



# NTR 306: Fundamentals of Nutrition

Chapter 1:  
An Overview of  
Nutrition



# Nutrition:

Nutrition: Branch of science examining the nutrients in foods and their actions within the body to impact health and well-being across all life stages.



- Nutrients: a substance that is essential for growth, development, & maintenance of life.
- Foods\*: any substance that people eat or drink to yield energy and nutrients for the growth, development, & maintenance of life.  
\*Note: includes solid foods and beverages

# Nutrition:

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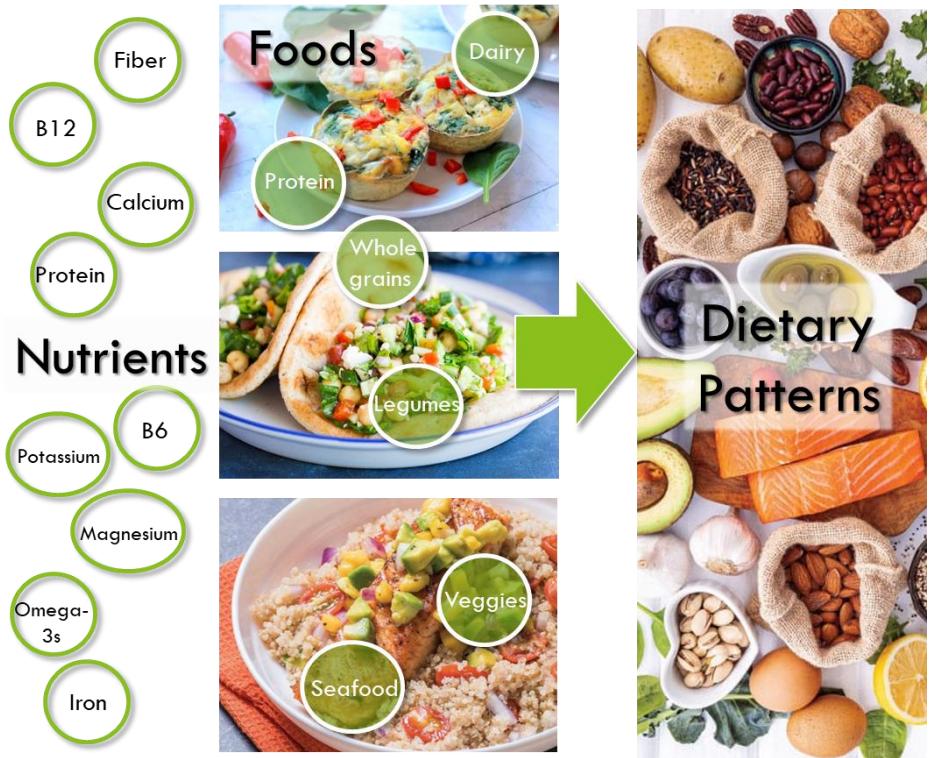


## ○ Dietary Pattern:

- Combination of foods + beverages that are habitually consumed within eating occasions across each day (over days/weeks/months)
- NOT 'dieting' or a 'weight-loss diet' X Not a dietary pattern
- Highly individualized and liked (enjoyed)
- Includes things like:
  - ✓ life-sustaining nutrients and energy
  - ✓ 'components to limit' → *Eating in moderation*

# Nutrition:

Nutrition: Branch of science examining the nutrients in foods and their actions within the body to impact health and well-being across all life stages.



## ○ Dietary Patterns *that promote health:*

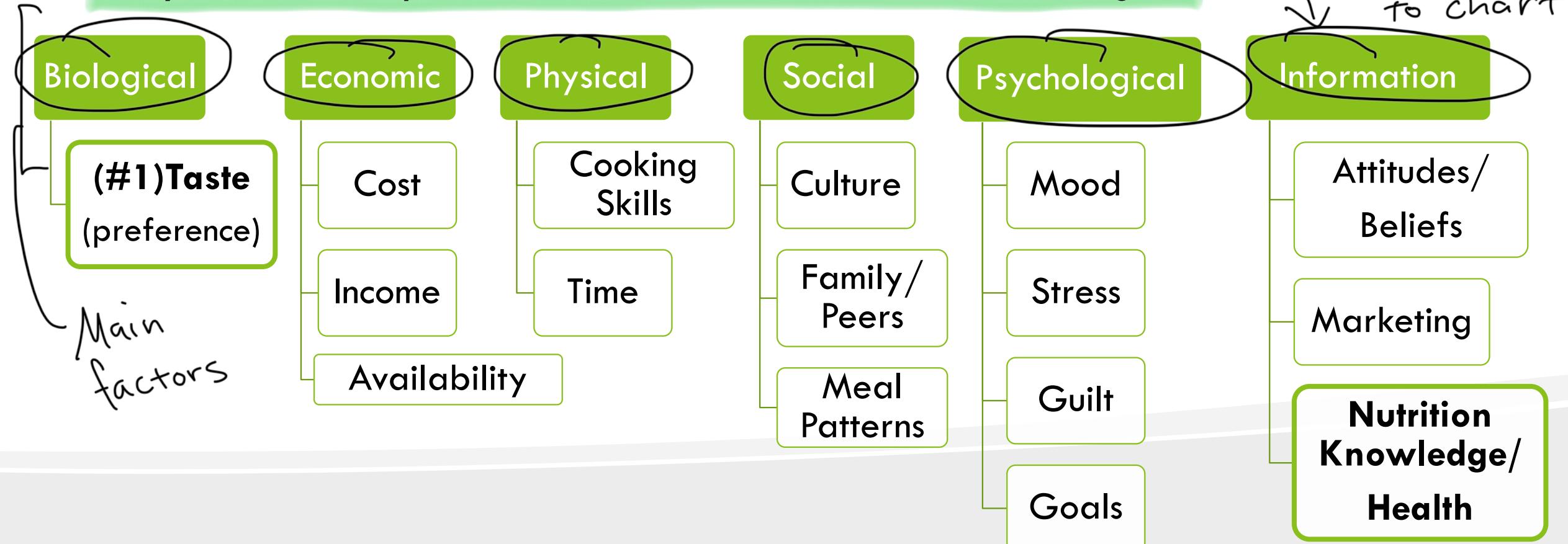
- Increase longevity (life expectancy) ↑
- Prevent chronic diseases ↑
- Increase quality of life ↑

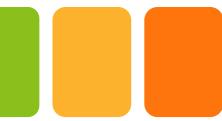
Good for your general well-being



# Factors that Influence Food Choices

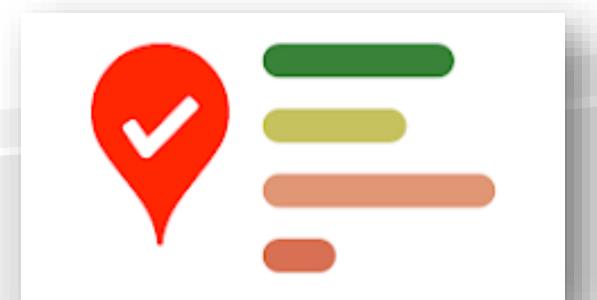
- Dietary patterns are made up of our food (and beverage) choices
- Many reasons why we choose certain foods and beverages





# InstaPoll

- When you have nutrition (or other health) questions, where do you usually go to find the answers?
  - “Doctor” Google
  - Social media
  - Mom
  - Personal trainer
  - Doctor/physician
  - Friends
  - Other





# Who (and what) to believe?

Misinformation is everywhere!

Nutrition information is accurate when it is:

- Disseminated by nutrition-trained professionals
  - Look for their credentials! → Just another suggestion
- Conveyed in a clear and understandable way
- Founded on high-quality scientific evidence



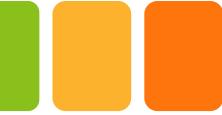
# Trust the (Nutrition) Experts!

- Registered Dietitian Nutritionist (RD/RDN)

- Degree and clinical internship (with national exam)
- Maintain up-to-date knowledge (registration)
- State-specific license to practice in some states

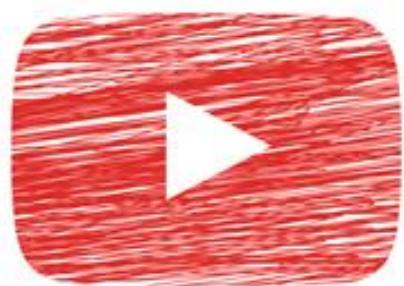
- Nutritionists with Academic Degrees

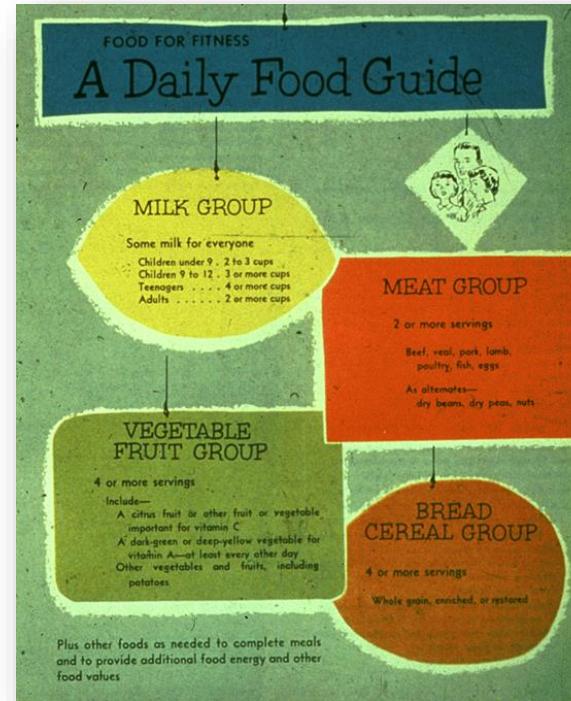
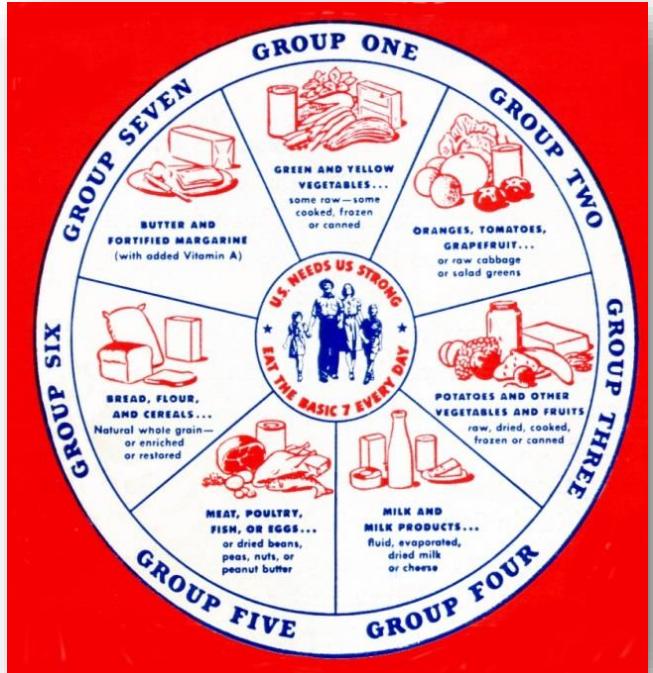
- MS or PhD in Nutrition Sciences, Public Health, Related Field
  - ✓ Academic Professors/Instructors
  - ✓ Industry, Federal, NIH Research Scientists
  - ✓ (Some) Physicians and Health Care Professionals...but not many!



# The Science of Nutrition

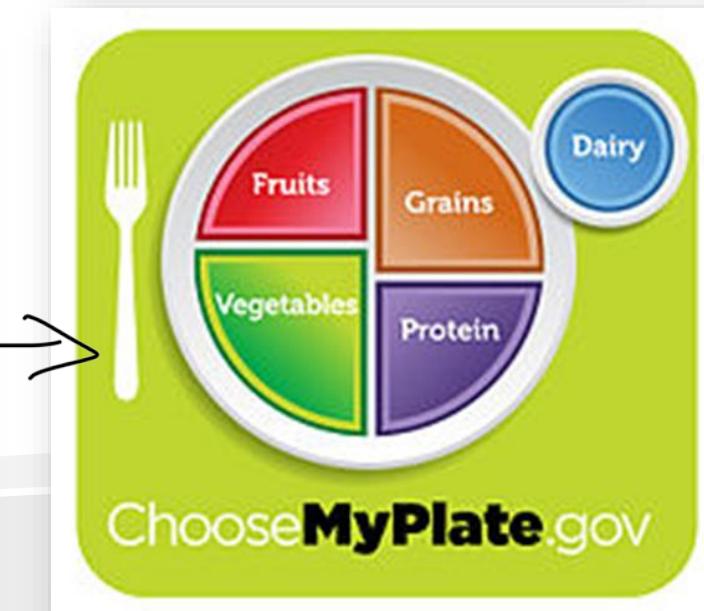
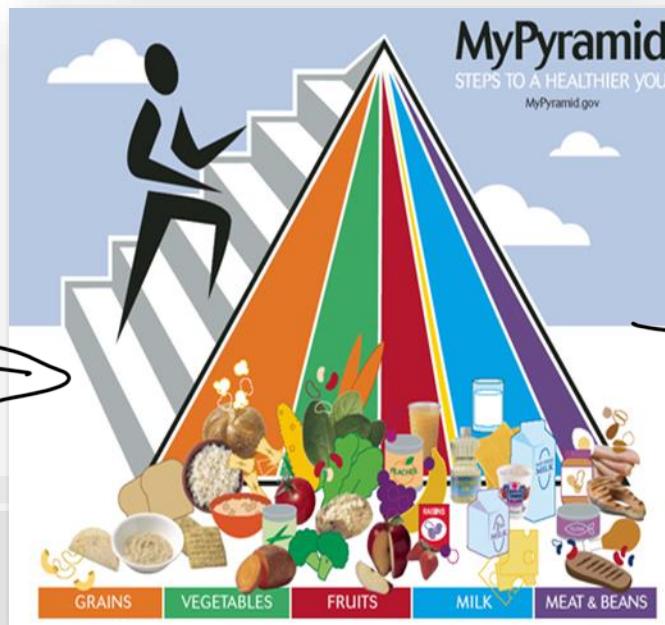
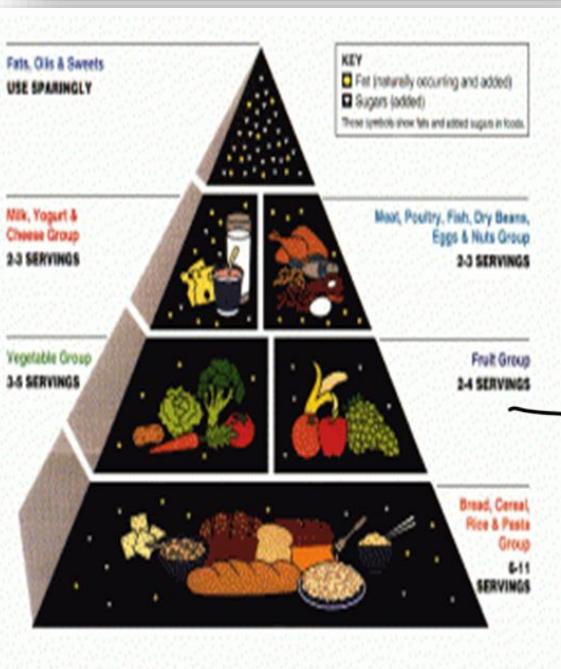
- Foundations: many branches of science
  - Biology, biochemistry, physiology, and more!
- New(ish) science, rapidly growing (and ever-changing) body of knowledge





1940s

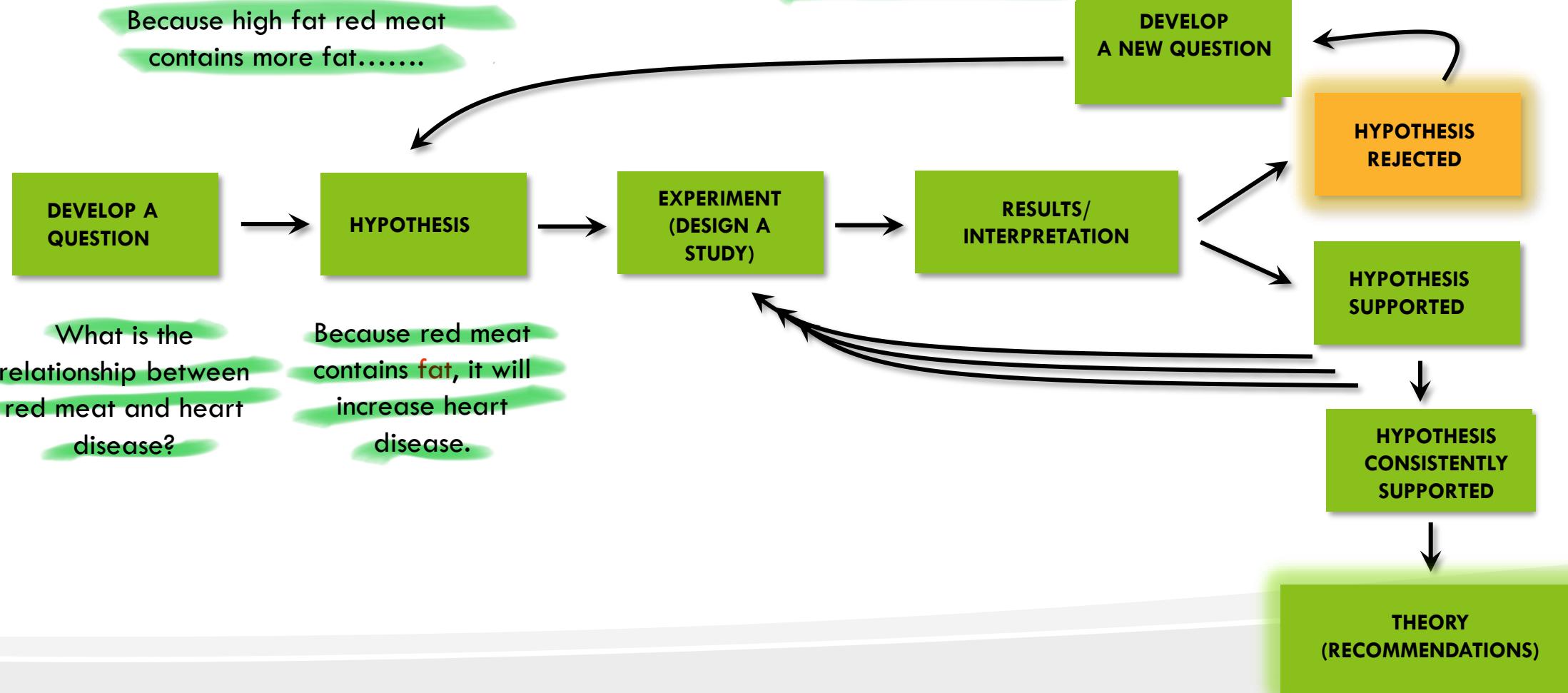
1960s



1970s

2000s

# Scientific Method





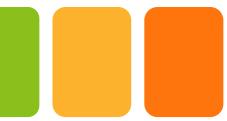
# Conducting Research

**TABLE 1-3** Strengths and Weaknesses of Research Designs

Type of Research	Strengths	Weaknesses
<b>Epidemiological studies</b> determine the incidence and distribution of diseases in a population. Epidemiological studies include cross-sectional, case-control, and cohort (see Figure 1-4).	<ul style="list-style-type: none"><li>• Can narrow down the list of possible causes</li><li>• Can raise questions to pursue through other types of studies</li></ul>	<ul style="list-style-type: none"><li>• Cannot control variables that may influence the development or the prevention of a disease</li><li>• Cannot prove cause and effect</li></ul>
<b>Laboratory-based studies</b> explore the effects of a specific variable on a tissue, cell, or molecule. Laboratory-based studies are often conducted in test tubes ( <i>in vitro</i> ) or on animals.	<ul style="list-style-type: none"><li>• Can control conditions</li><li>• Can determine effects of a variable</li></ul>	<ul style="list-style-type: none"><li>• Cannot apply results from test tubes or animals to human beings</li></ul>
<b>Human intervention or clinical trials</b> involve human beings who follow a specified regimen.	<ul style="list-style-type: none"><li>• Can control conditions (for the most part)</li><li>• Can apply findings to some groups of human beings</li></ul>	<ul style="list-style-type: none"><li>• Cannot generalize findings to all human beings</li><li>• Cannot use certain treatments for clinical or ethical reasons</li></ul>

## Observational Study

In any study, large sample size = better!



# Nutrients (Overview)

## ○ Nutrients

- Chemical substances in foods
- Source of: energy, structural materials, regulating agents
- Support growth, tissue maintenance and repair, and reduce disease risks
- **Inorganic nutrients**
  - ✓ Do not contain carbon
  - ✓ Minerals and water
    - Simple structure: each mineral is a chemical element (e.g. calcium); water is H + O
- **Organic nutrients**
  - ✓ Contain carbon (essential component of all living organisms)
  - ✓ Carbohydrates, lipids (fats), proteins, vitamins
  - ✓ More complex: H + O + C + more!



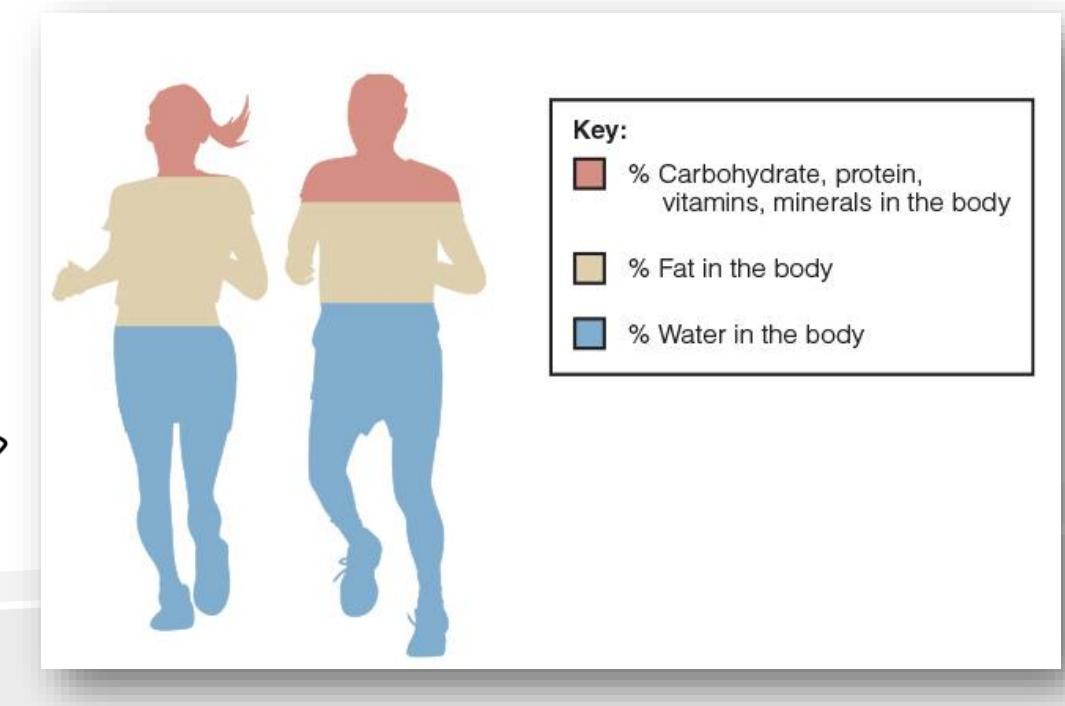
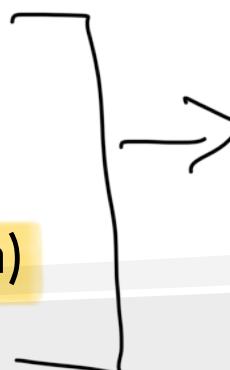
# Nutrient Composition of Foods and the Body

- Foods contain:

- Six classes of nutrients: Protein, carbohydrates, lipids, vitamins, minerals and water
- Other contents
  - ✓ Phytochemicals: compounds from plants
  - ✓ Pigments, additives, alcohols, etc.

- The body contains:

- Water: 60%
- Fat: 18-21% (men); 23-26% (women)
- Other nutrients: the rest



<b>Key:</b>
■ % Carbohydrate, protein, vitamins, minerals in the body
■ % Fat in the body
■ % Water in the body



# Nutrients (Overview)

## ○ **Macronutrients**

- Carbohydrates, lipids, proteins
- Required in relatively large amounts
- “Energy-yielding” (have kcalories)

## ○ **Micronutrients**

- Vitamins and minerals
- Required only in small amounts
- Do NOT have kcalories

## ○ **Alcohol ≠ nutrient**

- Interferes with growth, regulation and repair of body



# Nutrients (Overview)

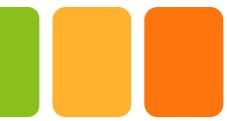
**TABLE 1-1** The Six Classes of Nutrients

Nutrient	Organic	Inorganic	Energy-yielding	Macronutrient	Micronutrient
Carbohydrates	✓		✓	✓	
Lipids (fats)	✓		✓	✓	
Proteins	✓		✓	✓	
Vitamins	✓				✓
Minerals		✓			✓
Water		✓			

# Carbohydrates

- Primary source of short-term energy for the body
  - Especially for brain function and physical exercise
- Used to build other molecules and structures in the cell
- Commonly called: CHOs, Carbs
- Common foods: breads, pasta, vegetables, fruits, legumes (lentils, beans, peas), seeds, nuts, 'sweets', and milk products





# Lipids



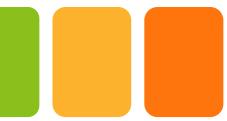
- Major form of *stored energy*
  - Stored as ‘adipose tissue’ (body fat)
  - Energy source during rest or low- to moderate-intensity exercise
- Used to make cell membranes and other complex molecules
- Commonly called ‘fats’
- Common foods: oils, animal fats, seeds, and nuts



# Proteins

- ~50% of cellular content
- Do most cellular work
  - Required for structure, function, and regulation of organs, tissues, and body systems
  - Support tissue growth, repair, and maintenance
- Commonly Called: PRO
- Common foods: primarily in meat, dairy, seeds, nuts and legumes
  - Small amounts also found in vegetables and whole grains





# Vitamins

- Do not supply energy to our bodies
- Micronutrients (required in smaller amounts)
- 13 vitamins assist in regulating MANY body processes
- Organic molecules (contain carbon)
  - Can be destroyed: heat, light and chemical agents



# Minerals

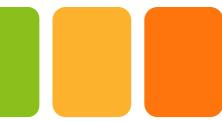
- Do not supply energy to our bodies → Same as vitamins
- Food and the body contain major minerals and trace minerals
- 16 minerals essential for several body processes
- Inorganic substances (do not contain carbon)
  - Indestructible: not vulnerable to heat, light or chemical agents



# Water

- Essential nutrient
- Inorganic (does not contain carbon)
- Water is involved in nearly ALL body processes!





# In Real Life





# Nutrient Needs

## ○ Priority #1: Nutrients provide energy

- When bonds between nutrient's atoms break → energy is released
- Energy can be:
  - ✓ Used immediately
  - ✓ Go into short-term storage: used between meals & overnight
  - ✓ Go into long-term storage: stored as body fat (for later use)

## ○ Other Key Priorities:

- Provide 'building blocks' & materials for body tissues
- Regulate bodily activities: digestion, energy metabolism, organ systems

# Nutrients that Yield Energy

## ○ Energy from food = kilocalories = kcalories = calories = kcals

- Amount of kcals depends on nutrient type:

- ✓ CHO: 4 kcal/g
- ✓ PRO: 4 kcal/g
- ✓ FAT: 9 kcal/g

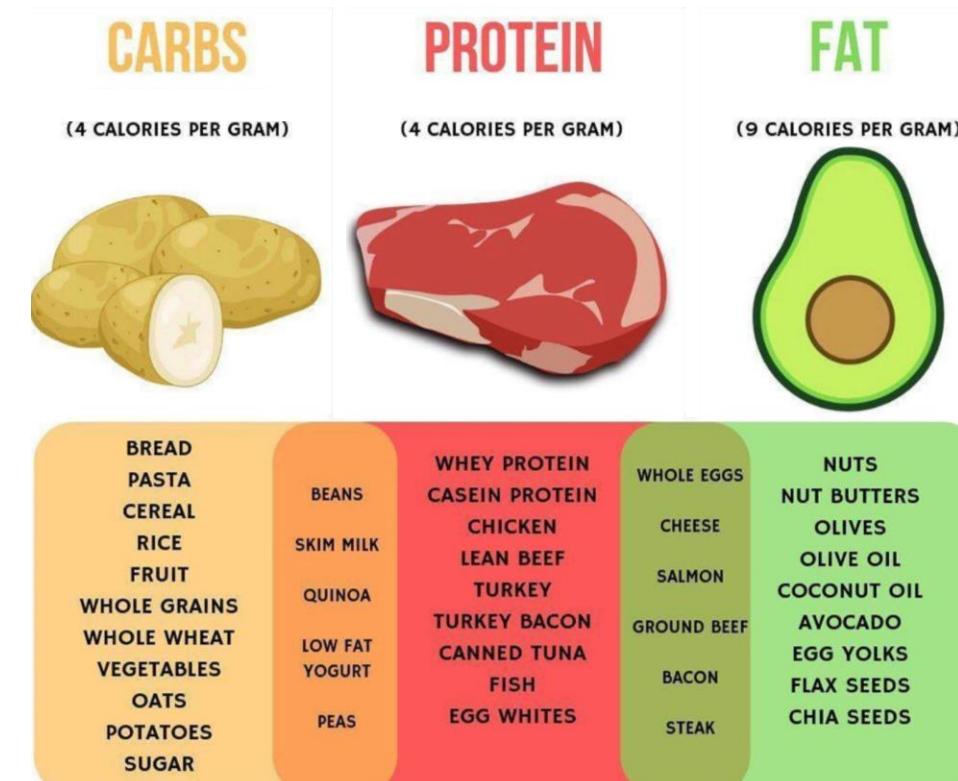
Important information!

This helps you on how to calculate  
the number of kcals per serving.

- Vitamins, minerals, water are not 'energy-yielding'

## ○ Most foods are a mixture of nutrients

- Exception: sugar (100% CHO) and oil (100% FAT)





# Nutrient Calculations

How many kcalories  
does this burrito  
contain?





# Nutrient Calculations



**Remember 4 – 4 – 9!**

$$\text{FAT: } 12\text{g} \times 9 \text{ kcal/g} = 108 \text{ kcals}$$

$$\text{CHO: } 55\text{g} \times 4 \text{ kcal/g} = 220 \text{ kcals}$$

$$\text{PRO: } 15\text{g} \times 4 \text{ kcal/g} = 60 \text{ kcals}$$

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$$\text{Total: } 388 \text{ kcals}$$



# Nutrients Calculations

What % of calories  
comes from each  
macronutrient?





# Nutrient Calculations



## Macronutrient Distribution (%)

FAT:  $\frac{108 \text{ kcals}}{388 \text{ kcals}} = 0.28 \times 100 = 28\%$

CHO:  $\frac{220 \text{ kcals}}{388 \text{ kcals}} = 0.57 \times 100 = 57\%$

PRO:  $\frac{60 \text{ kcals}}{388 \text{ kcals}} = 0.15 \times 100 = 15\%$



# How do we determine how many kcals are in food?

- Bomb calorimeter

- Direct measurement: food burns → releases heat energy (food's kcal value)
- Not exact: body less efficient at converting food → energy

