Name: _____ **Date:** _____

Answer Key: Metabolic Blueprint Quest: 11th Grade Bio-Nutrient Analysis Quiz

Evaluate hormonal regulation of satiety, the glycemic index of complex starch structures, and micronutrient bioavailability in varied physiological contexts.

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1. Which hormone, secreted by adipose tissue, acts as a long-term signal to the hypothalamus to decrease food intake and increase energy expenditure?

Answer: B) Leptin

Leptin is the 'satiety hormone' produced by fat cells that helps regulate energy balance by inhibiting hunger, whereas ghrelin increases appetite.

2. The enzymatic breakdown of _____ begins in the mouth via salivary amylase, though its glycemic impact is determined by its amylose-to-amylopectin ratio.

Answer: C) Complex carbohydrates

Salivary amylase specifically targets starches (complex carbohydrates). Higher amylose content usually results in a lower glycemic index due to its linear, tightly packed structure.

3. Consuming fat-soluble vitamins (A, D, E, K) without a source of dietary lipid significantly impairs their bioavailability and absorption in the small intestine.

Answer: A) True

Fat-soluble vitamins require dietary fats to be incorporated into micelles for absorption across the intestinal lumen.

4. An athlete experiencing 'hitting the wall' during a marathon has most likely reached a state of metabolic depletion regarding which specific fuel source?

Answer: C) Liver and muscle glycogen

'Bonking' or 'hitting the wall' occurs when the body's glycogen stores are exhausted, forcing a shift to less efficient fat oxidation for high-intensity demands.

5. The presence of _____, a compound found in spinach and rhubarb, can form insoluble precipitates with calcium, inhibiting its absorption in the gut.

Answer: A) Oxalic acid

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Oxalates (oxalic acid) are antinutrients that bind to minerals like calcium, making them unavailable for absorption even if the food is nutrient-dense.

6. Which lipoprotein is responsible for 'reverse cholesterol transport,' moving cholesterol from the peripheral tissues back to the liver for excretion?

Answer: C) HDL (High-Density Lipoprotein)

HDL is considered 'good' cholesterol because it facilitates the removal of excess cholesterol from arterial walls and tissues.

7. Intrinsic factor, a glycoprotein secreted by the parietal cells of the stomach, is mandatory for the absorption of Vitamin B12 in the terminal ileum.

Answer: A) True

Without intrinsic factor, the body cannot effectively absorb B12, leading to conditions like pernicious anemia regardless of dietary intake.

8. In the context of the 'Thrifty Gene' hypothesis, what is the primary evolutionary explanation for the modern prevalence of Type 2 Diabetes?

Answer: B) Biological adaptations for fat storage that are now maladaptive in a food-abundant environment

The hypothesis suggests that genes which once helped humans survive famines by storing energy efficiently now contribute to obesity and diabetes in sedentary, high-calorie societies.

9. Vegetarians must often combine legumes with grains to obtain all nine _____, which the body cannot synthesize endogenously.

Answer: B) Essential amino acids

Grains are typically low in lysine, while legumes are low in methionine; together, they provide a 'complete protein' profile of all essential amino acids.

10. The Thermic Effect of Food (TEF) is highest for dietary fats compared to proteins and carbohydrates because fats are the most energy-dense macro-nutrient.

Answer: B) False

Protein has the highest TEF (20-30%), requiring more energy for digestion and processing than carbohydrates (5-10%) or fats (0-3%).