University of Basrah
College of Nursing
Fundamentals of Nursing Department
Adult Nursing(1) 2nd Stage

Lecture 4 (Theory)

Nursing care for patients with endocrine system disorders.

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Lecture Contents

1. Anatomic and physiologic overview.
2. Assessment of the endocrine system.
3. Nursing management for patients with diabetes mellitus.

GLOSSARY

- **Acromegaly**: progressive enlargement of peripheral body parts resulting from excessive secretion of growth hormone.
- **Addison's disease**: chronic adrenocortical insufficiency due to inadequate adrenal cortex function.
- **Addisonian crisis:** acute adrenocortical insufficiency; characterized by hypotension, cyanosis, fever, nausea/vomiting, and signs of shock

GLOSSARY

- **Chvostek sign:** spasm of the facial muscles produced by sharply tapping over the facial nerve in front of the parotid gland and anterior to the ear.
- **Cushing’s syndrome:** group of symptoms produced by an over secretion of adrenocorticotropic hormone; characterized by truncal obesity, “moon face,” acne, abdominal striae, and hypertension

Introduction

- **Endocrine System:** Is interconnected network of glands is closely linked with the nervous and immune systems, regulating the functions of multiple body organs.

Introduction

- **The endocrine system involves the release of chemical transmitter substances known as hormones play vital roles:**

1- Transportation of chemicals across cell membranes.

2- Growth and development.

3- Metabolism.

4- Fluid and electrolyte balance.

5- Acid–base balance.

6- Adaptation, and reproduction

Glands

1- Endocrine glands: **Its glands secrete their products directly into the bloodstream.**

2- Exocrine glands: **which secrete their products through ducts onto epithelial surfaces or into the gastrointestinal tract.**

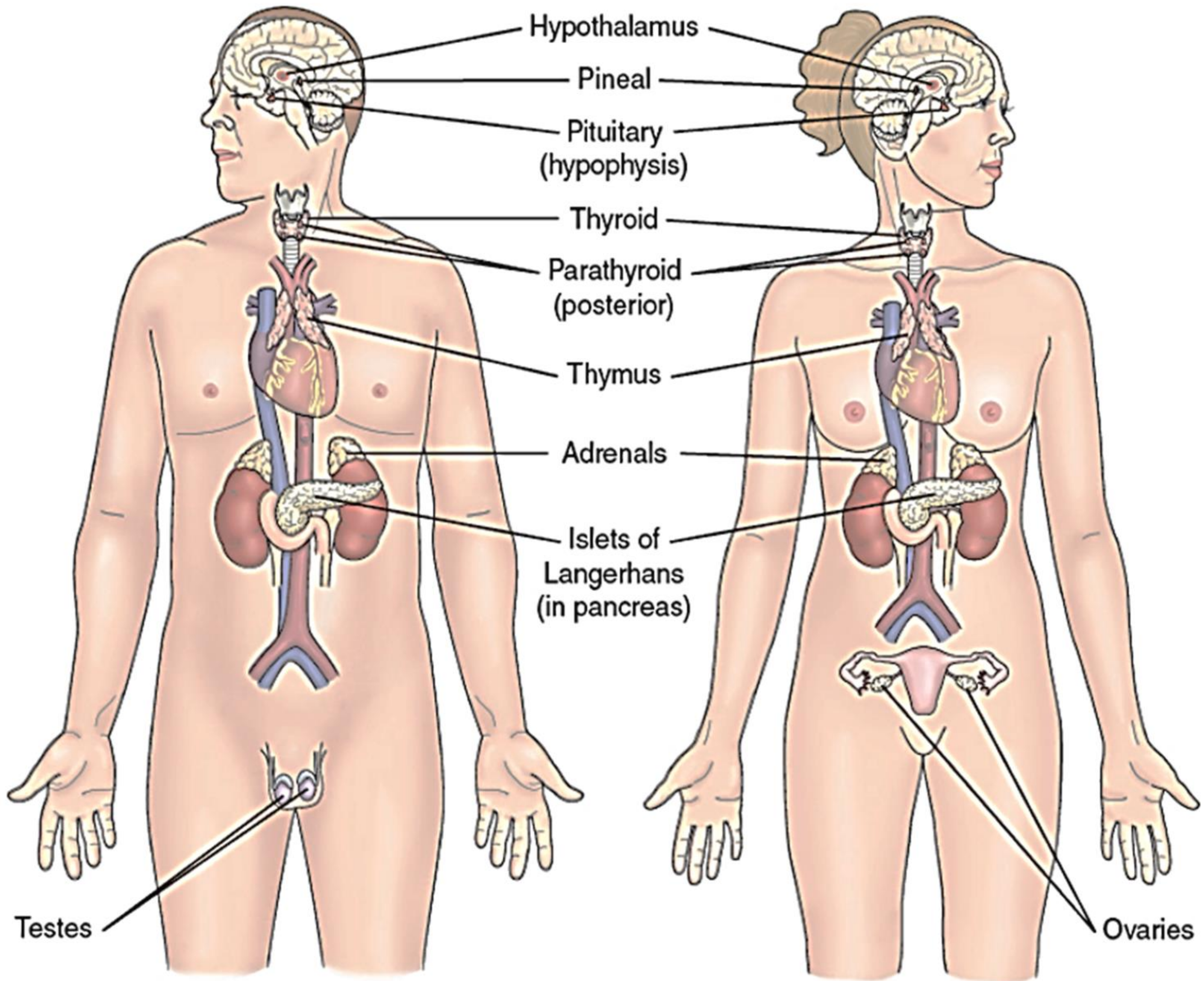
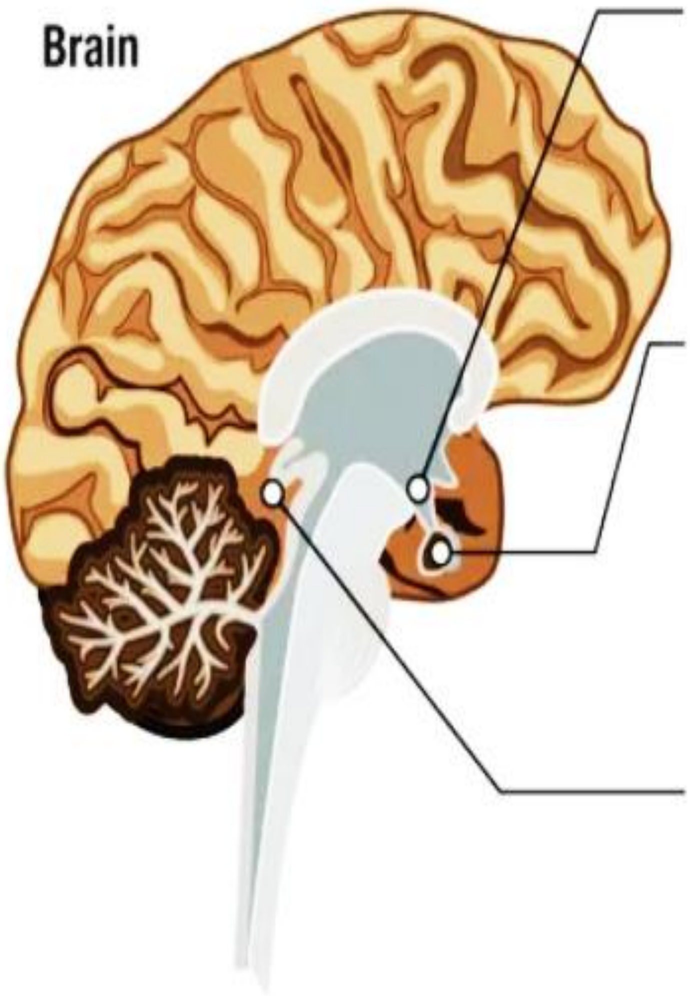


Figure 45-1 • Major hormone-secreting glands of the endocrine system.

Major Endocrine Glands



1. **Hypothalamus**

   Maintains the body's homeostasis and regulates body temperature, heart rate, and blood pressure.

2. **Pituitary Gland**

   Composed of 2 lobes: the anterior, which secretes hormones involved in the body's growth and development, and the posterior, which secretes hormones that increase the reabsorption of water into the kidneys.

3. **Pineal Gland**

   Responsible for the production of melatonin, which plays a major role in the body's sleep-wake cycle.

Major Endocrine Glands

Thyroid 4

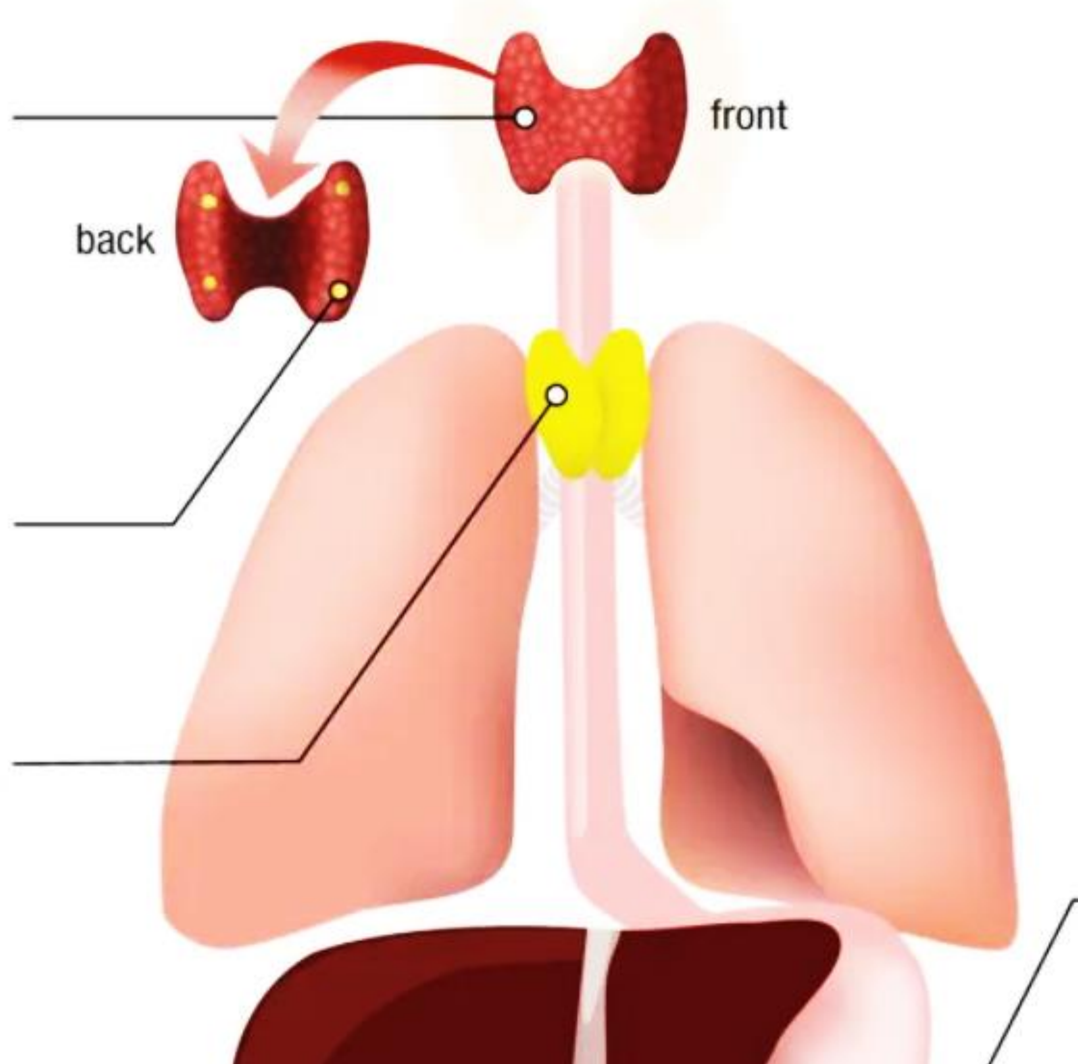
This butterfly-shaped gland produces 3 major hormones: calcitonin, triiodothyronine (T3), and thyroxine (T4). They help regulate the body's energy and metabolism.

Parathyroid 5

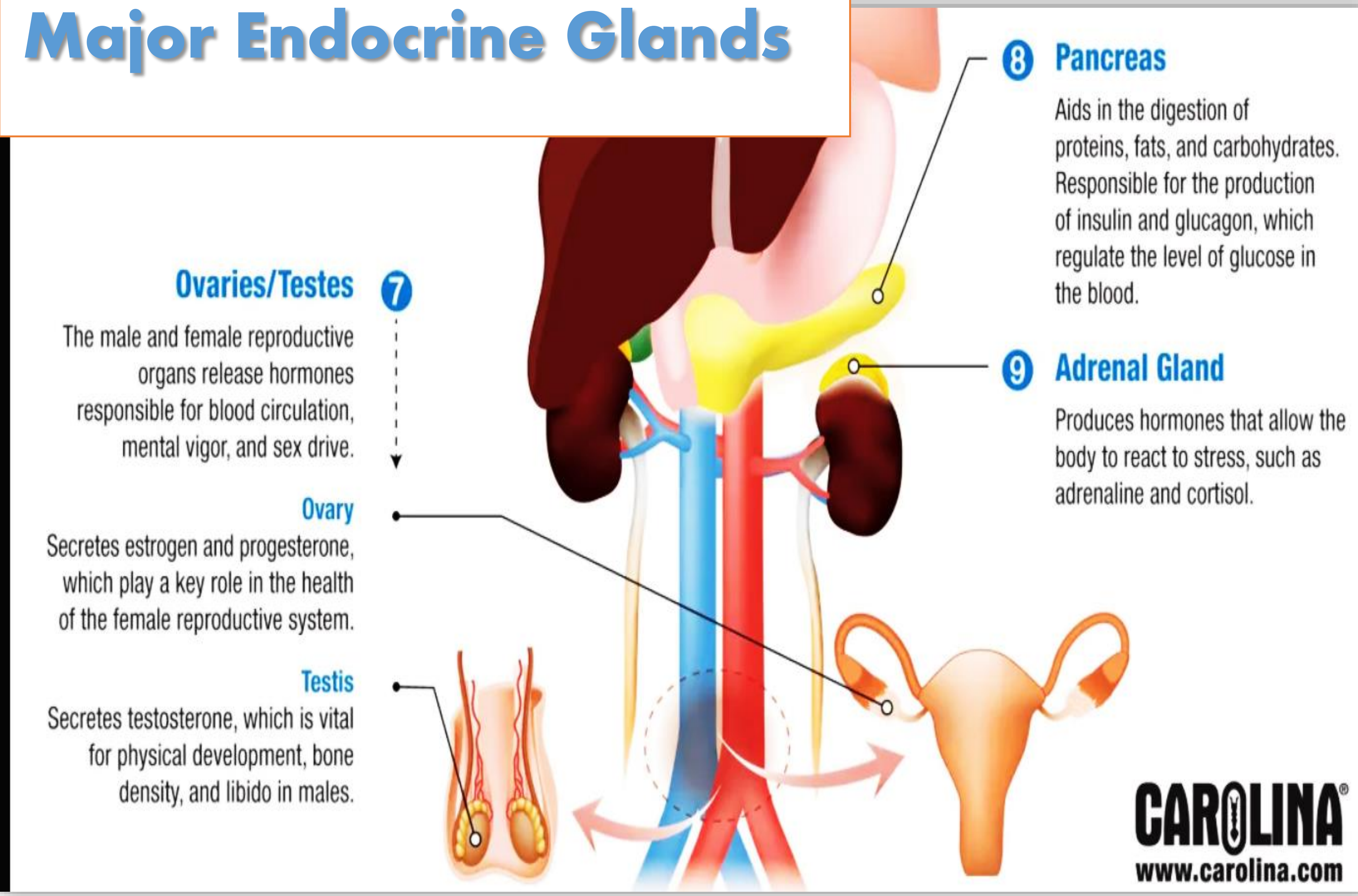
The parathyroid secretes hormones necessary for calcium absorption.

Thymus 6

The thymus controls production of T-cells (white blood cells) and plays a vital role in the body's ability to fight diseases.



Major Endocrine Glands



Classification and Action of Hormones

Hormones classified into four categories:

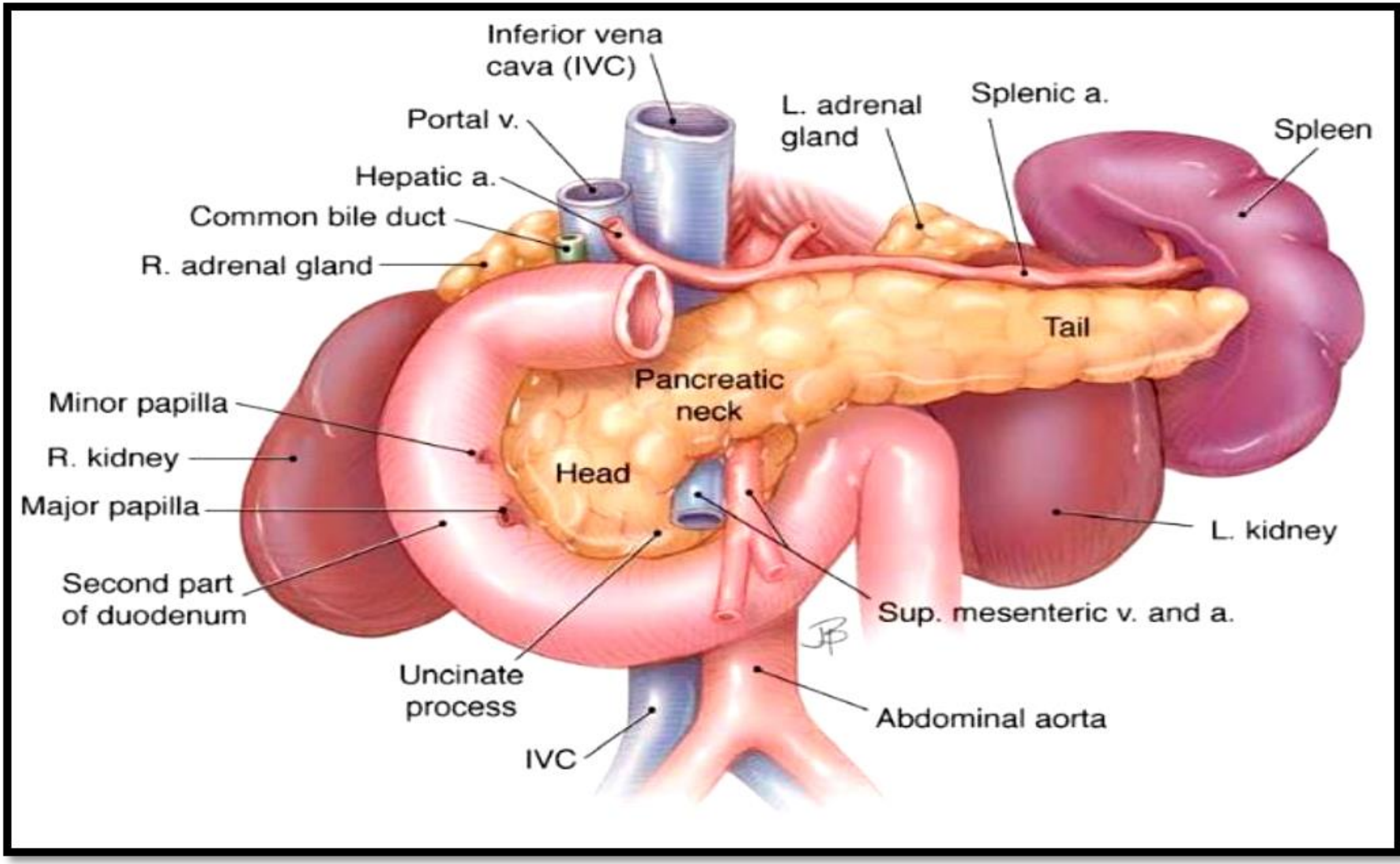
(1) amines and amino acids (e.g., epinephrine, norepinephrine, and thyroid hormones).

(**2) peptides, polypeptides, proteins, and glycoproteins** (e.g., thyrotropin-releasing hormone [TRH], follicle-stimulating hormone [FSH], and growth hormone [GH]).

(3) steroids (e.g., corticosteroids, which are hormones produced by the adrenal cortex or their synthetic equivalents);

(**4) fatty acid derivatives** (e.g., eicosanoid, retinoids)

Anatomy and physiology of pancreas gland



Anatomy and physiology of pancreas gland

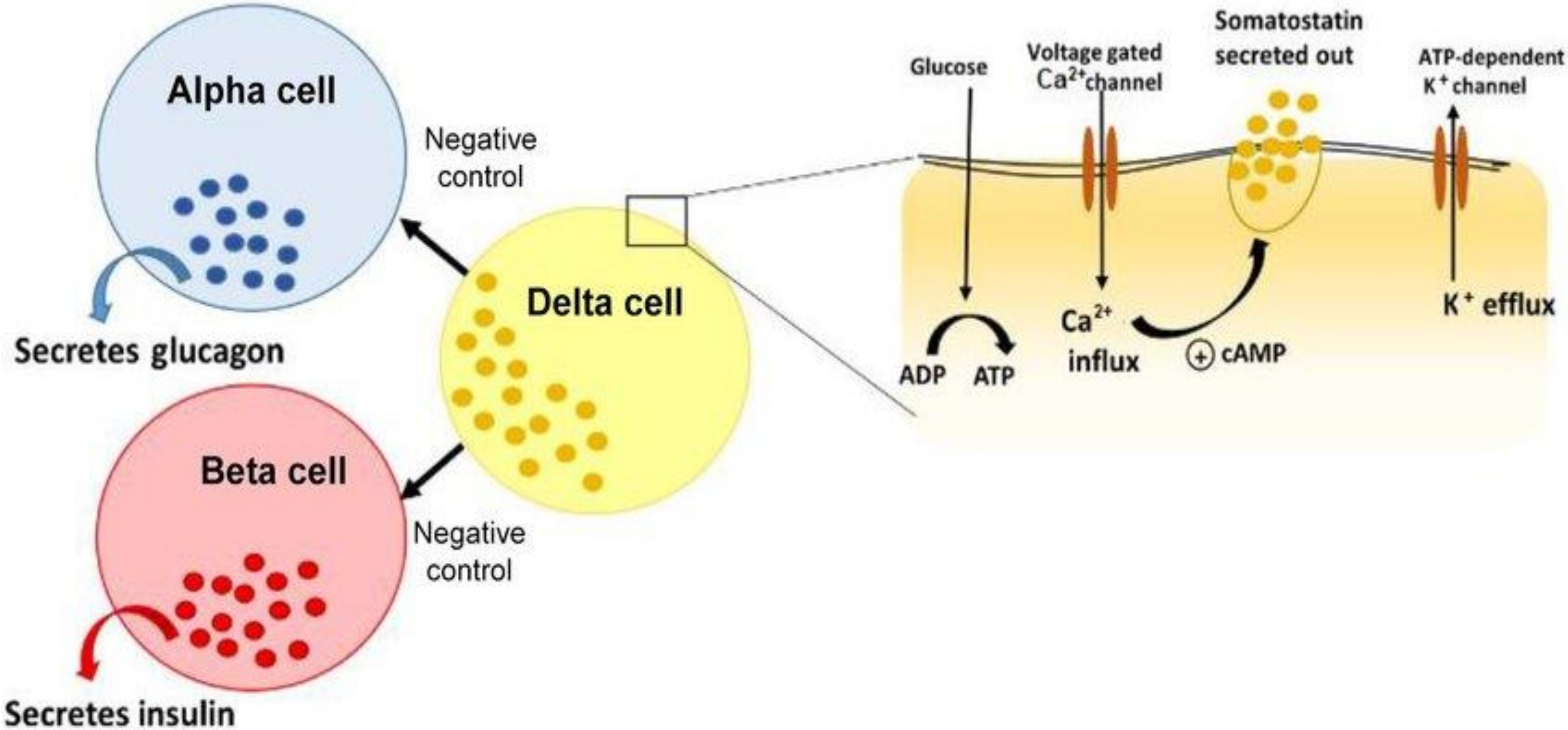
** Paul Langerhans described the pancreatic cells called them (Islets of Langerhans), The Islets Contain many cells are:

1- **The alpha cells** secrete **glucagon** hormone (**increase blood glucose**).

2- **The beta cells** secrete insulin (decrease blood glucose and inhibits glucagon secretion).

3- **The delta cells**, secrete Somatostatin (inhibits the secretion of both insulin and glucagon).

Anatomy and physiology of pancreas gland



Insulin Action

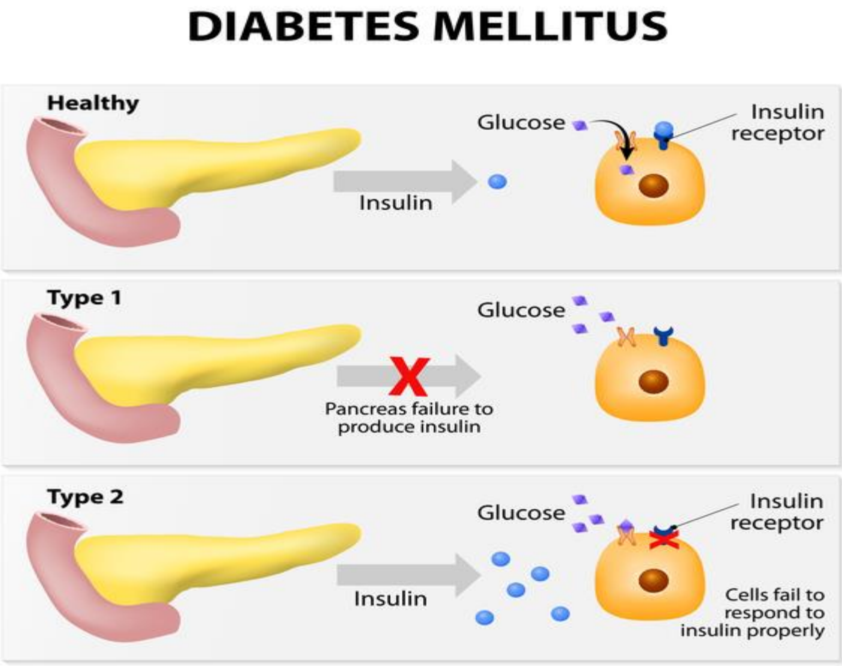
Insulin is a hormone secreted by beta cells.

insulin has the following actions:

- ✓Transports and metabolizes glucose for energy
- ✓Stimulates storage of glucose in the liver and muscle (in the form of glycogen)
- ✓Signals the liver to stop the release of glucose
- ✓Enhances storage of dietary fat in adipose tissue
- ✓Accelerates transport of amino acids (derived from dietary protein) into cells
- ✓Inhibits the breakdown of stored glucose, protein, and fat

Diabetes Mellitus (DM)

➢ **Diabetes** is a group of metabolic diseases characterized by **hyperglycemia** (an elevated level of glucose in the blood) resulting from defects in insulin secretion, insulin action, or both



Classification of Diabetes

1- Type 1 diabetes (TIDM).

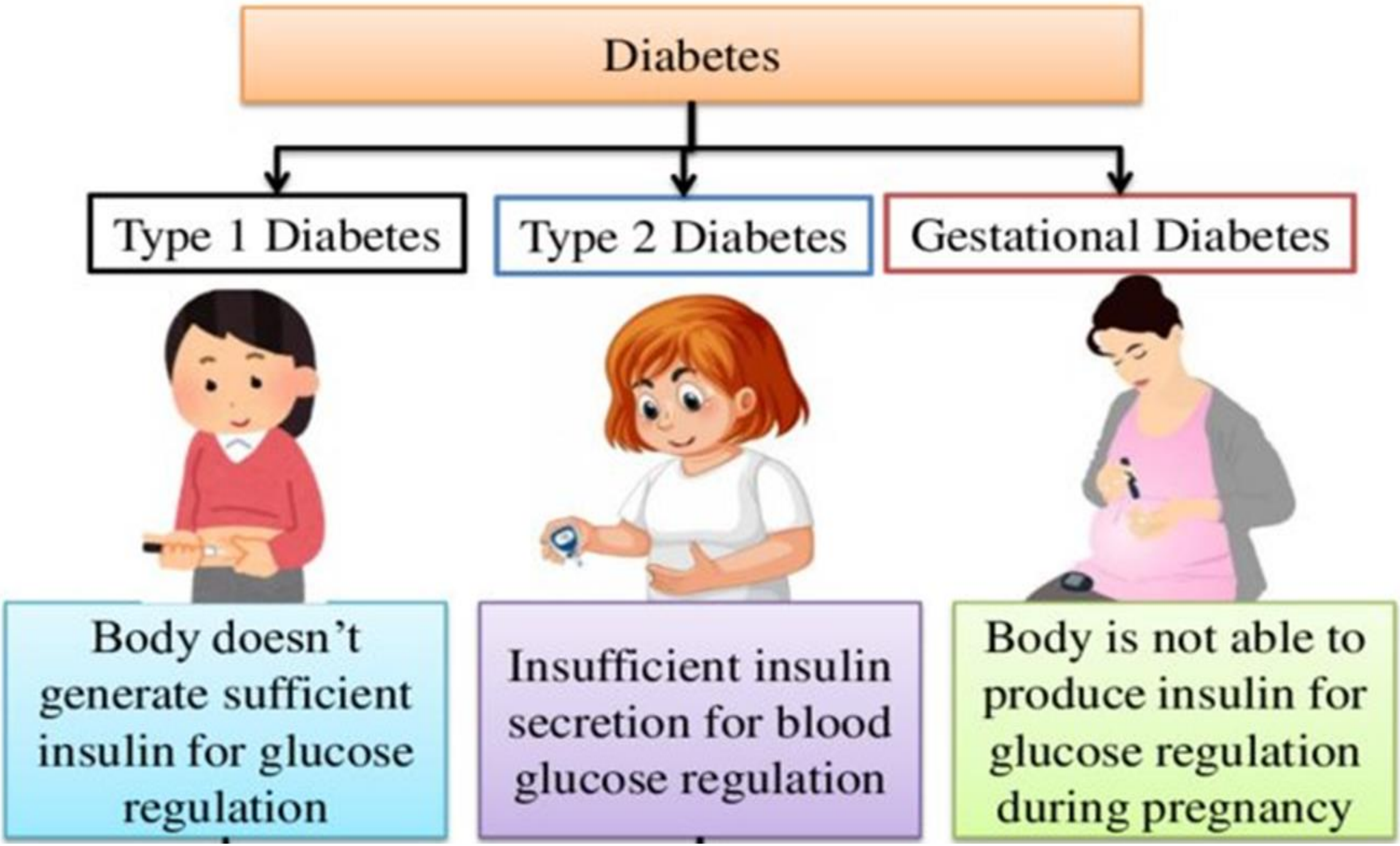
2- Type 2 diabetes (TIIDM.)

3- Gestational diabetes.

4- latent autoimmune diabetes of adults (LADA).

5- Diabetes associated with other conditions or syndromes

Types Of Diabetes



Physiology/Pathophysiology

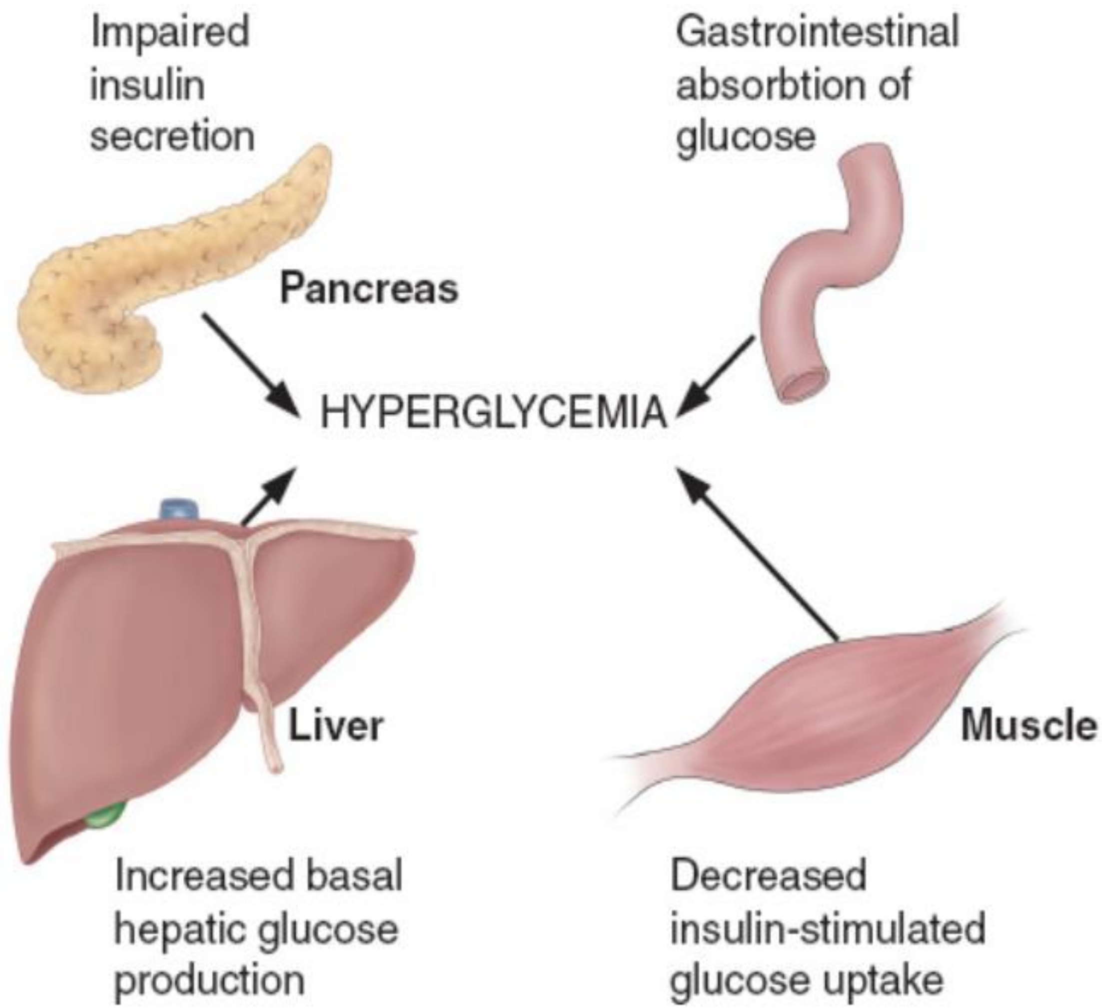


Figure 46-1 • Pathogenesis of type 2 diabetes.

Chart 46-1 RISK FACTORS

Diabetes

- Age >30 years for type 2 and <30 years for type 1
- High-density lipoprotein (HDL) cholesterol level ≤35 mg/dL (0.90 mmol/L) and/or triglyceride level ≥250 mg/dL (2.8 mmol/L)
- History of gestational diabetes or delivery of a baby over 9 lb
- Hypertension
- Family history of diabetes (e.g., parents or siblings with diabetes)
- Obesity (i.e., ≥20% over desired body weight or body mass index ≥30 kg/m^2)
- Previously identified impaired fasting glucose or impaired glucose tolerance
- Race/ethnicity (e.g., African Americans, Hispanic Americans, Native Americans, Asian Americans, Pacific Islanders)

Adapted from American Diabetes Association (ADA). (2020). Standards of medical care in diabetes—2020. *Diabetes Care*, *43*(Suppl 1), S1–S212.

Comparison of type 1 and 2 diabetes

Feature	Type 1 diabetes	Type 2 diabetes
1- Onset	Sudden	gradual
2- Age at onset	Mostly in children	Mostly in adult
3- Body size	Thin or normal	Often obese
4- Ketoacidosis	Common	Rare
5- Autoantibodies	Usually present	Absent
6- Endogenous insulin	Low or absent	Normal, decreased or increased
7- Prevalence	~10%	~90%

Clinical Manifestations Of D.M

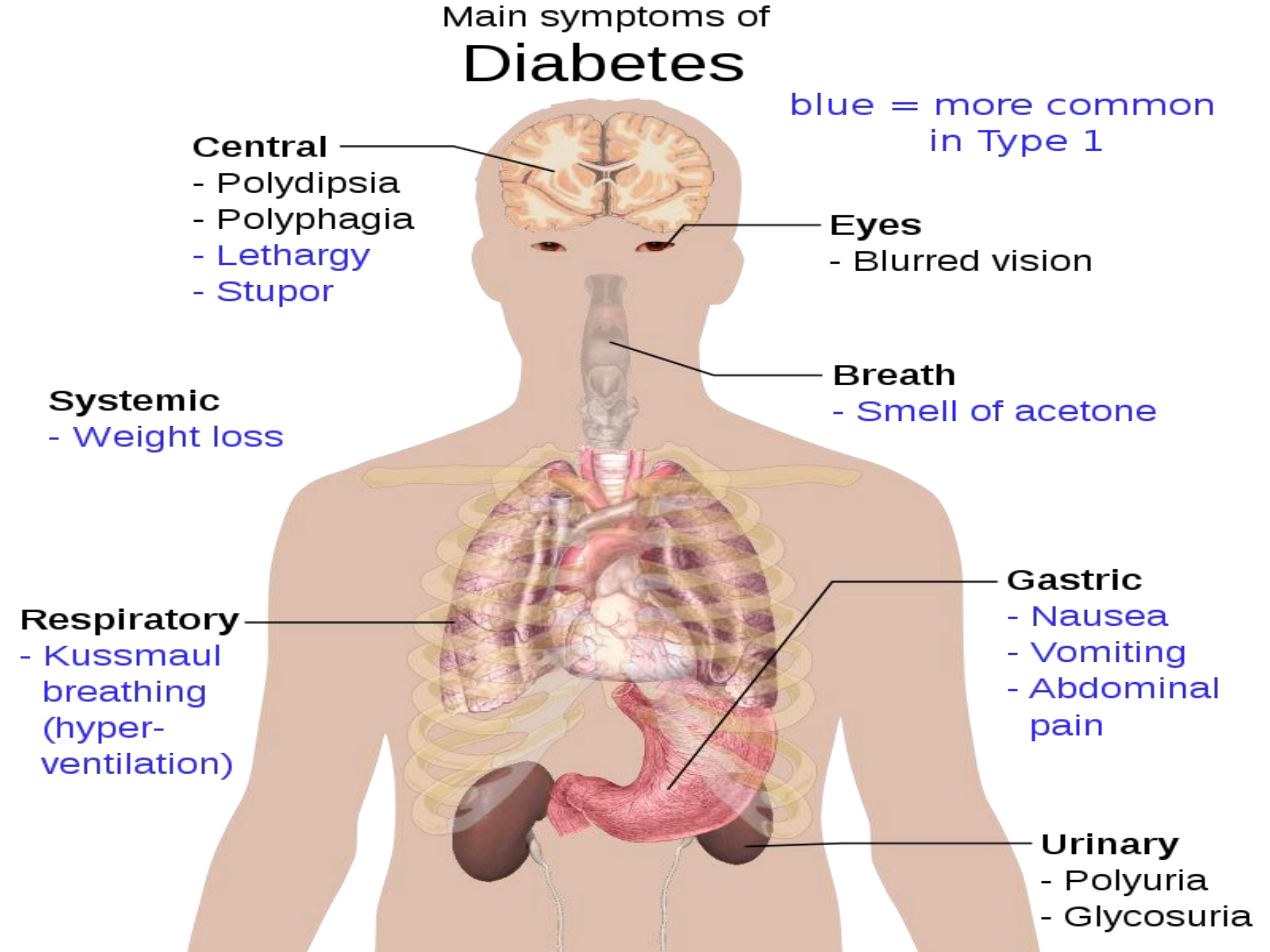
Main symptoms of diabetes (3. Ps):

1) Polydipsia – increased thirst.
2) Polyphagia – increased hunger
3) Polyuria – increased urination

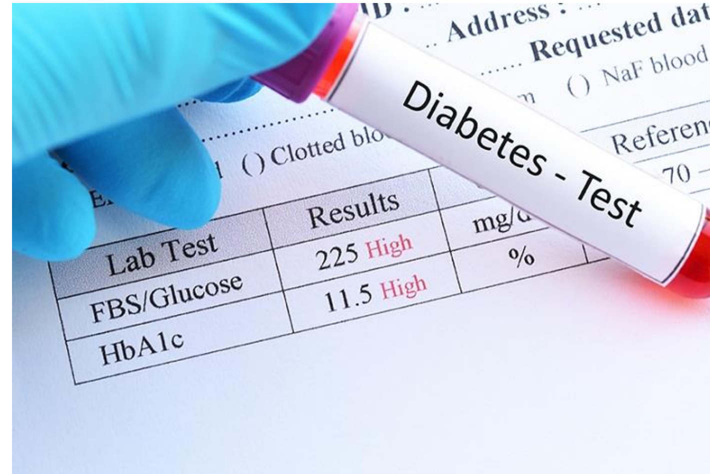
Clinical Manifestations Of D.M

<u>Other Symptoms include:</u>

1) fatigue
2) weakness.
3) sudden vision changes.
4) Tingling or numbness in hands or feet.
5) dry skin.
6) skin lesions or wounds that are slow to heal
7) Recurrent infections.


Main symptoms of
Diabetes
blue = more common in Type 1
Central
- Polydipsia
- Polyphagia
- Lethargy
- Stupor
Eyes
- Blurred vision
Breath
- Smell of acetone
Systemic
- Weight loss
Gastric
- Nausea
- Vomiting
- Abdominal pain
Respiratory
- Kussmaul breathing (hyper-ventilation)
Urinary
- Polyuria
- Glycosuria

Laboratory Tests



1. Random Blood glucose

Glucose blood concentration in samples obtained at any time regardless the time of the last meal.

3. Fasting blood glucose

Glucose blood concentration in samples obtained after at least 8 hours of the last meal

3. Glycosylated hemoglobin (HbA1C)

- **HbA1C** is formed by condensation of glucose with free amino groups of the globin component of hemoglobin.
- Normally it comprises **(4-6%)** of the total hemoglobin.

WHO diabetes diagnostic criteria

	Normal Blood Glucose level	Pre-diabetes	Diabetes Mellitus
Fasting Blood Glucose (FPG) (mg/dl)	FPG < 100 mg/dl	100 ≤ FPG < 126 (Impaired Fasting Glucose IGT)	FPG ≥ 126
Random Plasma Glucose (RPG) with presence of symptoms (mg/dl)	RPG < 200		RPG ≥ 200
HbA1c (%)	< 5.7	5.7 - 6.4	≥ 6.5
Oral Glucose Tolerance Test (OGTT) (mg/dl)	2hPG < 140	140 ≤ 2hPG < 200 (Impaired Glucose Tolerance IGT)	≥ 200

Laboratory Tests

4. Glucosuria

To detect glucose in urine by a paper strip.

5. Ketonuria

To detect ketonbodies in urine by a paper strip.

Complications of Diabetes Mellitus

1- **Diabetes retinopathy**

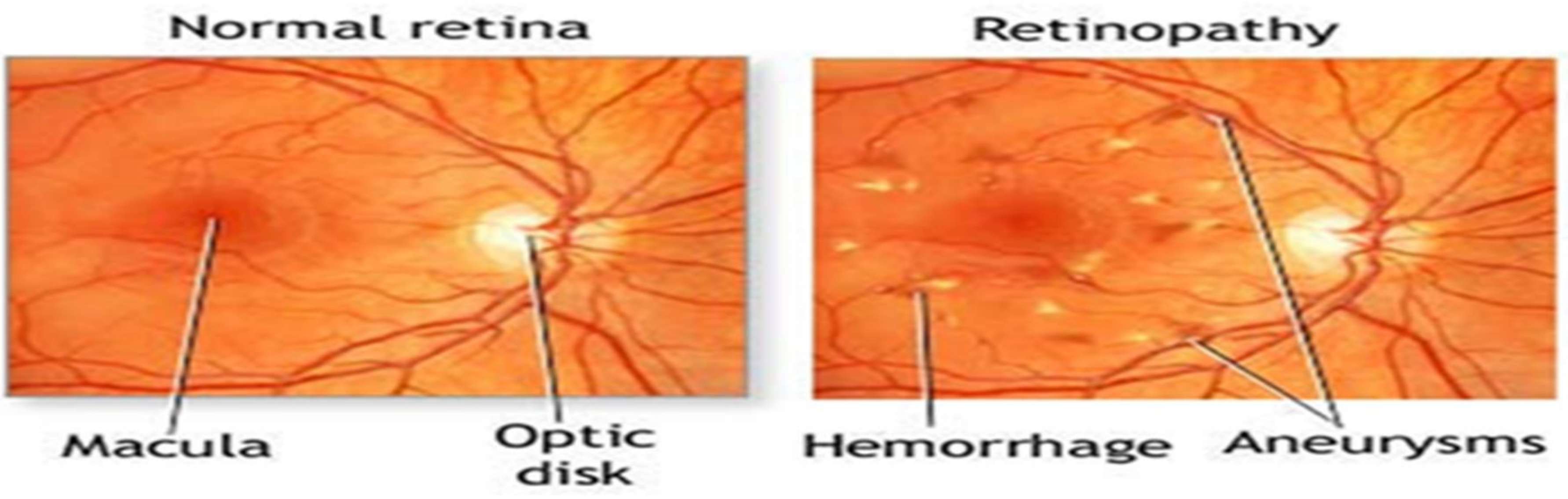
2- **Diabetes nephropathy**

3- **Diabetes neuropathy**

Complications of Diabetes Mellitus

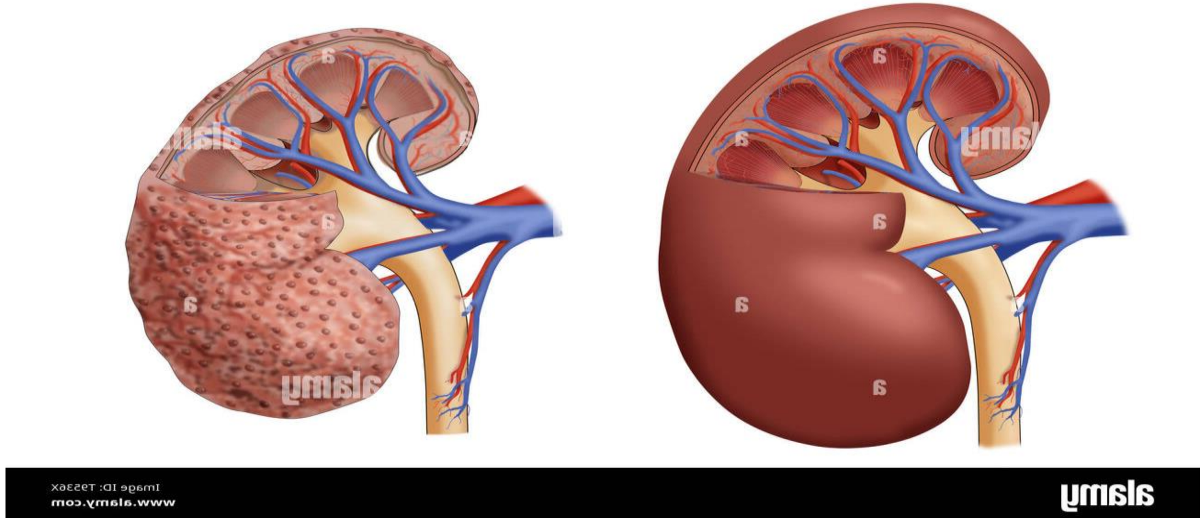
1. Diabetes retinopathy

- Micro-aneurysm
- Hemorrhage
- Retinal edema



2. Diabetes nephropathy

- (30-40 %) of all **Type 1 DM** patients develop nephropathy in 20 years
- (15-20 %) of **Type 2 DM** patients develop nephropathy
- Manifested as:
- Microalbuminuria
- Progressive diabetic nephropathy leading to end-stage renal disease



Diabetes Mellitus Complications

3. Diabetes neuropathy

- **neuropathy**: loss of sensation due to damage of nerve fibres (e.g. heat, cold, pain)

- high blood glucose changes the metabolism of nerve cells

- reduced blood flow

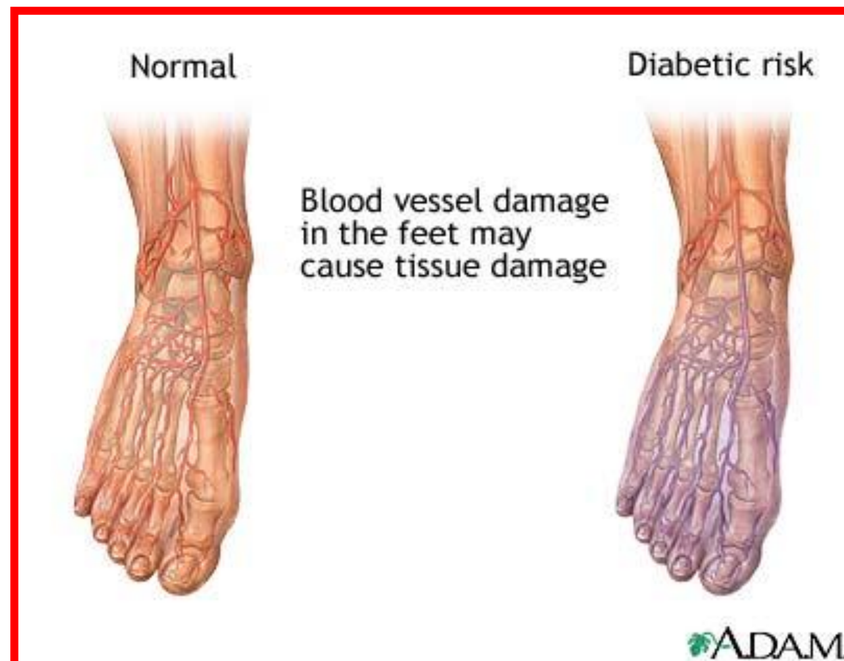
4- Peripheral vascular disease and foot ulcer

Incidence of gangrene of the feet in DM is 20 fold higher than control group due to:

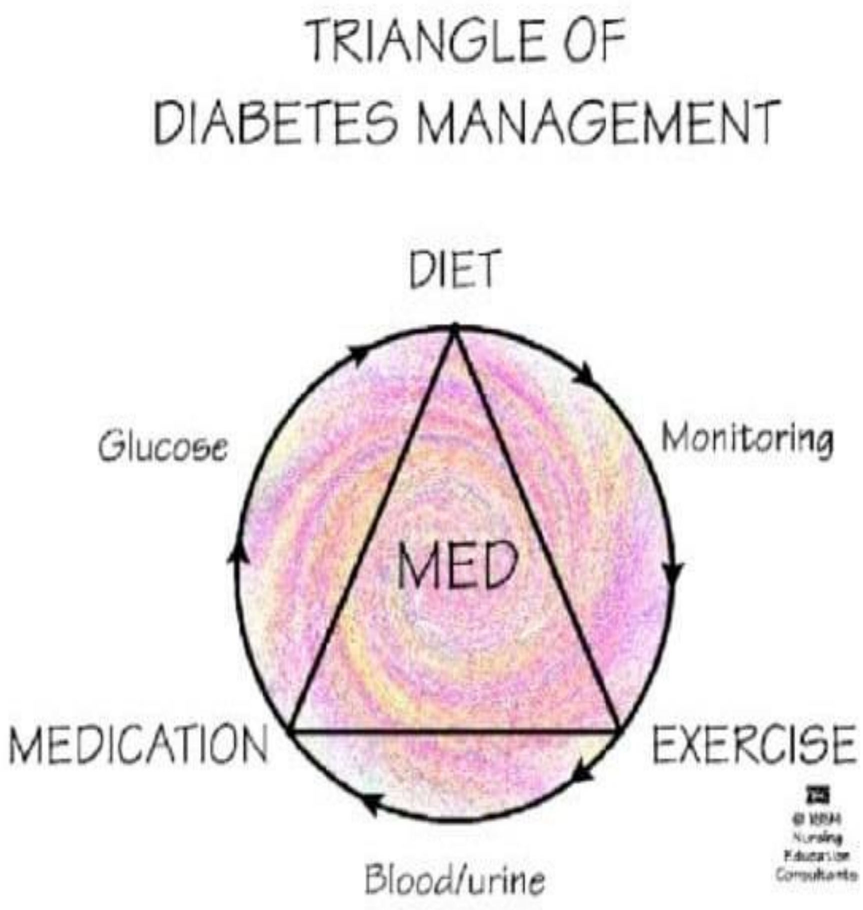
- ✓ **Ischemia**
- ✓ **Peripheral neuropathy**
- ✓ **Secondary infection**

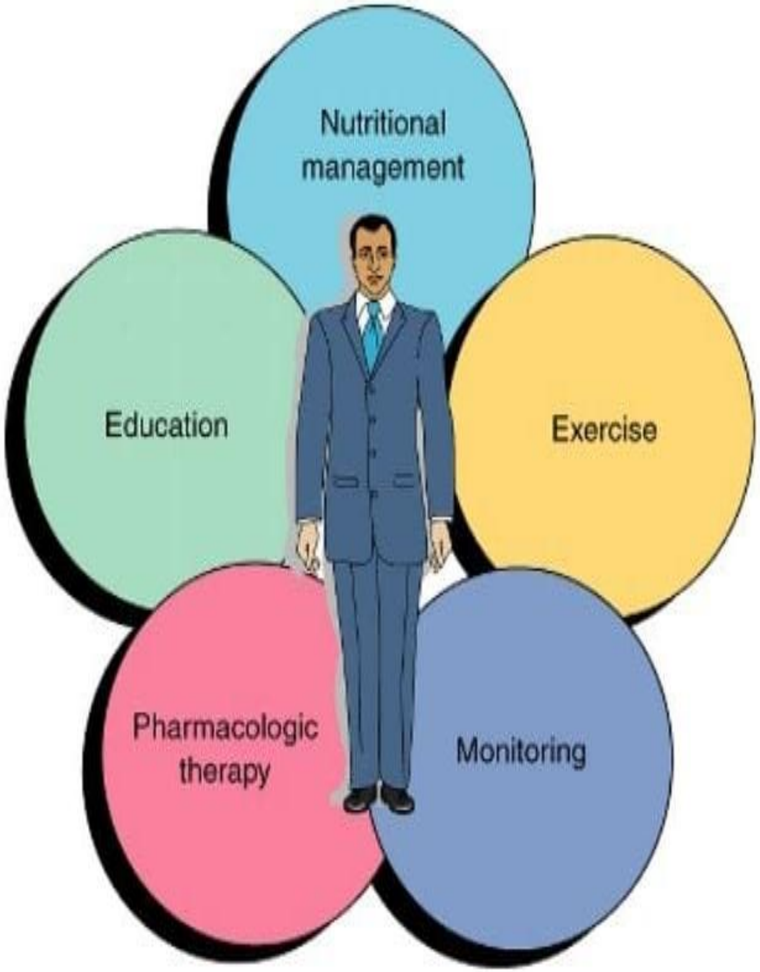
Complications of Diabetes Mellitus

Peripheral vascular disease and foot ulcer



Diabetes Management





Medical Management

- **Dietary Management and Physical Activity**

 modifying eating habits and increasing physical activity are typically the first steps toward reducing blood sugar levels.

- **Insulin Therapy**

 people with type 1 diabetes require multiple insulin injections each day to maintain safe insulin levels. Insulin is often required to treat type 2 diabetes too.

Medical Management

❖There are four major types of insulin:

1) Rapid-acting
2) Short-acting
3) Intermediate-acting
4) Long-acting

Medical Management

- **Oral Medications**
  - glimepiride (Amaryl)
  - metformin (Glucophage)
  - pioglitazone (Actos)
  - sitagliptin phosphate (Januvia), vildagliptin (Galvus)

Nursing Diagnosis

- **Risk for unstable blood glucose level** related to insulin resistance, impaired insulin secretion, and destruction of beta cells.
- **Risk for infection** related to delayed healing of open wounds.
- **Deficient knowledge** related to unfamiliarity with information, lack of recall, or misinterpretation.

Nursing Diagnosis

- **Impaired skin integrity** related to delayed wound healing.
- **Ineffective peripheral tissue perfusion** related to too much glucose in the bloodstream

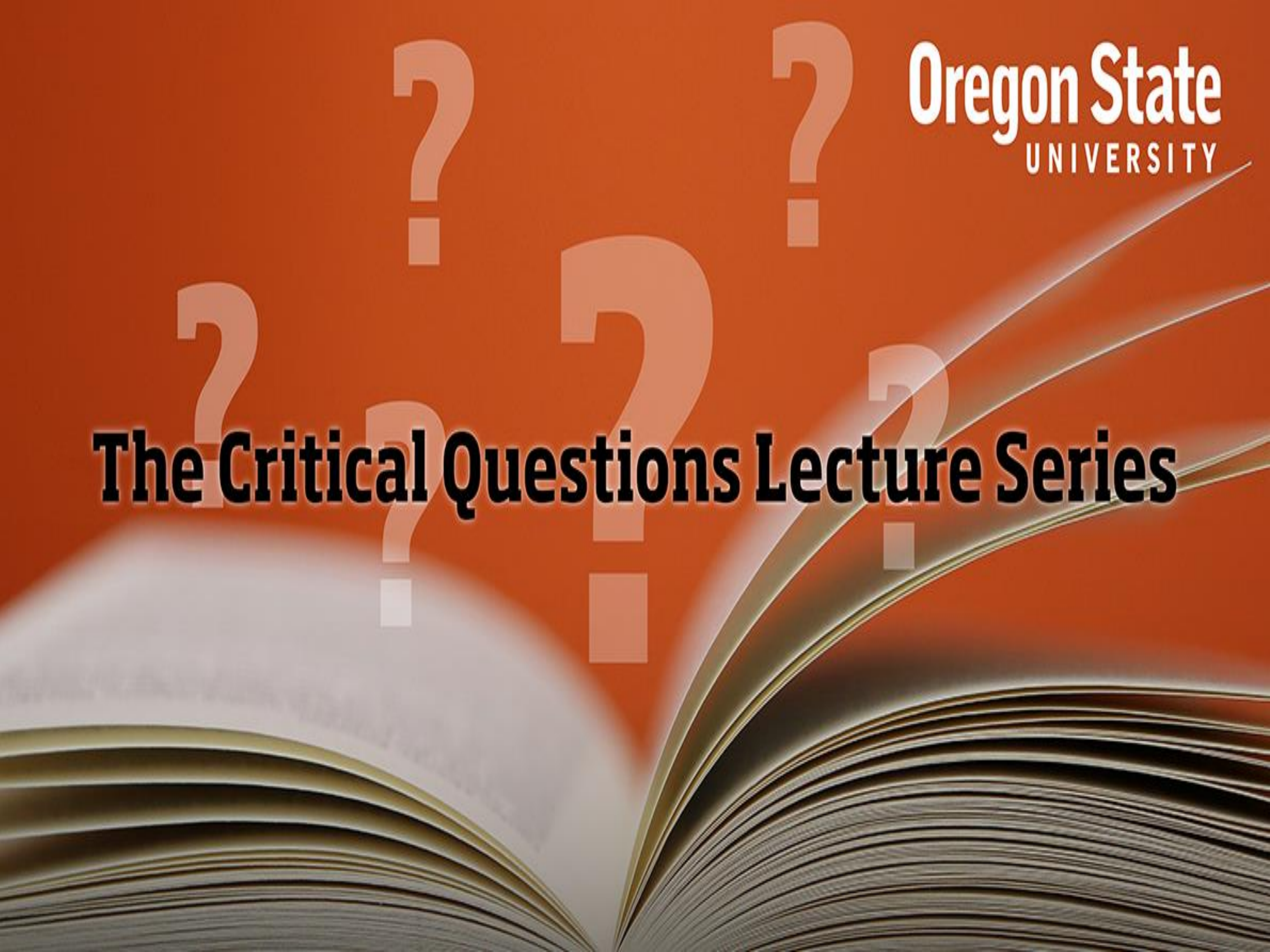
Nursing Management

1. Assess for signs of hyperglycemia or hypoglycemia.
2. Assess blood glucose levels before meals and at bedtime.
3. Monitor the patient’s **HbA1c.**
4. Assess feet for temperature, pulses, color, and sensation.

Nursing Management

5. Be knowledgeable about dietary management
6. Communicate important information to the dietician or other management specialists
7. Reinforce patient understanding
8. Support dietary and lifestyle changes

- ✓**Endocrine glands**: Its glands secrete their products directly into the bloodstream, which differentiates them from exocrine glands. which secrete their products through ducts onto epithelial surfaces
- ✓**Nine main** endocrine glands which are responsible for controlling a variety of vital functions.
- ✓pancreatic cells called them (**Islets of Langerhans) are (Alpha, Beta, and Delta).**
- ✓Diabetes classified into 3 types are **(Type I, Type II, and gestational diabetes).**
- ✓Risk factors of diabetes are family history, obesity, and hypertension.
- ✓**Diabetes is most common leading cause for renal failure, retinopathy and neuropathy.**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The Critical Questions Lecture Series

Q1/ Which of the following confirmed values meet the diagnostic threshold for diabetes?

- a) fasting blood glucose ? 140 mg/dl
- b) random glucose > 160 mg/dl
- c) 2 hour post prandial glucose ≥ to 126 mg/dl
- d) fasting blood glucose ≥ 126 mg/dl

Q2/ The test for checking mean plasma glucose concentration over the previous 8-10 weeks is:

a) Hemoglobin A1c

b) Oral glucose tolerance test (OGTT)

c) Fructosamine test

d) Fasting plasma glucose concentration

Q3/ What is the first-line drug for patients with type 2 diabetes and obesity?

a) Acarbose

b) Metformin

c) Sulphonylureas

d) Insulin

- Textbook of medical-surgical nursing Description: 14th edition. | Philadelphia : Wolters Kluwer, [2018], ISBN 9781496355157 (2-volume American edition)


THANK
YOU!