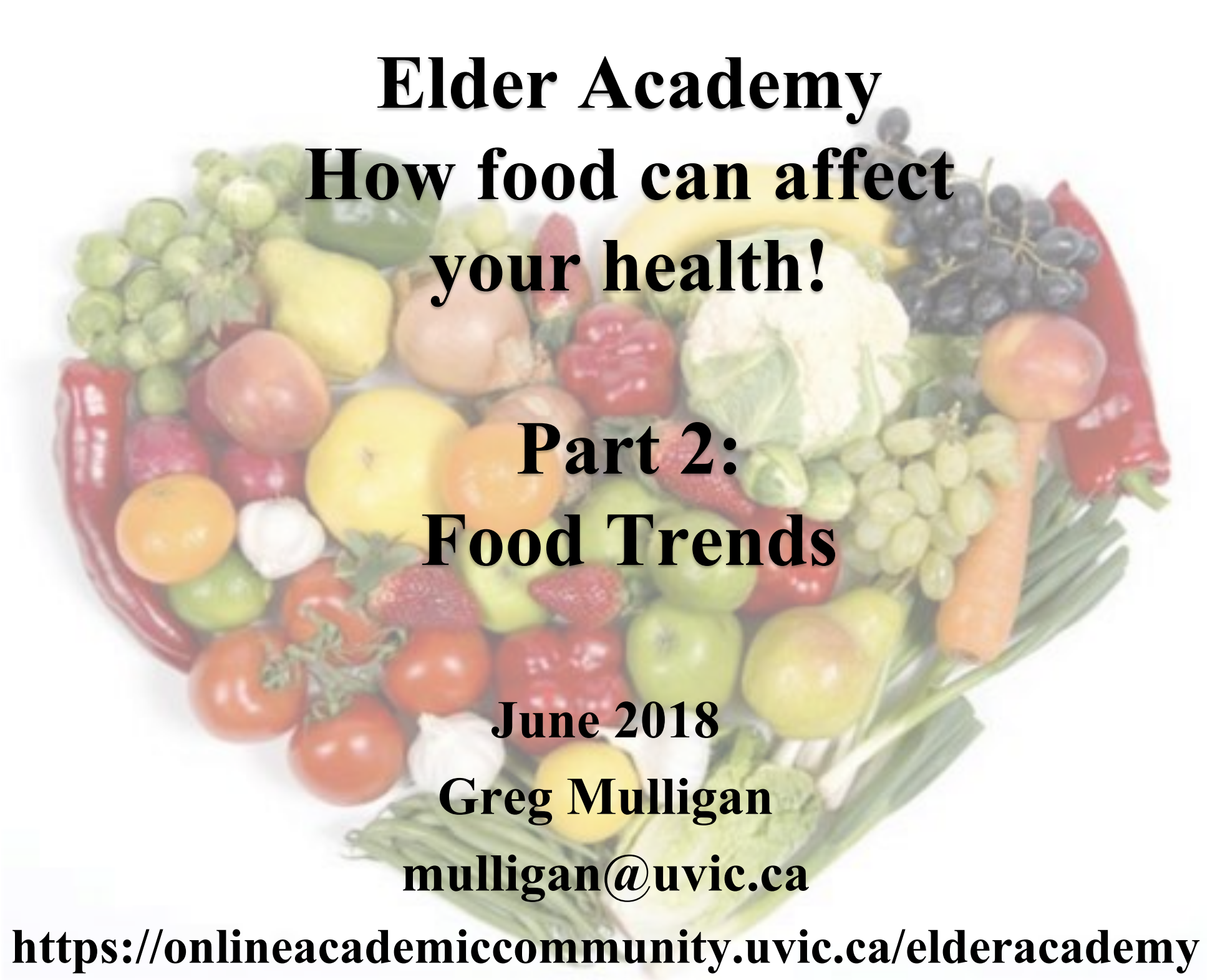

Elder Academy
How food can affect your health!

Part 2:
Food Trends

June 2018

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https://onlineacademiccommunity.uvic.ca/elderacademy

Topics for the Day

- Recap from Part 1
- Organics
- Genetically Modified Foods (GMO)
- Keto-diets
- Gluten-free diets

Pesticides

Pesticides are used to help protect against *crop losses*, *reduce the incidence of crop disease*, and *increase crop yields*

- Common pesticides are *insecticides*, *herbicides*, and *fungicides*
- Can be *natural* or *synthetic*
- Can *remain* as toxins on foods

- Regulated by: Health Canada's Pest Management Regulatory Agency

Noma Restaurant in Copenhagen

Ants on yogurt and beef tartare with ants by chef Rene Redzepi, *Noma Restaurant*

Nordic Food Lab mandate – edible etymology for the future of nutrition

Organic Foods

Organic foods are grown without the use of *synthetic* pesticides

- Organic Products Regulations were put into place in 2009 in Canada
- Approximately 1.7% of all farms in Canada are certified organic farms

CFIA, 2016

Organic Foods

"Organic"

- 95% of ingredients are organic

"Made with organic ingredients"

- 70% or more of ingredients are organic

95% of the ingredients must be organic

70% of the ingredients must be organic

USDA, 2016

Organic Foods

Do you wash your fruits & vegetables?

- Depending on the specific pesticide only some, if any, will rinse off.

- What about ***organic***?
  - Philosophy of not using pesticides
  - According to the Canadian Food Inspection Agency (CFIA) in 2014:

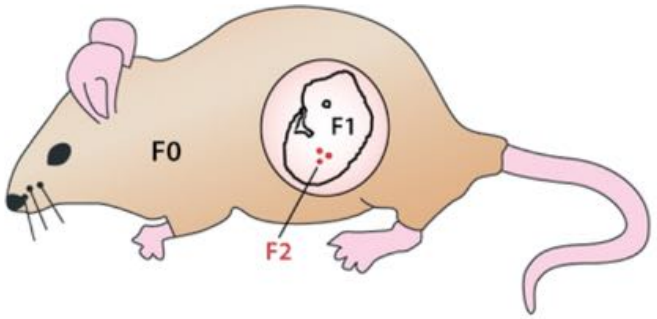
    ~½ contain pesticide residue

CFIA, 2016
Photo by Andrew Hendrickson

Organic Foods

Some pesticides mostly *don't wash off:*

- *Vinclozolin*
- *Bifenthrin*
- *Chlorpyrifios*



Youngson NA, Whitelaw E. 2008.
Annu. Rev. Genomics Hum. Genet. 9:233–57

Some show *transgenerational mutagenic effects*

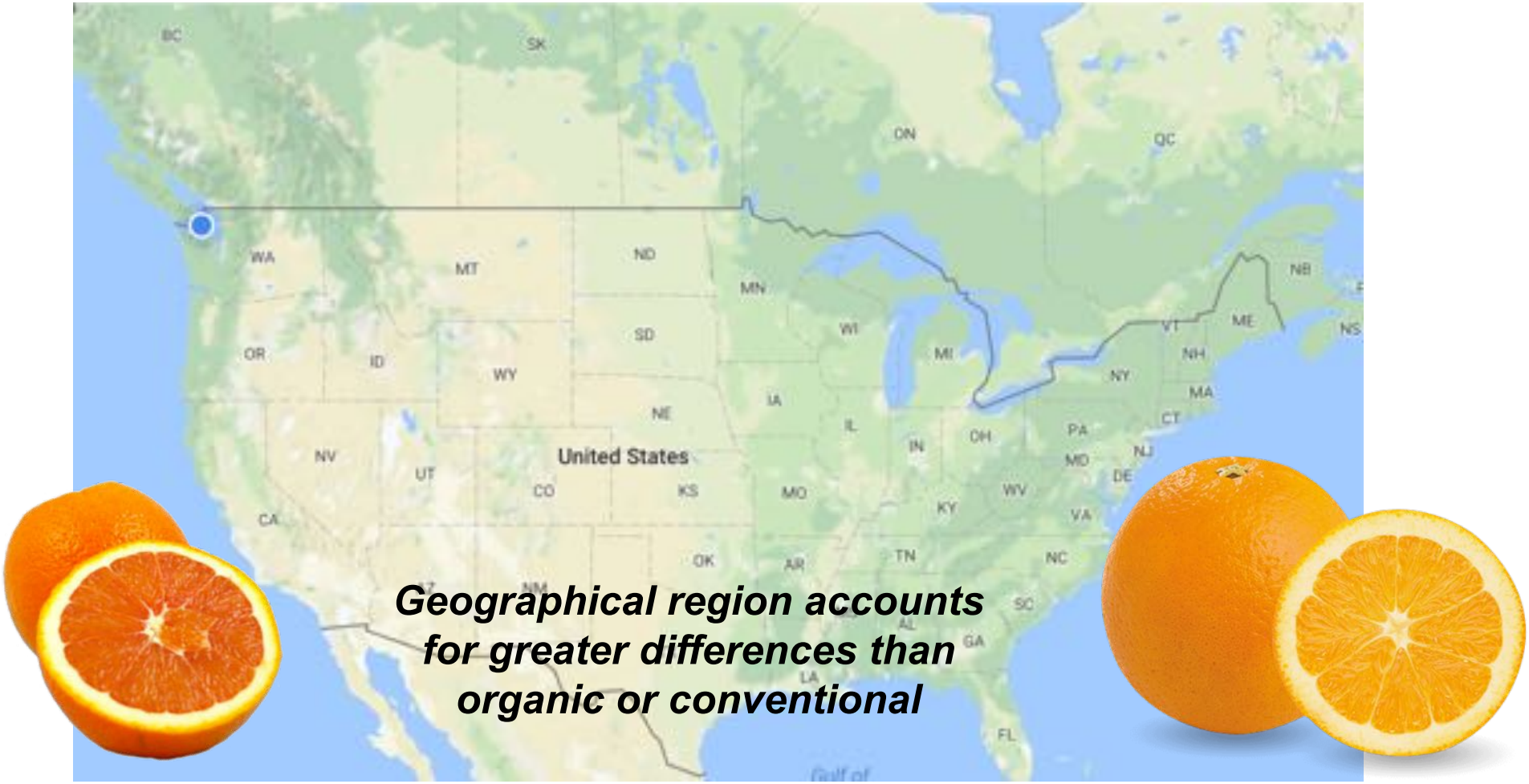
'Fruit & Veggie' washing agents or vinegar might slightly increase cleaning, but not by much:

~ same as scrubbing with water

US EPA, 2016

Are Organic foods healthier for you?

- some fruits & vegetables *may* contain higher
  - vitamins E & C, phosphorus, antioxidant phytochemicals, but …



Are **Organic** foods healthier for you?

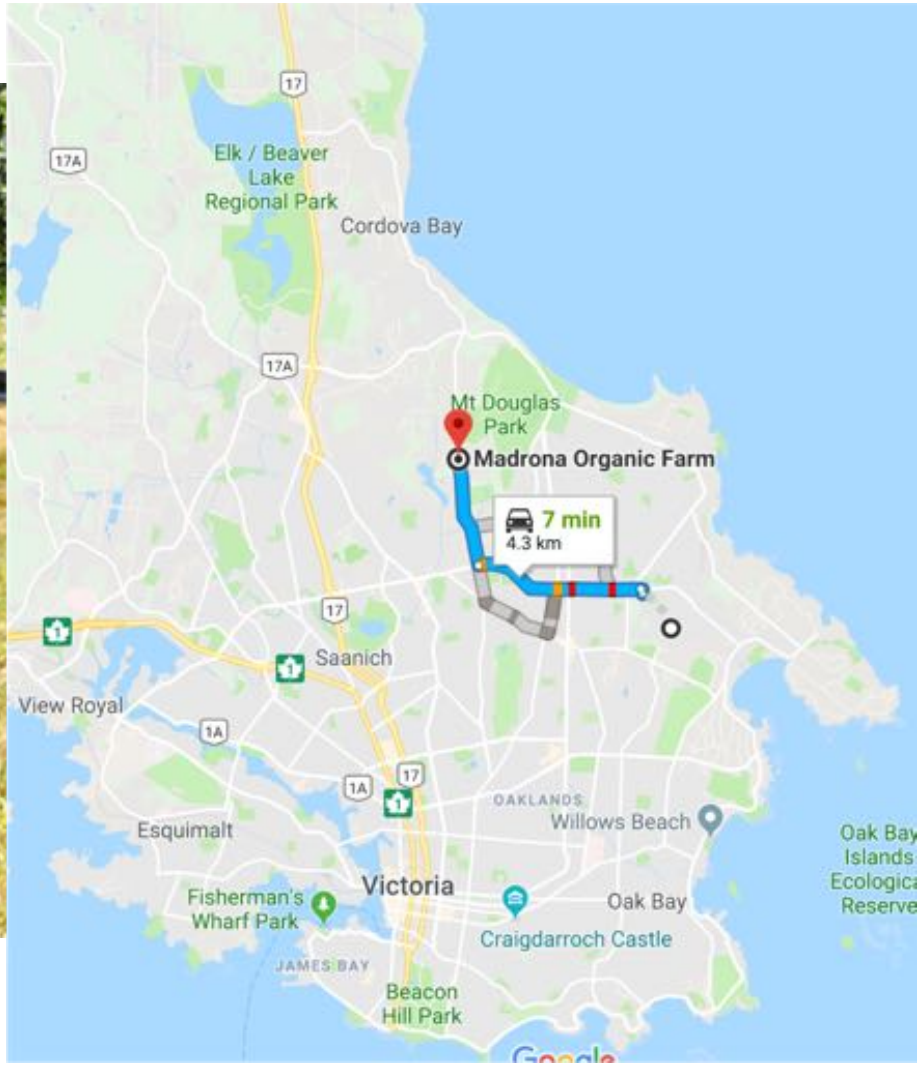
A 2012 review of 240 studies from 1966-2011:

- No clinically significant ***nutrient*** differences
- Less ***pesticide*** exposure
- Same ***E. coli*** & ***bacterial*** contamination risk
- Conventional meats have 33% higher risk for ***antibiotic resistant bacteria***
- "*The published literature lacks strong evidence that organic foods are significantly more **nutritious** than conventional foods.*" (Smith-Spangler et al, 2012)

You might still decide to eat organic for:

1. *Less pesticide exposure* risk
2. *Ecological* reasons
3. *Flavour – phytochemical differences*

Madrona Farm – Saanich BC

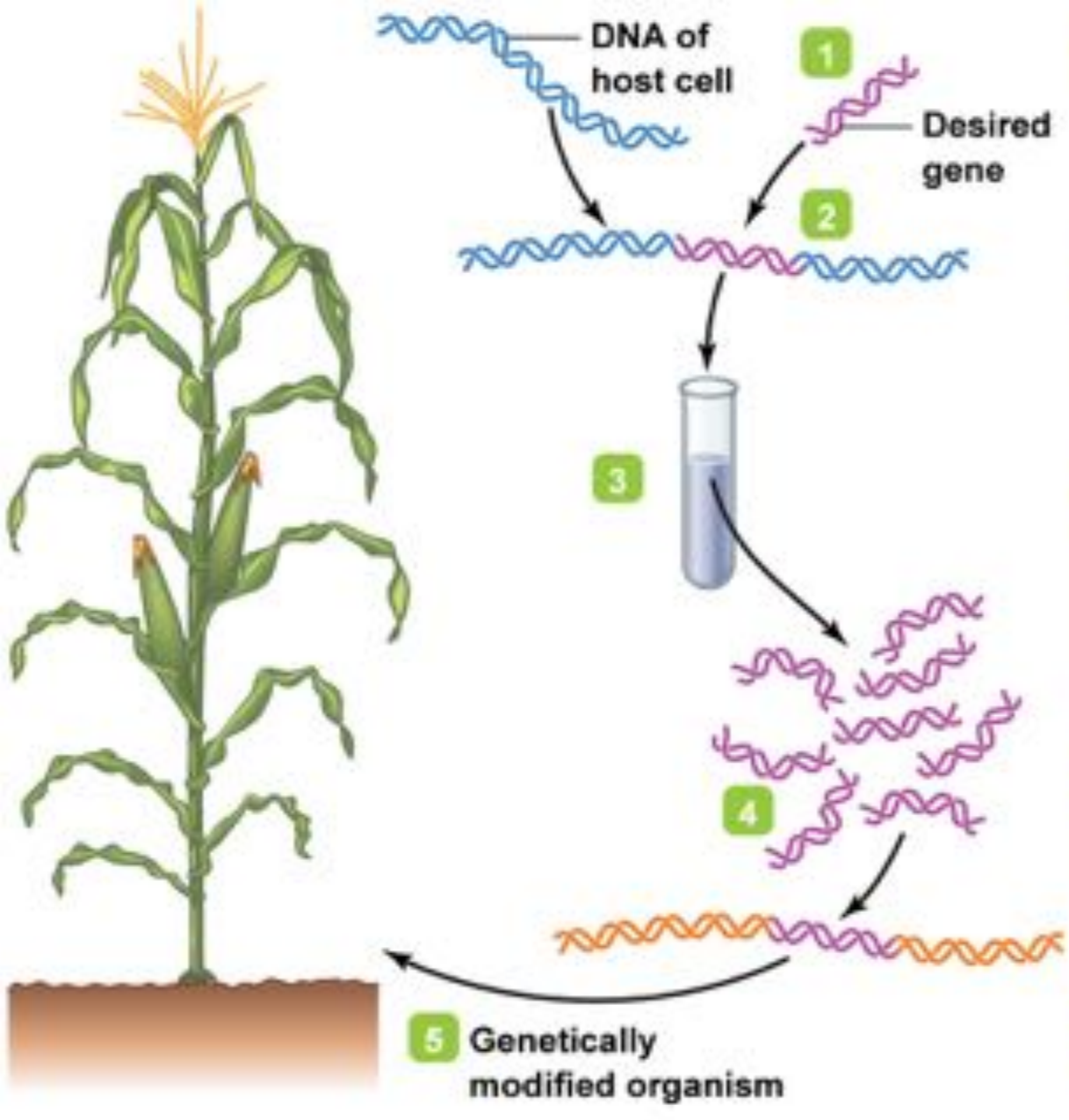


Locally Foraged Foods

From Instagram of *Lance Staples*: local food forager

"Gold chanterelles, porcini, winter chanterelles, hedgehogs, and 2 elusive and rare mushrooms which are the Blue Chanterelle and the Pig's Ear mushroom (pictured in the bottom right next to the hedgehogs)."

Genetically Modified Organism (GMO)



1. Gene that expresses a desired trait is extracted from cell.
2. Gene is combined with the DNA of a host cell that lacks this gene.
3. Host cell containing recombinant DNA is cultured, resulting in many copies of the gene.
4. Gene is extracted and inserted into the DNA of cells of an organism that lacks this gene.
5. Cells produce an organism that expresses the desired trait.

GMOs are not always bad

The *labradoodle* puppy

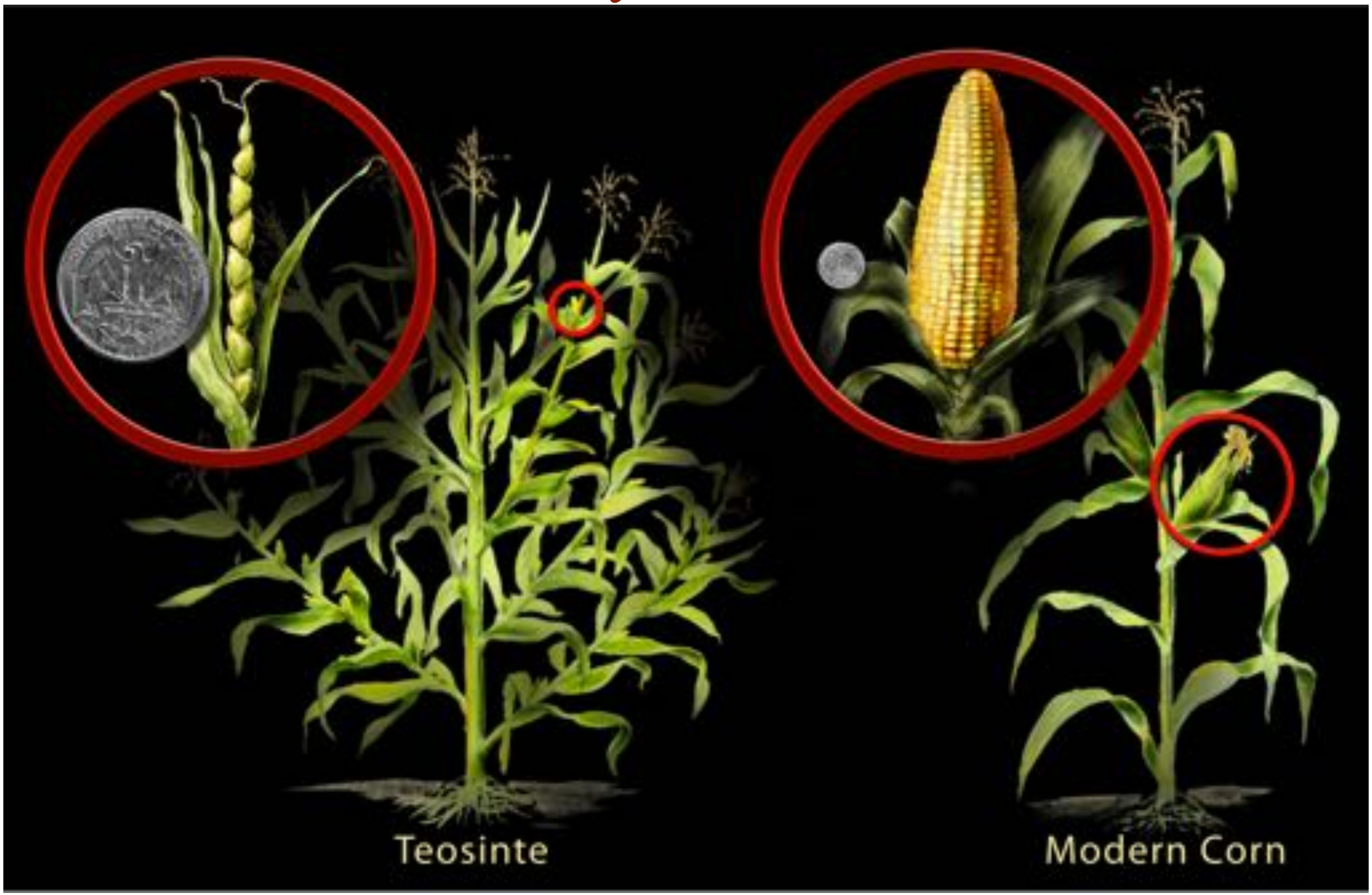
GMOs are not always bad

The Labrador (lab) retriever

The poodle

The *labradoodle* puppy

GMOs are not always bad



The historical selective breeding of corn over 10000 years involves only 5 genetic changes

Photo by Andrew Hendrickson

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.

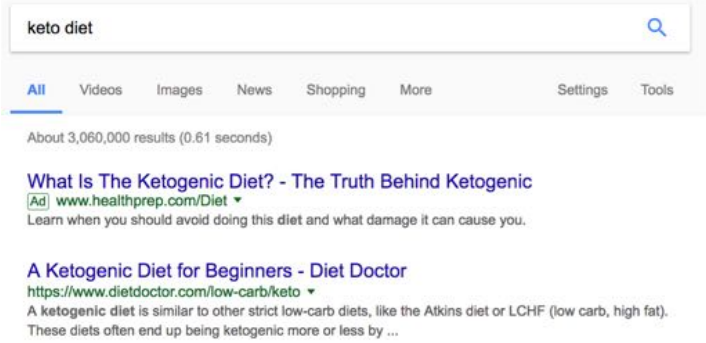
Photo of the "fermentation wall" at Agrius Restaurant by Andrew Hendrickson

Ketogenic Diets (KD)

- Characterized by low CHO & high fat intake
  - LCHF
- Used since the 1960s as an a therapy for epilepsy

- Popular since the 1990s in sport

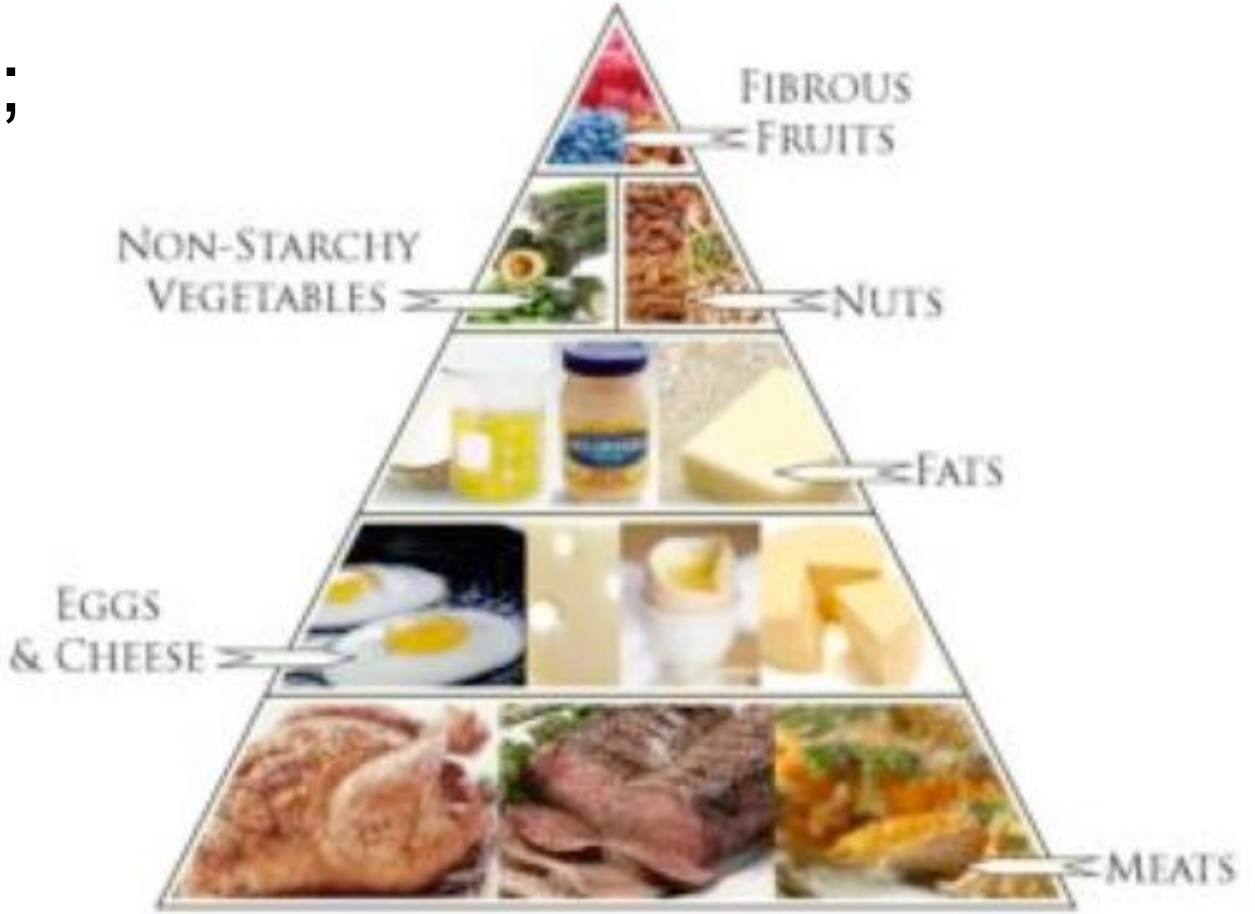
- Popular in the last few years as a ‘fad’ diet for weight loss



Ketogenic Diets (KD)

Recall from Part 1:
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



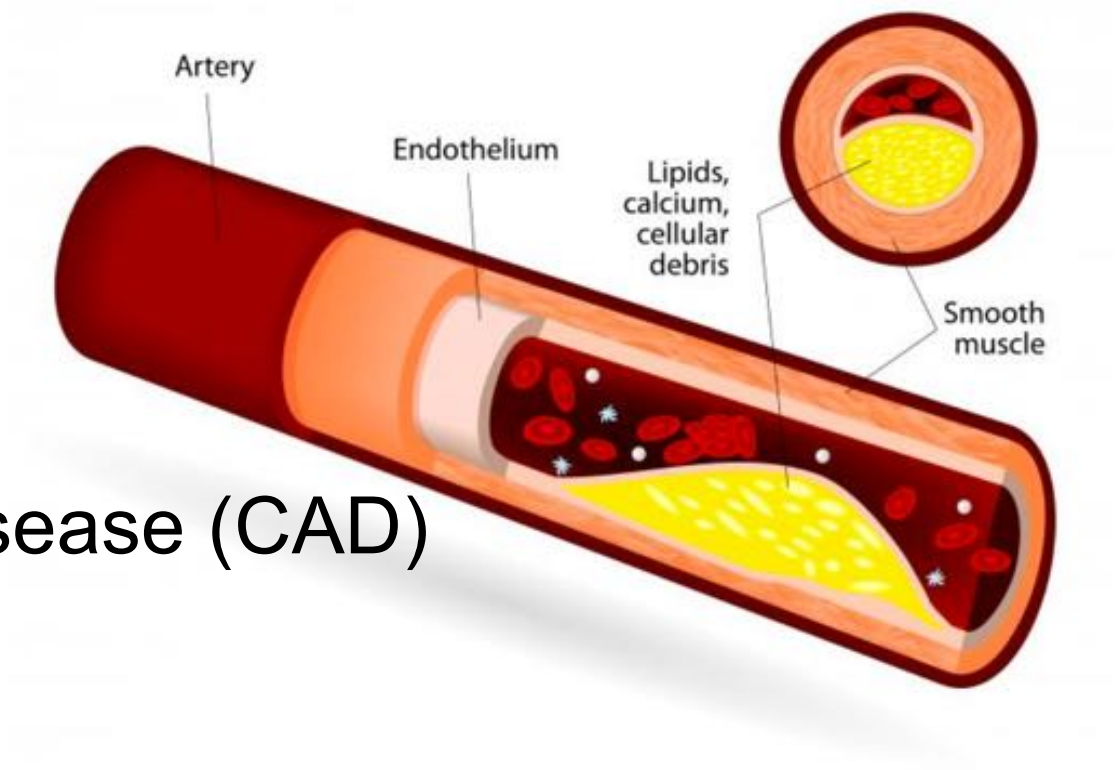
- Lacks minerals (i.e. potassium, magnesium, etc)
- Lacks vitamins (i.e. C, A, etc)

Bergqvist 2012
Theketogenicdiet.org

Ketogenic Diets (KD)

Well-established side effects

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



Effects include;

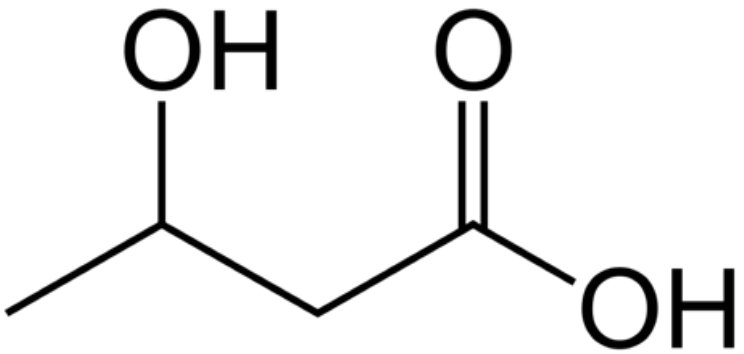
- Hyperlipidemia
- Coronary artery disease (CAD)
- Growth failure
- GI disorders
- Nephrolithiasis

Bergqvist 2012

Ketogenic Diets (KD)

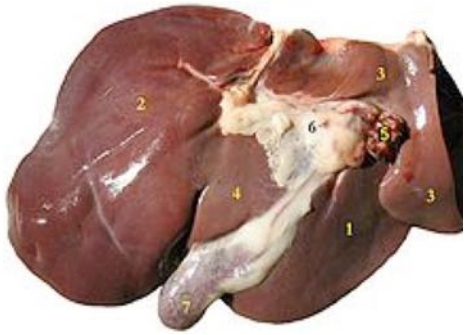
β-hydroxybutyrate (primary human ketone)

- 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*



Burke et al. 2017

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.

Burke et al. 2017

Ketogenic Diets (KD)

Efficacy for weight-loss?

Hall et al. 2016

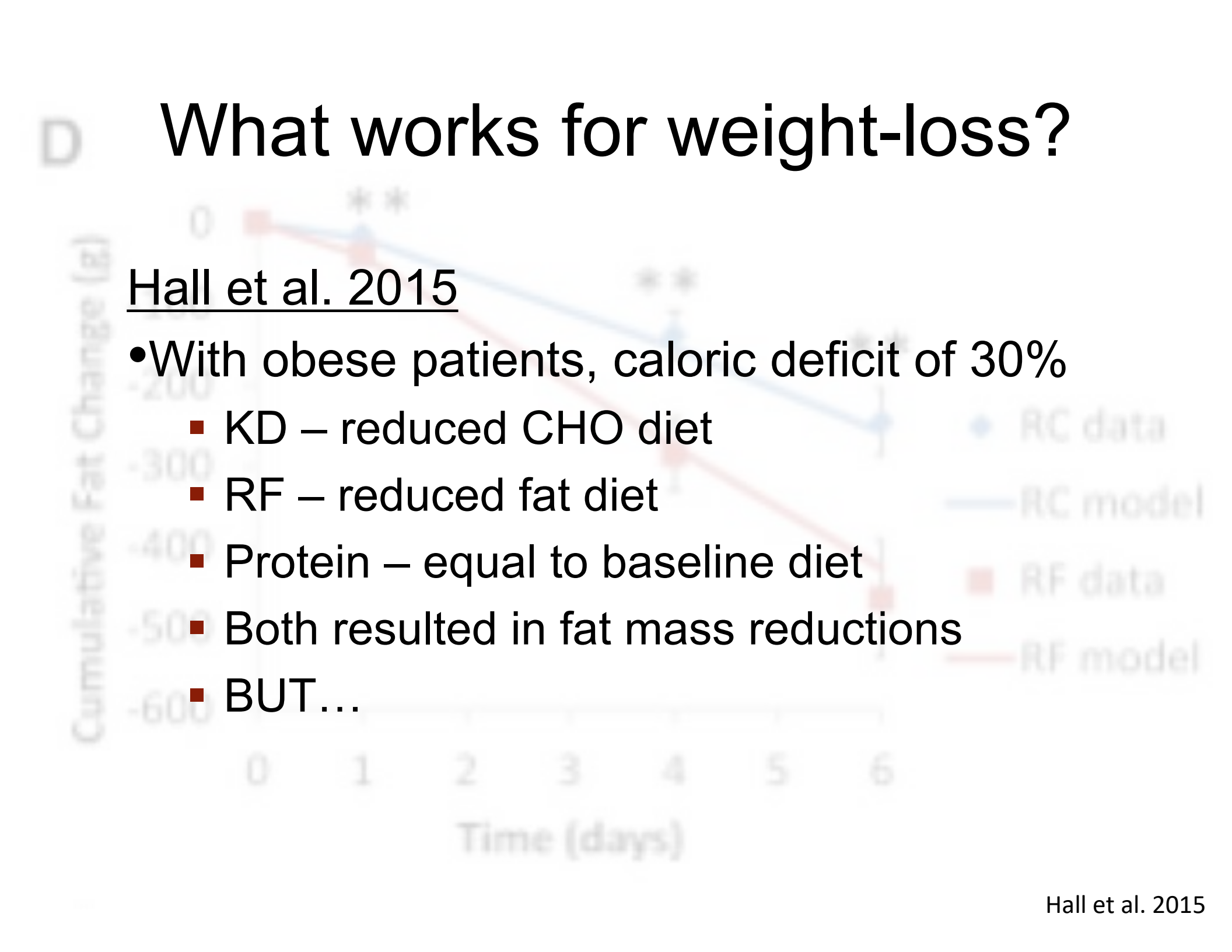
- With obesity, caloric deficit of 300 Cal/d
  - high-CHO baseline diet, followed by KD with equivalent protein
  - KD resulted in increased daily EE ~50-200 kcal
  - KD resulted in less body fat loss
  - KD resulted in increased loss of lean-mass
    - Increased protein oxidation

Hall et al. 2016

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…



Hall et al. 2015

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.

Hall et al. 2015

Proteins: Background

Long-standing human fascination with protein consumption and performance.

Ancient Greek & Roman athletes consumed meat-rich diets in the belief that they would achieve the strength of the consumed animal (~3000 years ago).

Debated in scientific literature since 1842.

Proteins: Background

- Proteins in the human body;
  - Average 70 kg human contains 12 kg of protein.
  - ~40% is contained within muscles.
  - 200 – 500 g are synthesized (built) every day.
  - 10 g are excreted per day.
  - In your life you will synthesize ~10,000 kg of protein!
  - You will only consume about ~2,000 kg.

Proteins: Background

- On-going debate – ‘how much protein?’
- Interest in protein consumption & supplementation among athletes and general population continues
- Misunderstanding due to complexity of protein metabolism.




How much dietary protein does the general population need?

- Quick answer – it depends.

- Requirements vary depending on age:
  - Childhood: 0-6 mo **1.5+** $g \cdot kg^{-1} \cdot day^{-1}$
  - Late childhood: 6 mo-13 yr **1.0** $g \cdot kg^{-1} \cdot day^{-1}$
  - Young adulthood: 14-18 yr, **0.9** $g \cdot kg^{-1} \cdot day^{-1}$
  - Adults: 19+ yr, **0.8** $g \cdot kg^{-1} \cdot day^{-1}$
  - Older adults: 65+ yr, **1.2** $g \cdot kg^{-1} \cdot day^{-1}$

- Eat in doses of 20 g of protein every 2-3 hours
  - Excess protein cannot be stored and
  - Digestion, absorption, and synthesis (building muscle) are all rate limited processes.

ACSM 2016
WHO 2017

What does 20 g of Protein Look Like?

¾ cup of hummus
& wheat crackers

1 cup of cottage cheese

75 grams chicken
(palm-sized)

1 cup of quinoa

100 grams salmon
(palm-sized)

3 large chicken eggs

For 65+ yrs: 1.2 g of protein per kg body weight

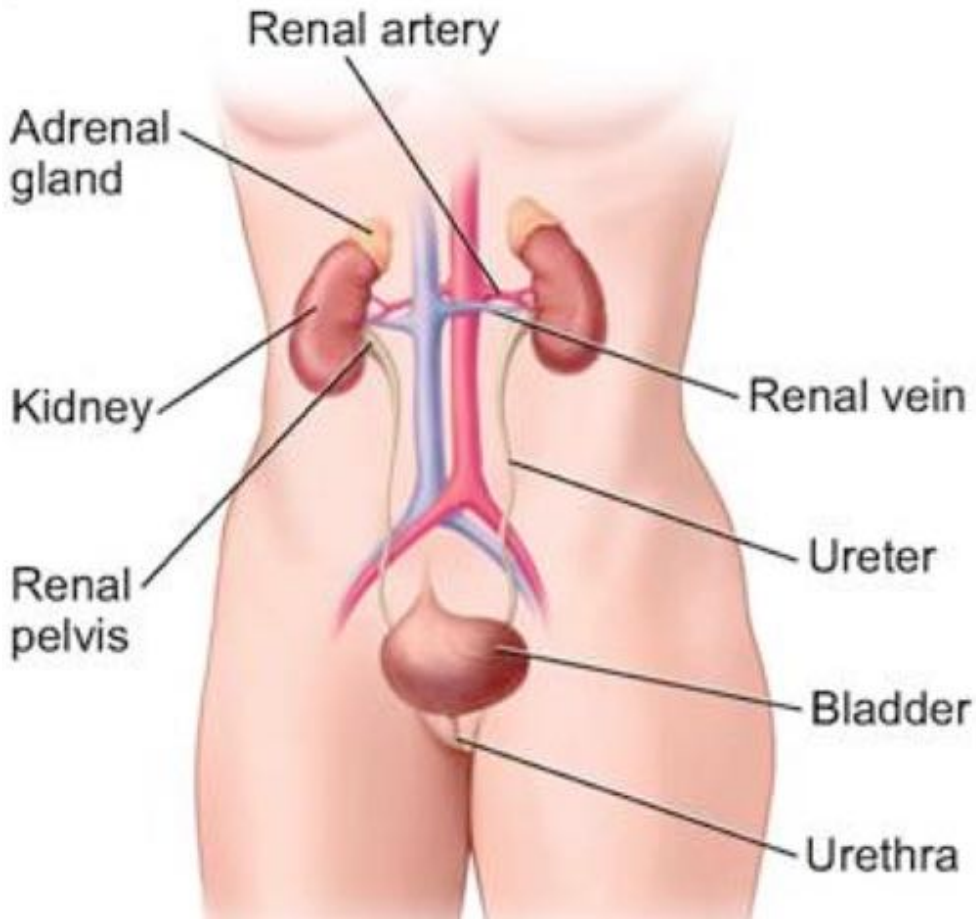
Example Calculation:

70 kg x 1.2 g protein/kg = 84 g per day

Can You Eat Too Much Protein?

The risks of too much protein may include;

- Cardiovascular diseases
  - Due to high fat content
- Metabolic disorders
  - Due to gluconeogenesis and related insulin response
- Kidney disease
  - Due to ↑ filtration rate
  - Especially for people who may be susceptible to kidney disease



Dairy Milk

Milk predominantly contains

two commonly studied proteins;

- Whey ~15-20% of milk proteins
- Casein ~80% of milk proteins

Safety and suitability is a common topic of questions for general population.

Dairy Milk

The “*straw man*” argument

Dairy Milk

- Milk is essentially liquid meat

- Advantages
  - Bioavailability (better than meat)
  - Cheapest animal protein
  - High Leucine content
- Disadvantages
  - High in fat (i.e. Cals)
  - Food safety challenges
  - Vegetarian proteins are cheaper

Dairy Milk

Recommendations

- US 732 mL/d = 243-436 Cal
- Canada 500 mL/d = 166-298 Cal

Actual consumption in 2014

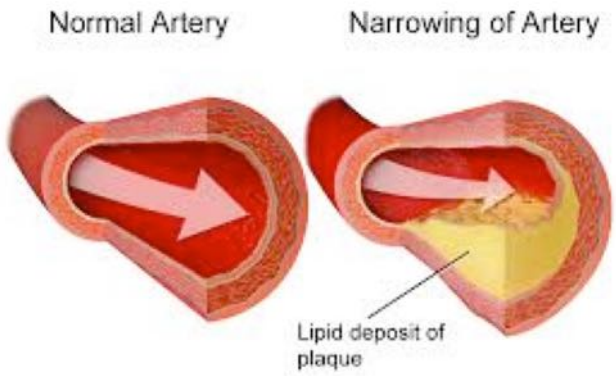
- US 196 mL/d = 65-117 Cal
- Europe 171 mL/d = 57-101 Cal
- Sweden 236 mL/d = 78-141 Cal
- Italy 171 mL/d = 57-101 Cal
- Bulgaria 60 mL/d = 20-36 Cal

Mullie et al. 2016

Dairy Milk

Disease Risk & Consumption

- Meta-analysis of observational prospective studies found no evidence for associations between milk consumption:
  - all-cause mortality,
  - fatal and non fatal coronary heart diseases and,
  - fatal or non fatal stroke.



Coronary Artery Disease

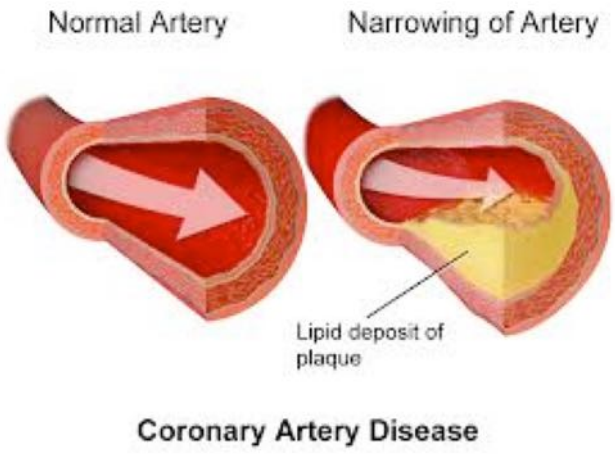
Mullie et al. 2016

Meat

Slow to digest, good source of iron but high fat & generally lacks other nutrients & increased disease risk

Fat content of meats (% of total kcals)

- "Lean" hamburger 42%
- Tenderloin 35%
- Sirloin 41%
- Pork tenderloin 28%
- Chicken breast (no skin) 19%
- Chicken thigh (w/ skin) 68%



Coronary Artery Disease

USDA 2018

Vegetarian & Vegan

- Cheapest source of protein but incomplete sources
  - Richest protein source of other nutrients

- Mutual supplementation: using two incomplete proteins together to make a complete protein

- Complementary proteins: two protein sources that together supply all **9** essential amino acids (EAAs)
  - Examples:
    - beans & rice
    - peanut butter & whole wheat bread
    - tortillas & beans

Thompson 2014

Food	Limiting Amino Acids	Good Plant Source of the Limiting Amino Acids*	Traditional Food Combinations in Which the Proteins Complement Each Other in a Meal
Legumes (beans)	Methionine	Grains, nuts, seeds	Red beans and rice
Grains	Lysine, threonine, tryptophan	Legumes	Rice and red beans; lentil curry and rice; corn tortillas and beans
Nuts and seeds	Lysine	Legumes	Soybeans and ground sesame seeds (miso); peanuts, rice, and black-eyed peas; green peas and sunflower seeds
Vegetables	Methionine	Grains, nuts, seeds	Green beans and almonds

Note: As you might suspect from the information in Table 6-2, the amino acids most likely to be low in a diet are lysine, methionine, threonine, and tryptophan. If a diet is low in an amino acid, nutrition experts recommend finding a good food source to supply it. Finding the right combinations of amino acids, such as a dish of rice and beans, is recommended. Forget about amino-acid supplements—they can lead to problems, such as decreased absorption of other, similar amino acids. Amino acids as such also have a disagreeable odor and flavor and are also much more expensive than food protein.

*Animal products in the diet serve the same purpose, such as when fish is consumed with rice, or cheese with macaroni.

Thompson 2014

Protein Supplements

Recall from Part 1:

- Protein is plentiful in the Canadian diet

So …

- Increasing protein intake above recommended amounts will not make your hair shine, protect you from disease, or make your muscles grow
  - **protein synthesis is a rate limited process**
  - **protein digestion & absorption are slow**

- Supplements are potentially *harmful*, are *expensive,* and can *add calories* to the diet

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?

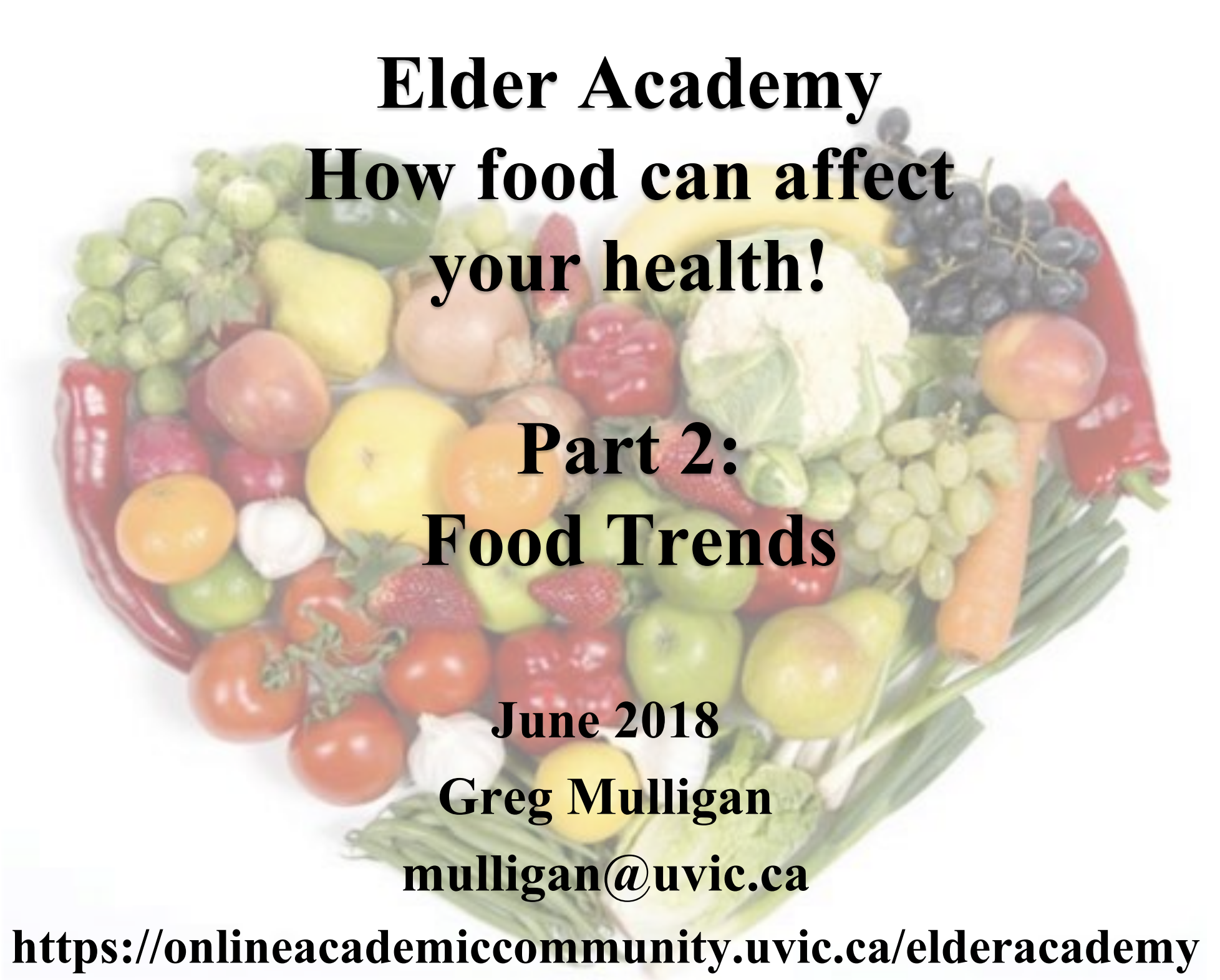
- In people with celiac disease, glutens cause an allergic response
  - 1-2% of the general population has celiac disease
- Another 20-30% of the north American population claims to be 'gluten sensitive'
  - Dominant theory is that this is a sensitivity instead to FODMAPs
    - **F**ermentable – meaning they are broken down (fermented) by bacteria in the large intestine
    - **O**ligosaccharides – "oligo" means "few" and "saccharide" means sugar. These molecules made up of individual sugars joined together in a chain
    - **D**isaccharides – "di" means two. This is a double sugar molecule.
    - **M**onosaccharides – "mono" means single. This is a single-sugar molecule.
    - **A**nd
    - **P**olyols – these are sugar alcohols (however don't lead to intoxication!)

Questions?

We have some time for questions and will return next week for:

Part 3: Super-Foods– gut-health, omega fats, brassicas, & more!

Photo of the "fermentation wall" at Agrius Restaurant by Andrew Hendrickson



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