Unit 3 Metabolic Disease

Content Area: **Science**
Course(s):
Time Period: **Semester 1**
Length: **5 weeks**
Status: **Published**

Enduring Understandings

- Consumer demand of quick, cheap food that tastes good changes the type of food grown, which has an impact on the earth's resources.
- Nutrients in foods provide energy and form the building blocks of cells and tissues.
- Metabolic disease focuses on how our body responds to food and how our choices change our health.
- The nervous system, digestive tract and the endocrine systems interact to ensure adequate calories are ingested
- Science is always evolving. As more research and data are collected regarding food and health, diet recommendations will change.

Essential Questions

- What is in your food?
- How does your body use food?
- What is Metabolic disease?
- How do you identify good and bad food?
- How can two completely different diets claim to prevent heart disease?

Knowledge and Skills

Knowledge

- Industrial food chain
- Food additives
- Food contaminants
- Nutritive value and components of food
- How food systems affect our health
- Food production
- Implications of mass food production

- Food contamination
- Properties of nutrients in food
- Calorimetry
- Digestion and absorption of macronutrients
- Metabolism
- Glucose homeostasis
- Body Composition and morbidity
- Metabolic disorders
- Obesity
- Basal metabolic rate
- Hunger and satiety signals
- How the hypothalamus regulates hunger
- Feedback mechanisms
- Food addictions
- Nutrition science
- Observational and Interventional studies
- Types of cholesterol and the roles they play in the body
- Cognitive behavior therapy
- Psychological aspects of eating

Skills

- Investigate the concept of nutritive value and the different components of food
- Explain the role of micro and macronutrients
- Analyze cases and make predictions about their nutritional needs
- Recognize and explain the impact of various types of diets on health
- Plan and conduct an investigation to predict how blood glucose responds to insulin
- Model how the storage and use of macronutrients changes based on activity level and diet
- Utilize illustrations and a case study to learn the steps of cellular respiration that lead to ATP synthesis
- Use calorimetry as a model to explain energy at the macroscopic level
- Provide examples of tangible and intangible elements of food
- Identify and explain how the way cells convert the food we eat into energy is similar to lighting food on fire
- Argue the advantages and disadvantages of the current food system using evidence, including deciding

whether food additives are good or bad.

- Identify the steps of glucose metabolism and describe what they require and produce
- Apply energy metabolism to real life situations
- Describe which organs play a role in the regulatory steps of maintaining glucose homeostasis
- Analyze and describe the symptoms, causes and treatments of six different metabolic disorders.
- Apply the metabolic pathways to physiological scenarios of high and low blood glucose
- Model the flow of energy and matter between organs and blood.
- Describe the digestion of macronutrients
- Model how cells convert food consumed into energy
- Research and explain the factors that contribute to basal metabolic rate
- Compare and contrast drug and food addiction
- Explain how knowledge about drug addiction might apply to dieting
- Describe the dopamine reward pathway
- Model the mechanisms to describe and explain type 1 and 2 diabetes and atherosclerosis
- Conduct a lab investigation to predict how blood glucose responds to insulin
- Utilize knowledge to solve the case of the "Metabolic Mystery Patient Lab". Gather and analyze blood glucose data, looking at the variability using average and standard deviation to make a conclusion and plan out the next investigation.
- Explain graphs showing trends of the number of people that are overweight or obese in the USA
- Calculate the BMI of fictional characters and design a diet to address patient needs
- Interpret data presented in a table and form conclusions about the caloric needs of people with different body compositions
- Explain how limitations in experimental design account for the fluid nature of nutritional information provided by the media
- Design a checklist to evaluate nutritional claims and recommendations
- Analyze scientific articles and apply the information to a case studies:
    - Should we say no to GMOs?
    - Do gut bacteria play a role in obesity?
    - What makes trans-fats so bad?
    - How are the gut and brain connected
    - Atkins vs. Mediterranean diet-Which is better?

Transfer Goals

- Recognize symptoms and use diagnostic tools to identify various metabolic diseases, understanding their biochemical basis and clinical manifestations.
- Assess different treatment options, including dietary changes, medications, and lifestyle modifications, and understand their impact on managing metabolic diseases.
- Apply their knowledge to analyze real-world case studies of metabolic disorders, proposing treatment plans and solutions based on scientific evidence.

- Reflect on how metabolic diseases affect individuals and communities, considering the broader social, economic, and personal impacts.

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit?usp=sharing