MCB465: Human Metabolic Disease

Spring Semester, 2019

Part I: Overview of Cellular Metabolism and Metabolic Signaling

1/15 #1 Course Information and Policies

Cellular Metabolism I:
Catabolism and Anabolism, Nutrients as Fuels, Digestion of Nutrients, Network of Metabolic Pathways, Metabolic Intermediates, Glycolysis (ATP Production from Glucose)

1/17 #2 Cellular Metabolism II:
Fuel Oxidation (TCA cycle, Oxidative Phosphorylation, Electron Transport Chain in Mitochondria), Anabolic Pathway (Synthesis of Carbohydrates, Proteins, and Lipids), Regulation of Cellular Metabolic Pathways

1/22 #3 Short-Term and Long-Term Control of Metabolism I:
Metabolic Tissues, Endocrine and Neural Control of Metabolism

1/24 #4 Short-Term and Long-Term Control of Metabolism II:
Metabolic Tissues, Endocrine and Neural Control of Metabolism

1/29 #5 Brief Overview of Cellular Signaling I:
Membrane Receptor Signaling

1/31 #6 Brief Overview of Cellular Signaling II:
Nuclear Receptor Signaling

Part II: Metabolic Disease and Potential Therapy

2/05 #7 Diabetes Mellitus 1: Type 1 DM
Pathology and Management of Type I Diabetes

2/07 No Lecture

2/12 #8 The Obesity Epidemic and Metabolic Syndromes and Type 2 Diabetes Mellitus: Type 2 DM, MODYs, Gestational DM, and Therapeutic Interventions

2/14 #9 **Review for Exam I**

2/19 **EXAMINATION I (Lectures #1-9)**

2/21 #10 Obesity and Cardiovascular Disease I: Functions of Cholesterol, Regulation of Cholesterol Levels, HDL and LDL Cholesterol, and Atherosclerosis

2/26 #11 Obesity and Cardiovascular Disease II: Key Players of Cholesterol Metabolism, Hypercholesterolemia, and Therapeutic Agents for Treating Hypercholesterolemia

2/28 #12 Energy Balance and Obesity I:
Hypothalamic Control of Appetite and Leptin Biology

3/05 #13 Energy Balance and Obesity II:
Hypothalamic Control of Appetite and Leptin Biology

3/07 #14 Adipose Biology: Adipose Tissue as a Key Endocrine Organ that Controls Energy Metabolism, Adipogenesis, Adipokines, Brown Adipose Tissue (BAT) vs. White Adipose Tissue (WAT), Energy-dissipating BAT and Adaptive Thermogenesis.

3/12 #15 Obesity and Non-Alcoholic Fatty Liver Disease (NAFLD),
#16 Obesity and Hypertension, Obesity and Female Infertility (PCOS)

3/14 #16 Obesity and Hypertension, Obesity and Female Infertility (PCOS)
#17 Bile Acids and Hepatobiliary Diseases: Gallstone, Cholestasis, Jaundice, Cirrhosis, and Liver Cancer

Spring Break: 3/16-3/24

3/26 #18 **Review for Exam II**

3/28 EXAMINATION II (Lectures #8, #10-18)

Part III: Current Topics in Metabolic Regulation

4/02 #19 Aging and Metabolism:
Discovery of Aging Controlling Genes in Model Organisms
Mammalian Seven Sirtuins (1-7) and Human Diseases
SIRT1: A Key Regulator Linking Metabolism and Aging

4/04 #20 Circadian Clock and Metabolism:
Central and Peripheral Clocks: Molecular Basis of Controlling the Circadian Clock; Circadian Rhythm Asynchrony and Metabolic Disease

4/09 #21 Metabolic Actions of Fibroblast Growth Factor 15/19 (FGF15/19) and FGF21: New Endocrine Hormones Controlling Metabolism and Energy Balance

4/11 #22 AMPK (AMP-activated Kinase): A Key Cellular Energy Sensor, a target for metabolic disease and cancer

4/16 #23 Post-Translational Modifications (PTMs) and Metabolism:
Therapeutic potential of targeting aberrant PTMs of metabolic regulators: e.g.)
Obesity-induced phosphorylation of PPARγ: New diabetes drug target?

4/18 #24 Small non-coding microRNAs and Metabolism:
MicroRNAs as Key Players Controlling Metabolism

4/23 #25 Cancer Cell Metabolism:
Altered Cancer Cell Metabolism (The Warburg Effect): Cancer's Achilles Heel

4/25 #26 **Review for Exam III**

4/30 Tues **EXAMINATION III (Lectures #19-26)**