



FAMILY AND COMMUNITY MEDICINE

EPIDEMIOLOGY OF DIABETES MELLITUS



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Objectives

- 1. To list the types of Diabetes Mellitus
- 2. To describe the prevalence of Diabetes Mellitus
- 3. To recognize the importance of diagnostic criteria for estimating the prevalence of diabetes mellitus
- 4. To discuss the risk factors and complications of type II diabetes mellitus

1 in 10 people are living with diabetes

IDF's mission is to improve the lives of people living with diabetes and prevent diabetes in those at risk.

[Learn about diabetes](#)

[View the latest data](#)

540
million
people live with
diabetes

DEFINITION:

Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycemia.

Several distinct types of DM are caused by a complex interaction of genetics and environmental factors.

Depending on the etiology of the DM, factors contributing to hyperglycemia include reduced insulin secretion, decreased glucose utilization, and increased glucose production.

CLASSIFICATION

Diabetes can be classified into the following general categories:

1.Type 1 diabetes (due to autoimmune β -cell destruction, usually leading to absolute insulin deficiency, including latent autoimmune diabetes of adulthood)

2.Type 2 diabetes (due to a non-autoimmune progressive loss of adequate β -cell insulin secretion, frequently on the background of insulin resistance and metabolic syndrome)

3. Specific types of diabetes due to other causes, e.g., monogenic diabetes syndromes (such as neonatal diabetes and maturity-onset diabetes of the young), diseases of the exocrine pancreas (such as cystic fibrosis and pancreatitis), and drug- or chemical-induced diabetes (such as with glucocorticoid use, in the treatment of HIV, or after organ transplantation)

4. Gestational diabetes mellitus (diabetes diagnosed in the second or third trimester of pregnancy that was not clearly overt diabetes prior to gestation) or other types of diabetes occurring throughout pregnancy, such as type 1 diabetes).

Type 1 diabetes



- Lack of insulin
- Autoimmune
- Usually children

Type 2 diabetes



- Insulin resistance
- Lifestyle factors
- Usually adults

Gestational diabetes

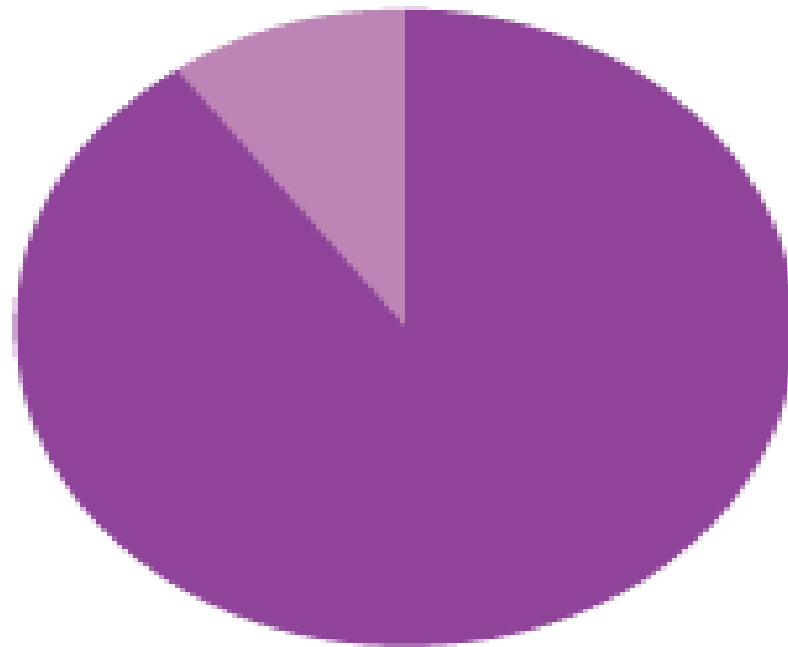


- Insulin resistance
- During pregnancy
- Risks to mother and child

90% to 95%

of all diabetes cases are type 2.

Type 1 Diabetes



Type 2 Diabetes

Table 2.1—Criteria for the diagnosis of diabetes in nonpregnant individuals

A1C $\geq 6.5\%$ (≥ 48 mmol/mol). The test should be performed in a laboratory using a method that is NGSP certified and standardized to the DCCT assay.*

OR

FPG ≥ 126 mg/dL (≥ 7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 h.*

OR

2-h PG ≥ 200 mg/dL (≥ 11.1 mmol/L) during OGTT. The test should be performed as described by the WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in water.*

OR

In an individual with classic symptoms of hyperglycemia or hyperglycemic crisis, a random plasma glucose ≥ 200 mg/dL (≥ 11.1 mmol/L). Random is any time of the day without regard to time since previous meal.

DCCT, Diabetes Control and Complications Trial; FPG, fasting plasma glucose; OGTT, oral glucose tolerance test; NGSP, National Glycohemoglobin Standardization Program; WHO, World Health Organization; 2-h PG, 2-h plasma glucose. *In the absence of unequivocal hyperglycemia, diagnosis requires two abnormal test results obtained at the same time (e.g., A1C and FPG) or at two different time points.

EPIDEMIOLOGY

The Diabetes Atlas further breaks down the global prevalence of diabetes according to regions. Here's the global burden as of 2021:

- **North America and the Caribbean:** 51 million
- **Europe:** 61 million
- **Middle East and North Africa:** 73 million
- **Africa:** 24 million
- **South and Central America:** 32 million
- **South East Asia:** 90 million
- **Western Pacific:** 206 million

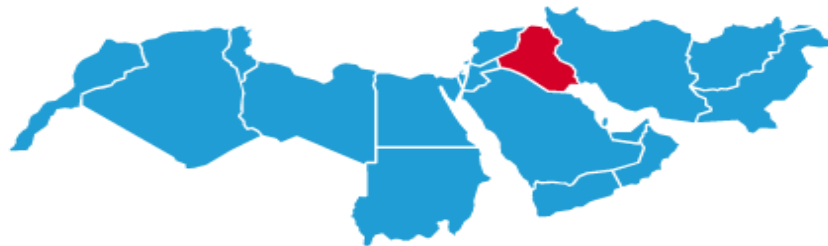
IT WAS EVIDENT THAT LOW AND MIDDLE-INCOME COUNTRIES AND REGIONS HAD THE HIGHEST PREVALENCE OF DIAGNOSED DIABETES. MORE SPECIFICALLY, ABOUT 3 IN 4 ADULTS WITH DIABETES LIVE IN LOW AND MIDDLE-INCOME COUNTRIES.

Here's the breakdown of 2045 projections according to regions:

- **North America and the Caribbean:** 63 million (24% increase)
- **Europe:** 69 million (13% increase)
- **Middle East and North Africa:** 136 million (87% increase)
- **Africa:** 55 million (134% increase)
- **South and Central America:** 49 million (50% increase)
- **South East Asia:** 152 million (68% increase)
- **Western Pacific:** 260 million (27% increase)



IRAQ-LAST UPDATE: 2022



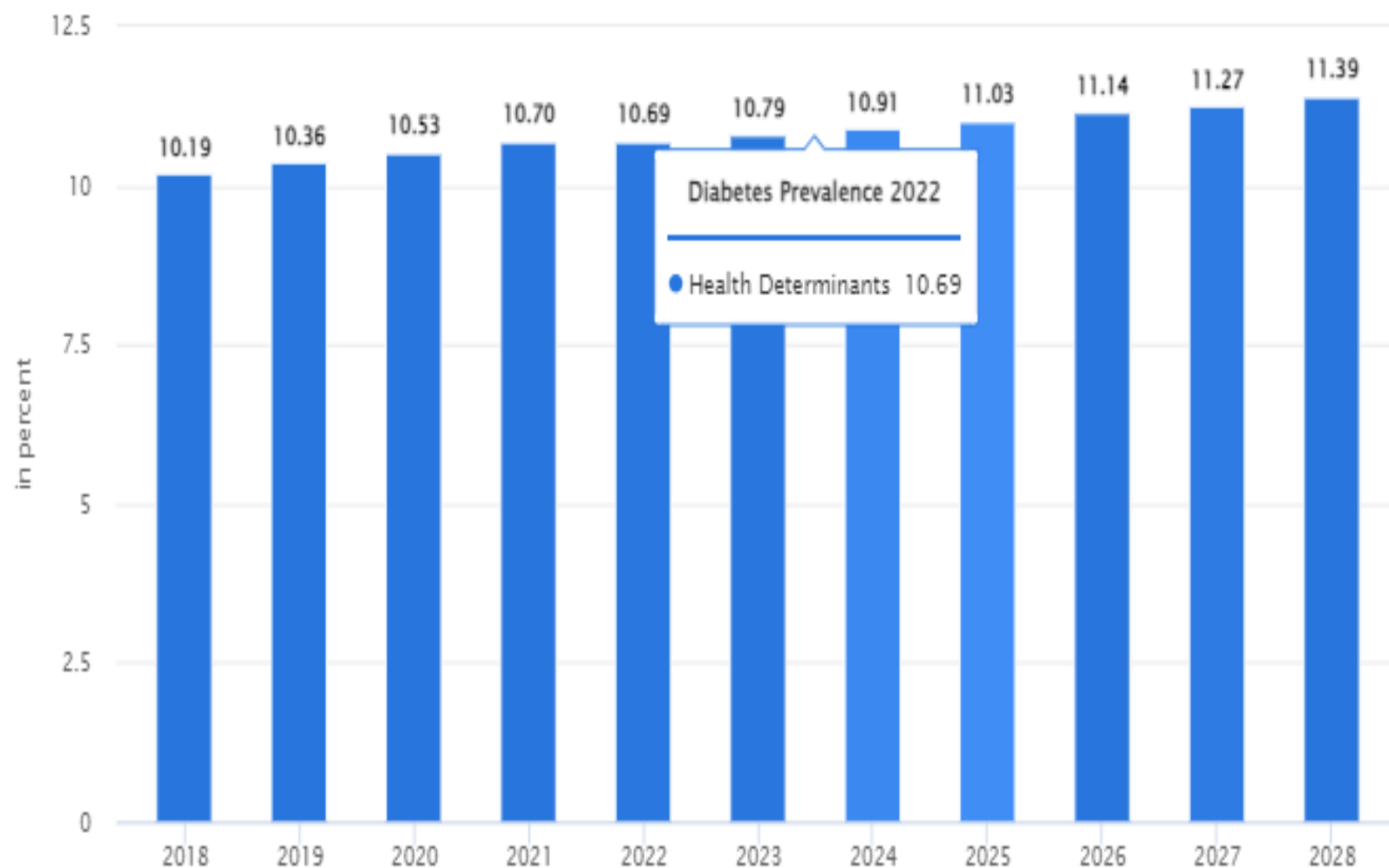
Iraq is one of the 21 countries and territories of the IDF MENA (middle east and north Africa).

Total adult population :21,391,100

Prevalence of diabetes in adults :9.4%-10.6%

Total cases of diabetes in adults :2,011,400

DIABETES PREVALENCE



Most recent update: Dec 2023

Sources: Statista Market Insights , World Bank



Iraq

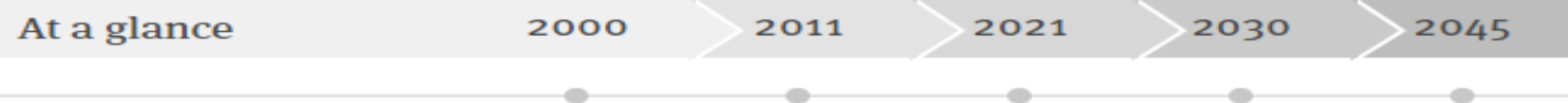
Diabetes report 2000 – 2045

At a glance

2000 2011 2021 2030 2045

Diabetes estimates (20-79 y)

People with diabetes, in 1,000s	449.9	1,089.0	2,011.4	2,738.7	4,373.8
Age-adjusted comparative prevalence of diabetes, %	-	9.1	10.7	11.6	12.2
People with undiagnosed diabetes, in 1,000s	-	-	946.4	-	-
Proportion of people with undiagnosed diabetes, %	-	-	47.1	-	-



Type 1 diabetes estimates in children and adolescents

New cases of type 1 diabetes (0-14 y), in 1,000s	0.5	-	0.5	-	-
New cases of type 1 diabetes (0-19 y), in 1,000s	-	-	0.7	-	-
Type 1 diabetes (0-14 y), in 1,000s	2.4	-	2.5	-	-
Type 1 diabetes (0-19 y), in 1,000s	-	-	5.0	-	-



Type 1 DM =

AFREZZA® INHALER



Table 2.3—Staging of type 1 diabetes

	Stage 1	Stage 2	Stage 3
Characteristics	<ul style="list-style-type: none">● Autoimmunity● Normoglycemia● Presymptomatic	<ul style="list-style-type: none">● Autoimmunity● Dysglycemia● Presymptomatic	<ul style="list-style-type: none">● Autoimmunity● Overt hyperglycemia● Symptomatic
Diagnostic criteria	<ul style="list-style-type: none">● Multiple islet autoantibodies● No IGT or IFG	<ul style="list-style-type: none">● Islet autoantibodies (usually multiple)● Dysglycemia: IFG and/or IGT● FPG 100–125 mg/dL (5.6–6.9 mmol/L)● 2-h PG 140–199 mg/dL (7.8–11.0 mmol/L)● A1C 5.7–6.4% (39–47 mmol/mol) or ≥10% increase in A1C	<ul style="list-style-type: none">● Autoantibodies may become absent● Diabetes by standard criteria

Adapted from Skyler et al. (40). FPG, fasting plasma glucose; IFG, impaired fasting glucose; IGT, impaired glucose tolerance; 2-h PG, 2-h plasma glucose. Alternative additional stage 2 diagnostic criteria of 30-, 60-, or 90-min plasma glucose on oral glucose tolerance test ≥200 mg/dL (≥11.1 mmol/L) and confirmatory testing in those aged ≥18 years have been used in clinical trials (79).

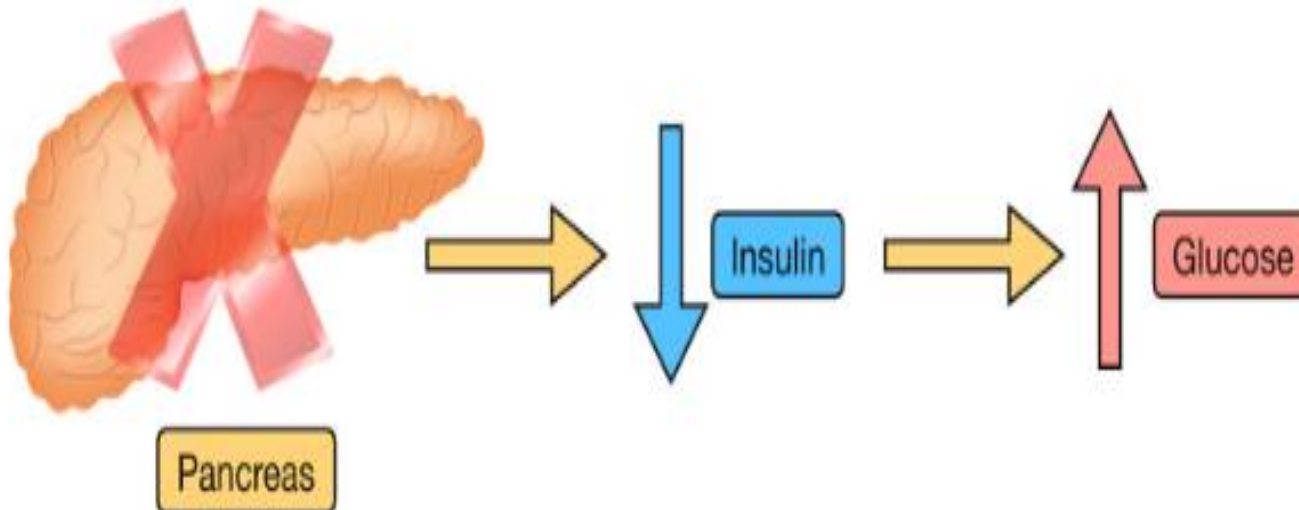


Type 1 Diabetes Mellitus



Definition

Type 1 Diabetes - An autoimmune disease in which the insulin-producing cells of the pancreas are destroyed, leading to high blood glucose levels





Type 1 Diabetes Mellitus



Causes

Infections

- Potential association between certain viruses and the development of the autoimmunity that leads to type 1 diabetes
 - Enteroviruses
 - Coxsackievirus B
 - Rotavirus
 - Cytomegalovirus

Autoantibodies

- Association between autoantibodies against beta cell antigens and the development of type 1 diabetes
- Beta cells are responsible for producing insulin
- The autoantibodies destroy the beta cells

Genetics

- May be a genetic link to the development of type 1 diabetes
- Potential association between the presence of HLA-DR3 and HLA-DR4 genotypes and the development of type 1 diabetes

Type 1 Diabetes Causes: The pathophysiology and causes of type 1 diabetes include infections, autoantibodies, and genetics.

ENVIRONMENTAL RISK FACTORS FOR TYPE 1 DIABETES

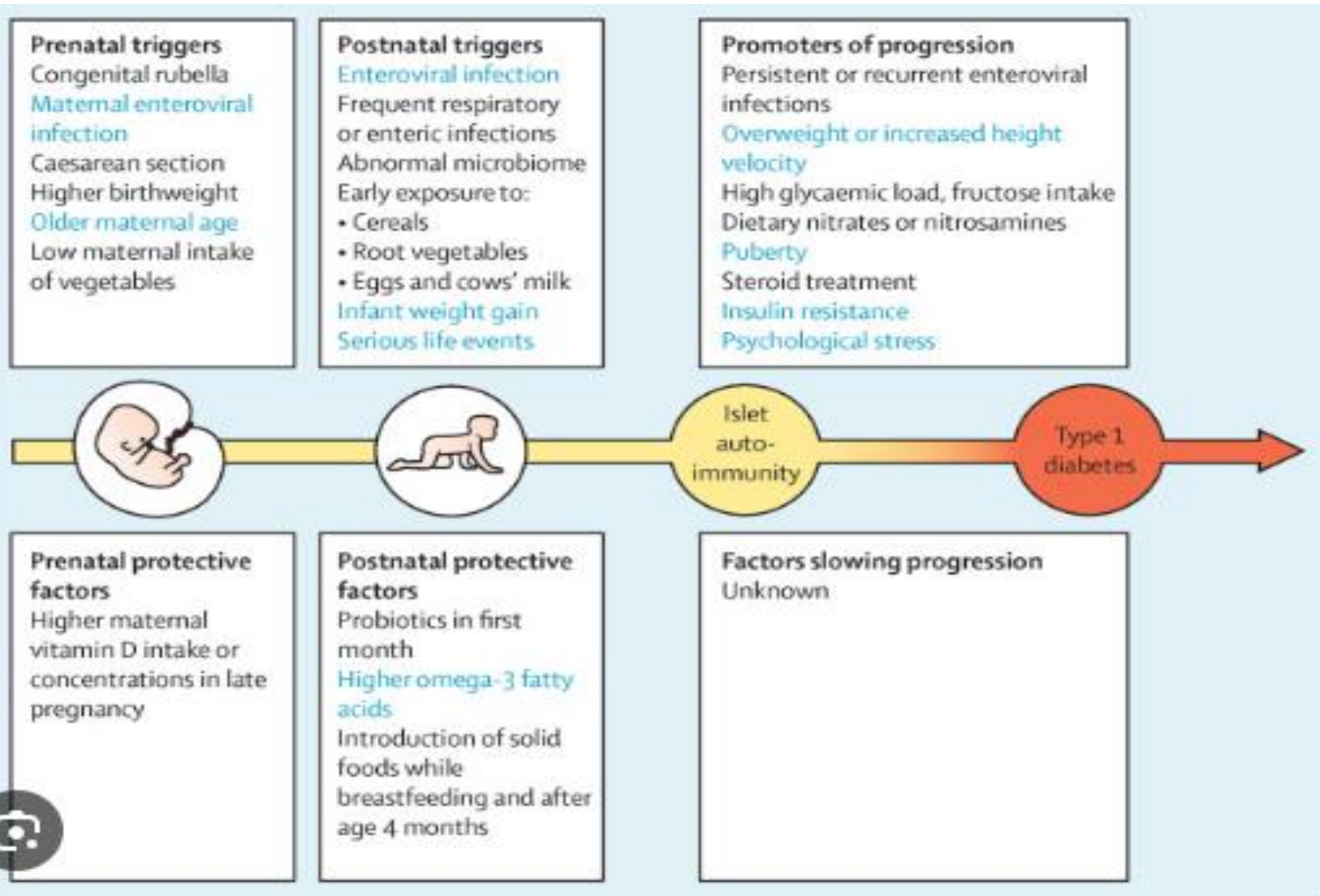


Table 1. Main viruses that might cause T1D and their mechanisms of action

Virus	Effects on cells
Enterovirus	Induction of autoantibodies, induction of β cell lysis, molecular mimicry, stimulation of autoreactive T-cell activity.
Cytomegalovirus	Infection of β cells, clonal activation of T cells, induction in macrophage recruitment to the pancreas.
Rotavirus	Infection of β cells, molecular mimicry.
Rubella virus	Induction of cross-reactions between viral antigens and GAD, which are then subject to T lymphocyte activity infection of β cells.
Mumps virus	Infection of β cells, increased expression of HLA classes I and II in β cells.
Parvovirus	Does not infect β cells, macrophages activate a type Th1 immune response cascade while type Th2 response is attenuated.



Type 1 Diabetes Mellitus



Risk Factors

Family History

- Family history of type 1 diabetes increases risk
- Increased risk if parent has type 1 diabetes
 - Even larger risk if both parents have it
- Family history of other autoimmune diseases increases the risk

Environmental

- Obesity
- Poorly-diverse gut microbiome
- Diet
 - Breastfeeding possibly decreases risk
 - Early cow's milk possibly increases risk
- Lack of vitamin D

Type 1 Diabetes Risk Factors: Risk factors for developing type 1 diabetes include family history, obesity, diet, lack of vitamin D exposure, etc.

- ◎ 90 per cent of people who develop type 1 diabetes have no family connection with the condition, genetic factors can pre-dispose people to developing type 1 diabetes.
- ◎ Certain genes are associated with type 1 diabetes risk. However, having these genes alone is not enough to cause type 1 diabetes

EPIDEMIOLOGY OF TYPE 1 DIABETES



- Before Insulin, the only option for Type 1 diabetics, was the starvation diet. To control their blood sugar they were limited on their food intake. This could prolong death by up to 2 years. 2 years was the longest a diabetic could go without insulin. January 1922 was the first time insulin was given to a human. Dr. Banting went into a hospital room full of children with Diabetes most of them unconscious. Administered insulin to everyone in the room. By the time he administered to the last child the first one woke up. The room went from one of hopelessness to a room of celebration and joy.

- ◉ Even though insulin replacement therapy and other advances in the management of T1DM have improved the prognosis of persons with T1DM, their mortality is still at least two times (~2-8-fold) higher than population.
- ◉ This is because of both acute and chronic complications of the disease.

Complications of **Diabetes** Type-1

Diabetes Mellitus Type-1 complications that can occur over time such as:

- Diabetic neuropathy
- Heart and blood vessel disease
- Diabetic nephropathy
- Diabetic retinopathy
- Skin and mouth infections
- Pregnancy complications
- Diabetic ketoacidosis



TYPE 1 DIABETES PREVENTION

- ◉ Monitor people at risk of developing type 1 diabetes.
- ◉ Teplizumab recommended to delay onset of stage 3
- ◉ (symptomatic) type 1 diabetes in people aged 8 years or older
- ◉ with preclinical (stage 2) type 1 diabetes.



Teplizumab, sold under the brand name Tziel, is a humanized anti-CD3 monoclonal antibody that is the first approved treatment indicated to **delay** the onset of stage 3 type 1 diabetes in people with stage 2 T1D.



Each vial of teplizumab 1 mg/1 mL in 2-mL vials costs \$13,850, and a 14-day supply of teplizumab costs \$193,900

EPIDEMIOLOGY OF TYPE 2 DIABETES





Type 2 Diabetes Mellitus



Signs & Symptoms



Excessive Thirst



Weight Loss



Frequent Urination



Slow Healing



Excessive Hunger



Fatigue



Blurred Vision



Numbness

Type 2 Diabetes Symptoms: Signs and symptoms of type 2 diabetes include increased thirst (polydipsia), increased hunger (polyphagia), unexplained weight loss, fatigue, increased urine output (polyuria), blurred vision, numbness, etc.

RISK FACTORS FOR T2DM

TYPE 2 DIABETES RISK FACTORS

Risk factors for Diabetes

Family history
of Diabetes



Overweight/
Obesity



Polycystic
ovarian syndrome
(PCOS)



Physical
Inactivity

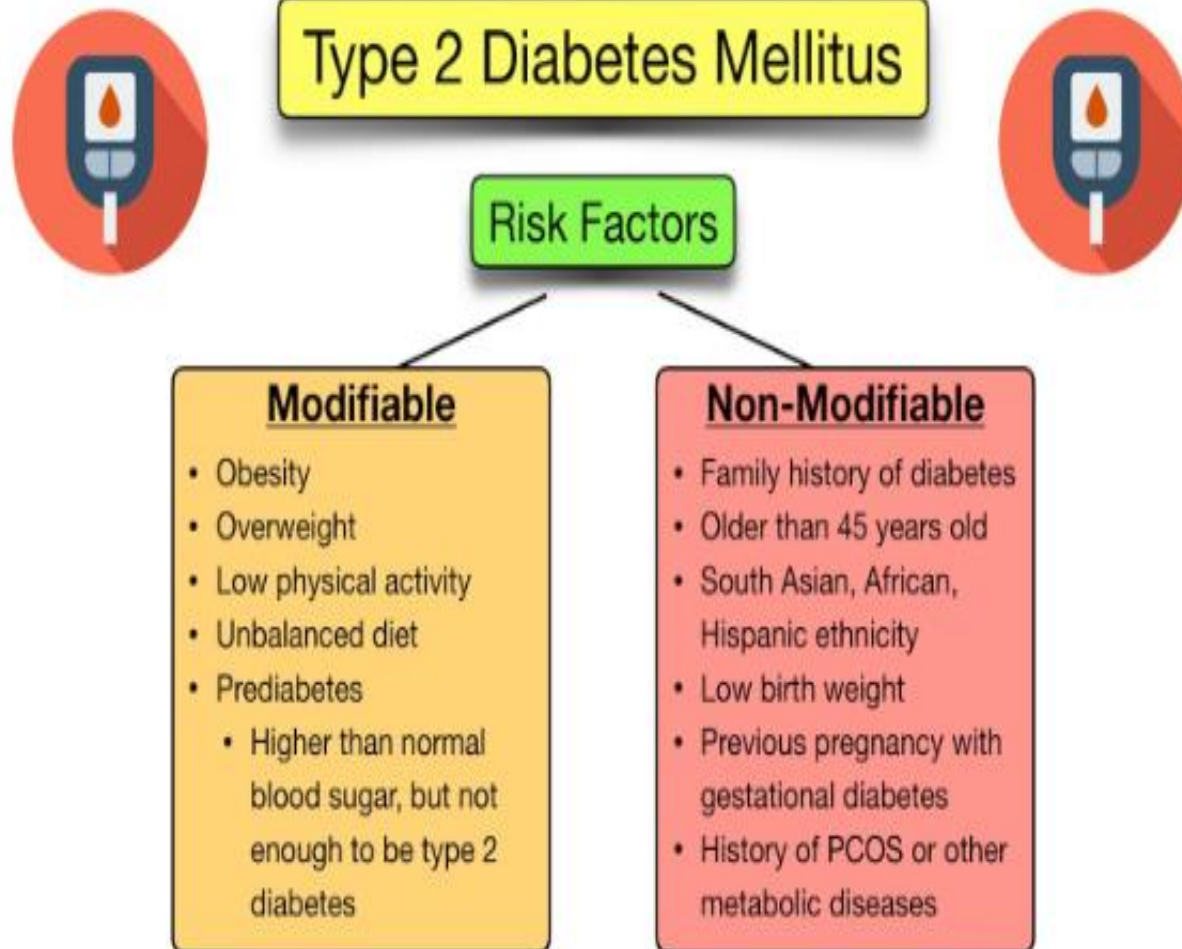


Age



High Blood
Pressure

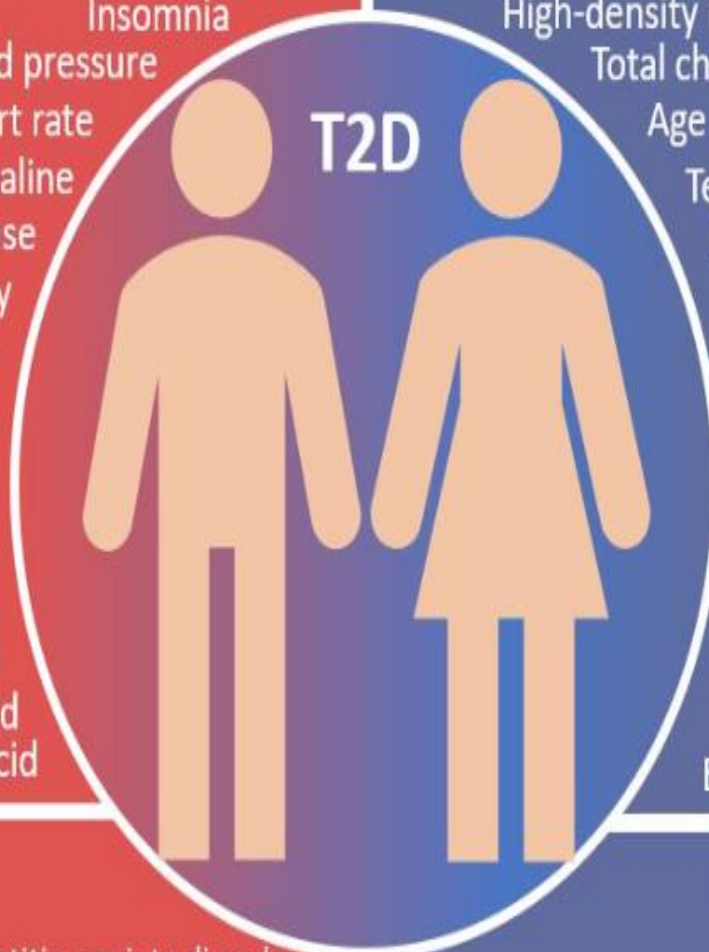




Type 2 Diabetes Risk Factors: Risk factors for developing type 2 diabetes include obesity, low physical activity, unbalanced diet, prediabetes, family history, age, ethnicity, gestational diabetes, etc.

Causal risk factor

Depression
Insomnia
Systolic blood pressure
Resting heart rate
Isoleucine, leucine, valine
Alanine aminotransferase
Childhood obesity
Adulthood obesity
Body fat percentage
Visceral fat mass
Smoking
Coffee
Eicosapentaenoic acid
Docosapentaenoic acid
Arachidonic acid
Stearic acid



Causal protective factor

Alanine
High-density lipoprotein cholesterol
Total cholesterol
Age at menarche
Testosterone
Sex hormone binding globulin
Birthweight
Adulthood height
Lean body mass (for women)
25-hydroxyvitamin D
 α -Linolenic acid
Linoleic acid
Palmitoleic acid
Oleic acid
Education years

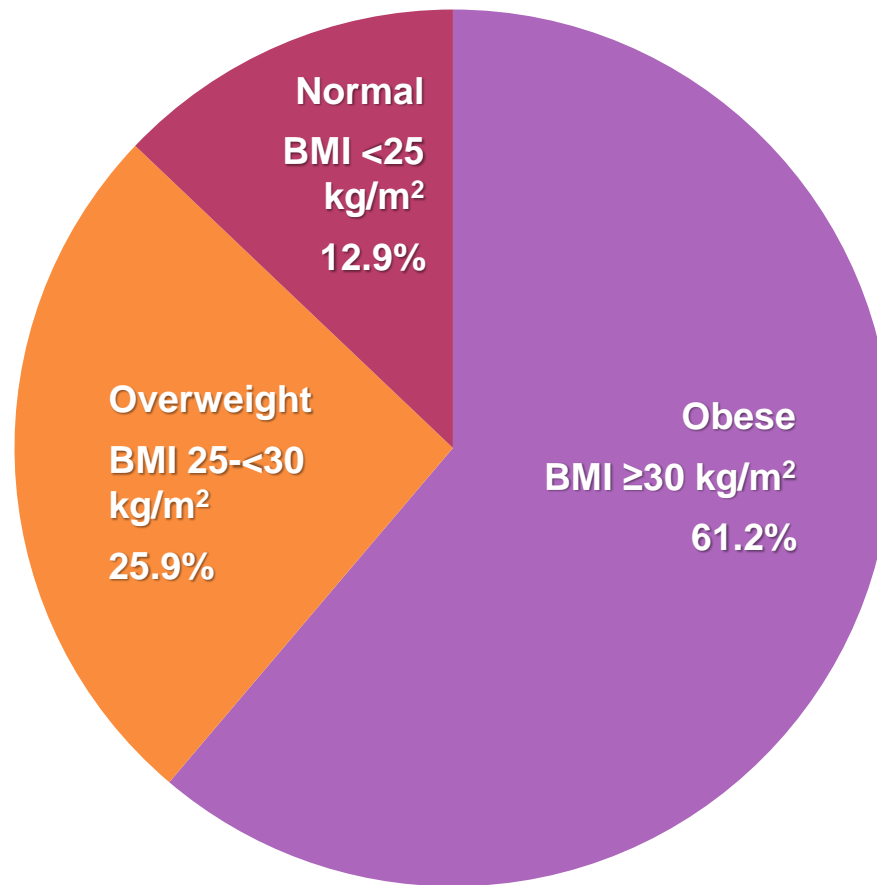
Suggestive risk factor

Giant cell arteritis, atopic dermatitis, anxiety disorder, serum iron and selenium, urinary sodium, total triglyceride, fetuin-A levels, homocysteine, phenylalanine, interleukin 1 receptor antagonist, tumour necrosis factor, alcohol consumption, breakfast skipping, daytime napping and short sleep duration

Suggestive protective factor

Thyroid-stimulating hormone, low-density lipoprotein cholesterol, tyrosine, interleukin 6 receptor subunit α and morningness

PREVALENCE OF OVERWEIGHT AND OBESITY IN DIABETES



OBESITY IS ALSO ASSOCIATED WITH OTHER METABOLIC ABNORMALITIES

◉Dyslipidemia

LDL AND HDL -TRIGLYCERIDE

◉Hypertension

BP MORE THAN 140/90

PART 2

NON-MODIFIABLE RISK FACTORS FOR TYPE 2 DIABETES

Family history: Some factors that increase the risk of diabetes are inherited from our parents or close biological relatives. If you have a blood relative with diabetes, your risk for developing it is significantly increased. Share your family health history with your doctor to find out what it may mean for you.

Race or ethnic background: If you're of African-American, Asian-American, Latino/Hispanic-American, Native American or of Pacific-Islander descent, you have a greater chance of developing diabetes.

Age: The older you are, the higher your risk for prediabetes and Type 2 diabetes. Type 2 diabetes generally occurs in middle-aged adults, most frequently after age 40. But health care professionals are diagnosing more and more children and adolescents with Type 2 diabetes.

Gestational diabetes: If you developed diabetes during pregnancy, you are at increased risk of developing diabetes again later in life.

MODIFIABLE RISK FACTORS FOR TYPE 2 DIABETES

Weight: Being overweight or obese increases your risk of developing diabetes. Losing 5% to 10% of your body weight—in addition to getting regular physical activity—can significantly reduce your risk of developing diabetes. Your risk decreases even more as you lose more weight. For most people, a body mass index calculator will provide a good target weight for your height.

Physical activity: Physical inactivity is a key modifiable risk factor for prediabetes and Type 2 diabetes. Regular physical activity helps lower insulin resistance. This means your body can use its own insulin more effectively. Even a brisk 30-minute walk at least five days a week has been shown to significantly reduce the risk of diabetes and heart disease.

For your overall cardiovascular health, aim for:

At least 150 minutes per week of moderate-intensity aerobic physical activity;

Or 75 minutes per week of vigorous-intensity aerobic physical activity (or a combination of the two);

And muscle-strengthening at least two days per week.

Blood pressure: In addition to causing •
damage to the cardiovascular system,
untreated high blood pressure has been
linked to complications from diabetes.
People with diabetes and HBP should
maintain a blood pressure of less than
130/80 mm Hg. Normal blood pressure is
below 120/80 mm Hg.

Cholesterol (lipid) levels: Diabetes is •
associated with atherosclerosis (hardening
of the arteries) and blood vessel disease.
Low HDL “good” cholesterol and/or high
triglycerides can increase the risk for Type 2
diabetes and cardiovascular disease.
Following a healthy eating plan, getting
regular physical activity and reaching and
maintaining a healthy weight can help
improve abnormal lipid levels. Sometimes,
=STATIN

Smoking: If you smoke, there are a number of tools, medications and online resources that you can use to help you quit. Talk to your health care team about the best options for you. •

Diet: It's important to eat healthy foods in the right amounts. Diet is one of the most important modifiable risk factors for prediabetes and Type 2 diabetes. •

The American Heart Association recommends an eating plan that includes fruits and vegetables, whole grains, skinless poultry, fish, legumes, non-tropical vegetable oils and unsalted nuts and seeds. A healthy diet should also replace saturated fats with monounsaturated and polyunsaturated fats, avoid trans fats, reduce cholesterol and sodium (salt) and limit red and processed meats, refined carbohydrates and sweetened beverages. •

- ◉ **Alcohol:** Heavy use of alcohol can cause inflammation in the pancreas and limit its ability to produce enough insulin. Alcohol can cause liver damage and adds more sugar and starch to your diet that must either be used or stored as fat. Moderate your alcohol intake.

Stress and well-being: Everyone feels stress, but people react differently. Managing the stress in our lives is an important part of healthy living, not only for diabetes but for heart disease and many other conditions. Find ways to address the causes of your stress and make time for things you enjoy.

Sleep: Adults should get seven to nine hours of sleep a night. Sleep benefits your whole body, including your heart and brain. It improves mood, memory and reasoning. Research also has shown that too little or too much sleep is linked to a high A1C in people with Type 2 diabetes. If you have insomnia (trouble going to sleep or waking up too soon) or sleep apnea (problems breathing while asleep), work with your health care team to diagnose and treat them.

IS DIABETES HEREDITARY?

HOW YOUR GENES CAN PLAY A ROLE

- ◉ It's true that diabetes tends to run in families.
- ◉ You may wonder if that means there is a genetic cause to the disorder.
- ◉ The answer is complex and depends on the type of diabetes and other factors, such as diet, lifestyle, and environment.
- ◉ "For most people who have diabetes, it is not due to a straight genetic group of factors or to environmental ones, but rather it is a combination of both, in fact it is polygenic

IS TYPE 2 DIABETES FAMILIAL?

- ◎ Type 2 diabetes does run in families, but not only because family members are related. Sometimes it's because they share certain habits that can increase their risk. Family history is just one of several risk factors for type 2 diabetes.



3.FAMILY HISTORY

- A positive family history is an important risk factor for T2DM.



What is Metabolic Syndrome?



Metabolic syndrome occurs when a person has three or more of the following measurements:

- Abdominal obesity (Waist circumference >40 inch in men, & >35 inch in women)
- Triglyceride level of 150mg/dL or greater
- HDL cholesterol of <40mg/dL in men or <50mg/dL in women
- Systolic blood pressure 130mm Hg or greater, or diastolic blood pressure 85mm Hg or greater
- Fasting glucose of 100 mg/dL or greater



RISK FACTORS OF METABOLIC SYN.

Age	The prevalence of metabolic syndrome increases with age, affecting less than 10% of people in their 20s and 40% of people in their 60s.
Race	Metabolic syndrome is generally more common among blacks and Mexican-Americans than among Caucasians.
Obesity	A body mass index (BMI) greater than 25 increases your risk of metabolic syndrome and abdominal obesity increase the risk of MS. Abdominal obesity refers to having an apple shape rather than a pear.
History of diabetes	Having a family history of type 2 diabetes or diabetes during pregnancy (gestational diabetes) increases the risk for developing metabolic syndrome.
Other diseases	A diagnosis of hypertension, cardiovascular disease (CVD) or polycystic ovary syndrome (a hormonal disorder in which a woman's body produces an excess of male hormones) also increases the risk for metabolic syndrome.

ALL THE FOLLOWING REGARDING METABOLIC X SYNDROM ARE TRUE EXCEPT:

- A. Systolic BP $>$ 140 mmHg**
- B. FBS $>$ 130 mg/d.**
- C. TG $>$ 250 mg/dl**
- D. HDL $>$ 50 mg/dl**
- E. BMI $>$ 30**

INCREASE IN THE PREVALENCE OF T2DM.

- ⦿ changes in the ratio of diagnosed to undiagnosed cases of diabetes;
- ⦿ population demographic changes with an aging population;
- ⦿ earlier age at onset of diabetes;
- ⦿ longer survival in people with diabetes;
- ⦿ Increasing incidence of diabetes.

**TYPE
2 DM**

**HIGH
Incidence**

Prevalence

NO CURE

LOW

Mortality



INCREASE IN THE PREVALENCE OF T2DM INCLUDE ALL OF THE FOLLOWING EXCEPT:

- A. changes in the ratio of diagnosed to undiagnosed cases of diabetes;
- B. population demographic changes with an aging population;
- C. earlier age at onset of diabetes;
- D. High case fatality.
- E. Increasing incidence of diabetes.

ONE OF THE FOLLOWING TESTS IS HIGHLY SUSPICIOUS FOR PATIENT TO HAVE DIABETES MELLITUS:

- A. GTT post 2 hr = 140mg/dl
- B. HbA1C = 5.2 %
- C. Fasting blood sugar = 130mg/dl
- D. Urine for sugar= +++

What is your next step??????

USE OF A1C FOR SCREENING AND DIAGNOSIS OF DIABETES

The A1C test should be performed using a method that is certified by the National Glycohemoglobin Standardization Program (NGSP) as traceable to the Diabetes Control and Complications Trial (DCCT) reference assay.

ADA 2024

Table 2.3—Criteria for screening for diabetes or prediabetes in asymptomatic adults

1. Testing should be considered in adults with overweight or obesity ($\text{BMI} \geq 25 \text{ kg/m}^2$ or $\geq 23 \text{ kg/m}^2$ in Asian Americans) who have one or more of the following risk factors:
 - First-degree relative with diabetes
 - High-risk race/ethnicity (e.g., African American, Latino, Native American, Asian American, Pacific Islander)
 - History of CVD
 - Hypertension ($\geq 140/90 \text{ mmHg}$ or on therapy for hypertension)
 - HDL cholesterol level $< 35 \text{ mg/dL}$ (0.90 mmol/L) and/or a triglyceride level $> 250 \text{ mg/dL}$ (2.82 mmol/L)
 - Women with polycystic ovary syndrome
 - Physical inactivity
 - Other clinical conditions associated with insulin resistance (e.g., severe obesity, acanthosis nigricans)
2. Patients with prediabetes ($\text{A1C} \geq 5.7\%$ [39 mmol/mol], IGT, or IFG) should be tested yearly.
3. Women who were diagnosed with GDM should have lifelong testing at least every 3 years.
4. For all other patients, testing should begin at age 35 years.
5. If results are normal, testing should be repeated at a minimum of 3-year intervals, with consideration of more frequent testing depending on initial results and risk status.
6. People with HIV

CVD, cardiovascular disease; GDM, gestational diabetes mellitus; IFG, impaired fasting glucose; IGT, impaired glucose tolerance.

Table 2.4—Risk-based screening for type 2 diabetes or prediabetes in asymptomatic children and adolescents in a clinical setting (254)

Screening should be considered in youth* who have overweight (≥ 85 th percentile) or obesity (≥ 95 th percentile) **A** and who have one or more additional risk factors based on the strength of their association with diabetes:

- Maternal history of diabetes or GDM during the child's gestation **A**
- Family history of type 2 diabetes in first- or second-degree relative **A**
- Race/ethnicity (Native American, African American, Latino, Asian American, Pacific Islander) **A**
- Signs of insulin resistance or conditions associated with insulin resistance (acanthosis nigricans, hypertension, dyslipidemia, polycystic ovary syndrome, or small-for-gestational-age birth weight) **B**

GDM, gestational diabetes mellitus. *After the onset of puberty or after 10 years of age, whichever occurs earlier. If tests are normal, repeat testing at a minimum of 3-year intervals (or more frequently if BMI is increasing or risk factor profile deteriorating) is recommended. Reports of type 2 diabetes before age 10 years exist, and this can be considered with numerous risk factors.

Table 2.7—Screening for and diagnosis of GDM

One-step strategy

Perform a 75-g OGTT, with plasma glucose measurement when an individual is fasting and at 1 and 2 h, at 24–28 weeks of gestation in individuals not previously diagnosed with diabetes. The OGTT should be performed in the morning after an overnight fast of at least 8 h. The diagnosis of GDM is made when any of the following plasma glucose values are met or exceeded:

- Fasting: 92 mg/dL (5.1 mmol/L)
- 1 h: 180 mg/dL (10.0 mmol/L)
- 2 h: 153 mg/dL (8.5 mmol/L)

Two-step strategy

Step 1: Perform a 50-g GLT (nonfasting), with plasma glucose measurement at 1 h, at 24–28 weeks of gestation in individuals not previously diagnosed with diabetes.

If the plasma glucose level measured 1 h after the load is ≥ 130 , 135, or 140 mg/dL (7.2, 7.5, or 7.8 mmol/L, respectively),* proceed to a 100-g OGTT.

Step 2: The 100-g OGTT should be performed when the individual is fasting.

The diagnosis of GDM is made when at least two† of the following four plasma glucose levels (measured fasting and at 1, 2, and 3 h during OGTT) are met or exceeded (Carpenter-Coustan criteria [226]):

- Fasting: 95 mg/dL (5.3 mmol/L)
- 1 h: 180 mg/dL (10.0 mmol/L)
- 2 h: 155 mg/dL (8.6 mmol/L)
- 3 h: 140 mg/dL (7.8 mmol/L)

GDM, gestational diabetes mellitus; GLT, glucose load test; OGTT, oral glucose tolerance test. *American College of Obstetricians and Gynecologists (ACOG) recommends any of the commonly used thresholds of 130, 135, or 140 mg/dL for the 1-h 50-g GLT (222). †ACOG notes that one elevated value can be used for diagnosis (222).

PREDIABETES

WHAT IS PREDIABETES?

- ◉ **Prediabetes means your blood sugar level is higher than normal but not high enough to be diagnosed with diabetes. It is a warning sign, signaling a need for lifestyle changes.**
- ◉ **Those with prediabetes typically develop type 2 diabetes within several years and are also at increased risk for serious health problems such as stroke and heart disease.**

THE ROAD TO TYPE 2 DIABETES

A1C TEST

FASTING BLOOD SUGAR TEST

GLUCOSE TOLERANCE TEST

DIABETES

6.5%
or above

126
mg/dL
or above

200
mg/dL
or above

PREDIABETES

5.7 –
6.4%

100-125
mg/dL

140-199
mg/dL

NORMAL

Below
5.7%

99
mg/dL
or below

140
mg/dL
or below



Prediabetes

Prediabetes means your blood sugar level is higher than normal but not high enough to be diagnosed with diabetes. It is a warning sign, signaling a need for lifestyle changes.

More than
1 in 3
adults have prediabetes



9 out of 10

don't know they have prediabetes



Who is at risk?

45+

Over 45 years old



Overweight



Have a parent or
sibling with diabetes



Had gestational diabetes



Have high blood pressure



Not physically active

How can I reduce my risk?



Keep a healthy weight



Eat healthy foods



Move more



Quit smoking/tobacco use

For more information, visit
parkview.com/diabetes



PARKVIEW

PREVENTION OR DELAY OF DIABETES AND ASSOCIATED COMORBIDITIES 2024-ADA

OVERALL RECOMMENDATIONS

- ◉ In people with prediabetes, monitor for the development of type 2 diabetes at least annually.
- ◉ In people with preclinical type 1 diabetes, monitor for disease progression using A1C approximately every 6 months and 75-g oral glucose tolerance test (i.e., fasting and 2-h plasma glucose) annually.

(POSSIBLE TEPLIZUMAB??)

LIFESTYLE BEHAVIOR CHANGE FOR DIABETES PREVENTION

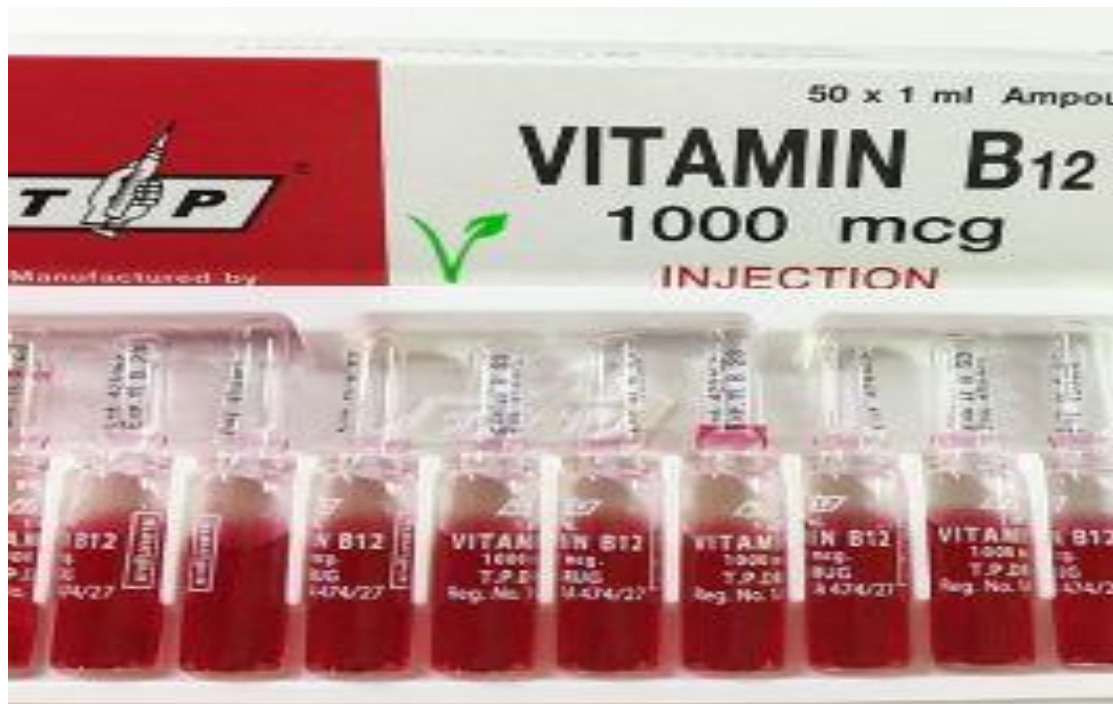
- Refer adults with overweight/obesity at high risk of type 2 diabetes, as typified by the Diabetes Prevention Program (DPP), to an intensive lifestyle behavior change program to achieve and maintain a weight reduction of at least 7% of initial body weight through healthy reduced-calorie diet and 150 min/week of moderate intensity physical activity.
- A variety of eating patterns can be considered to prevent diabetes in individuals with prediabetes.

PHARMACOLOGIC INTERVENTIONS

- Metformin therapy for the prevention of type 2 diabetes should be considered in adults at high risk of type 2 diabetes, especially those aged
 - 25- 59 years with
 - BMI 35 kg/m²
 - FBS=110 mg/Dl (PREDIABETES)
 - Higher and A1C (PREDIABETES)
 - Gestational diabetes



Long-term use of metformin may be associated with biochemical vitamin B12 deficiency; consider periodic measurement of vitamin B12 levels in metformin- treated individuals, especially in those with anemia or peripheral neuropathy.



PREVENTION OF VASCULAR DISEASE AND MORTALITY

Statin therapy may **increase the risk of type 2 diabetes** in people at high risk of developing type 2 diabetes.

In such individuals, glucose status should be monitored regularly .

It is not recommended that statins be discontinued



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In people with a history of stroke and evidence of insulin resistance and prediabetes, pioglitazone may be considered to lower the risk of stroke or myocardial infarction.

However, this benefit needs to be balanced with the increased risk of **weight gain, edema, and fracture.**

A Lower doses may reduce the risk of adverse effects.



PRIMARY PREVENTION OF TYPE 2 DM

No population based studies on primary prevention of type 2 DM.

Prevention should be based on efforts to decrease insulin resistance and promotion of insulin secretion.

SECONDARY PREVENTION OF TYPE 2 DM

Aims at postponed of DM, decreases risk or severity of complications and so decreases premature morbidity and mortality

? Screening for undetected DM

? Control of hyperglycemia, and other metabolic abnormalities

? Correction of other cardiovascular risk factors (smoking, dyslipidemias, obesity).

[HTTPS://IDF.ORG/ABOUT-DIABETES/TYPE-2-DIABETES/](https://idf.org/about-diabetes/type-2-diabetes/)

Know your risk of type 2 diabetes

IDF has developed an online risk assessment to predict a person's risk of developing type 2 diabetes within the next ten years. The test is based on the Finnish Diabetes Risk Score (FINDRISC) developed and designed by Adj. Prof Jaana Lindstrom and Prof. Jaakko Tuomilehto from the National Institute for Health and Welfare, Helsinki, Finland.

[Test your risk](#)

REFERENCES

- ◉ <https://insujet.com/blogs/en/diabetes-prevalence>
- ◉ [Harrison's Principles of Internal Medicine, 21e – AccessMedicine](#)
- ◉ <https://www.diabetesincontrol.com/international-textbook-of-diabetes-mellitus-type-2-diabetes-in-children/>

THANK YOU