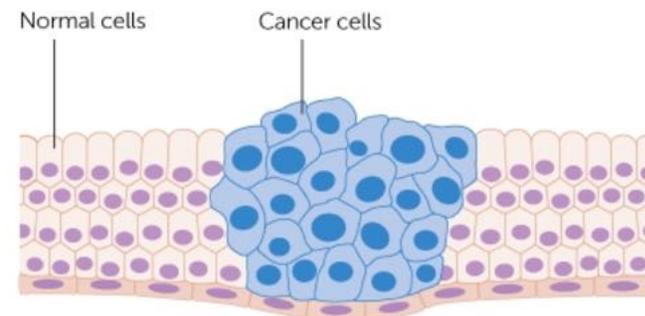
- Vitamins C, E, K
- Folate
- Minerals
- Carotenoids



- e.g., beta-carotene, lutein, and zeaxanthin.
- Cruciferous vegetables are also a unique source of *glucosinolates*
 - a large group of sulfur containing compounds, which have been shown to *trigger the death of tumor cells*

Cruciferous Vegetables

- A diet high in cruciferous vegetables has been associated with:
 - lower risk of developing cancers of the bladder, breast, colon, endometrium, stomach, lungs, ovaries, pancreas, prostate, and kidneys.
- Inverse association between cruciferous vegetable consumption and heart disease
 - eating at least *one serving* of cruciferous vegetable per week could reduce the risk of heart disease risk by 16-48%.



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

- 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

- What does it look/taste like?
- *High* intake (5+ per day) of:
 - Olive oil – principle source of fat
 - AMDR of 15-35% of daily calories
 - 25-35% in Med Diet with saturated fat 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.

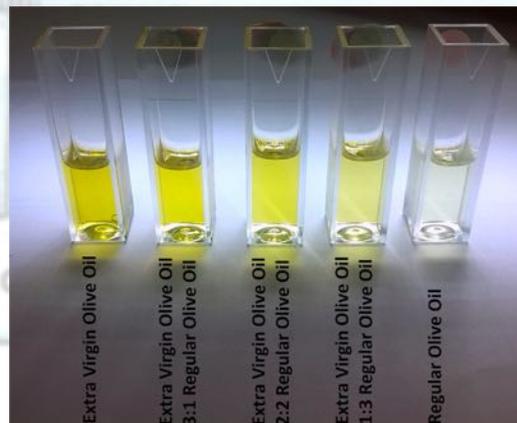
- It should smell and taste ‘fresh’, some combination of:

- Green

- Peppery

- Earthy

- Grassy



Your body evolved to eat food.

Your body is what you ate.

Eat where & when you live.

Questions?

Thank you!

*Related info at
EatWhereYouLive.org*



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

Panacea or Peril:

*Can the foods you eat save you
or doom you?*

September 2018

Greg Mulligan

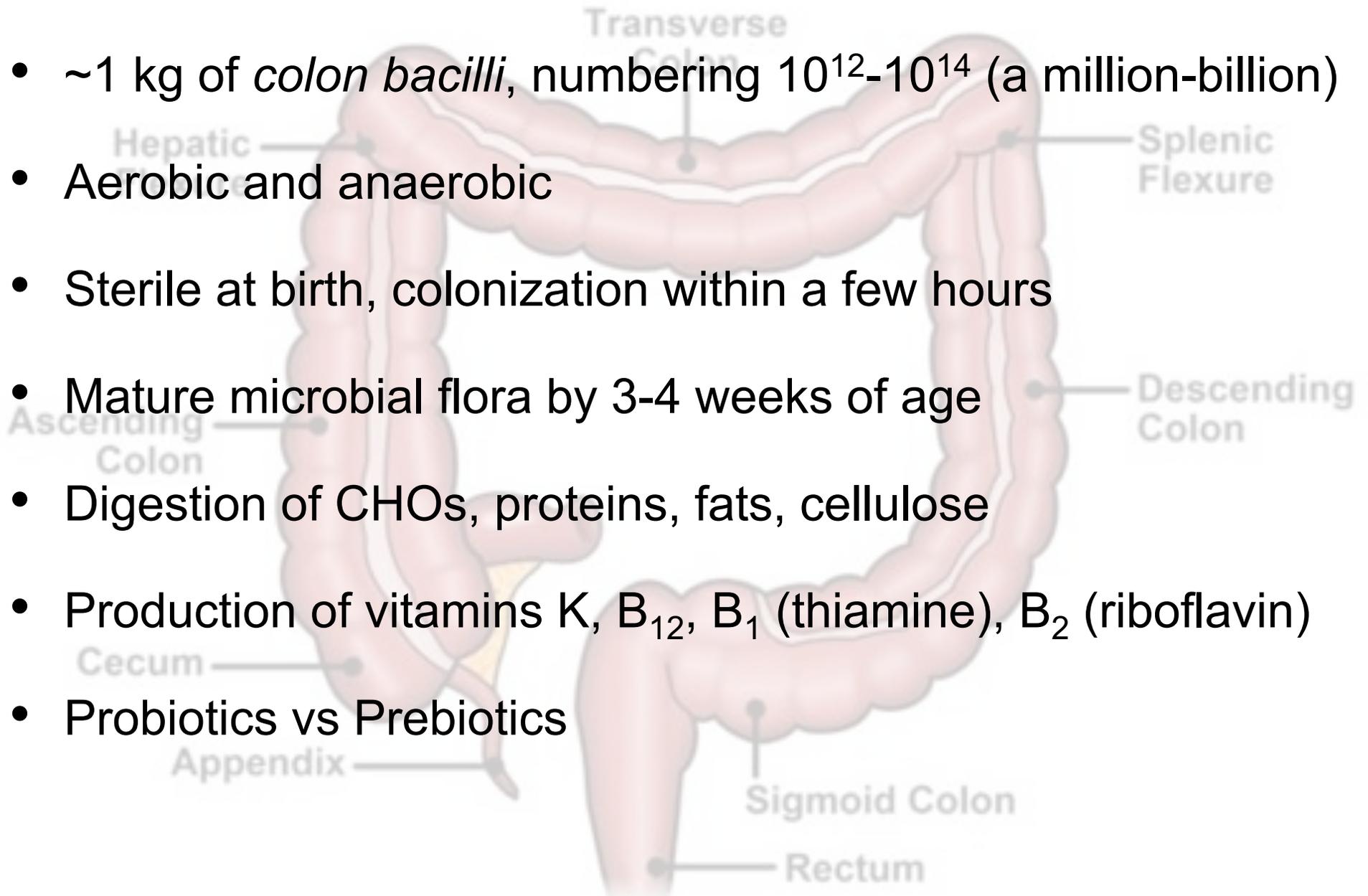
mulligan@uvic.ca

EatWhereYouLive.org

Extra Material ...

(Pro)bacteria in the Colon

- ~1 kg of *colon bacilli*, numbering 10^{12} - 10^{14} (a million-billion)
- Aerobic and anaerobic
- Sterile at birth, colonization within a few hours
- Mature microbial flora by 3-4 weeks of age
- Digestion of CHO's, proteins, fats, cellulose
- Production of vitamins K, B₁₂, B₁ (thiamine), B₂ (riboflavin)
- Probiotics vs Prebiotics



(Pro)bacteria in the Colon

- Microbiota influence metabolism by playing a critical role in controlling our circadian clock
- The disruption of microbiota can result in altered corticosteroid levels and subsequent metabolic disorders.
- Microbiota can change quickly in response to dietary changes and be altered by consuming prebiotic fibres.

(Pro)bacteria in the Colon

- A substance that has prebiotic activity is a substance that exhibits the selective stimulation of growth/activity of gut microbiota that benefits the health of the host.
- Consuming prebiotics and improving gut microbiota has been associated with physiological benefits such as the *improvement of laxation and digestive health, reduced risk of obesity, type 2 diabetes, and colon cancer*, as well as *improved mineral bioavailability*.

Fermentation in Your Body

Fermentation is *dependent* on Gut Microbiota

Probiotic Foods



- Yogurt, cheese, kimchi, sauerkraut, soya sauce, kombucha, kefir, etc
 - Mainly consist of *lactic acid* producing bacteria:
 - *lactobacilli, streptococci, enterococci, lactococci, bifidobacteria, bacillus*
 - Fungi such as *saccharomyces* & *aspergillus*

Practical Considerations

Once they are no longer consumed, *probiotics* wash out of the system quite quickly

Growth of healthy bacteria can be promoted by consuming *prebiotics*

- cheap natural sources
- currently sold as supplements
- also in tube feeding formulas



Risk of using *probiotics* or *prebiotics* are considered negligible

Fermentation in Your Body

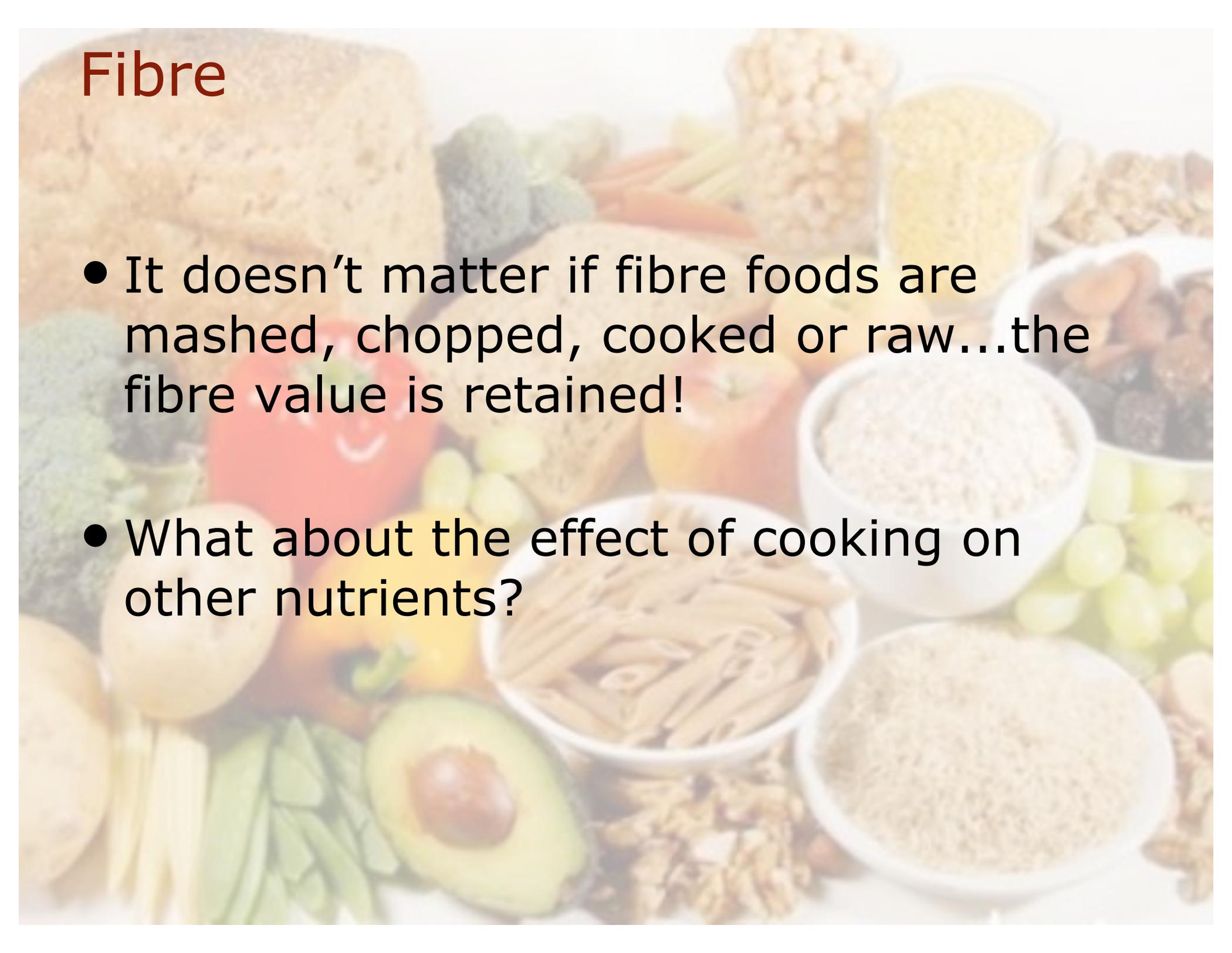
Fermentation is Dependent on Gut Microbiota

Prebiotic Foods

- *Onions, leeks, garlic, wheat, oats, chicory root, bananas, Jerusalem artichoke*
- Building evidence for:
 - *Peas, nuts, rye, barley, wheat, lentils, chickpeas*

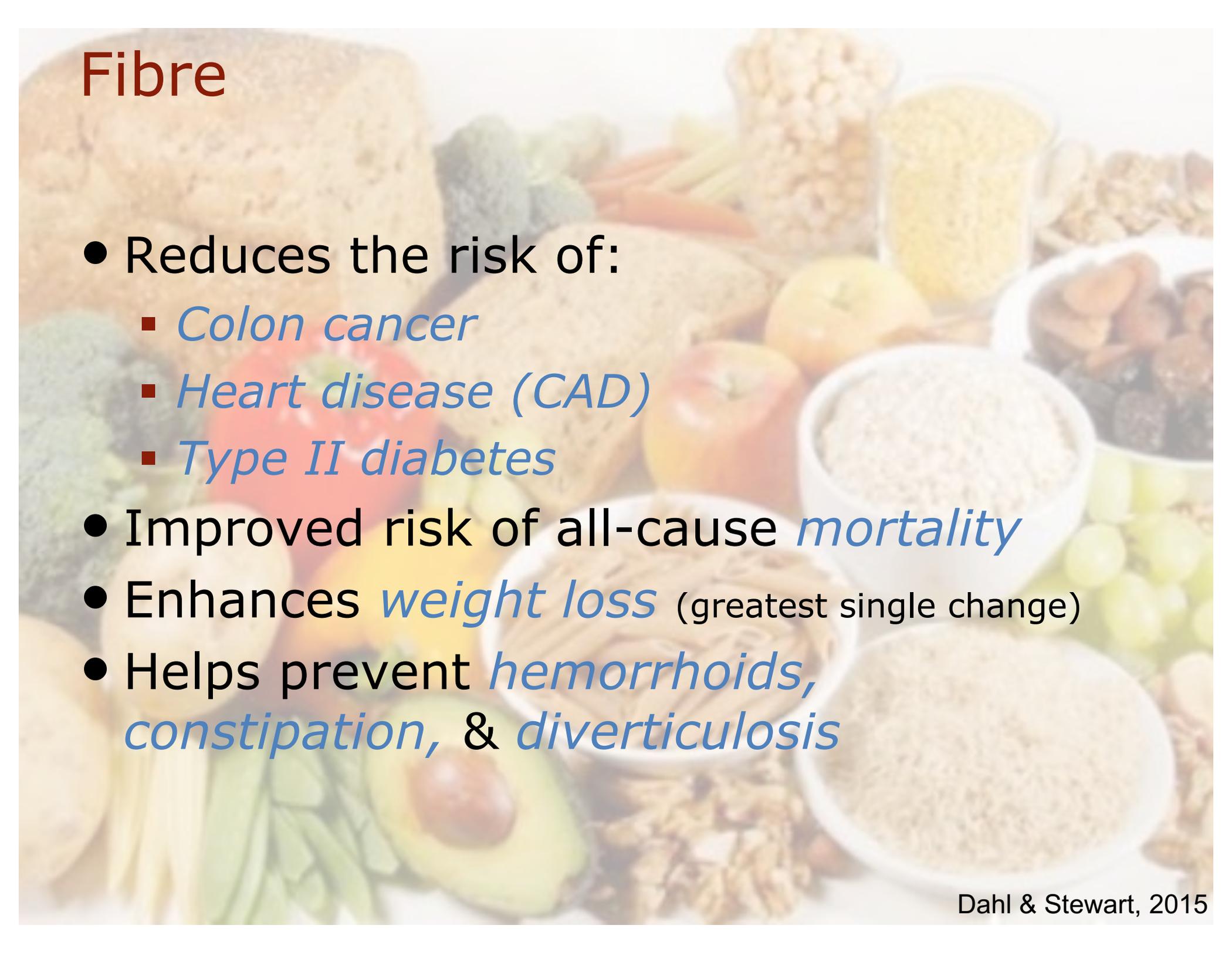


Fibre

A collage of various high-fiber foods including bread, vegetables, fruits, and grains. The image shows a variety of textures and colors, from the golden-brown crust of bread to the vibrant green of peas and the deep red of tomatoes. There are also bowls of different types of grains and nuts, emphasizing the diversity of fiber sources.

- It doesn't matter if fibre foods are mashed, chopped, cooked or raw...the fibre value is retained!
- What about the effect of cooking on other nutrients?

Fibre

A collage of various high-fiber foods including bread, vegetables, fruits, and grains. The background is a soft-focus image of these items, with some items in white bowls or containers.

- Reduces the risk of:
 - *Colon cancer*
 - *Heart disease (CAD)*
 - *Type II diabetes*
- Improved risk of all-cause *mortality*
- Enhances *weight loss* (greatest single change)
- Helps prevent *hemorrhoids, constipation, & diverticulosis*

Panacea or Peril:

*Can the foods you eat save you
or doom you?*

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