Name: _____ **Date:** _____

Metabolic Mastery: Senior Seminar in Advanced Nutritional Bioenergetics

Scholars synthesize complex biochemical pathways and evaluate systemic physiological responses to macronutrient shifts in this high-level analysis of metabolic health.

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1. A patient exhibiting high levels of serum homocysteine despite adequate B6 and B12 intake may be struggling with a deficiency in which methyl-donor nutrient often overlooked in standard dietary guidelines?

A. Choline
B. Manganese
C. Selenium
D. Chromium

2. The metabolic phenomenon where the body prioritizes the oxidation of _____ over other macronutrients is termed 'oxidative priority,' significantly impacting lipid storage dynamics.

A. Lipids
B. Ethanol
C. Complex Polysaccharides
D. Leucine

3. True or False: The 'Thermic Effect of Food' (TEF) for dietary protein is significantly higher than that of lipids due to the high energetic cost of peptide bond synthesis and urea cycle processing.

A. True
B. False

4. Which specific fatty acid is clinical research identifying as a potent signaling molecule that activates GPR120, potentially reversing insulin resistance through anti-inflammatory pathways?

A. Palmitic Acid
B. Oleic Acid
C. Eicosapentaenoic Acid (EPA)
D. Stearic Acid

5. When assessing the bioavailability of plant-based minerals, lecturers emphasize that _____ acid, found in seeds and grains, can significantly inhibit the absorption of divalent cations like zinc and iron.

A. Ascorbic
B. Phytic
C. Lauric
D. Acetic

6. True or False: De novo lipogenesis (DNL) is the primary pathway by which humans store excess dietary glucose as adipose tissue under standard, non-hypercaloric Western dietary conditions.

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A. True
B. False

7. Consider a case of 'Rabbit Starvation' (Protein Poisoning). What is the physiological bottleneck that limits the amount of energy an individual can derive from a purely lean protein diet?

A. Gastrointestinal transit speed
B. The liver's maximum rate of urea synthesis
C. Inadequate pepsin production in the stomach
D. Muscle tissue saturation of branched-chain amino acids

8. Analysis of the 'Satiety Cascade' suggests that the hormone _____, secreted by L-cells in the ileum, plays a critical role in the 'ileal brake' mechanism to slow gastric emptying.

A. Ghrelin
B. Glucagon-like peptide-1 (GLP-1)
C. Somatostatin
D. Pancreatic Polypeptide

9. True or False: Sarcopenic obesity is characterized by the simultaneous loss of skeletal muscle mass and increase in adipose tissue, often exacerbated by low-protein, hypocaloric dieting in geriatric populations.

A. True
B. False

10. In the context of the 'Endurance Athlete's Paradox,' why might a high-fat, low-carbohydrate (Keto) adaptation be sub-optimal for high-intensity, anaerobic glycolytic bursts?

A. Fatty acids require 10% more oxygen per ATP produced than glucose
B. Beta-oxidation occurs too rapidly for the Krebs cycle to keep up
C. Ketones inhibit the release of adrenaline from the adrenal medulla
D. Glycerol backbones create an osmotic imbalance in the mitochondria