

# Eagle's Landing Diabetes & Endocrinology

## Type 2 Diabetes: Patient-Friendly Explanation

---

### What is Type 2 Diabetes?

Type 2 diabetes (T2D) is a chronic condition where the body:

1. Becomes resistant to insulin (a hormone that helps glucose enter cells for energy).
  2. Does not produce enough insulin to keep blood glucose levels normal.
- 

### Causes

- **Insulin Resistance:** The body's cells do not respond effectively to insulin, causing high blood sugar.
  - **Pancreatic Dysfunction:** Over time, the pancreas struggles to produce enough insulin.
  - **Triggers:** Poor diet, lack of exercise, obesity, and genetics.
- 

### Onset

- Develops gradually over time, often going undiagnosed for years.
- 

### Genetic Risk Factors

- The family history of diabetes significantly increases the risk.
  - Ethnic groups at higher risk include African Americans, Hispanics, Asians, and Native Americans.
  - Genes influencing insulin function and fat storage contribute to risk.
- 

### How Diet, Exercise, and Weight Affect Blood Glucose

- **Diet:** High-sugar or high-carb diets raise blood glucose. Eating fiber-rich, low-glycemic foods helps maintain stable levels.
- **Exercise:** Increases insulin sensitivity, allowing muscles to use glucose for energy.

- **Weight:** Extra fat, especially around the abdomen, worsens insulin resistance. Losing just 5–10% of body weight improves glucose control.

## Symptoms

- Increased thirst (**polydipsia**)
- Frequent urination (**polyuria**)
- Fatigue
- Blurred vision
- Slow-healing wounds
- Tingling or numbness in hands/feet
- Darkened skin (often in neck or armpit folds)

## Normal Blood Glucose and A1c Levels

- **Normal Glucose Range:**
  - Fasting: 70–99 mg/dL
  - Post-meal: <140 mg/dL
- **Normal A1c: <5.7%**
- **Pre-diabetes A1c = 5.7% to 6.4%**
- **Diabetes A1c = or >6.5%**

## Age of Onset

- Commonly diagnosed in adults over 45, but younger people, including children, are increasingly affected due to rising obesity rates.

## Treatment

### Medications

1. **Metformin:**
  - **How It Works:** Lowers glucose production in the liver and improves insulin sensitivity.
  - **Effectiveness:** Mildly lowers A1c (by ~1–1.5%) but does not prevent diabetes progression.
  - **Side Effects:** Nausea, diarrhea, and potential B12 deficiency.
2. **Glipizide (Sulfonylureas):**

- **How It Works:** Stimulates insulin release from the pancreas.
  - **Effectiveness:** Lowers A1c (~1–1.5%), but effects may wear off over time.
  - **Side Effects:** Hypoglycemia (low blood sugar) and weight gain.
3. **GLP-1 Receptor Agonists:**
- **What They Do:** Mimic GLP-1, a hormone that:
    - Enhances insulin release after meals.
    - Reduces appetite and promotes weight loss.
    - Slows stomach emptying, helping regulate blood sugar.
  - **Benefits:**
    - Lower A1c (~1–1.5%).
    - Promote weight loss.
    - Reduce cardiovascular risks.
  - **Side Effects:** Nausea, vomiting, and rare cases of pancreatitis.
  - **Examples:** Oral :
    - Semaglutide (Rybelsus)  
Injection: Weekly
      1. Semaglutide (Ozempic),
      2. Dulaglutide (Trulicity),
      3. Tirzepatide (Mounjaro)
    - Injection: Daily:
      1. Liraglutide (Victoza)
4. **SGLT2 Inhibitors:**
- **What They Do:** Block glucose reabsorption in the kidneys, causing glucose to be excreted in urine.
  - **Benefits:**
    - Lower A1c (~0.5–1%).
    - Promote weight loss and lower blood pressure.
    - Protect the heart and kidneys.
  - **Side Effects:** Urinary tract infections, genital yeast infections, and dehydration.
  - **Examples:** Empagliflozin (Jardiance), Dapagliflozin (Farxiga), Canagliflozin (Invokana), Ertugliflozin (Steglatro), Bexagliflozin (Brenzavvy only from Marley Pharmacy lowest price)
5. **Insulin Therapy (Advanced Cases):**
- Used when other treatments are insufficient.
  - **Basal Insulin:** Long-acting insulin for maintaining baseline glucose levels (e.g., Glargine, Lantus, Toujeo, Tresiba, Basaglar ).
  - **Bolus Insulin:** Rapid-acting insulin for meals and corrections (e.g., Novolog, Humalog, Lyumjev, Admelog, Fiasp, Apidra). Novolin R and Humulin R used less often.
  - **Intermediate Insulin:** Humulin N, Novolin N, NPH, used less often today.
6. **Glucose Monitoring:**
- Continuous glucose monitors (CGMs) like Dexcom G6, Dexcom G7 or Freestyle Libre 2+, 3+, Guardian.
  - Fingerstick blood glucose meters.
7. **Insulin Pumps:**

- Devices delivering basal and bolus insulin doses.
    - Medtronic pump, Omnipod 5 pump, Tandem Tslim Pump, Bionic Ilet Pump
  - May include hybrid closed-loop systems integrated with CGMs.
- 8. Lifestyle Adjustments:**
- Balanced diet (e.g., carb counting).
  - Regular exercise.
  - Stress management.

## Glucose Monitoring

- 1. Continuous Glucose Monitors (CGMs):**
  - Real-time glucose readings (e.g., Dexcom, Freestyle Libre).
- 2. Fingerstick Glucose Meters:**
  - Provides spot-check readings.

## Insulin Pumps

- Deliver basal and bolus insulin doses automatically.
- Often used with CGMs for advanced management.

## Complications of Poorly Controlled T2D

- **Short-Term:**
  - Hyperglycemia (high blood sugar).
  - Frequent infections.
- **Long-Term:**
  - Neuropathy (nerve damage).
  - Retinopathy (eye damage).
  - Nephropathy (kidney failure).
  - Cardiovascular disease (heart attack, stroke).
  - Foot ulcers and amputations.

## Benefits of Well-Controlled T2D

- Reduced risk of complications.
- Improved quality of life.
- Stable blood glucose levels.

- Increased life expectancy.
- Better mental and physical energy.

### **Glucose Goal Target Ranges**

- **Fasting/Pre-meal:** 80–130 mg/dL
- **Post-meal (1–2 hours):** <180 mg/dL
- **Target A1c:** <7.0% (individualized for age and health).

### **Summary**

Type 2 diabetes is manageable with lifestyle changes, medications, and regular monitoring. Staying informed and adhering to treatment plans can greatly improve outcomes and quality of life.