



FIGURE 66-2 Natural history of type 2 diabetes mellitus. The numbers for time/age markers in years for the different phases of beta-cell decompensation toward overt diabetes and an insulin-requiring state are approximate guides. Certain groups are more insulin sensitive and require a greater loss of beta-cell function to precipitate diabetes, compared with obese insulin-resistant people, who develop diabetes after small declines in beta-cell function. Use of insulin in patients with type 2 diabetes varies considerably and is not age dependent. HGP, Hepatic glucose production; IR, insulin resistance.

residual insulin activity to partially suppress lipolysis, and this protects them from developing DKA. In a subset of T2DM patients, DKA can develop, possibly reflecting individual variations in the degree of suppression of insulin secretion by glucotoxicity.

As a consequence of prolonged exposure to hyperglycemia and associated metabolic disturbances, patients with T2DM may already have developed long-term microvascular or macrovascular complications of diabetes by the time of diagnosis. Therefore, patients may experience a cardiovascular event, such as acute myocardial infarction, and then incidentally be found to have T2DM.

The Metabolic Syndrome

Susceptibility to cardiovascular disease is further increased by the frequent association of insulin resistance, prediabetes, and T2DM with other cardiac risk factors, including abdominal or visceral obesity, dyslipidemia, and hypertension. The term *metabolic syndrome* has been applied to patients who have a combination of these cardiovascular risk factors. Different but overlapping diagnostic criteria for the metabolic syndrome have been proposed by various expert panels. The National Cholesterol Education Program Adult Treatment Panel III (ATP III) defines this syndrome as the presence of any three of the following five characteristics:

1. Fasting blood glucose level ≥ 100 mg/dL or drug treatment for elevated blood glucose
2. High-density lipoprotein (HDL)-cholesterol < 40 mg/dL in men or < 50 mg/dL in women or drug treatment for low HDL-cholesterol
3. Plasma triglycerides ≥ 150 mg/dL or drug treatment for elevated triglycerides
4. Abdominal obesity (waist ≥ 102 cm in men or ≥ 88 cm in women)
5. Blood pressure $\geq 130/85$ mm Hg or drug treatment for hypertension.

There is debate about whether the metabolic syndrome represents a discrete pathologic entity, but its recognition does draw attention to the frequent clustering of cardiovascular risk factors.

Treatment

Patients with T2DM should receive nutrition counseling starting at the time of diagnosis. This should include efforts at weight loss in overweight or obese patients. Adjustments in diet, especially reductions in calorie intake, can rapidly improve blood glucose levels in many patients independent of other interventions. Weight reduction by as little as 10% to 20% of body weight can have marked beneficial effects on insulin resistance and glycemia in some patients.