Glossary of Terms

A

Acetyl CoA
Acetyl coenzyme A is a molecule created through glycolysis when from carbohydrates and through beta-oxydation when from fatty acids, that enters the citric acid cycle (Krebs cycle) to be oxidized for energy production.

Adipose Tissue
Fat tissue in the body, which serves as an energy storage depot. Its composition (e.g., levels of stored linoleic acid) can influence metabolic health and insulin sensitivity.

Aerobic
In the presence of oxygen.

AGEs (Advanced Glycation End-products)
Sticky, damaging byproducts of prolonged glycation that impair tissue function.

Alzheimer's / Type 3 Diabetes
A term used to describe Alzheimer's disease as a metabolic disorder of the brain, driven by insulin resistance and impaired glucose metabolism in neural tissue.

Amino Acids
Organic compounds that combine to form proteins.

Anaerobic
Without the presence of oxygen.

Apoptosis
Programmed cell death of sick or damaged cells to prevent anything from excessive inflammation to cancer.

ATP (adenosine triphosphate)
The main molecule cells use for energy.

B

Basal Lipolysis
The ongoing breakdown of fat in adipocytes at a resting state. In obesity, basal lipolysis can increase as fat cells become distended, contributing to elevated free fatty acid levels and systemic insulin resistance.

Beta-oxidation
The mitochondrial process of breaking down fatty acids into acetyl-CoA to generate ATP.

Blood Pressure
The force exerted by the blood against the walls of arteries as the heart pumps blood throughout the body. Typically measured as two numbers: the systolic, the pressure during the heart beat (higher number,) and the diastolic, the pressure between heart beats (lower number.)

Blood Sugar (Blood Glucose)
The amount of glucose circulating in the bloodstream.

C

Caloric Balance Model
Calories In, Calories Out (CICO)
The conventional explanation of obesity, which posits that weight gain is caused by consuming more calories than are expended. This model is challenged by both the insulin resistance and ROS hypotheses.

Carbohydrate
A non-essential macronutrient that includes sugars, starches, and fiber.

Cell Signalling
The process by which cells communicate with each other or their environment to coordinate functions, respond to stimuli, and maintain homeostasis.

Cellular Respiration
The process of converting nutrients into ATP.

Cholesterol
A lipid essential for building cell membranes, making hormones, and digesting food. Generally broken into three main types, LDL (low-density lipoprotein,) HDL (high-density lipoprotein,) and VLDL (very low-density lipoprotein.)

CVFMHI
Constantly Varied Functional Movements at High Intensity.

Cytoplasm
The gelatinous liquid that fills the inside of a cell.

D

Diabetes (Type 2)
A chronic metabolic disorder where the body either does not respond properly to insulin (insulin resistance), or does not produce enough insulin to maintain normal blood sugar levels. As a result, glucose builds up in the blood, leading to hyperglycemia.

DNA (deoxyribonucleic acid)
The molecule that carries the genetic instructions for life. It tells cells how to build proteins, which are the building blocks and machinery of your body.

Dopamine
A neurotransmitter that plays a key role in how we feel pleasure, motivation, and reward. It also helps regulate movement, attention, mood, and several other brain functions.

E

Ectopic Fat
Fat that is stored in places where it normally doesn't belong, particularly outside of adipose tissue, in places like the liver, muscles, heart, pancreas, or kidneys. Once there, it interferes with the normal functioning of the organ.

Electron Transport Train
A series of proteins in the mitochondrial inner membrane that transfer electrons from NADH and FADH2 to oxygen, releasing energy used to generate ATP.

Energy Conservation
The total energy in a system remains constant, but the form it takes and how efficiently it's used vary. The First Law preserves quantity, but not quality or effectiveness.

Entropy
A measure of disorder or randomness in a system. In biology, it reflects the inevitable loss of usable energy during metabolic processes. More entropy means less available energy for productive biological work.

Epidemiology
Making observations and associating risk factors with diseases. Observational studies inherently cannot usually establish or even infer causality. Observational epidemiology is highly prone to bias and confounding.

F

FADH2 to NADH Ratio (FN Ratio)
A ratio that determines the production of ROS during fatty acid oxidation in mitochondria. Saturated fats promote a higher FN ratio, leading to more ROS, while polyunsaturated fats lower it, reducing ROS.

Fat (dietary)
A dense energy source (macronutrient) that includes saturated, monounsaturated, and polyunsaturated fats. Fats are essential for brain health, hormone production, and cellular integrity.

Fat Oxidation
The process of breaking down fat molecules to produce energy.

Fatty Acids
Long chains of carbon and hydrogen atoms that are the building blocks of fats (lipids.) Unsaturated fatty acids have one or more double bonds between the carbon atoms, while saturated fatty acids have no double bonds.

Fasting Glucose
The amount of glucose in the bloodstream after having not eaten for at least 8 hours.

Fasting Insulin
The amount of insulin in the bloodstream after having not eaten for at least 8 hours.

First Law of Thermodynamics
Energy cannot be created or destroyed; it can only be transformed from one form to another. In metabolism, this law is often misused to justify calorie counting without accounting for how different energy sources are metabolized, stored, or lost.

Free Fatty Acids (FFAs)
Fat molecules released during lipolysis that circulate in the bloodstream and are used for energy.

Fructose
A sugar that glycates proteins faster than glucose and promotes fat storage.

Functionality
The ability to perform functional movements.

G

Glucagon
A hormone that promotes energy release by stimulating lipolysis, especially during fasting or low-carbohydrate intake.

Gluconeogenesis
The metabolic process where the liver converts non-carbohydrate substrates like glycerol into glucose.

Glucose
A simple sugar, used as a fuel by the body to produce ATP.

Glycation
A non-enzymatic reaction where sugar binds to proteins, altering their function.

Glycogen
The stored form of glucose in the liver and muscles. Can be broken down and converted to ATP quickly when the body signals for sugar for energy.

Glycolytic Pathway
The breakdown of glucose to produce energy. It occurs in the cytoplasm of cells and does not require oxygen, so can happen in both aerobic and anaerobic conditions. Utilized in efforts ranging from 10–120 seconds.

Glycolosis
The first step of cellular respiration, in which glucose is broken down into pyruvate.

H

HbA1C (A1C)
A glycated form of hemoglobin used as a clinical marker for average blood sugar over 2–3 months.

High-density Lipoprotein – HDL
A lipoprotein, a fat and protein particle, that transports fats through the bloodstream, particularly cholesterol. Primarily moves cholesterol from tissues and carries them back to the liver. Contains more protein, and less fat than LDL, making it more dense.

Homeostasis
Your body's ability to maintain internal stability.

Hyperglycemia
High blood glucose, a primary driver of glycation.

Hyperinsulinemia
An abnormally high level of insulin in the blood, often caused by insulin resistance. Hyperinsulinemia suppresses fat breakdown (lipolysis) and drives fat storage.

Hypertension
Chronically elevated blood pressure.

Hypoinsulinemia
A state of low circulating insulin, such as during fasting or ketogenic diets.

I

Inflammation
The body's defense response to injury, infection, or harmful stimuli.

Insulin
A hormone that promotes energy storage. It inhibits lipolysis and signals the body to store fat rather than burn it.

Insulin Resistance
A condition in which cells become less responsive to insulin.

Insulin Signaling
The process by which insulin tells cells to take in nutrients. Controlled by ROS feedback.

J

K

Ketogenic Diet
A low-carbohydrate, high-fat diet that induces a state of ketosis, where the body primarily burns fat for energy instead of carbohydrates.

Ketones (ketone bodies)
Molecules produced when fat is broken down for energy. There are three main types: Acetoacetate (AcAc), Beta-hydroxybutyrate (BHB), and Acetone.

Ketosis
A metabolic state in which the body uses ketones (produced from fat breakdown) as its primary energy source instead of glucose. Ketosis is induced by ketogenic diets or fasting.

L

Lactate (lactic acid)
A byproduct of anaerobic metabolism, when glucose is broken down without oxygen.

Low-density Lipoprotein – LDL
A lipoprotein, a fat and protein particle, that transports fats through the bloodstream, particularly cholesterol. Primarily moves cholesterol from the liver and and carries them to other tissues. Contains more fat, and less protein than HDL, making it less dense.

Linoleic Acid
A polyunsaturated fatty acid (PUFA) found in seed oils (e.g., soybean, corn, sunflower oils). Linoleic acid reduces ROS production during fatty acid oxidation, leading to excessive insulin sensitivity and fat storage.

Lipolysis
The breakdown of stored fat into free fatty acids, which can then be used as energy.

Lipoprotein
A molecule of fat and protein that helps transport cholesterol, triglycerides, and other fats through the bloodstream.

M

Macronutrients
The three types of nutrients that provide energy: protein, fat, and carbohydrates.

Metabolic Dysfunction
A state where the body's systems for producing and using energy are impaired, often involving poor blood sugar regulation, insulin resistance, and fat storage abnormalities.

Metabolic Flexibility
The body's ability to switch between burning carbohydrates and fats for energy. Poor metabolic flexibility is associated with insulin resistance and obesity.

Metabolic Pathways
A series of chemical reactions within a cell that transform molecules to produce energy, build cellular structures, or break down substances; forming the metabolism.

Metabolism
The process of converting food into energy, allowing the body to function, grow, and repair itself.

Mitochondria
Organelles within cells that produce energy through processes like fatty acid oxidation.

Mitochondrial Dysfunction
Impairment of mitochondrial function, leading to diseases, including obesity and type 2 diabetes.

N

NADH / $FADH_2$
Nicotinamide adenine dinucleotide and flavin adenine dinucleotide are energy carriers that donate electrons in the electron transport chain.

Nucleus
The control center of the cell. It holds the genetic material (DNA) and directs most cellular activities including growth, protein synthesis, and cell division.

O

Obesity
A disorder of excess fat accumulation and a risk factor (often an early-warning sign) of metabolic dysfunction..

Obesity Epidemic
The dramatic rise in obesity rates over the past century, often linked to changes in diet composition, such as the increased consumption of seed oils and refined carbohydrates.

Observational Data (Epidemiology)
Making observations and associating risk factors with diseases. Observational studies inherently cannot usually establish or even infer causality. Observational epidemiology is highly prone to bias and confounding.

Omega-3 Fatty Acids
A subclass of polyunsaturated fats that includes EPA (eicosapentaenoic acid,) DHA (docosahexaenoic acid,) and ALA (alpha-linolenic acid.) Omega 3s are essential and cannot be produced by the body, so must be consumed.

Omega-6 Fatty Acids
A subclass of polyunsaturated fats, of which linoleic acid is the primary example. Omega-6 fats are highly prevalent in modern diets and have been linked to inflammation, insulin dysregulation, and obesity.

Oxidative Pathway (aerobic pathway)
The process of producing ATP in the presence of oxygen. Utilized in efforts lasting longer than 2 minutes.

Oxidative Phosphorylation (OxPhos)
The final stage of cellular respiration where ATP is produced using oxygen.

Oxidative Stress
A condition where ROS levels are too high, causing damage to cells.

P

Pathological Insulin Sensitivity
A state where adipocytes (fat cells) are overly responsive to insulin due to insufficient ROS production. This excessive sensitivity promotes fat storage and is central to the ROS hypothesis of obesity.

Phosphocreatine
A high-energy compound stored in muscle cells, that generates ATP during short bursts of activity.

Phosphogen Pathway
The body's fastest way to produce ATP, during short, high-intensity efforts (0–10seconds.)

Polyunsaturated Fats (PUFAs)
A type of fat with multiple double bonds in its chemical structure. PUFAs, such as linoleic acid, are commonly found in seed oils and have been linked to suppressed ROS production and pathological fat storage.

Postprandial Metabolism
The metabolic processes that occur after a meal, including insulin release, nutrient storage, and ROS production.

Power
The product of Force and Distance over a given time. **F x D / T**
Quantified as either horsepower, watts, foot pounds per minute, etc.

Protein
A critical building block composed of amino acids. Used to build and repair tissues, make enzymes and hormones, and support immune function.

Proton Gradient
A buildup of H^+ ions across the membrane that stores potential energy.

Pyruvate
A 3-carbon molecule produced at the end of glycolysis, the breakdown of glucose. Under aerobic conditions, it enters the mitochondria and is converted into acetyl-CoA, which feeds into the Krebs cycle for further energy production. Under anaerobic conditions, pyruvate is converted into lactate to regenerate NAD^+ and allow glycolysis to continue.

Q

R

RAGE
Receptor for AGEs; binding triggers inflammation.

Reverse Electron Transport (RET)
A mitochondrial process in which electrons flow backward in the electron transport chain, generating ROS. This process is regulated by the FADH2 to NADH ratio and is essential for moderating insulin signaling.

ROS – Reactive oxygen species (signal)
Small, highly reactive molecules produced as byproducts of mitochondrial energy metabolism. ROS play a critical role in cellular signaling, including moderating insulin's effects to prevent excessive nutrient storage.

S

Saturated Fats
A type of fat with no double bonds in its chemical structure.

Seed Oils
Oils extracted from seeds, such as soybean, corn, and sunflower oil, which are high in polyunsaturated fats, particularly linoleic acid. These oils have been implicated in metabolic dysfunction and obesity.

Second Law of Thermodynamics
In any energy transfer or transformation, some energy is lost as heat, and the entropy (disorder) of a system tends to increase. Biological systems are not perfectly efficient. This law explains why not all calories are consumed in usable energy and why the quality and directionality of energy matter.

SLIPS
Scales, L-sits, Inversions (handstands), Planks, and Stretching.

Statins
A class of medications aimed at lowering cholesterol levels, especially LDL cholesterol.

T

Thiazolidinediones (TZDs)
A class of drugs used to treat type 2 diabetes by improving insulin sensitivity.

Triglycerides (TGs)
The primary form of stored fat in the body and transported in the bloodstream, made of one glycerol molecule and three fatty acid chains.

Type 2 Diabetes
A chronic condition where the body becomes resistant to insulin or doesn't produce enough, leading to elevated blood glucose levels and widespread metabolic damage.

U

V

Visceral Fat
Fat stored around the organs, associated with insulin resistance, inflammation, and chronic disease.

W

WCABTMD
Work Capacity Across Broad Time and Modal Domains. A quantification of one's fitness.

Work Capacity
A collection of your performance data. While this measure is a representation of one's fitness, it's typically referred to in theory, and rarely actually measured or plotted.

X

Y

Z