Type 2 Diabetes – Disease Overview

Definition and Epidemiology Type 2 diabetes (T2D) is a chronic metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It involves insulin resistance in target tissues and relative insulin deficiency due to beta-cell dysfunction. Globally, T2D affects over 500 million adults, with projections exceeding 700 million by 2045. In the United States, it impacts 11.3% of the population (37 million people), comprising 90-95% of all diabetes cases. Prevalence is higher in certain ethnic groups (e.g., Hispanic, African American) and is rising due to aging populations and lifestyle factors.

Pathophysiology The core mechanisms include peripheral insulin resistance (reduced glucose uptake in muscle and adipose tissue, increased hepatic gluconeogenesis) coupled with progressive pancreatic beta-cell failure. This leads to chronic hyperglycemia, glucotoxicity, and lipotoxicity, exacerbating beta-cell decline. Inflammatory pathways (e.g., elevated cytokines like TNF-α) and genetic factors (e.g., TCF7L2 variants) interplay with environmental triggers, promoting oxidative stress and endothelial dysfunction.

Common Risk Factors

- **Modifiable**: Obesity (BMI ≥30 kg/m², especially visceral fat), physical inactivity, diets high in refined carbohydrates and saturated fats, smoking.
- **Non-modifiable**: Age (>45 years), family history (first-degree relative increases risk 2-6 fold), ethnicity, gestational diabetes history, polycystic ovary syndrome. Screening is recommended for adults ≥35 years or with risk factors, using fasting plasma glucose, A1C, or OGTT.

Complications

- **Microvascular**: Retinopathy (proliferative changes leading to blindness in 10-20%), nephropathy (microalbuminuria progressing to ESRD in 20-40%), neuropathy (distal symmetric, increasing foot ulcer/amputation risk).
- **Macrovascular**: Accelerated atherosclerosis causing coronary heart disease (2-4x risk), stroke, and peripheral artery disease. Other: Increased infection susceptibility, cognitive decline, and non-alcoholic fatty liver disease.

High-Level Treatment Goals

- Glycemic control: Individualized A1C targets (<7% for most; <6.5% if achievable without hypoglycemia; <8% for frail elderly).
- Cardiovascular risk reduction: BP <130/80 mmHg, LDL <100 mg/dL (<70 mg/dL with CVD).
- Lifestyle optimization: 5-10% weight loss, 150 min/week exercise, balanced nutrition. Multidisciplinary management prevents complications and improves quality of life.

References

- American Diabetes Association. Standards of Medical Care in Diabetes—2025. Diabetes Care. 2025;48(Suppl 1).
- International Diabetes Federation. Diabetes Atlas, 11th ed. 2024.