

**$\alpha$ -Cell**

$\alpha$ -Cells are endocrine cells localized within islets of the pancreas, where they secrete the peptide hormone glucagon during times of prolonged fasting/starvation in order to stimulate hepatic glucose production for maintaining normoglycemia. The  $\alpha$ -cell makes up approximately 20% of the pancreatic islet-cell population in humans.

**Body mass index**

Body mass index (BMI) is a formula for measuring an individual's relative weight based on their mass and height and is calculated by the formula  $BMI = \text{mass in kilogram}/(\text{height in meters})^2$ . A healthy BMI is generally considered to be in the range of 18.5 to 24.9, whereas those with BMIs in the 25 to 29.9 range are classified as being overweight, and those with BMIs >30 are classified as obese. Although BMI is frequently used to assess general body mass in patient populations, the BMI does not take into account age, sex, or muscle mass, and it can result in large BMI scores for people that actually have very low body fat percentages, such as body builders.

**Carnitine palmitoyl transferase-1**

Carnitine palmitoyl transferase-1 (CPT-1) is the rate-limiting enzyme involved in the uptake of fatty acids in the mitochondria. It converts fatty acyl-coenzyme A to fatty acylcarnitine, which is then transported into the mitochondria where it is further metabolized. CPT-1 is a highly regulated enzyme that prevents excess fatty acid from being taken up into the mitochondria.

**Endothelin-1**

Endothelin-1 is a small peptide produced in a variety of tissues, including endothelial and vascular smooth muscle cells. It acts as a modulator of vasomotor tone, cell proliferation, and hormone production. It is a potent vasoconstrictor.

**Glycated hemoglobin**

Glycated hemoglobin ( $HbA_{1c}$ ) forms from the nonenzymatic coupling of glucose to the major component of adult hemoglobin (ie,  $HbA_{\alpha 2\beta 2}$ ). Glucose, via a complex series of reactions, is coupled to specific valine residues of  $HbA_{\beta}$  chains.  $HbA_{1c}$  levels at a threshold of 6.5% can be used as a diagnostic test indicative of diabetes.  $HbA_{1c}$  levels are reflective of av-

erage glycemic control over a period of 2 to 3 months before testing/analysis.

**Glycolysis**

Glycolysis is the series of biochemical reactions occurring in the cytosolic compartment that converts a glucose molecule into two molecules of pyruvate. In the presence of oxygen (ie, the aerobic setting), pyruvate is transported into the mitochondria and undergoes oxidative decarboxylation, yielding acetyl-CoA. In the absence of oxygen (ie, the anaerobic setting), pyruvate is reduced to lactate by the enzyme lactate dehydrogenase, which generates the nicotinamide adenine dinucleotide ( $NAD^+$ ) required to maintain flux through glycolysis.

**Incretin**

Incretin refers to gastrointestinal peptide hormones released by enteroendocrine cells of the intestinal mucosa in response to the ingestion of food (or oral glucose load). The two major incretins are glucagon-like peptide-1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP). Incretins enhance glucose-stimulated insulin secretion and, thus, are important regulators of glucose homeostasis. In addition, a variety of extraglycemic effects of incretins have been documented, including a slowing of gastric emptying, promotion of satiety, and reductions in food intake.

**Insulin**

Insulin is a pancreatic peptide hormone secreted from  $\beta$ -cells of the islets of Langerhans in the post-absorptive state. Its major metabolic effects are anabolic in nature, exemplified by the ability of insulin to do the following: increase glucose and amino acid uptake, as well as glycogen and protein synthesis, in muscle; increase glucose uptake and triacylglycerol synthesis in adipose tissue; and increase glucose uptake, glycogen, and triacylglycerol synthesis in the liver.

**Leptin**

Leptin is a peptide hormone synthesized by adipocytes and plays a key role in the regulation of appetite and energy expenditure. This can occur through direct actions of leptin on the hypothalamus or on peripheral lipid and glucose metabolism.

### **Thromboxane A<sub>2</sub>**

Thromboxane A<sub>2</sub> is a product of the cyclooxygenase pathway of arachidonic acid metabolism. In that pathway, cyclooxygenase catalyzes the production of prostaglandin H<sub>2</sub> (PGH<sub>2</sub>) from arachidonic acids; PGH<sub>2</sub> can then be used in the formation of a number of different eicosanoid products, including prostaglandins. Metabolism of PGH<sub>2</sub> by thromboxane synthase, which is abundant in lung and platelets, results in the production of thromboxane A<sub>2</sub>. Thromboxane A<sub>2</sub> has a variety of biological effects, including vasoconstriction and promotion of platelet aggregation.