Regulation of Lipid Breakdown

This unit will cover the synthesis of lipids including cholesterol, fatty acid and triglyceride synthesis. For more details on these topics, refer to Chapters 28 and 29 in Biochemistry: A Short Course available in reserve[1].

[1]

Contents

Learning Objectives

- Identify the functions of cholesterol within our body
- Understand how fatty acids are synthesized in the body
- Describe the initial highly regulated step of FA synthesis
- Understand the reactions resulting in triacylglycerol synthesis resulting in 3 fatty acids esterified to glycerol
- Describe the breakdown of triacylglycerol to glycerol plus fatty acids and the fates of these products
- Describe fatty acid breakdown (beta-oxidation)
- Determine the amount of energy produced by fatty acid breakdown in comparison to glucose
- Understand when ketogenesis occurs, what organs ketones are a fuel source for and consequences of overactive ketogenesis
- Describe how triglyceride synthesis is regulated in the liver

Synthesis of Triglycerides from Fatty Acids

Cholesterol Synthesis

HMG-CoA Reductase is the Rate Limiting Step for Cholesterol Synthesis

Sensing and Regulation of Sterol Biosynthesis by SREBP2

De Novo Fatty Acid Synthesis

Fatty Acid Synthesis from Glucose and Ketogenic Amino Acids

Desaturation of Fatty Acids

Regulation of Fatty Acid Synthesis