STAGES OF DIABETES — METABOLIC PROGRESSION

Stage 1: Normal Regulation
- Insulin binds receptor
- GLUT4 transports glucose
- Stable blood glucose

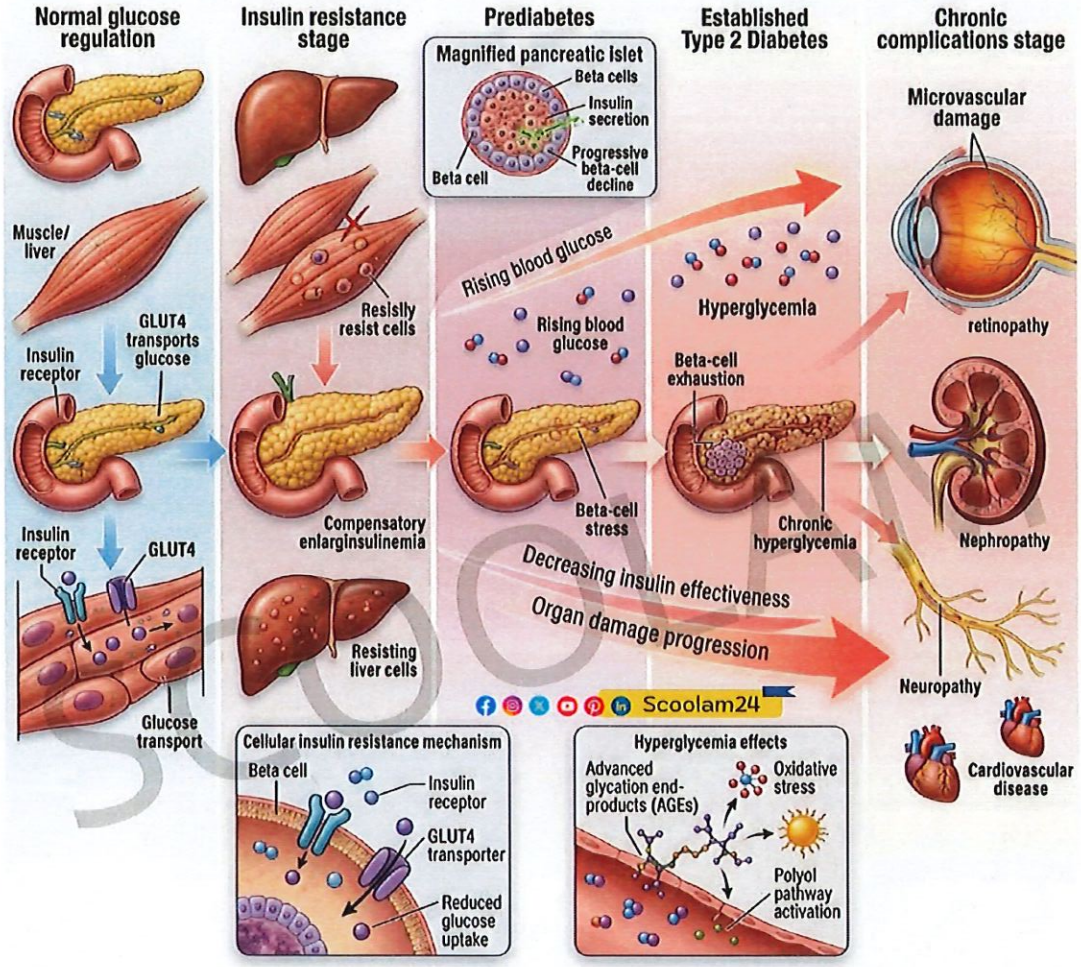
Stage 2: Insulin Resistance

Event	Effect
Reduced receptor signaling	Glucose remains in blood
Compensatory hyperinsulinemia	Pancreas overworks

Stage 3: Prediabetes
- Elevated fasting glucose
- Beta-cell stress
- Impaired glucose tolerance

Stage 4: Type 2 Diabetes
- Beta-cell dysfunction
- Chronic hyperglycemia
- Reduced insulin production

Stage 5: Chronic Complications
- Retinopathy
- Nephropathy
- Neuropathy
- Cardiovascular disease



Stage 2: Insulin Resistance

Event	Effect
Reduced receptor signaling	Glucose remains in blood
Compensatory hyperinsulinemia	Pancreas overworks

⚠ Pathophysiological Mechanisms
- AGE formation
- Oxidative stress
- Inflammatory cytokines
- Endothelial dysfunction

Biological Importance
- Global epidemic
- Multisystem damage
- Progressive metabolic failure
- Preventable early-stage disease

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