

# AI-01914 DIY GLP-1 at Zero Cost

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**How a human can lose weight like the one who is using a GLP-1 but not using it. How is metabolic process occurring with GLP-1. Not all humans can afford the expensive GLP-1, list a similar method to achieve a similar objective of weight loss.**

GLP-1 receptor agonists (like Ozempic, Wegovy, Mounjaro) have revolutionized weight loss by harnessing the power of a natural hormone. While these medications are incredibly effective, their high cost makes them inaccessible for many. The good news is that you can achieve similar metabolic effects and significant weight loss through non-pharmacological methods by understanding how GLP-1 works and optimizing your lifestyle to naturally enhance its activity.

## How GLP-1 (Glucagon-Like Peptide-1) Works in Metabolism

GLP-1 is a naturally occurring hormone produced in your gut (specifically in L-cells of the small intestine) in response to food intake. It plays several crucial roles in regulating appetite, blood sugar, and metabolism:

- 1. Delays Gastric Emptying:** GLP-1 slows down how quickly food leaves your stomach and enters your small intestine. This makes you feel fuller for longer, reducing overall food intake.
- 2. Increases Satiety:** GLP-1 acts on receptors in the brain (especially in the hypothalamus, the "satiety center"), sending signals that reduce hunger and increase feelings of fullness and satisfaction after eating. This helps to "quiet food noise" and curb cravings.
- 3. Enhances Insulin Secretion (Glucose-Dependent):** When blood sugar levels are high (after a meal), GLP-1 stimulates the pancreas to release more insulin.

Importantly, this insulin release is "glucose-dependent," meaning insulin is released only when needed, reducing the risk of dangerously low blood sugar (hypoglycemia).

4. **Suppresses Glucagon Secretion:** Glucagon is a hormone that raises blood sugar. GLP-1 suppresses glucagon release, further helping to keep blood glucose levels stable and preventing unnecessary spikes.
5. **May Promote Beta Cell Growth/Survival:** Some research suggests GLP-1 might have beneficial effects on the pancreatic beta cells that produce insulin, though this is more relevant for diabetes management.

In essence, GLP-1 helps you feel full, eat less, and improves your body's ability to manage blood sugar, all of which contribute to weight loss.

## Achieving Similar Weight Loss Without GLP-1 Medications

The goal is to naturally stimulate your body's own GLP-1 production and leverage the same metabolic pathways. This requires a multi-pronged approach focused on diet, exercise, and lifestyle.

### 1. Dietary Strategies: The Cornerstone

Diet is arguably the most powerful tool for naturally increasing GLP-1 and achieving sustained weight loss.

- **Prioritize Protein:** Protein is known to be a strong stimulator of GLP-1 release and significantly increases satiety.
  - **Aim for:** Lean meats, poultry, fish/seafood, eggs, Greek yogurt, cottage cheese, beans, lentils, tofu, nuts, and seeds.
  - **Include protein at every meal,** especially breakfast, to promote fullness throughout the day.
- **Boost Fiber Intake (Especially Soluble Fiber):** Fiber, particularly soluble fiber, slows digestion, promotes a gradual release of glucose, and is fermented by gut bacteria into short-chain fatty acids (SCFAs), which can directly stimulate GLP-1 secretion from L-cells.

- **Aim for:** Oats, barley, whole grains, legumes (beans, lentils, chickpeas), psyllium husk, fruits (apples, berries, avocados), and vegetables (broccoli, Brussels sprouts, asparagus).
- **Gradually increase fiber** to avoid digestive discomfort and drink plenty of water.
- **Include Healthy Fats:** Monounsaturated and polyunsaturated fats (especially omega-3s) can enhance GLP-1 release and contribute to satiety by slowing gastric emptying.
  - **Aim for:** Avocados, olive oil, nuts (almonds, walnuts, pistachios), seeds (chia, flax), and fatty fish (salmon, mackerel).
- **Mindful Eating Practices:**
  - **Eat Slowly:** Chewing thoroughly and eating slowly gives your gut time to signal the release of GLP-1 and for those satiety signals to reach your brain. This allows you to recognize fullness cues before overeating.
  - **Meal Sequencing:** Eating protein and vegetables *before* carbohydrates in a meal can lead to higher GLP-1 release and better blood sugar control.
  - **Structured Meals:** Aim for consistent meal times and avoid prolonged grazing.
- **Limit Processed Foods, Added Sugars, and Refined Carbs:** These foods are often low in fiber and protein, high in rapidly absorbed sugars, which can lead to blood sugar spikes and crashes, and don't effectively stimulate satiety hormones like GLP-1.

## 2. Exercise: Enhancing Hormonal Response

Both moderate and high-intensity exercise can increase GLP-1 levels.

- **Aerobic Exercise:** Regular cardiovascular activity (brisk walking, jogging, cycling, swimming) helps improve metabolic health, insulin sensitivity, and can increase GLP-1 secretion.
- **Resistance Training (Strength Training):** Building and maintaining muscle mass is crucial for metabolism. Muscle is more metabolically active than fat,

meaning it burns more calories at rest. Strength training also improves insulin sensitivity. Aim for 2-3 sessions per week.

- **Combination:** A mix of aerobic and resistance training is often considered the most effective for overall health and weight management.

### 3. Lifestyle Factors: Supporting Your Metabolism

- **Adequate Sleep:** Poor sleep disrupts hunger and satiety hormones (ghrelin and leptin), can increase cortisol (a stress hormone that promotes fat storage), and impair insulin sensitivity. Aim for 7-9 hours of quality sleep per night.
- **Stress Management:** Chronic stress can elevate cortisol, leading to increased appetite and fat storage. Practices like meditation, yoga, deep breathing, or spending time in nature can help manage stress.
- **Gut Health:** A healthy gut microbiome can influence GLP-1 production. Incorporate probiotic-rich foods (yogurt, kefir, sauerkraut, kimchi) and prebiotic fibers (from fruits, vegetables, whole grains) to support beneficial gut bacteria.
- **Intermittent Fasting (IF):** While not for everyone, some forms of intermittent fasting (e.g., 16/8 method where you fast for 16 hours and eat within an 8-hour window) can help shift your body towards fat burning and improve insulin sensitivity. This can indirectly support weight loss by reducing overall calorie intake and leveraging periods of lower insulin.

#### Important Considerations:

- **Consistency is Key:** Natural GLP-1 enhancement and weight loss are long-term processes that require consistent effort in diet and exercise.
- **Individual Variation:** Everyone's body responds differently. What works perfectly for one person may need adjustment for another.
- **Consult a Professional:** Before making significant dietary or exercise changes, especially if you have underlying health conditions, consult with a doctor, registered dietitian, or certified fitness professional. They can provide personalized guidance and ensure your approach is safe and effective for you.

By diligently applying these strategies, you can naturally optimize your body's own GLP-1 response, improve metabolic health, and achieve sustainable weight

loss, much like the mechanisms seen with GLP-1 medications, but through a holistic and accessible approach.

## **Explain the fed, fasted, intermediate and extended fasted state in human metabolism.**

The human body constantly switches between different metabolic states to ensure a continuous supply of energy for its various functions. These states are primarily determined by the availability of food and are regulated by a complex interplay of hormones.

Here's an explanation of the fed, fasted, intermediate, and extended fasted states:

### **1. Fed State (Absorptive State)**

- **Duration:** Typically occurs for about 3-4 hours after a meal.
- **Key Characteristics:**
  - **High Blood Glucose:** As food is digested, carbohydrates are broken down into glucose, leading to a rise in blood sugar.
  - **High Insulin, Low Glucagon:** The pancreas responds to high blood glucose by releasing insulin and suppressing glucagon. Insulin is the primary anabolic hormone in this state.
  - **Nutrient Absorption and Storage:** The body is focused on absorbing nutrients from the digestive tract and storing excess energy.
- **Metabolic Pathways:**
  - **Glycolysis:** Glucose is used as the primary fuel source by most tissues, undergoing glycolysis to produce ATP.
  - **Glycogenesis:** Excess glucose is converted into glycogen (a stored form of glucose) in the liver and muscles for later use.
  - **Lipogenesis:** When glycogen stores are full, excess glucose is converted into fatty acids and then triglycerides, which are stored in adipose (fat) tissue.

- **Protein Synthesis:** Amino acids from digested proteins are used to build and repair tissues.
- **Organ Roles:**
  - **Liver:** Takes up glucose, synthesizes glycogen, and converts excess glucose to fat.
  - **Muscle:** Takes up glucose and amino acids, synthesizes glycogen and protein.
  - **Adipose Tissue:** Takes up glucose and fatty acids, synthesizes and stores triglycerides.
  - **Brain & Red Blood Cells:** Continuously use glucose for energy, regardless of insulin levels.

## 2. Fasted State (Post-Absorptive State)

- **Duration:** Begins roughly 3-4 hours after a meal and can last up to 12-24 hours. This is the state your body is in during an overnight fast.
- **Key Characteristics:**
  - **Falling Blood Glucose:** As absorbed nutrients are used up, blood glucose levels begin to drop.
  - **Low Insulin, High Glucagon:** The decrease in blood glucose triggers the pancreas to reduce insulin secretion and increase glucagon release. Glucagon is a catabolic hormone.
  - **Mobilization of Stored Energy:** The body shifts from storing energy to breaking down stored reserves to maintain blood glucose and provide fuel for tissues.
- **Metabolic Pathways:**
  - **Glycogenolysis:** The liver breaks down its stored glycogen into glucose, releasing it into the bloodstream to maintain blood sugar levels. Muscle glycogen is used primarily by the muscle itself.
  - **Lipolysis:** Adipose tissue breaks down stored triglycerides into free fatty acids and glycerol. Free fatty acids become a major fuel source for many

tissues (like muscle and liver), sparing glucose for the brain and red blood cells. Glycerol can be transported to the liver and used for gluconeogenesis.

- **Organ Roles:**

- **Liver:** Primarily responsible for maintaining blood glucose through glycogenolysis.
- **Adipose Tissue:** Releases free fatty acids and glycerol.
- **Muscle:** Switches to using fatty acids as its primary fuel source, conserving glucose.

### 3. Intermediate Fasted State

- **Duration:** Typically from about 12-24 hours after the last meal, overlapping with the later part of the "fasted state" and transitioning into extended fasting. This is often seen in intermittent fasting protocols (e.g., 16/8).

- **Key Characteristics:**

- **Glycogen Depletion:** Liver glycogen stores become significantly depleted or completely exhausted.
- **Increased Reliance on Fat:** The body increasingly relies on fat breakdown for energy.
- **Initiation of Gluconeogenesis and Ketogenesis:** The liver ramps up glucose production from non-carbohydrate sources and begins to produce ketone bodies.

- **Metabolic Pathways:**

- **Gluconeogenesis:** The liver synthesizes new glucose from precursors like amino acids (from muscle protein breakdown), lactate (from red blood cells and exercising muscle), and glycerol (from fat breakdown). This is crucial for providing glucose to tissues that depend on it (brain, red blood cells).
- **Ketogenesis:** As fatty acid oxidation increases in the liver, acetyl-CoA (a product of fatty acid breakdown) is converted into ketone bodies (beta-hydroxybutyrate and acetoacetate).

- **Hormonal Changes:** Glucagon remains high, insulin remains low. Cortisol and epinephrine levels may rise to further support glucose production and fat mobilization.
- **Organ Roles:**
  - **Liver:** Becomes the central hub for gluconeogenesis and ketogenesis.
  - **Adipose Tissue:** Continues robust lipolysis.
  - **Muscle:** May contribute amino acids for gluconeogenesis if glucose demand is high.

## 4. Extended Fasted State (Starvation)

- **Duration:** Beyond 24-48 hours, lasting for several days or even weeks.
- **Key Characteristics:**
  - **Significant Ketone Production:** Ketone bodies become the primary fuel source for the brain and other tissues, significantly reducing the body's reliance on glucose. This is a critical adaptation for survival, as it spares protein breakdown.
  - **Protein Conservation:** The body strives to conserve protein as much as possible, as excessive protein breakdown can compromise vital functions.
  - **Sustained Gluconeogenesis:** Though ketone bodies fuel the brain, a minimal amount of glucose is still required, so gluconeogenesis continues, largely from glycerol and some amino acids.
- **Metabolic Pathways:**
  - **Dominant Ketogenesis:** The liver produces large quantities of ketone bodies, which are transported to the brain and other tissues (like heart and muscle) for energy.
  - **Reduced Protein Breakdown:** The shift to ketone bodies as the primary fuel helps reduce the need to break down muscle protein for gluconeogenesis.
  - **High Fatty Acid Oxidation:** Fat stores continue to be the main energy reserve.

- **Hormonal Changes:** Insulin remains very low, glucagon remains high. Growth hormone levels may increase, and IGF-1 levels may decrease, which can have implications for cellular repair and longevity.
- **Organ Roles:**
  - **Brain:** Adapts to utilize ketone bodies for a significant portion of its energy needs, reducing its glucose requirement.
  - **Liver:** Continues to produce ketones and glucose.
  - **Adipose Tissue:** Continues to supply fatty acids for fuel.
  - **Muscle:** Reduces protein breakdown, primarily using fatty acids and ketones for energy.

In summary, the human body exhibits remarkable metabolic flexibility, adapting its fuel utilization and hormonal profile to match nutrient availability, ensuring survival and maintaining physiological function across various states of feeding and fasting.

**In long distance cycling, Explain the fed and fasted state in human metabolism. I want to know exactly the timing of my next feeding if my pre-meal is a cup of oatmeal. Also, how does hydration mixed into the metabolic process.**

Long-distance cycling presents unique metabolic demands that make understanding fed and fasted states crucial for performance and recovery. Hydration also plays a vital, often overlooked, role.

## Fed vs. Fasted State in Long-Distance Cycling

The core principles of the fed and fasted states remain the same, but their implications are amplified during prolonged exertion:

### Fed State (During a Long Ride)

- **What it means:** You are actively consuming carbohydrates (and some fats/proteins) before or during your ride. This aims to keep your blood glucose stable and your glycogen stores topped up.

- **Key Fuel Source:** Exogenous carbohydrates (from your food/drinks) are the primary fuel. Your body is also utilizing stored glycogen (muscle and liver) and some fat.
- **Hormonal Environment:** Insulin will be elevated (though less dramatically than at rest, as exercise itself increases glucose uptake), and glucagon will be present to mobilize liver glycogen.
- **Why it's important for cycling:**
  - **Maintains Energy:** Provides a continuous supply of quick-burning glucose for high-intensity efforts and to spare limited glycogen stores.
  - **Delays Fatigue:** Prevents "bonking" or "hitting the wall," which is the sensation of extreme fatigue caused by glycogen depletion.
  - **Sparses Glycogen:** By providing external carbohydrates, you preserve your body's finite glycogen reserves for later in the ride or for more intense efforts.
  - **Supports Recovery:** Consuming carbohydrates and protein during a ride can initiate recovery processes and reduce muscle damage.

## **Fasted State (During a Long Ride - Generally Not Recommended)**

- **What it means:** You are not consuming calories during your ride, relying solely on your body's internal energy stores.
- **Key Fuel Source:** Stored glycogen (muscle and liver) initially, then predominantly fat (from adipose tissue) once glycogen stores become depleted. Ketones may be produced in later stages.
- **Hormonal Environment:** Low insulin, high glucagon, increased catecholamines (adrenaline/noradrenaline), and potentially cortisol to promote fat breakdown and gluconeogenesis.
- **Why it's generally avoided for performance:**
  - **Limited Glycogen:** Even well-trained cyclists only store enough glycogen for 90-120 minutes of moderate-to-high intensity cycling. Once depleted, performance severely drops.

- **Slower Energy Release from Fat:** While fat stores are vast, the rate at which your body can convert fat into usable energy (ATP) is significantly slower than carbohydrate oxidation. This limits your ability to sustain higher intensities.
- **"Bonking":** Inevitable if the ride is long enough, leading to severe fatigue, impaired decision-making, and difficulty maintaining pace.
- **Increased Protein Breakdown:** To a lesser extent, your body may start breaking down muscle protein for gluconeogenesis to maintain some blood glucose, which is counterproductive for muscle health and recovery.
- **Exceptions (for training, not racing):** Some cyclists intentionally train in a "fasted" or "low-carb" state for shorter, lower-intensity rides (e.g., Zone 2 efforts) to improve fat adaptation. However, this is a specific training strategy and not for maximizing performance on long, demanding rides.

## Timing Your Next Feeding After a Cup of Oatmeal (Pre-Meal)

A cup of plain rolled oatmeal (cooked with water) is a good source of complex carbohydrates, which are digested and absorbed relatively slowly. This provides a sustained release of glucose.

Given a cup of oatmeal as your pre-meal, here's a general guideline for your next feeding during a long-distance cycling event:

1. **Digestion Time:** Oatmeal typically takes 1.5 to 3 hours to be fully digested and absorbed, depending on your individual metabolism, the amount consumed, and what else was eaten with it.
2. **Glycogen Stores:** Your body can store enough glycogen for approximately 90-120 minutes of moderate-to-high intensity cycling.
3. **The "Sweet Spot" for Refueling:** You want to start replenishing carbohydrates *before* your glycogen stores become significantly depleted. This is a proactive strategy.

### Recommendation for Next Feeding:

- **Start eating within 60-90 minutes of starting your ride.**

- Even though the oatmeal is still digesting and providing energy, by starting your intake within this window, you ensure a continuous supply and prevent a significant dip in blood glucose or premature glycogen depletion.
- Your body can process about 60-90 grams of carbohydrates per hour during exercise (some elite athletes can manage more with specific carbohydrate blends). Start with smaller, frequent doses rather than large boluses.

### **Examples of what to eat:**

- Energy gels (20-30g carbs per gel)
- Energy chews/blocks
- Sports drinks (e.g., 500ml of a typical sports drink might provide 30-40g carbs)
- Small pieces of fruit (banana, dates)
- Small rice cakes or half a sandwich

**Key Principle:** Fuel early and fuel often. Don't wait until you feel hungry or tired to eat.

## **How Hydration Mixes into the Metabolic Process**

Hydration is not just about thirst; it's intricately linked to nearly every metabolic process, especially during exercise. Dehydration can severely impair performance, even before you feel thirsty.

Here's how hydration plays a role:

1. **Nutrient Transport:** Water is the solvent that carries carbohydrates, fats, proteins, vitamins, and minerals throughout your body. Without adequate water, the transport of these essential nutrients to working muscles becomes inefficient.
2. **Waste Product Removal:** Metabolic processes produce waste products (e.g., lactic acid, urea). Water is crucial for flushing these out of the system via urine and sweat. Dehydration can lead to an accumulation of waste products, contributing to fatigue.

3. **Thermoregulation (Sweating):** During exercise, your body generates a significant amount of heat. Sweating is the primary mechanism for dissipating this heat. For every liter of sweat evaporated, your body cools by approximately 580 kilocalories. Dehydration reduces your ability to sweat effectively, leading to an increase in core body temperature (hyperthermia), which drastically impairs performance and can be dangerous.
4. **Electrolyte Balance:** When you sweat, you lose electrolytes (sodium, potassium, chloride, magnesium, calcium). These minerals are vital for nerve impulse transmission, muscle contraction, and maintaining fluid balance within and outside cells. Dehydration, especially with significant electrolyte loss, can lead to muscle cramps, fatigue, and even more serious cardiac issues.
5. **Blood Volume and Oxygen Delivery:** Water constitutes a large portion of your blood plasma. Dehydration reduces blood volume, making your blood thicker and harder for your heart to pump. This means less oxygen-rich blood reaches your working muscles, impairing aerobic performance.
6. **Enzyme Function:** Many enzymes involved in carbohydrate, fat, and protein metabolism require water to function optimally. Dehydration can slow down these crucial metabolic reactions.
7. **Glycogen Storage:** Each gram of stored glycogen is bound to approximately 3-4 grams of water. While the water isn't "used" for energy directly, it's essential for the structural integrity of glycogen stores.

### **Practical Hydration for Long Rides:**

- **Start Hydrated:** Begin your ride well-hydrated.
- **Drink Consistently:** Don't wait until you're thirsty. Sip fluids regularly (every 10-15 minutes) throughout your ride.
- **Electrolytes are Key:** For rides longer than 60-90 minutes, use a sports drink or add electrolyte tablets to your water. This replenishes lost sodium and other minerals, preventing hyponatremia (low blood sodium) and muscle cramps.
- **Consider Conditions:** Hot and humid conditions will significantly increase your sweat rate, requiring more aggressive hydration strategies.
- **Listen to Your Body:** Pay attention to signs of dehydration like dark urine, dry mouth, or lightheadedness.

By understanding the interplay of feeding, fasting, and hydration, you can optimize your metabolic strategy for successful long-distance cycling.