retinal examination, orthostatic blood pressure, foot examination, peripheral pulses, and insulin injection sites. Blood pressure >140/80 mmHg is considered hypertension in individuals with diabetes. Because periodontal disease is more frequent in DM, the teeth and gums should also be examined.

An annual foot examination should (1) assess blood flow, sensation (vibratory sensation [128-MHz tuning fork at the base of the great toe], the ability to sense touch with a monofilament [5.07, 10-g monofilament], pinprick sensation, testing for ankle reflexes, and vibration perception threshold using a biothesiometer), ankle reflexes, and nail care; (2) look for the presence of foot deformities such as hammer or claw toes and Charcot foot; and (3) identify sites of potential ulceration. The ADA recommends annual screening for distal symmetric neuropathy beginning with the initial diagnosis of diabetes and annual screening for autonomic neuropathy 5 years after diagnosis of type 1 DM and at the time of diagnosis of type 2 DM. This includes testing for loss of protective sensation (LOPS) using monofilament testing plus one of the following tests: vibration, pinprick, ankle reflexes, or vibration perception threshold (using a biothesiometer). If the monofilament test or one of the other tests is abnormal, the patient is diagnosed with LOPS and counseled accordingly (Chap. 419).

CLASSIFICATION OF DM IN AN INDIVIDUAL PATIENT

The etiology of diabetes in an individual with new-onset disease can usually be assigned on the basis of clinical criteria. Individuals with type 1 DM tend to have the following characteristics: (1) onset of disease prior to age 30 years; (2) lean body habitus; (3) requirement of insulin as the initial therapy; (4) propensity to develop ketoacidosis; and (5) an increased risk of other autoimmune disorders such as autoimmune thyroid disease, adrenal insufficiency, pernicious anemia, celiac disease, and vitiligo. In contrast, individuals with type 2 DM often exhibit the following features: (1) develop diabetes after the age of 30 years; (2) are usually obese (80% are obese, but elderly individuals may be lean); (3) may not require insulin therapy initially; and (4) may have associated conditions such as insulin resistance, hypertension, cardiovascular disease, dyslipidemia, or PCOS. In type 2 DM, insulin resistance is often associated with abdominal obesity (as opposed to hip and thigh obesity) and hypertriglyceridemia. Although most individuals diagnosed with type 2 DM are older, the age of diagnosis is declining, and there is a marked increase among overweight children and adolescents. Some individuals with phenotypic type 2 DM present with diabetic ketoacidosis but lack autoimmune markers and may be later treated with oral glucose-lowering agents rather than insulin (this clinical picture is sometimes referred to as *ketosis-prone type 2 DM*). On the other hand, some individuals (5–10%) with the phenotypic appearance of type 2 DM do not have absolute insulin deficiency but have autoimmune markers (GAD and other ICA autoantibodies) suggestive of type 1 DM (termed *latent autoimmune diabetes of the adult*). Such individuals are more likely to be <50 years of age, thinner, and have a personal or family history of other autoimmune disease than individuals with type 2 DM. They are much more likely to require insulin treatment within 5 years. Monogenic forms of diabetes (discussed above) should be considered in those with diabetes onset at <30 years of age, an autosomal pattern of diabetes inheritance, and the lack of nearly complete insulin deficiency. Despite recent advances in the understanding of the pathogenesis of diabetes, it remains difficult to categorize some patients unequivocally. Individuals who deviate from the clinical profile of type 1 and type 2 DM, or who have other associated defects such as deafness, pancreatic exocrine disease, and other endocrine disorders, should be classified accordingly (Table 417-1).

LABORATORY ASSESSMENT

The laboratory assessment should first determine whether the patient meets the diagnostic criteria for DM (Table 417-2) and then assess the degree of glycemic control (Chap. 418). In addition to the standard laboratory evaluation, the patient should be screened for DM-associated conditions (e.g., albuminuria, dyslipidemia, thyroid dysfunction).

The classification of the type of DM may be facilitated by laboratory assessments. Serum insulin or C-peptide measurements often do not distinguish type 1 from type 2 DM, but a low C-peptide level confirms a patient's need for insulin. Many individuals with new-onset type 1 DM retain some C-peptide production. Measurement of islet cell antibodies at the time of diabetes onset may be useful if the type of DM is not clear based on the characteristics described above.

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Alvin C. Powers

OVERALL GOALS

The goals of therapy for type 1 or type 2 diabetes mellitus (DM) are to (1) eliminate symptoms related to hyperglycemia, (2) reduce or eliminate the long-term microvascular and macrovascular complications of DM (Chap. 419), and (3) allow the patient to achieve as normal a lifestyle as possible. To reach these goals, the physician should identify a target level of glycemic control for each patient, provide the patient with the educational and pharmacologic resources necessary to reach this level, and monitor/treat DM-related complications. Symptoms of diabetes usually resolve when the plasma glucose is <11.1 mmol/L (200 mg/dL), and thus most DM treatment focuses on achieving the second and third goals. This chapter first reviews the ongoing treatment of diabetes in the outpatient setting and then discusses the treatment of severe hyperglycemia, as well as the treatment of diabetes in hospitalized patients.

The care of an individual with either type 1 or type 2 DM requires a multidisciplinary team. Central to the success of this team are the patient's participation, input, and enthusiasm, all of which are essential for optimal diabetes management. Members of the health care team include the primary care provider and/or the endocrinologist or diabetologist, a certified diabetes educator, a nutritionist, and a psychologist. In addition, when the complications of DM arise, subspecialists (including neurologists, nephrologists, vascular surgeons, cardiologists, ophthalmologists, and podiatrists) with experience in DM-related complications are essential.

ONGOING ASPECTS OF COMPREHENSIVE DIABETES CARE

A number of names are sometimes applied to different approaches to diabetes care, such as intensive insulin therapy, intensive glycemic control, and "tight control." The current chapter, and other sources, uses the term *comprehensive diabetes care* to emphasize the fact that optimal diabetes therapy involves more than plasma glucose management and medications. Although glycemic control is central to optimal diabetes therapy, comprehensive diabetes care of both type 1 and type 2 DM should also detect and manage DM-specific complications (Chap. 419) and modify risk factors for DM-associated diseases. The key elements of comprehensive diabetes care are summarized in Table 418-1. In addition to the physical aspects of DM, social, family, financial, cultural, and employment-related issues may impact diabetes care. The International Diabetes Federation (IDF), recognizing that resources available for diabetes care vary widely throughout the world, has issued guidelines for "recommended care" (a well-developed service base and with health care funding systems consuming a significant part of their national wealth), "limited care" (health care settings with very limited resources), and "comprehensive care" (health care settings with considerable resources). This chapter provides guidance