

# Nutritional Biochemistry

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**Week 1, Lecture 1-2**

# We are... What we eat



# Choosing a Healthy Diet: Calories In = Calories Out

**Extra calories you consume during the day can be balanced by increasing the calories you burn in physical activity.**

**If you have a Big Mac for lunch instead of a smaller plain burger, you will have to increase your energy expenditure by 300 Calories.**



**If you have a grande mocha frappuccino instead of a regular iced coffee, you will have to increase your energy expenditure by 370 Calories.**



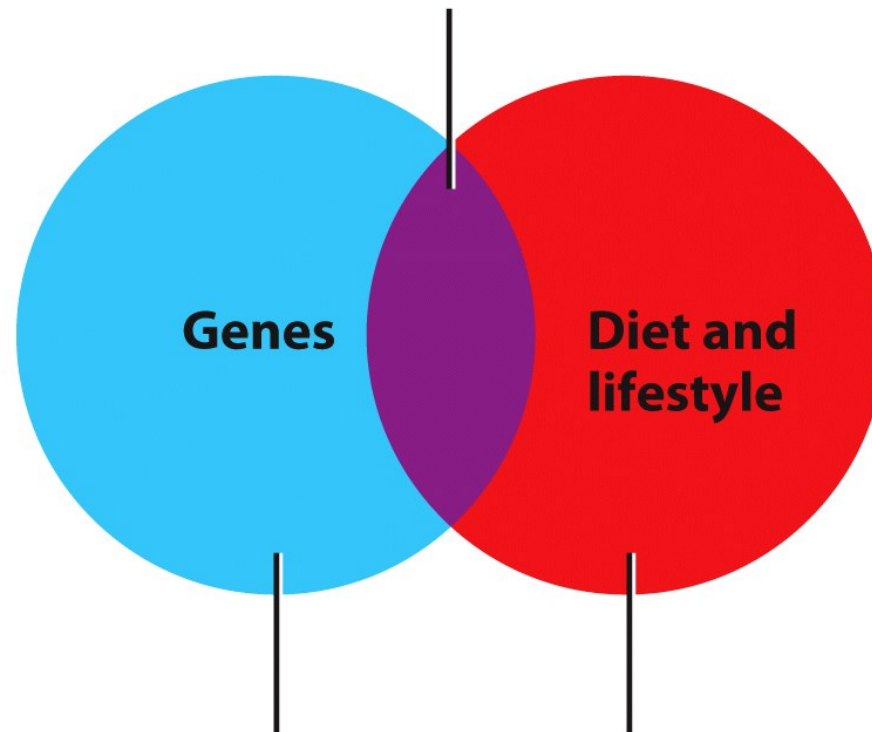
**You could do this by playing golf for about an hour, carrying your own clubs.**



**You could do this by jogging for about 30 minutes.**

# Health: Genetics and Lifestyle

**Your actual risk of disease results from the interplay between the genes you inherit and the diet and lifestyle choices you make.**



**The genes you inherit may give you a greater or lesser tendency to develop conditions like obesity, heart disease, high blood pressure, or diabetes.**

**The nutrients and food components you consume and the amount of exercise you get can increase or decrease your risk of developing nutrition-related diseases.**

# Nutrition Terms

- Nutrition is a science that **studies the interactions between living organisms and food.**
- **Nutrients and energy** are provided by **food.**
- Energy is measured in **calories.**
- **Essential nutrients** must be provided **by diet.**

- **Nutrition**

- Food, vitamins, and minerals that are ingested and assimilated into the body

- **Metabolism**

- Process of using food molecules as energy sources and as building blocks for our own molecules

- **Catabolism**

- Breaks food molecules down, releasing their stored energy; oxygen used in catabolism

- **Anabolism**

- Builds food molecules into complex substances

# What Nutrients Do: Provide Energy

- Working together, macronutrients and micronutrients help the **body stay healthy**.
- **Biochemical reactions** in the body help to release the energy contained in carbohydrates, fats and proteins.
- Energy is **used to maintain body functions**, fuel physical work and to repair the body.
- If **more energy is consumed** than is needed, over time, **body weight will increase**.

# What Nutrients Do: Form Structures

- Most of the **weight of the body** is due to **water, fat and protein**.
- Nutrients help to form and maintain the **shape and structure** of the body.
- Proteins **form ligaments and tendons** that **hold bones** together and attach muscles to bones.
- At the cellular level, **lipids and proteins** make up the **membranes** that surround cells.



# What Nutrients Do: Regulate Body Processes

- All the reactions that occur in the body are called **metabolism**.
- The proper regulation of metabolism is called **homeostasis**.
- Each nutrient plays a role in helping to **maintain homeostasis**.
- Water helps to **regulate temperature**.
- Protein, vitamins and minerals **help to speed up or slow down metabolic reactions**.

What you people do ?

# Dietary/Social History

- Evaluation of **food habits**.
  - **24-hour recall**: Client interviewed by the dietitian and asked to give types, amounts, and preparation of all foods eaten in past 24 hours
  - **Food diary**: written record of all food and drink ingested in a specified period
  - **Computer diet analysis** to determine nutrient deficiencies or toxicities

# Assessment

- A case study for you....

- **A client** is at home recovering from surgery.
- You ask the client **what they have eaten** over the **past 24 hours**.
- The client states the following:
  - **Breakfast:** 2 doughnuts, orange juice
  - **Lunch:** lettuce salad with oil & vinegar, soda
  - **Snack:** pretzels, soda
  - **Dinner:** spaghetti with tomato sauce, garlic bread; wine

- Discuss the answers to the following questions:
  - What nutrients are missing in the client's diet?
  - Why are these nutrients important for this client?
  
- What you think ?

- The client is **missing protein and water** in the diet.
- **Protein** is needed to build and repair body tissues after surgery.
- **Water** is needed to prevent dehydration.

- How you make an assessment ?



# Nutritional Assessment

- Anthropometric measurements
- Clinical examination
- Biochemical tests
- Dietary/social history

# Anthropometric Measurements

- Height
- Weight
- Head circumference (children)
- Upper arm measurement
- Skinfold

# Anthropometric Measurements



Head circumference



Triceps skinfold

# Clinical Examination

## Clinical Signs

Pallor, blue half circles beneath eyes

Edema

Bumpy “gooseflesh”

Lesions at corner of mouth

Glossitis

## Possible Deficiencies

Iron, copper, zinc, B12, B6, biotin

Protein

Vitamin A

Riboflavin

Folic acid

# Clinical Examination

## Clinical Signs

Numerous “black and blue” spots and tiny, red “pin prick” hemorrhages under the skin

Emaciation

## Possible Deficiencies

Vitamin C

Carbohydrates, proteins; kcal

# Clinical Examination

## Clinical Signs

Poorly shaped bones or teeth or delayed appearance of teeth in children

Slow clotting time of blood

## Possible Deficiencies

Vitamin C

Vitamin K

# Clinical Examination

## Clinical Signs

Unusual nervousness, dermatitis,  
diarrhea in same patient

Tetany

Goiter

Eczema

## Possible Deficiencies

Niacin

Calcium, potassium, sodium

Iodine

Fat