

Crafting Curriculum

Exploring the Creation of a 300-Level Biochemistry Module

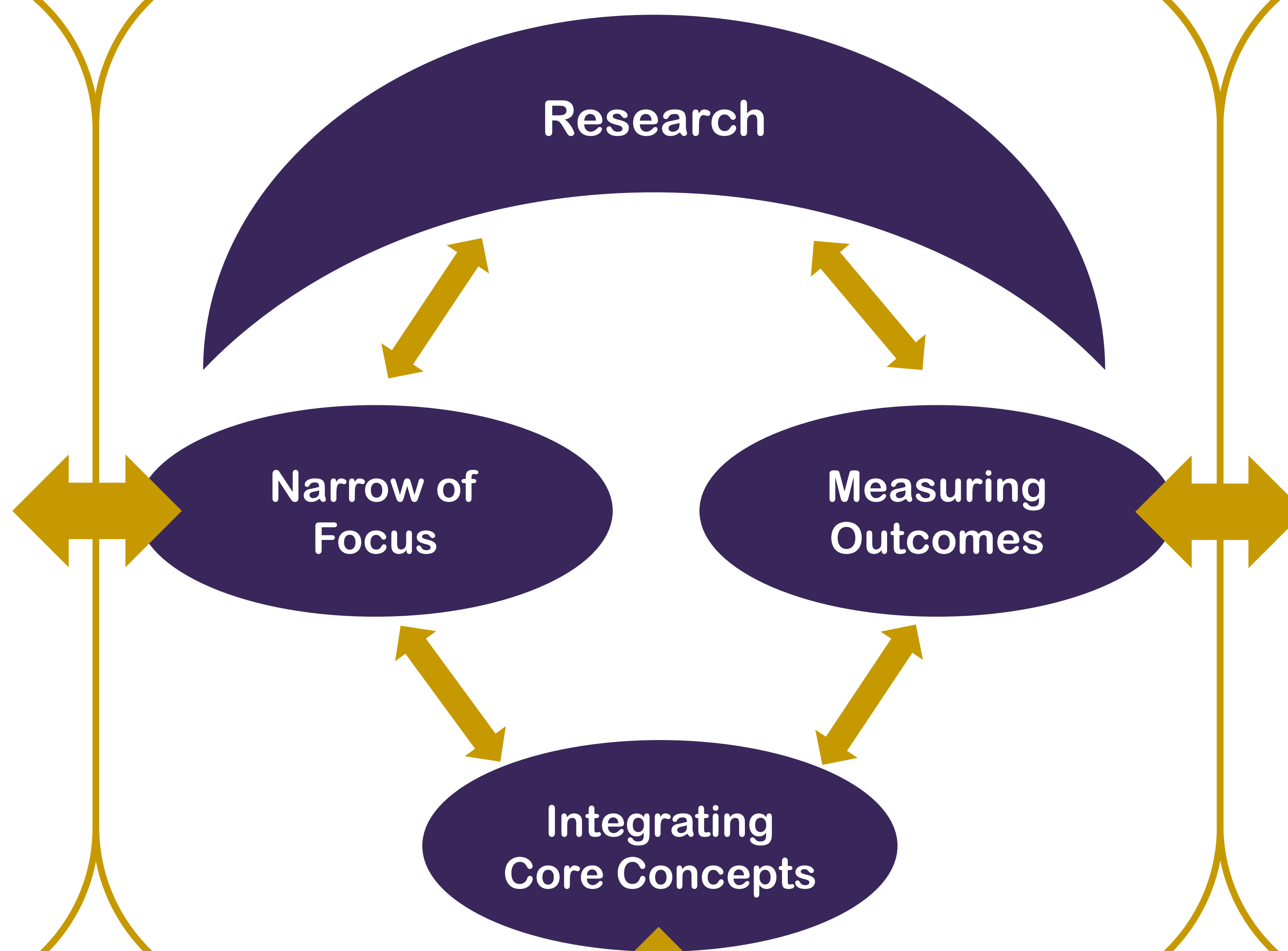
Chris Kidner

Capstone Mentors: Laura Murphy and Leighann Chaffee
University of Washington, Tacoma 2024



Learning Objectives

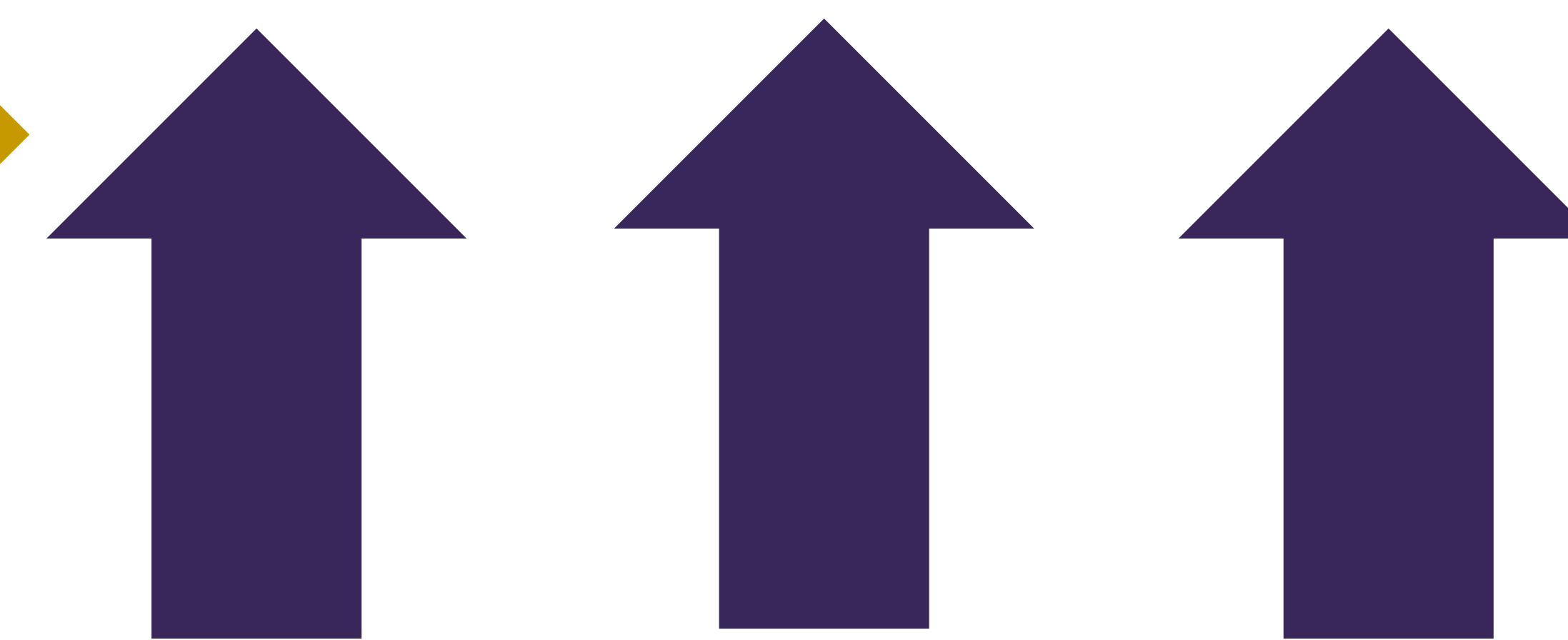
- **Characteristics of the Microbiome:** Identify and describe the phyla of prevalent Gram-positive and Gram-negative bacteria. Differentiate between eubiosis and dysbiosis. Understand the role of lipopolysaccharides and other inflammatory particles, and their impact on gut health. Explain the importance of metabolism of β -glycosidic bonds within the microbiome.
- **Gut-Brain Axis:** Local and Global Pathways Affecting the Brain: Analyze the connection between the gut and the brain, focusing on the role of the vagus nerve and the TLR4/CD14 inflammation pathway in modulating brain function.
- **Peptides:** General Characteristics of Key Peptides: Describe the characteristics of Neuropeptide Y, GABA, and Serotonin, including their production sites, basic functions, and effects on physical and mental health. Explore how these peptides interact with the microbiome.
- **Short-Chain Fatty Acids (SCFAs):** Functions of SCFAs: Discuss the roles of short-chain fatty acids in the hepatic system, including lipid synthesis, cell signaling, and apoptosis. Identify the primary producing phyla of these SCFAs. Characteristics of Major SCFAs: Understand the general characteristics and metabolic pathways of butyrate, propionate, and acetate.
- **Lactobacillus:** Characteristics and Functions: Examine the characteristics of the Lactobacillus genus, including its rod-shaped, Gram-negative structure, preferred environments, and role in dysbiosis. Analyze the metabolic pathways, focusing on homolactic and heterolactic fermentation.
- **Enterohepatic Circulation and Bile Salt Hydrolase Role and Function:** Explore the process of enterohepatic recirculation and the function of bile salt hydrolase in maintaining gut health and metabolism.



Active learning

Nutrition Research Prompt

Diets and Health: For this assignment, choose a dietary plan that has been popular. Analyze it with the information from this nutrition class with at least three peer-reviewed sources. Consider beyond weight loss and examine how the diet may affect a person's physical and mental health.

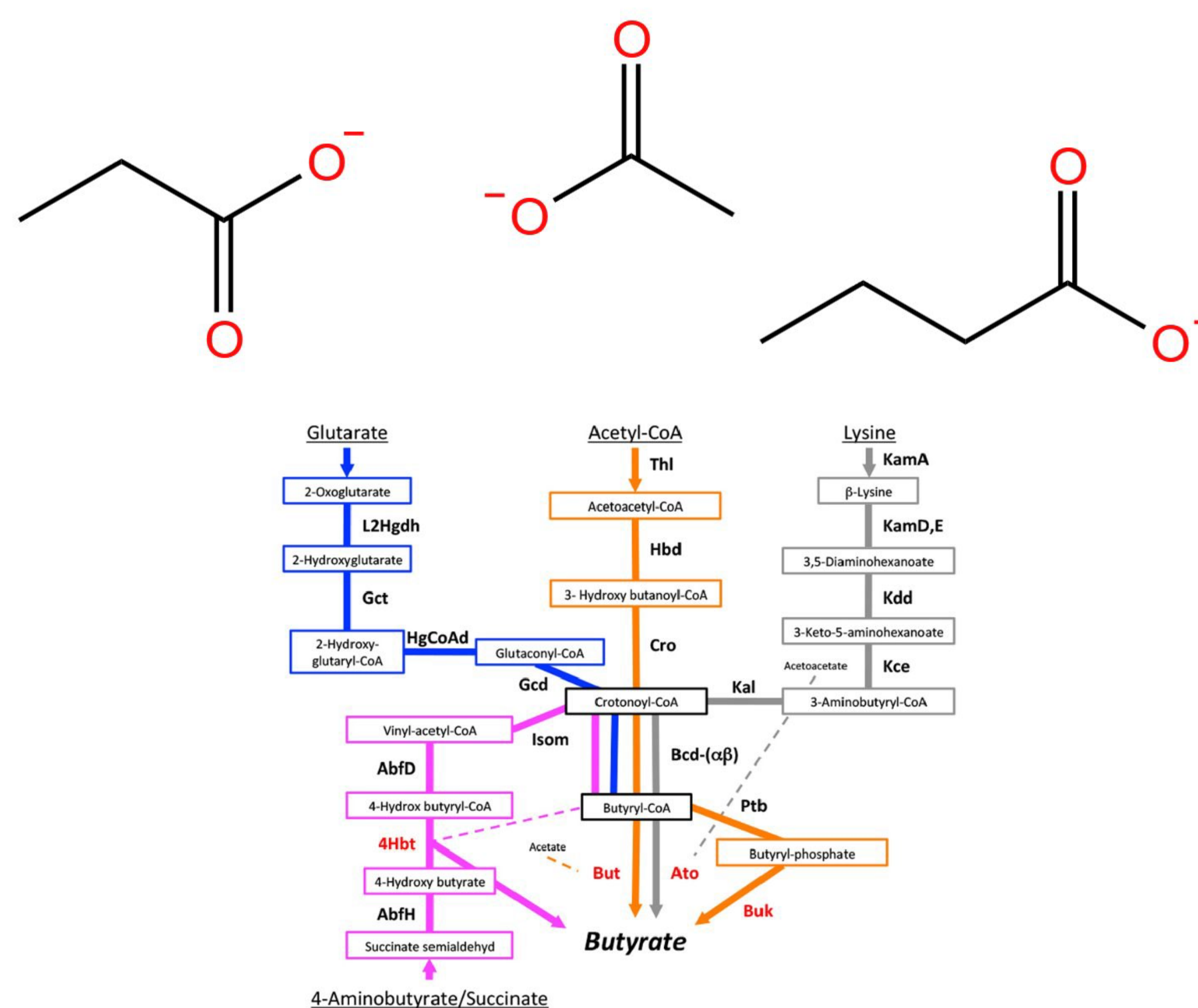


Understanding

Comprehension

Inquiry

Biochemistry Connection



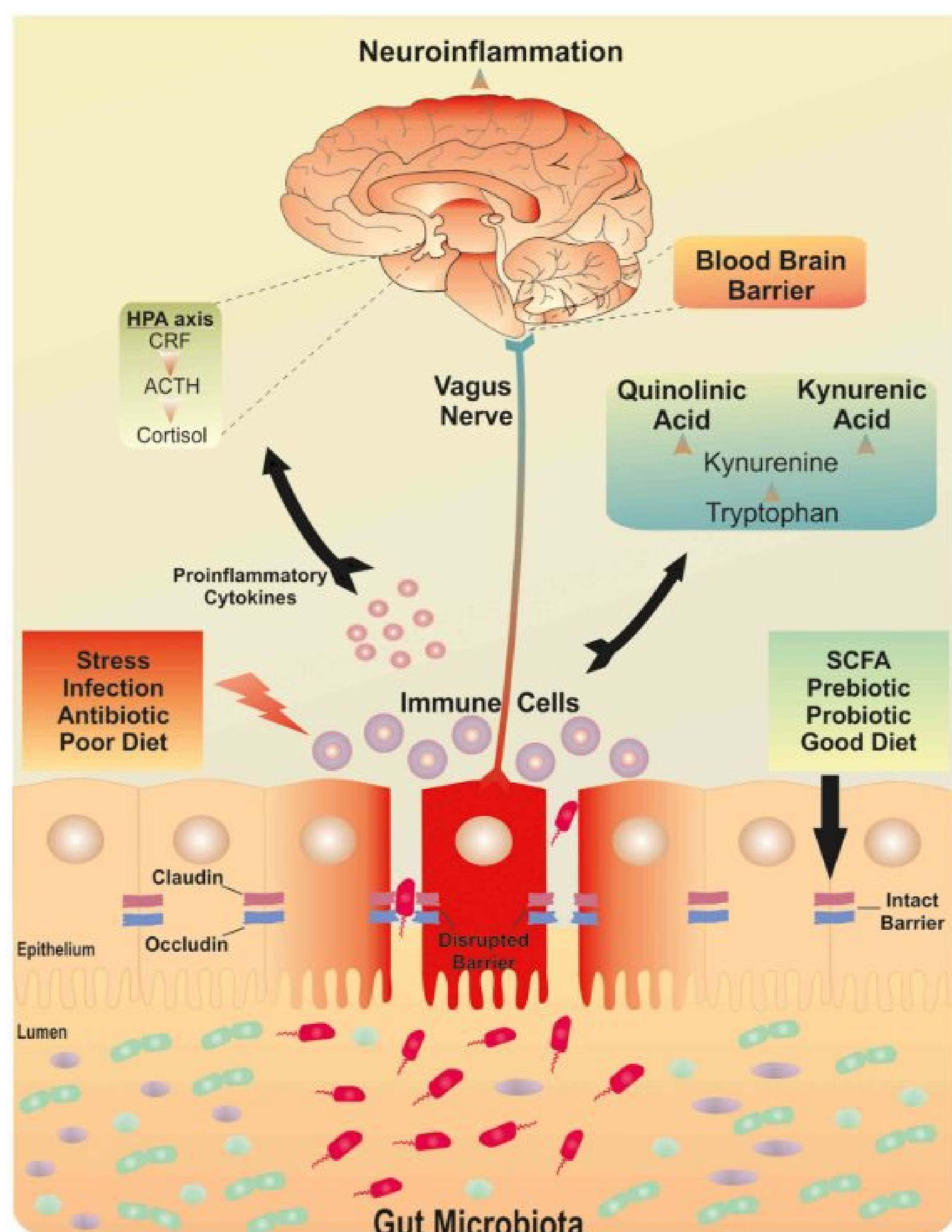
Keeping Up to Date

3-5 years for relevancy of scientific research.

Integrating the novel research encourages students to engage in the most recent discoveries while building the foundation to reach new heights of understanding.



Scan QR code to watch my presentation.



Liang, Shan, et al. "Gut-Brain Psychology: Rethinking Psychology From the Microbiota-Gut-Brain Axis." *Frontiers in Integrative Neuroscience*, vol. 12, 2018, pp. 33-35. <https://doi.org/10.3389/fnint.2018.00033>.

Sender, R., Fuchs, S., & Milo, R. (2016). "Revised Estimates for the Number of Human and Bacteria Cells in the Body." *PLoS biology*, 14(8). e1002533. <https://doi.org/10.1371/journal.pbio.1002533>