

From symptoms to diagnosis: Type 1 diabetes vs. type 2 diabetes

Diabetes impairs the body’s ability to regulate blood glucose levels. **Type 1 diabetes (T1D)** is an **autoimmune condition** involving the destruction of pancreatic beta cells, resulting in insulin deficiency. **Type 2 diabetes (T2D)** primarily results from **insulin resistance**, often accompanied by progressive loss of adequate beta-cell insulin secretion. T1D and T2D present with similar symptoms, but the differences highlighted in *Table 1* can help inform accurate diagnosis and classification and optimal disease management, leading to better outcomes for your patients.

Table 1. Comparison of features of T1D and T2D

Feature	T1D	T2D
Prevalence	5% to 10% of diabetes cases	90% to 95% of diabetes cases
Cause	Autoimmune destruction of insulin-producing cells in pancreas (i.e., beta cells)	Insulin resistance and progressive insulin deficiency
Insulin production	Little to no insulin produced	Insulin produced but not used effectively
Prevention	- No known prevention - Islet autoantibody tests may be used for early detection of presymptomatic T1D.	Often preventable with lifestyle changes
Risk factors	Genetic predisposition, environmental autoimmune triggers	- Overweight/obesity, physical inactivity, family history - T2D disproportionately affects certain racial and ethnic groups.
Typical onset age	Childhood, adolescence or early adulthood	Usually 45 years or older, but increasingly seen in younger people
Symptoms	- Rapid onset - Increased thirst or hunger, frequent urination, fatigue, blurred vision, slow-healing sores, unexplained weight loss	- Gradual onset - Increased thirst or hunger, frequent urination, fatigue, blurred vision, slow-healing sores, numbness or tingling in hands or feet
Management	Daily insulin via injections, pump or automated insulin delivery; blood glucose monitoring	Lifestyle changes, non-insulin medications (oral and injectable), insulin in certain cases
Complications	DKA, hypoglycemia	Heart disease, stroke, CKD, eye problems, neuropathy

CKD = chronic kidney disease; DKA = diabetic ketoacidosis; T1D = type 1 diabetes; T2D = type 2 diabetes.

Information from references 1-8.

Diabetic ketoacidosis

Diabetic ketoacidosis (DKA) is a serious and potentially life-threatening complication that is most commonly associated with T1D. It occurs when insufficient insulin leads to elevated blood glucose, ketone buildup and metabolic acidosis.^{4,9} Early recognition and treatment are critical.

Common symptoms of DKA include the following^{9,10}:

- Excessive thirst and dry mouth
- Frequent urination
- Dry or flushed skin
- Nausea and vomiting
- Abdominal pain
- Fruity-scented breath
- Difficulty breathing
- Confusion or difficulty concentrating
- Fatigue

Diagnosis and classification of T1D

Accurate identification of T1D in the primary care setting is key to reducing morbidity and supporting lifelong disease management. Clinicians should be alert to classic symptoms of T1D, such as excessive thirst or hunger, frequent urination, unexplained weight loss and fatigue, especially in children. Diabetes may be diagnosed on the basis of A1C or plasma glucose levels (*Table 2*). Prompt diagnosis of T1D improves long-term outcomes by enabling clinicians to initiate insulin therapy before serious complications (e.g., DKA) develop, provide timely patient education and coordinate care. It also allows them to address psychosocial needs and test for related autoimmune conditions (e.g., autoimmune thyroid diseases, celiac disease, autoimmune gastritis, rheumatoid arthritis¹¹), as appropriate.

Table 2. Criteria for diagnosis of diabetes

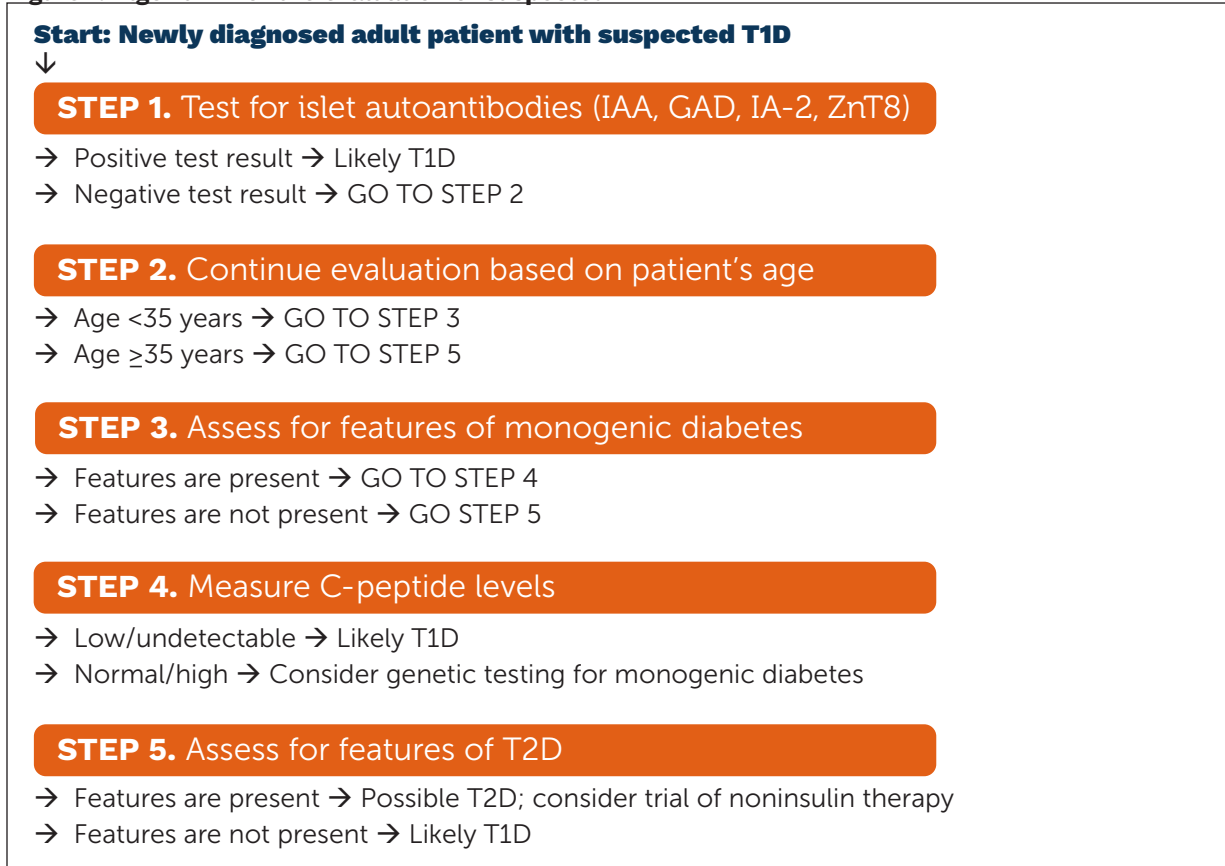
Fasting PG \geq 126 mg/dL or
2-hour PG \geq 200 mg/dL during OGTT or
Random PG \geq 200 mg/dL with symptoms of hyperglycemia (e.g., excessive thirst, frequent urination, unexplained weight loss) or
A1C \geq 6.5%

OGTT = oral glucose tolerance test; PG = plasma glucose.

Information from reference 5.

The American Diabetes Association's standards of care for diagnosis and classification of diabetes recommend "[classifying] people with hyperglycemia into appropriate diagnostic categories to aid in personalized management."⁵ Misdiagnosis of T1D as T2D can delay insulin initiation and increase risk of DKA.¹² Testing for autoantibodies to insulin (IAA), glutamic acid decarboxylase (GAD), islet antigen 2 (IA-2) and zinc transporter 8 (ZnT8) at diagnosis supports accurate classification of diabetes type and timely treatment, particularly for patients with atypical features (*Figure 1*).⁵ C-peptide testing is not routinely recommended at diagnosis, but it may be considered if diabetes type remains uncertain after three or more years.¹³ A high C-peptide level strongly suggests T2D, while a low or undetectable level suggests T1D.

Figure 1. Algorithm for the evaluation of suspected T1D



GAD = glutamic acid decarboxylase; IA-2 = islet antigen 2; IAA = insulin autoantibodies; T1D = type 1 diabetes; T2D = type 2 diabetes; ZnT8 = zinc transporter 8.

Information from references 5 and 13.

“It is important for health care professionals to realize that classification of diabetes type is not always straightforward at presentation and that misdiagnosis is common and can occur in [approximately] 40% of adults with new type 1 diabetes (e.g., adults with type 1 diabetes misdiagnosed as having type 2 diabetes).”⁵

– American Diabetes Association

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