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)