

inhibitors are taken orally and result in decreased HbA_{1c} in the range of 0.5% to 1.0%. They can be used as monotherapy or in combination with one or more other agents and have favorable side effect profiles.

α-Glucosidase Inhibitors

The α -glucosidase inhibitors, acarbose and miglitol, are oral agents that improve glycemia by inhibiting the enzymatic breakdown of complex carbohydrates within the lumen of the small intestine. They have modest glucose-lowering effects, decreasing HbA_{1c} in the range of 0.5% to 0.8%. Their use is limited by the frequent occurrence of flatulence and diarrhea as a consequence of undigested carbohydrates reaching lower intestinal regions.

Pramlintide

Pramlintide is a stable analogue of the beta cell peptide, amylin, which has actions that include slowing of gastric emptying, satiety effects that decrease food intake, and decrease in postmeal glucagon. It is not widely used because of required multiple injections and limited efficacy in lowering HbA_{1c}.

SGLT2 Inhibitors

Canagliflozin, dapagliflozin, and empagliflozin are recently approved oral agents that function by inhibiting the subtype 2 sodium glucose transport protein (SGLT2). SGLT2 mediates more than 90% of glucose reabsorption in the renal tubules, and the drug lowers blood glucose levels by promoting excretion of glucose in the urine. This results in a decrease in HbA_{1c} in the range of 0.5% to 1.0% and modest weight loss. Concerns about potential side effects of increased cardiovascular events, increased LDL-cholesterol, urinary and genital infections, hypotension, and hypoglycemia are under investigation.

Insulin Treatment in T2DM

For patients who have inadequate glycemic control with oral agents, insulin may be started as a basal supplement to the oral regimen. Frequently used choices include glargine (once daily), detemir (once or twice daily), or NPH (once daily at bedtime) (see later discussion and [Table 66-5](#) for more details on different types of insulin). Starting doses are typically in the range of 10 U (or can be more specifically calculated as 0.2 U/kg), with increases of 2 to 4 U at intervals of 3 days or longer. Oral agent regimens commonly are simplified at the time of starting insulin (e.g., shifting from multiple agents to a single oral agent). For patients who do not achieve adequate control with basal insulin, mealtime coverage is provided by a rapid-acting insulin. Often, under this circumstance, all oral agents are discontinued, and blood glucose control is achieved with the use of exogenous insulin alone. Compared to patients with T1DM, those with T2DM may not require as tight a match of carbohydrate to insulin doses at meals, perhaps because of some residual insulin secretion. For this reason, insulin pumps are only rarely used in T2DM.

Nutritional and Weight Management

Patients should receive counseling from a dietician and be assisted in developing a nutritional plan that is individualized to their lifestyle, exercise, culture, and financial resources.

Guidelines from many current expert panels allow flexibility in the relative amounts of carbohydrate, fat, and protein. Nutritional management in T2DM often has a major focus on achieving reductions in calorie intake and weight loss. Achieving weight loss may be made more difficult by a tendency of some oral antidiabetic agents and also insulin to induce a degree of weight gain.

An important goal of nutritional management should be to balance the timing and quantities of ingested macronutrients with medications and exercise to help achieve targets for blood glucose control without periods of hypoglycemia.

For overweight or obese patients, it often is practical to set an initial goal of losing 5% to 10% of body weight. This may significantly improve diabetes control and increase the patient's motivation to then set goals for further weight loss (see [Chapter 67](#)).

Bariatric surgical procedures represent a method for achieving weight loss and potentially dramatic improvements in glycemia and risk factors for long-term complications in T2DM. Patients typically have improvements in glycemic control and lower requirements for antidiabetic medications within days after undergoing the Roux-en-Y gastric bypass procedure. This is thought to reflect changes in gut hormones and metabolic factors independent of weight loss. Beneficial effects on glucose control develop more gradually after the placement of an adjustable gastric band or sleeve gastrectomy. Randomized trials comparing bariatric surgery with medical nutrition therapy alone for weight loss have shown greater efficacy in achieving HbA_{1c} goals with surgery, and some studies have shown dramatic rates of remission, with 75% of patients or more becoming normoglycemic off all antidiabetic agents (see [Chapter 67](#)).

Exercise

Physical exercise should be encouraged in T2DM as an important component of weight loss regimens and also for its beneficial effects in decreasing the risks of long-term complications. The general recommendation of several expert panels is 30 minutes or more of moderate-intensity physical exercise on at least 5 days per week, but the regimen needs to be highly individualized according to a patient's capabilities and limitations imposed by other medical conditions such as cardiovascular disease. Patients who are unwilling or unable to undertake significant aerobic exercise should be encouraged to do daily walking or other physical activities within their limitations.

Standards of Care in T1DM and T2DM in Addition to Blood Glucose Control

A number of assessments and interventions should be performed at intervals in patients with T1DM or T2DM. These include blood pressure measurement and examination of the feet at each physician visit. Patients who smoke should receive counseling at each visit about the importance of and strategies for discontinuing. A dilated eye examination should be performed annually, or more often in patients with diabetic eye disease. A dental examination also should be performed at least annually. Starting 5 years after disease onset in T1DM and at the time of diagnosis in T2DM, patients should have annual measurement of their urinary albumin/creatinine ratio with confirmation if elevated (>30 mg albumin per gram of creatinine). A fasting lipid profile should be obtained annually. Aspirin (75 to 162 mg daily) is

