

HLT201

Chapter 3: Diabetes

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Definition

- ▶ A group of metabolic diseases in which a person has high blood sugar because:

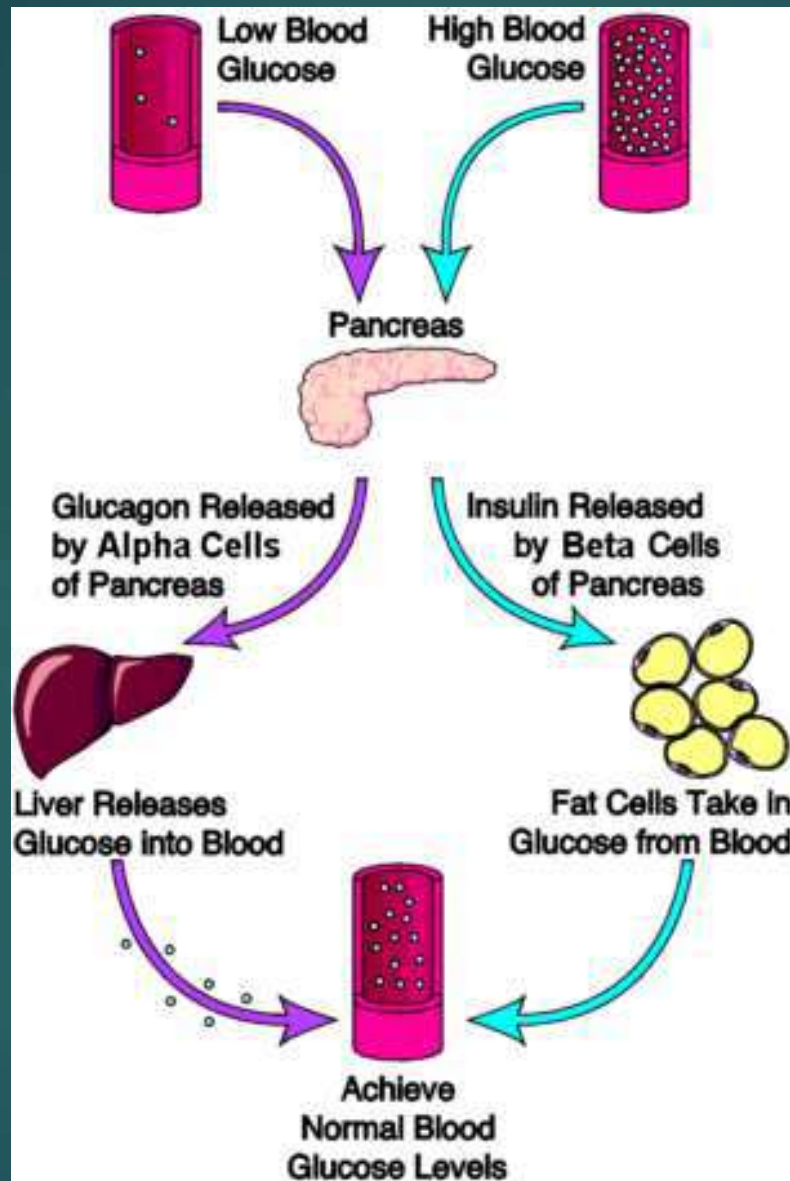
- ▶ **The body does not produce enough insulin**

or

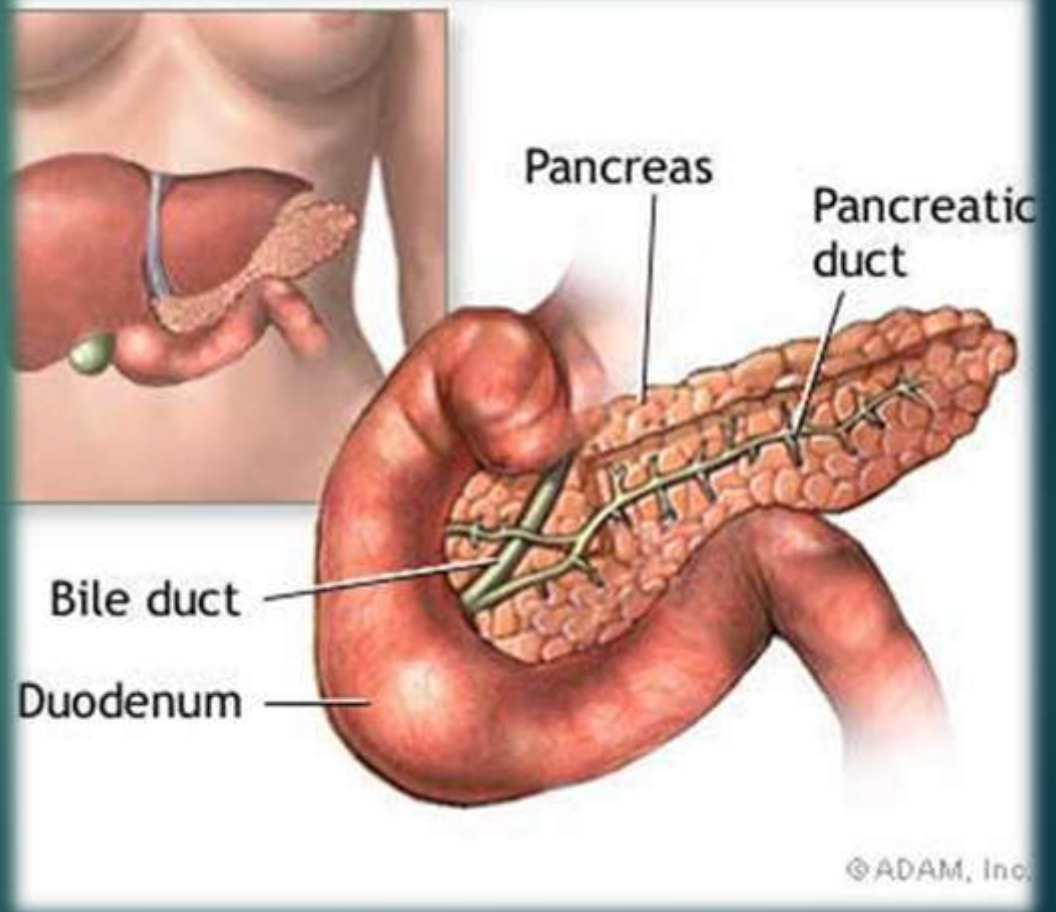
- ▶ **The receptor cells do not respond to the produced insulin**

Overview

- ▶ Insulin is a hormone that is needed to convert sugar, starches and other food into energy needed for daily life.
- ▶ It is produced by the pancreas.
- ▶ The cause of diabetes continues to be a mystery, although both genetics and environmental factors such as obesity and lack of exercise appear to play roles.



Pancreas



Genetics

- ▶ Unlike some traits, diabetes does not seem to be inherited in a simple pattern.
- ▶ Yet clearly, some people are born more likely to get diabetes than others.

Types

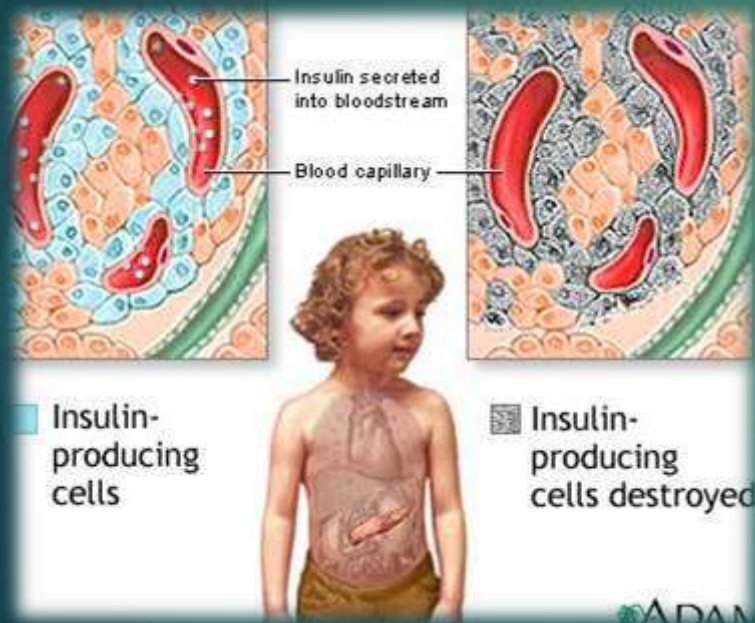
- ▶ **Type I:** 10% of cases
- ▶ **Type II:** Most common type
- ▶ **Gestational Diabetes:** during pregnancy

Type I

- ▶ Results from the body's failure to produce insulin.
- ▶ *It is estimated that 5-10% of Americans who are diagnosed with diabetes have type 1 diabetes.*
- ▶ Appears at <40 yrs and in **childhood**.
- ▶ Known as **Insulin Dependent Diabetes**, (IDD) **or Juvenile Diabetes**

Type I

- ▶ Cause is controversial (could be immune mediated)



Type 1 Diabetes

1. The stomach changes food into glucose.
 2. Glucose enters the bloodstream.
 3. The pancreas makes little or no insulin.
 4. Little or no insulin enters the bloodstream.
 5. Glucose builds up in the bloodstream.
-
- This diagram shows the digestive process in a person with Type 1 Diabetes. It starts with the stomach (1) where food is broken down into glucose (blue dots). Glucose enters the bloodstream (2) through a blood vessel. The pancreas (3) is shown producing very little or no insulin (yellow dots). Consequently, little or no insulin enters the bloodstream (4). This leads to glucose building up in the bloodstream (5), as shown by the large accumulation of blue dots in the blood vessel.

Type II

- ▶ Results from **insulin resistance**: the body fails to properly use insulin, combined with relative insulin deficiency.
- ▶ *Most Americans who are diagnosed with DM have type 2 diabetes.*
- ▶ usually appears in **middle-aged** or older people.

Type II

- ▶ Type 2 diabetes develops slowly over a period of years.
- ▶ Some people may not notice any symptoms at all and their diabetes is only picked up in a routine medical check up.
- ▶ Some people may put the symptoms down to 'getting older' or 'overwork'.

Causes:

An **interaction** between **genetic predisposition & lifestyle factors**

- ▶ Life time risk of developing DMII is **5-10 x higher** in 1st degree relatives (sister/Brother/son/Daughter) of a person with DMII compared to a person with no family history of DM II

Type II Diabetes

Stomach
Pancreas

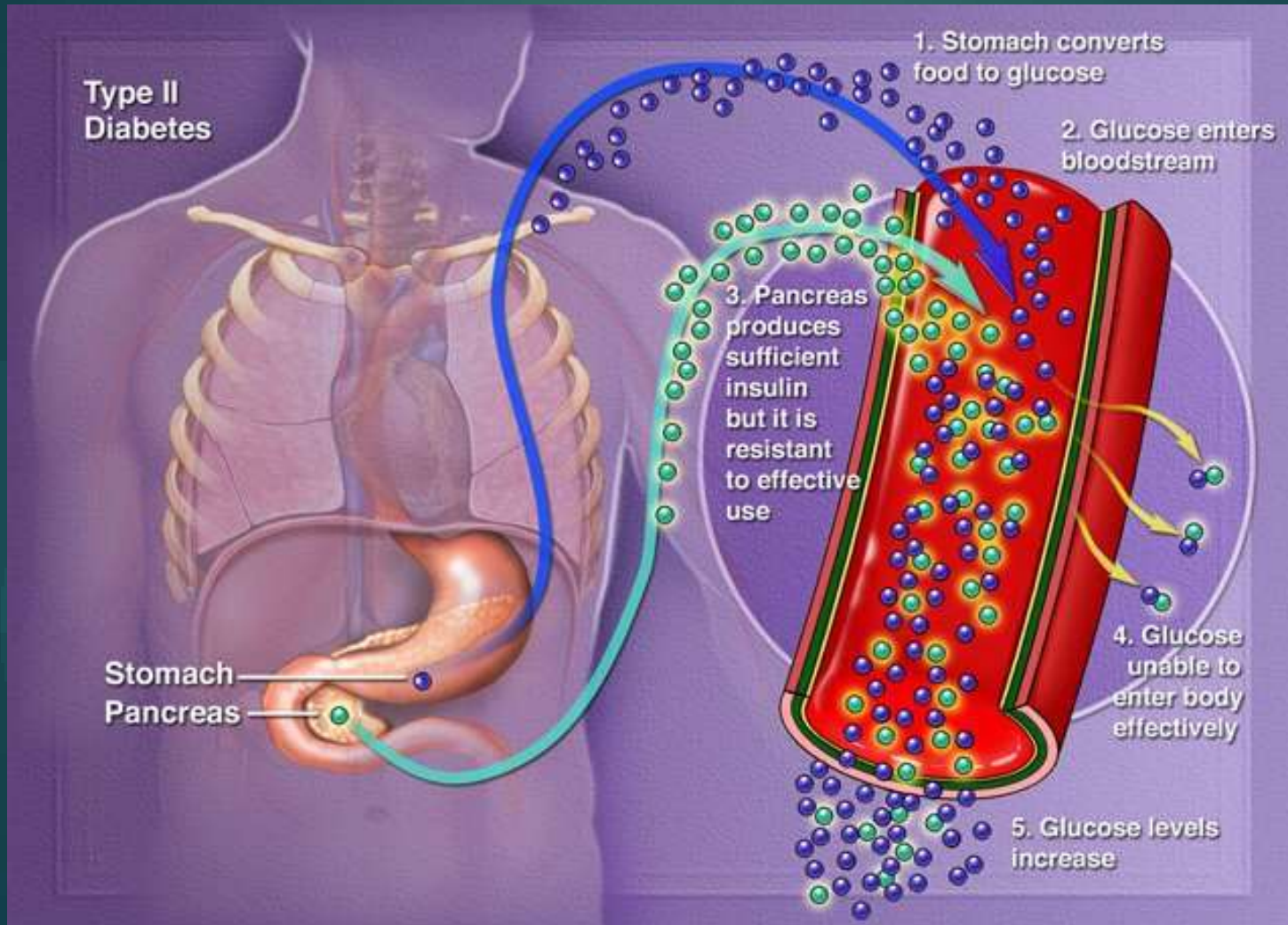
1. Stomach converts food to glucose

2. Glucose enters bloodstream

3. Pancreas produces sufficient insulin but it is resistant to effective use

4. Glucose unable to enter body effectively

5. Glucose levels increase



People at risk

Are people aged over 40 years and :

1. have a **family history** of diabetes
2. are **overweight**
3. have high blood pressure, **heart disease** or have had a heart attack
4. have had a **borderline high blood glucose** test
5. are women with polycystic ovary syndrome who are overweight.
6. are women who have had high blood glucose levels during pregnancy (gestational diabetes).

Gestational diabetes

- ▶ If a woman is 28 weeks pregnant. Her doctor has just told her that she has gestational diabetes.

Should she be concerned about gestational diabetes?

The short answer: yes.

Gestational diabetes affects about 4% of all pregnant women

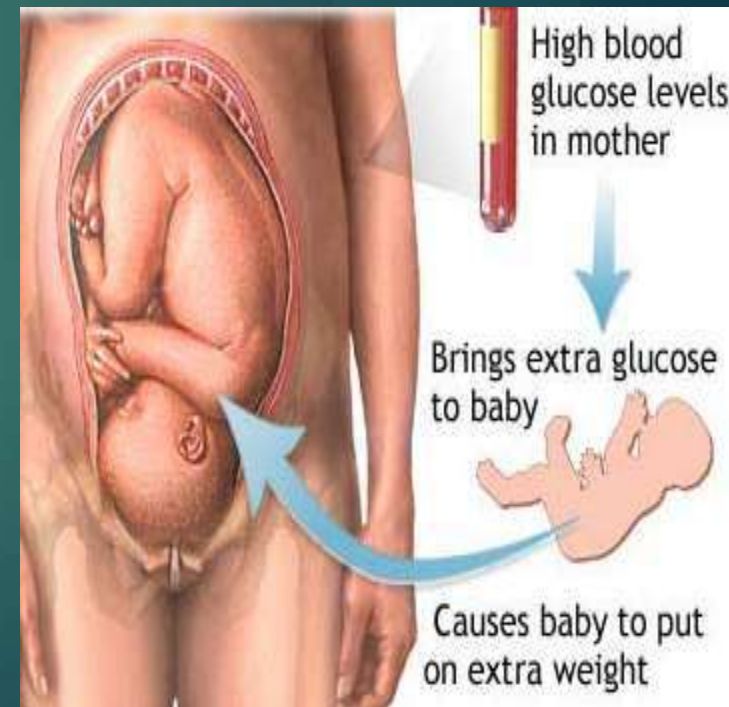
135,000 cases in USA each year.

Gestational diabetes

- ▶ Pregnant women who have never had diabetes before but who have high blood sugar (glucose) levels **during pregnancy** are said to have gestational diabetes.
- ▶ The cause of gestational diabetes is unknown. It is said that hormones from the placenta block the action of the mother's insulin in her body.
- ▶ This problem is called **insulin resistance**.

How G.diabetes can affect the baby?

- ▶ Although insulin does not cross the placenta, glucose and other nutrients do.
- ▶ So extra blood glucose goes through the placenta, giving the baby high blood glucose levels.
- ▶ This causes the baby's pancreas to make extra insulin to get rid of the blood glucose.
- ▶ *Since the baby is getting more energy than it needs to grow and develop, the extra energy is stored as fat.*



Consequences

- ▶ *Macrosomia*, or a "fat" baby.
- ▶ Damage to their shoulders during birth.
- ▶ Low blood glucose levels (Hypoglycemia) at birth.
- ▶ Breathing problems.
- ▶ Babies with excess insulin become children who are at risk for obesity and adults who are at risk for type 2 diabetes.

Pre-diabetes

- ▶ *Pre-diabetes is a condition that occurs when a person's blood glucose levels are higher than normal but not high enough for a diagnosis of type 2 diabetes.*
- ▶ 54 million Americans have pre-diabetes.
- ▶ **Recent research has shown that some long-term damage to the body, especially the heart and circulatory system, may already be occurring during pre-diabetes.**

What are the signs and symptoms of diabetes?

- ▶ being very thirsty
- ▶ urinating often
- ▶ feeling very hungry or tired
- ▶ losing weight
- ▶ having sores that heal slowly
- ▶ having dry, itchy skin
- ▶ Loss of feeling or tingling in the feet
- ▶ blurred vision

Main symptoms of Diabetes

blue = more common
in Type 1

Central

- Polydipsia
- Polyphagia
- Lethargy
- Stupor

Eyes

- Blurred vision

Systemic

- Weight loss

Breath

- Smell of acetone

Respiratory

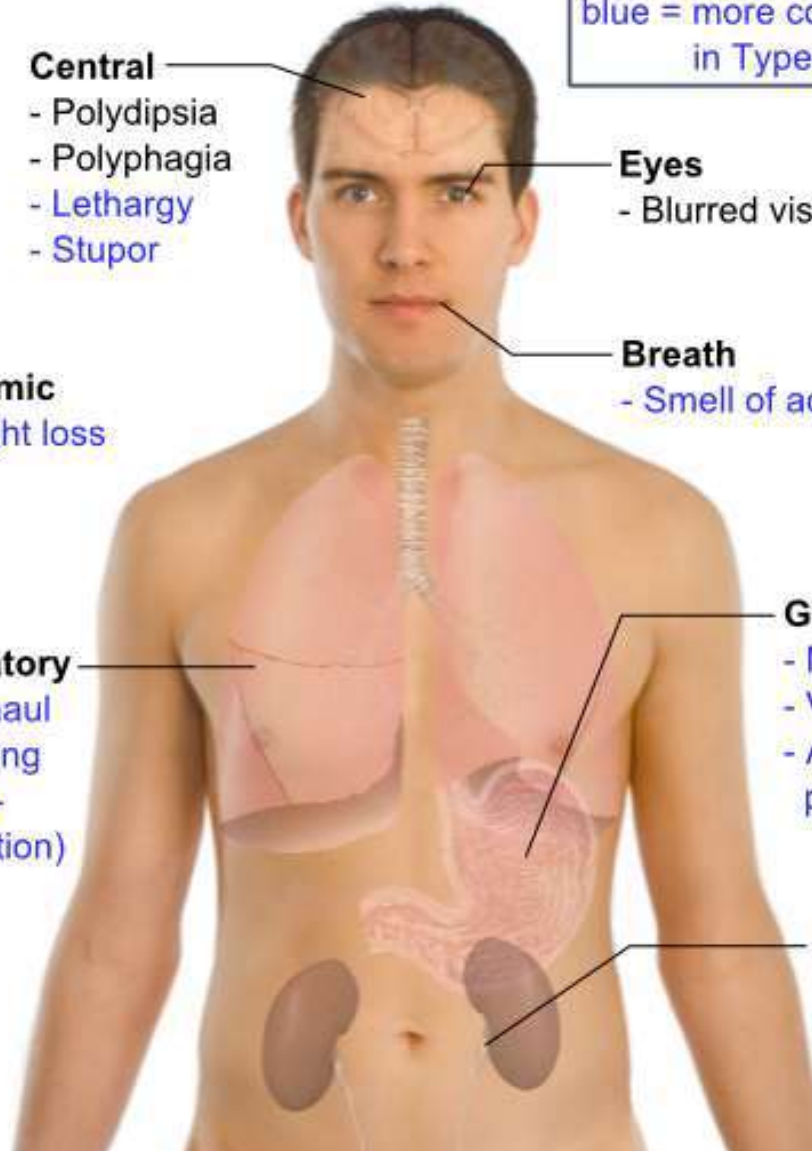
- Kussmaul
breathing
(hyper-
ventilation)

Gastric

- Nausea
- Vomiting
- Abdominal
pain

Urinary

- Polyuria
- Glycosuria



Complications

1. **Heart and Blood Vessels:**
2. **Eyes: Cataract (opacification of the lens)**
3. **Kidneys: renal failure**
4. **Nerves: neuropathy (nerve dysfunction)**
5. **Feet : foot ulcers: non healing**

Others:

- ▶ **Digestion:** constipation
- ▶ **Mouth:** gums, and teeth
- ▶ **sexual response :** erectile dysfunction
- ▶ **mood changes :** depression.

How can diabetes affect cardiovascular health?

- ▶ Cardiovascular disease is the leading cause of early death among people with diabetes.
- ▶ Adults with diabetes are two to four times more likely than people without diabetes to have heart disease or experience a stroke.
- ▶ At least 65% of people with diabetes die from heart disease or stroke.
- ▶ About 70% of people with diabetes also have high blood pressure.

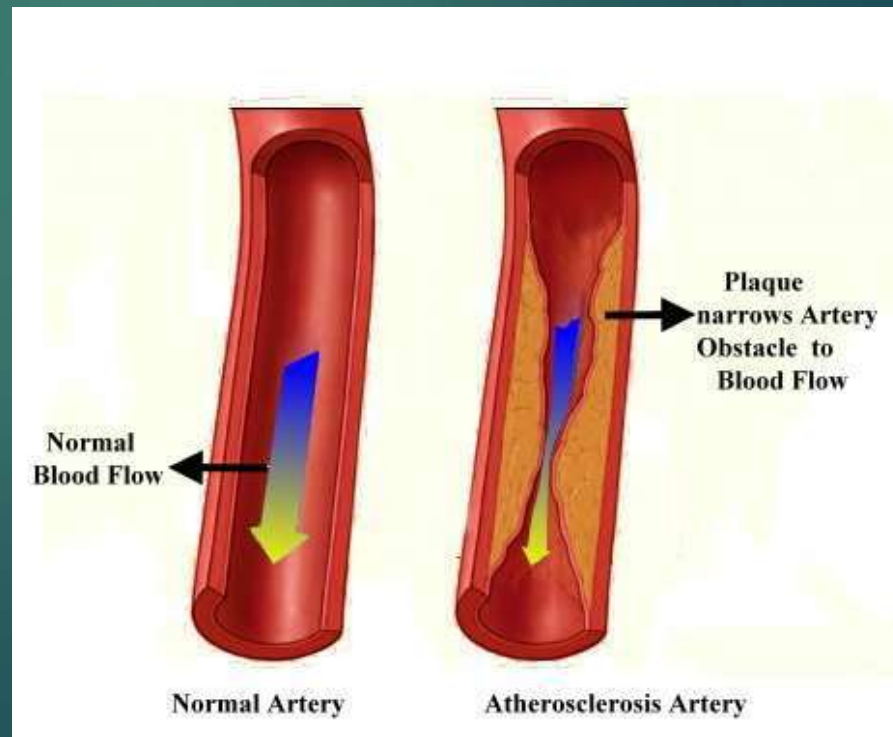
How can diabetes affect the sexual response?

- ▶ Many people with diabetic nerve damage have trouble having sex.
- ▶ Men can have trouble maintaining an erection and ejaculating.
- ▶ Women can have trouble with sexual response and vaginal lubrication.
- ▶ Both men and women with diabetes can get urinary tract infections and bladder problems more often than average.

Complications

A. Vascular Complications- vasculopathy:

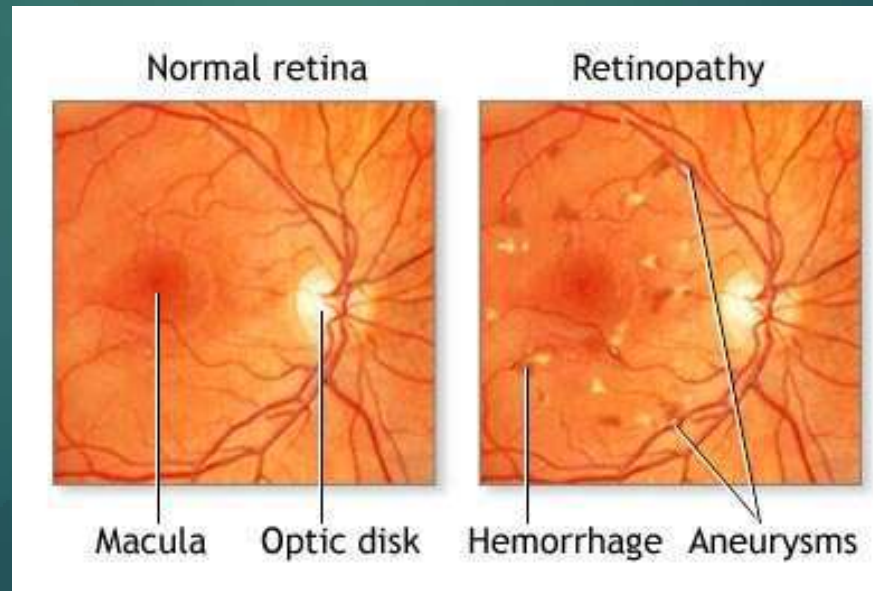
- ▶ Coronary heart diseases
- ▶ Stroke



Complications

► **B. Retinopathy** (Disease of the eyes)

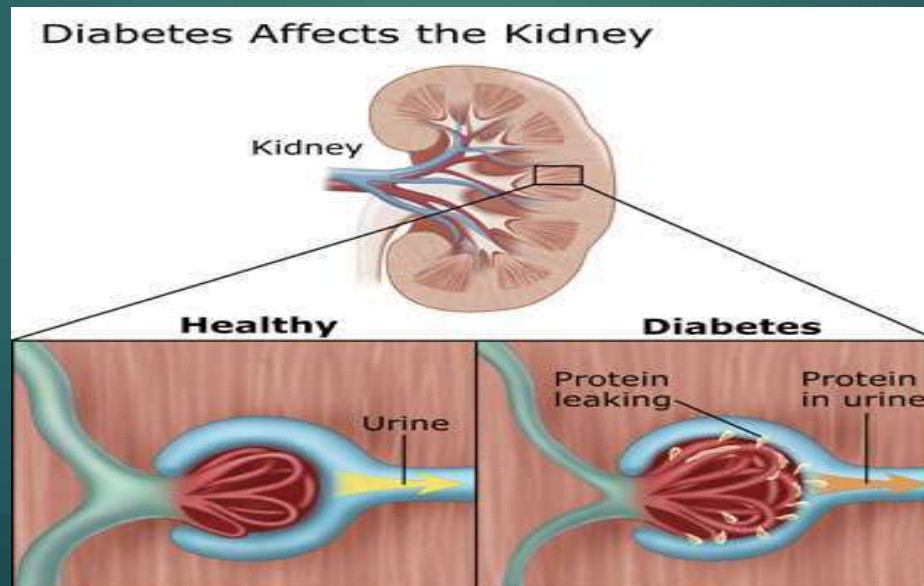
Can lead to blindness



Complications

► C. Nephropathy (Disease of the kidneys)

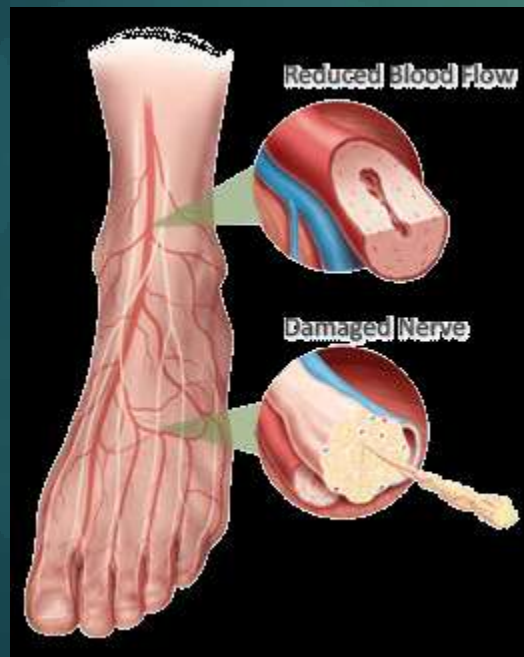
Can lead to kidney failure and need for dialysis



Complications

- **D. Neuropathy** (Disease of the nervous system)

Can lead to foot ulceration and possible amputation



Diabetic foot

Things that **do not** cause diabetes

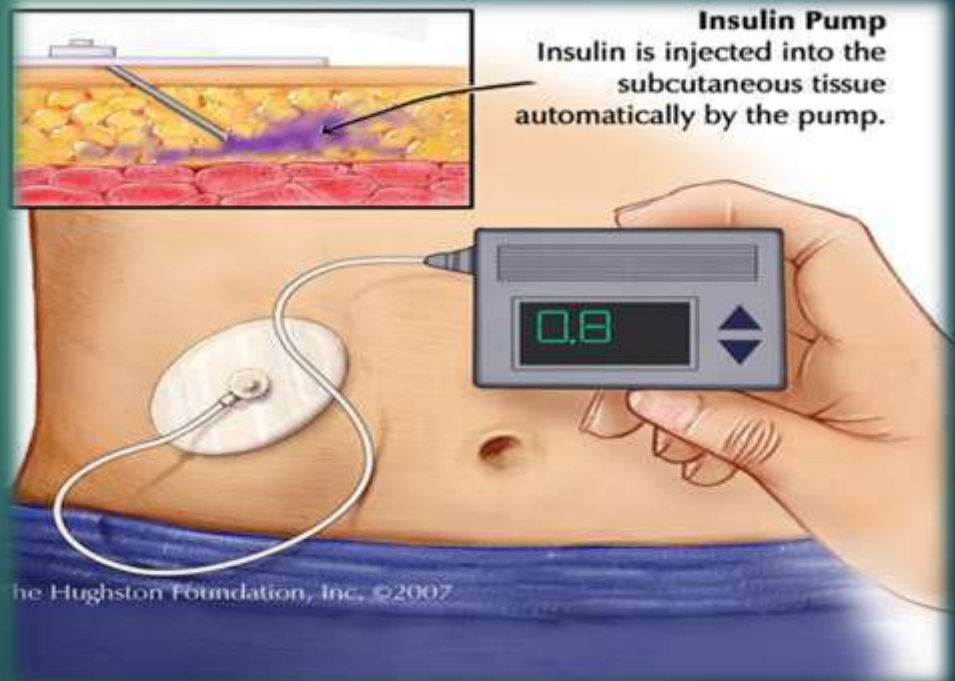
- ▶ Eating sweets or sugar does not cause diabetes
- ▶ Stress does not cause diabetes although it may make the symptoms worse in people who already have the condition.
- ▶ Sometimes an accident or an illness may reveal diabetes if it is already there, but they do not cause it.
- ▶ **You cannot catch diabetes from somebody, nor can you give it to anyone.**

Is it curable?

- ▶ Although diabetes cannot yet be cured, it can be managed very successfully.
- ▶ **CHRONIC DISEASE**
- ▶ The aim of diabetes management is to keep blood glucose levels as near to normal as possible (70-110 mg/dl) before meals and up to 160 mg/dl two hours after a meal).

Type I treatment

- ▶ **Type I:** Insulin injections and diet

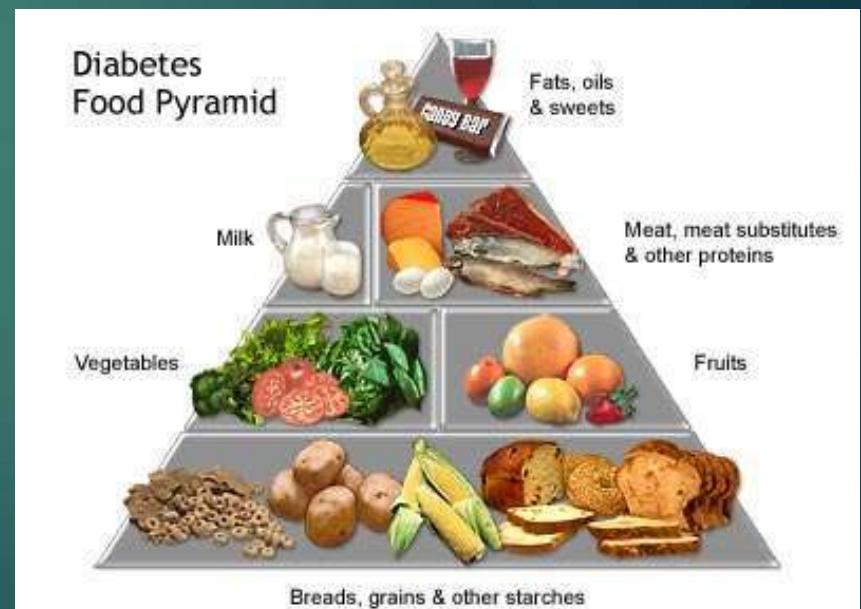


Type II treatment

- ▶ Diet control
- ▶ Drugs (oral hypoglycemic agents)
- ▶ Physical exercise
- ▶ Treatment of complications

Dietary management:

- ▶ Use of artificial sweeteners (aspartame, saccharin..)
- ▶ Low fat diet
- ▶ Low sodium diet
- ▶ High fiber diet
- ▶ Avoid weight gain



Gestational diabetes treatment

1. Diet: limit intake by 30% or less of daily calories.

2. Physical exercise

3. Insulin Injections

- ▶ *Gestational diabetes usually goes away after pregnancy.*
- ▶ *But once you've had gestational diabetes, your chances are 2 in 3 that it will return in future pregnancies.*

Blood sugar surveillance

- ▶ Fasting blood sugar level, lab test
- ▶ Daily blood sugar (1-4x) –finger prick
- ▶ Long-term blood glucose levels (HbA1c) should be checked every three or four months, or at least once a year.
- ▶ It's a percentage normally equal to 5.7-6.5%

Prognosis

- ▶ Regular medical care, **compliance** with dietary and medical treatment are ESSENTIAL
- ▶ Despite the risks associated, most people can live **active lives** and continue to enjoy the foods and activities they enjoyed before being diagnosed

Key messages

- ▶ Keeping blood glucose, blood pressure, and cholesterol in control can make a difference in reducing your risk for heart attack or stroke.

- ▶ **In diabetics**

Annual dilated eye exams and routine foot exams and blood pressure checks can prevent blindness, amputations, heart disease, kidney disease, and strokes.

References

- ▶ www.ADA.com
- ▶ www.diabetes.org.uk