

Lecture 3

Food choices and Human Health



Learning Objectives

- Discuss how a particular lifestyle choice can impact overall health
- Define “Nutrient” and list the 6 major nutrients
- Characteristics of a healthy diet and suggestions for using them
- Summarize how a particular culture can impact a person’s food choices
- List major steps in behaviour change and devise a plan for making successful long-term changes in diet
- Recognize misleading nutrition claims in advertisements for dietary supplements and in the popular media

Nutrients

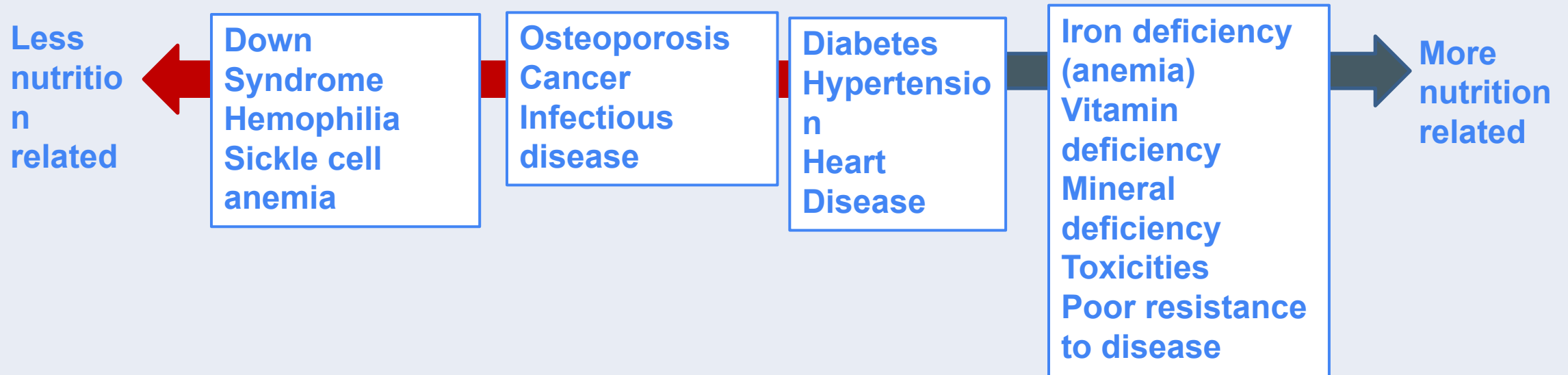
Nutrient:

A substance that provides nourishment for growth or metabolism. Plants absorb **nutrients** mainly from the soil in the form of minerals and other inorganic compounds, and animals obtain **nutrients** from ingested foods.

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Nutrition profoundly affects health

- Examples of chronic diseases connected to poor diet: heart disease, diabetes, some kinds of cancer, dental disease, adult bone loss



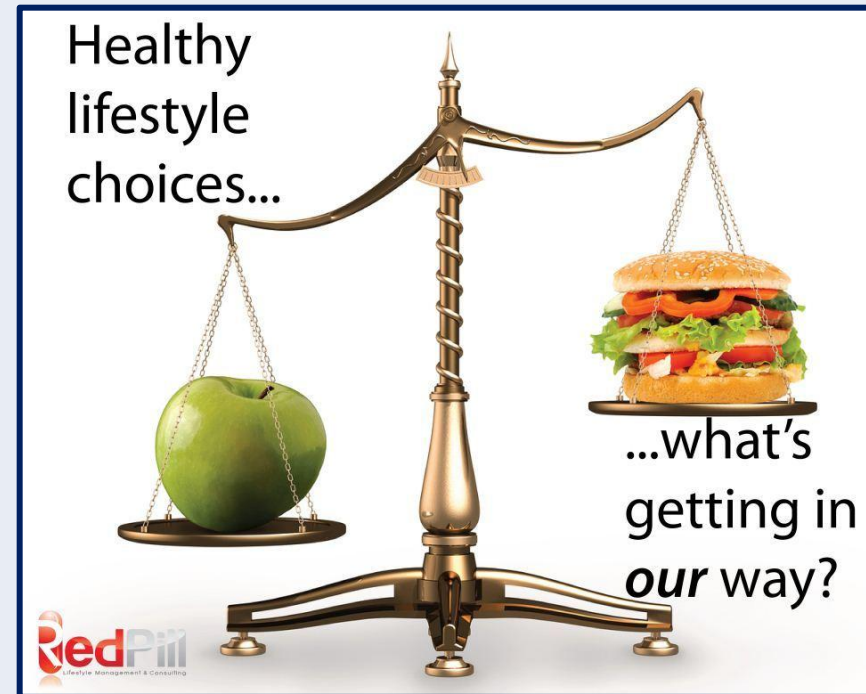
- Nutrition has little influence on some diseases but strongly affects others

Nutritional Genomics

- Choice of diet influences long-term health within a range set by genetic inheritance
- **Nutritional Genomics:** integration of nutrition, genomic science and molecular biology
- It studies *how nutrients affect genes* and vice versa
- Pinpoints nutrient needs for growing children, healthy adults, chronic conditions, etc.

Other lifestyle choices

- Tobacco, alcohol and other substance abuse can destroy health
- Physical activity, sleep, low stress levels, improved conditions at home and work, quality of air and water, etc. can prevent/reduce severity of some diseases

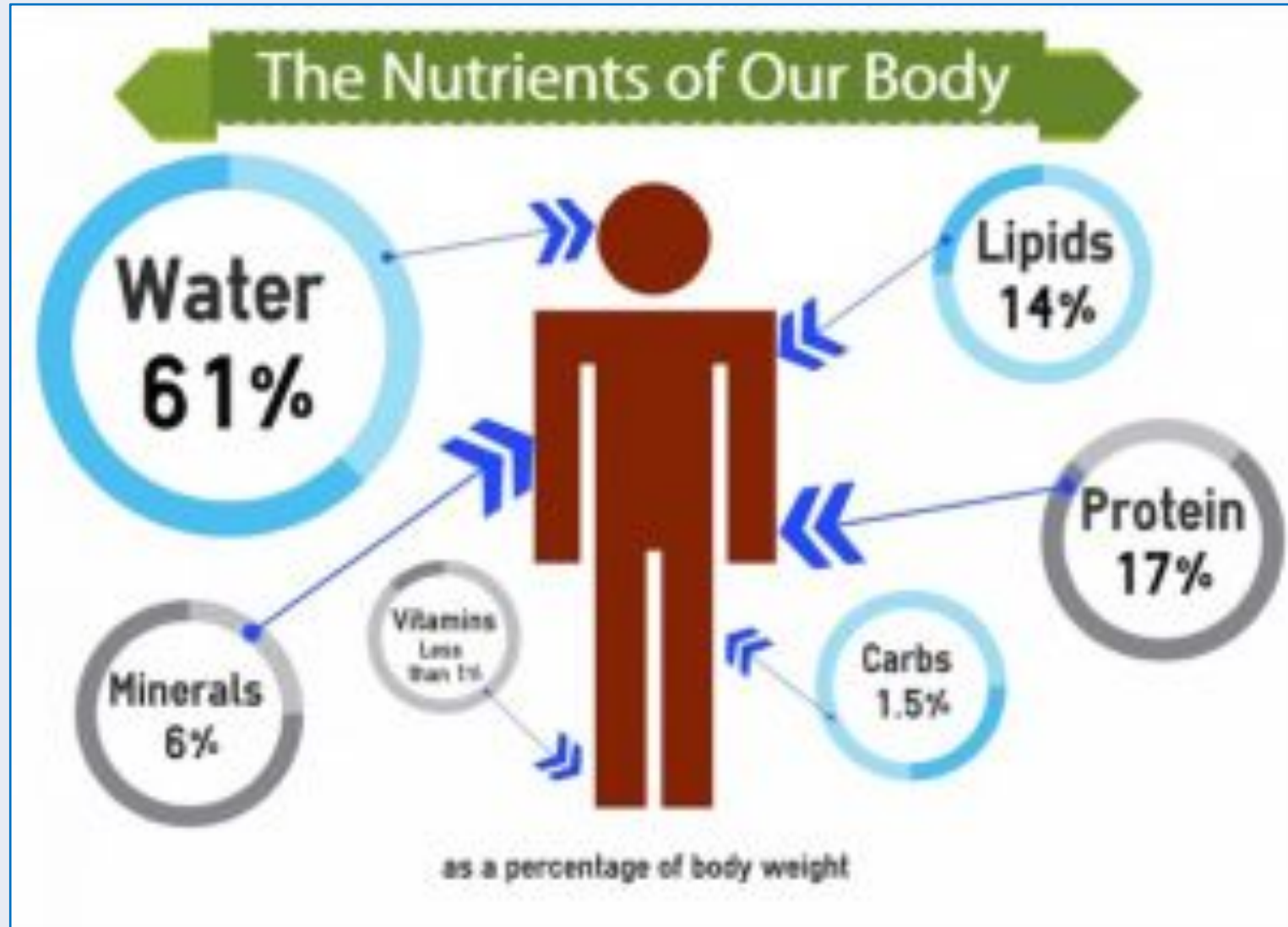


Why people choose foods...

Many factors influence food-related choices:

- Sharing ethnic food, cherish values and culture
- Omnivores, carnivores, vegetarians, vegans
- Convenience (time, budget)
- Advertising, availability, emotional comfort, habit, personal preference and genetic inheritance, positive associations
- Region of the country
- Social pressure
- Values or beliefs
- Weight, nutritional value

The Six Classes of Nutrients



Six kinds of indispensable molecules:

- Water
- Carbohydrates*
- Lipids (fats)*
- Proteins*
- Vitamins*
- Minerals

(*) organic compounds (contain Carbon)

<https://youtu.be/fR3NxCR9z2U?feature=shared>

Elements in the Six Classes of Nutrients

	Carbon	Hydrogen	Oxygen	Nitrogen	Minerals
Inorganic nutrients					
Minerals					✓
Water		✓	✓		
Organic nutrients					
Carbohydrates	✓	✓	✓		
Lipids (fats)	✓	✓	✓		
Proteins ^a	✓	✓	✓	✓	
Vitamins ^b	✓	✓	✓		

^aSome proteins also contain the mineral sulfur.

^bSome vitamins contain nitrogen; some contain minerals.

Nutrients in Food

- **Water**: it must constantly be replaced
- **Energy-yielding nutrients (energy in C-C bonds):**
 - **Carbohydrates** (i.e., sugar, starch)
 - **Lipids** (fats) (saturated and unsaturated)
 - **Proteins** (chains of amino acids)
- **Regulators (assist in body processes):**
 - **Vitamins** (i.e. Vitamin C)
 - **Minerals** (i.e. Calcium, Iron)



Nutrients (Cont.)

- **Essential Nutrient:** your body can't make them so if you don't ingest them, you will develop deficiencies
- **Calorie/kilocalorie:** unit of energy in food (amount of heat energy to raise the temp of 1 kg (a litre) of water by 1 °C).
- **Lipids** (fats) (saturated and unsaturated)
- **Proteins** (chains of amino acids)
 - Regulators (assist in body processes):
- **Vitamins** (i.e. Vitamin C)
- **Minerals** (i.e. Calcium, Iron)

Energy-yielding nutrients

Body uses energy from C-C bonds from:

- Carbohydrates – sugar, starch
- Lipids (fats) – saturated and unsaturated
- Proteins – (aa) produce energy and structure of body

Calorie values of energy-yielding nutrients

Energy Nutrient	Energy
Carbohydrate	4 Cal/g
Lipid (fat)	9 Cal/g
Protein	4 Cal/g

Water

- ~ 60% of body is water
- Important for all the cellular functions
- Will go over more in Minerals lecture
- <https://youtu.be/P8c9DliAFz8?feature=shared>



Food Terminology

Basic foods (whole foods): milk, milk products, meats, vegetables, grains, fruits

Staple foods: foods used frequently or daily (rice, potatoes).

Enriched foods (fortified foods): nutrients have been added

Fast foods: avail within minutes after customers order them, such as hamburgers, French fries, milkshakes, salads (may or may not meet people's needs)

Functional foods: foods known to possess nutrients or non-nutrients that might help protect against disease

And more food terms...

Natural foods: it implies wholesomeness (no legal definition)

Organic foods: nutrients grown without synthetic pesticides or fertilizers. Growers conform to standards set by Canadian Organic Standards or USDA Organics or others.

Processed foods: foods subjected to any process (milling, alteration of texture, addition of additives, etc.). It may or may not be nutritious

Ultra processed Food: An industrially produced edible substance derived from natural food or synthesized from organic compounds.

https://youtu.be/9Vrp_MglwZI?feature=shared

Food Processing Classifications

NOVA Food classification

Unprocessed or minimally processed foods	Processed culinary ingredients	Processed foods	Ultra-processed foods
Foods which did not undergo processing or underwent minimal processing techniques, such as fractionating, grinding, pasteurization and others. 	These are obtained from minimally processed foods and used to season, cook and create culinary dishes. 	These are unprocessed or minimally processed foods or culinary dishes which have been added processed culinary ingredients. They are necessarily industrialized. 	These are food products derived from foods or parts of foods, being added cosmetic food additives not used in culinary. 
Legumes, vegetables, fruits, starchy roots and tubers, grains, nuts, beef, eggs, chicken, milk	Salt, sugar, vegetable oils, butter and other fats.	Bottled vegetables or meat in salt solution, fruits in syrup or candied, bread, cheeses, purees or pastes.	Breast milk substitutes, infant formulas, cookies, ice cream, shakes, ready-to-eat meals, soft drinks and other sugary drinks, hamburgers, nuggets.

Nutraceuticals

Definition: Any substance that is a food or part of food that provides significant medical or health benefits.

Eg. Vitamin D, L- Carnitine, Probiotics, Curcumin etc.



Can I live on just supplements/nutraceuticals?

- Forming pairs discuss arguments favoring and against the question above

Importance of real food

- Elemental diets (precise chemical composition)
- Aroma, taste
- Digestive organs weaken and grow smaller
- Hormones in response to food contribute to health
- Physical and emotional comfort
- Other chemicals in food (phytochemicals) may reduce disease risks

Phytochemicals: what do they promise?

- Bioactive compounds found in plants
- Provide taste, aroma, texture and colour to food
- Examples: burning sensation of hot peppers, aromatic herbs, pungent flavour of onions, garlic, red color of tomatoes...
- **Antioxidants:** protect against disease (heart disease, cancer)
- **Flavonoid:** antioxidants in red wine, grapes, chocolate
- **Lignans:** present in flaxseed, are converted to phytosterols by intestinal bacteria and has possible anticancer properties
- **Phytoestrogens** (in soybeans): may alter women's monthly hormonal cycle in menopause, reducing symptoms

Lycopene	Kale, broccoli, tomatoes, red pepper, watermelon
Lutein	Collard greens, spinach, Brussels sprouts, artichokes
Resveratrol	Red wine, peanuts, grapes
Anthocyanins	Blueberries, blackberries, plums, cranberries, raspberries
Isoflavones	Soybeans

Phytochemicals

- **Definition: Any chemical compound produced by plants, generally for their own protection. Many are beneficial to human health while some are poisonous.**
- <https://youtu.be/Hja0SLs2kus>

Flavonoids reduce Dementia

September 18, 2024

Flavonoid-Rich Foods, Dementia Risk, and Interactions With Genetic Risk, Hypertension, and Depression

Amy Jennings, PhD¹; Alysha S. Thompson, MSc¹; Anna Tresserra-Rimbau, PhD^{1,2,3}; [et al](#)

In JAMA

Question What is the association of a flavonoid-rich diet with dementia risk among UK adults?

Findings In this cohort study of 121 986 UK Biobank participants, those with the highest adherence to a flavonoid-rich diet, specifically intakes of tea, red wine, and berries, had a lower risk of dementia. Reductions were more pronounced in participants with a high genetic risk, hypertension, and depressive symptoms.

Meaning These findings suggest that increasing daily consumption of flavonoid-rich foods may lower dementia risk, especially in populations at high risk

Phytochemicals activity – searching for answers...

- Supplements with phytochemicals – benefits?
- Scientific evidence concerning their effects?
- Phytochemicals in:
chocolate, wine, tea, whole foods, soybeans, flaxseeds,
tomatoes, garlic. What do they do?
- Tips for consuming phytochemicals?

Can I trust the media to deliver nutrition news?

- Forming pairs discuss how you distinguish among dishonest scams, well-meaning but misinformed advice, and honest and helpful ideas and products
- Provide an example (from the internet) of a nutrition/health fraud
- Present to class

How can I recognize a nutritious diet?



<http://daily.jstor.org/plan-get-poor-eat-healthy-food-1890s/>

How can I recognize a nutritious diet?

****SIX PRINCIPLES OF A HEALTHY & BALANCED DIET ****

Adequacy: food provides enough of each essential nutrient, fibre and energy

Balance: choices do not overemphasize one nutrient or food type at expense of another

Calorie control: provides amount of energy needed to maintain appropriate weight –not more, not less

Moderation: foods not provide excess fat, salt, sugar, or other unwanted constituents

Variety: foods chosen differ from one day to the next; meals should occur with regular timing throughout the day

Nutrient Density: Choose more foods that are high in nutrient content versus the amount of calories it contains

Key point

A well-planned diet is adequate in nutrients, balanced with regard to food types, offers food energy that matches energy expended in activity, is moderate in unwanted constituents and offers a variety of nutritious foods

***Energy-yielding nutrients include all of the following
EXCEPT:***

1. Vitamins
2. Carbohydrates
3. Fat
4. Protein

Organic nutrients include all of the following EXCEPT:

1. minerals
2. fat
3. carbohydrates
4. protein

A characteristic of a nutritious diet is that the diet provides no constituent in excess. This principle of diet planning is called:

- 1. adequacy**
- 2. balance**
- 3. moderation**
- 4. variety**