Diabetes Mellitus

PART

[2]

PROFESSOR DOCTOR

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Learning Objectives:

1. Illustration figures of the common general as well as oral complications of DM

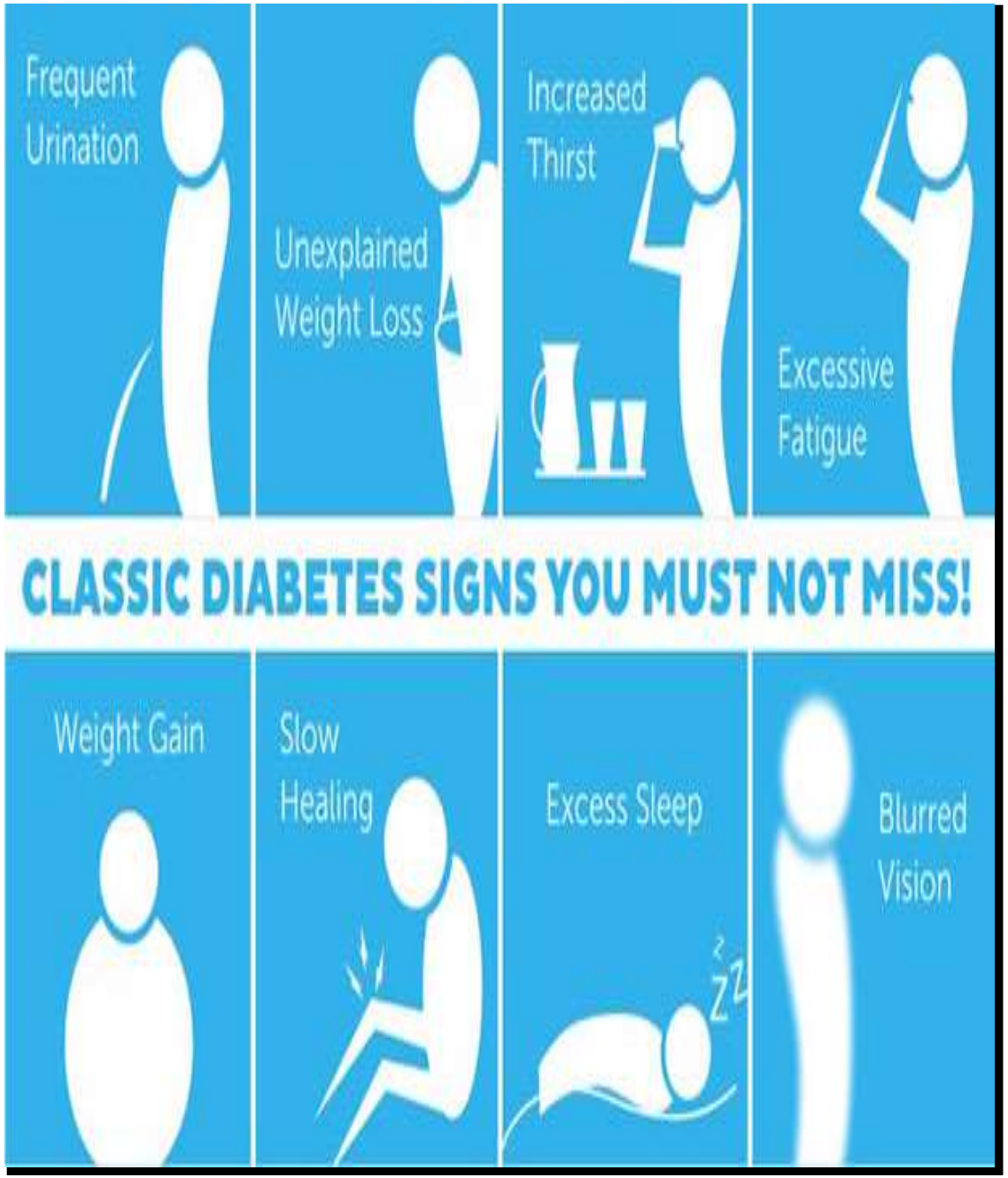
2. Review the diagnosis of patients with DM.

3. Review the general medical treatment of patients with DM.

The classic symptoms of untreated diabetes

- polyuria (increased urination)
- polydipsia (increased thirst) and
- polyphagia (increased hunger).

- Symptoms may develop rapidly (weeks or months) in type 1 DM, while they usually develop much more slowly and may be subtle or absent in type 2 DM.



COMPARISON OF TYPE 1 AND 2 DIABETES

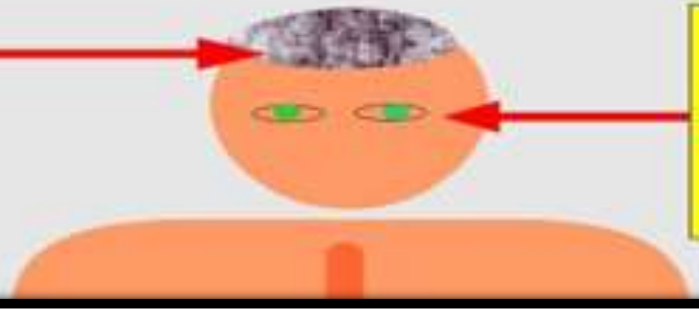
Feature	Type 1 diabetes	Type 2 diabetes
Onset	Sudden	Gradual
Age at onset	Mostly in children	Mostly in adults
Body size	Thin or normal	obese
Ketoacidosis	Common	Rare
Autoantibodies	present	Absent
Endogenous insulin	Low or absent	Normal, decreased or increased
Concordance in identical twins	50%	90%
Prevalence	~10%	~90%

BRAIN

1. Microangiopathy
2. Cerebrovascular Infarct
3. Hemorrhage

EYE

1. Retinopathy
2. Cataract (Immature)
3. Glaucoma



HEART & BLOOD VESSELS

Hypertension

Myocardial infarction

LOWER LIMBS

Peripheral neuropathy

Gangrene foot

KIDNEY + GENITAL ORGANS

Nephropathy

Erectile dysfunction

- Nephropathy& Nephrotic syndrome
- Erectile dysfunction

- Diabetic Retinopathy

- Hyperlipidemia
- Diabetic ketoacidosis

- Arterial Microthrombosis
- Cardiomyopathy
- Angina pectoris
- Hypertension

- Stroke

- Diabetic Neuropathy
- Amputations

DIABETIC FOOT

Diabetic gangrene of the feet.

- Diabetes-related foot problems (such as diabetic foot ulcers) may occur, and can be difficult to treat, occasionally requiring amputation.

- The symptoms can include numbness, tingling, pain, and altered pain sensation, which can lead to damage to the skin.

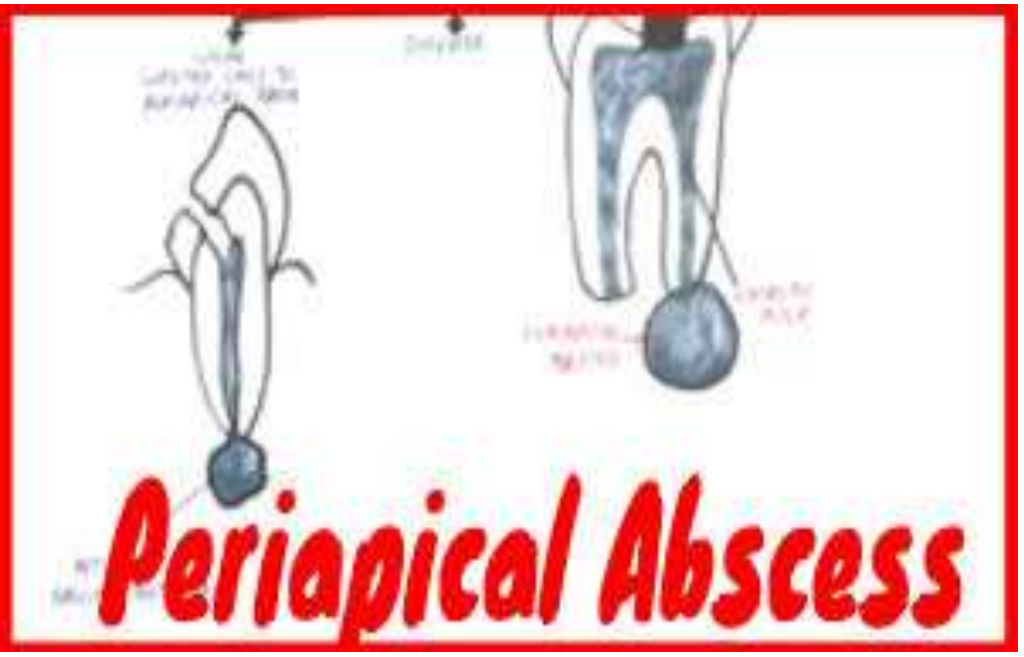
Oral complication of poorly controlled DM:-

- Xerostomia.
- Burning sensation.
- Gingivitis and periodontitis.
- Dental caries.
- Bacterial, viral and fungal infections.
- Peri apical abscess.

XEROSTOMIA

- Xerostomia (dry mouth) is defined as a subjective complaint of dry mouth that may result from a decrease in the production of saliva.


normal
Periodontitis
mild
moderate
severe



DENTAL ABSCESS

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Dental Caries


Oral moniliasis in a patient with diabetes(Multiple white lesions)

mucormycosis

Mucormycosis is a serious but rare fungal infection caused by a group of Rhizopus species and Mucor species called mucormycetes.

Diagnosis Criteria of DM:-

- **If has Symptoms of Diabetes → → →**
- **Fasting plasma glucose = 126 mg/ dl or greater.**
- **Random plasma glucose = 200 mg/ dl or greater.**
- **2 hours plasma glucose by Glucose Tolerance Test (GTT) = 200mg/dl or greater**

Treatment Types of Diabetes Mellitus Depend on DM Types

TYPE 1 DIABETES

- Diet and physical activity
- Insulin
- Pancreatic transplant

TYPE 2 DIABETES

- Diet and physical activity
- Insulin
- Oral hypoglycemic agents

+ Treatment of:

1. **Hypertension**
2. **Hyperlipidemia**
3. **other systemic diseases**

= required in the management of Diabetes Mellitus .

New cases of DM obtained adequate control of their glucose levels by :

1. In 50%= Changes in Diet and Lifestyle
2. In 25%= Oral Anti-Diabetic Medications.
3. In 25%= Insulin.

Changes in Diet and Lifestyle

❑Healthy eating:

Consumption of foods which produce a slow, gradual rise in blood glucose.

Examples of Starchy Foods:

1) **Basmati rice** تمن البسمتى
2) **Spaghetti** الاسباغتى
3) **Noodles** المعكرونه
4) **Granary bread.** خبز القمح
5) **Barely bread** خبزالشعير

❑ Exercise: All advised to do significant physical activity for long term.

❑Weight management:

- People with Type 2 Diabetes are overweight or obese
- Many anti-diabetic drugs + Insulin= Cause weight gain.

ORAL ANTIDIABETIC AGENTS

Currently available Classes of Anti-Diabetic Drugs :

1) Biguanides (e.g., metformin)
2) Sulfonylureas (e.g., glimepiride)
3) Meglitinides (e.g., repaglinide)
4) Thiazolidinediones (e.g., pioglitazone)
5) α-glucosidase inhibitors (e.g., acarbose).
6) Dipeptidyl peptidase-4 inhibitors(DPP-4i)(sitagliptin)
7) Sodium-glucose cotransporter-2 inhibitors = (SGLT2i).

Oral anti-diabetic drugs

1... فصيلة الدواء =اسم بكواناید Biguanide = اسم

الدواء Metformin = متفورمين

1) insulin resistance
2) absorption of glucose
3) appetite
4) gluconeogenesis.

A. First-line therapy in **All type 2 DM**

B. Addition to insulin in **Obese type 1 DM**

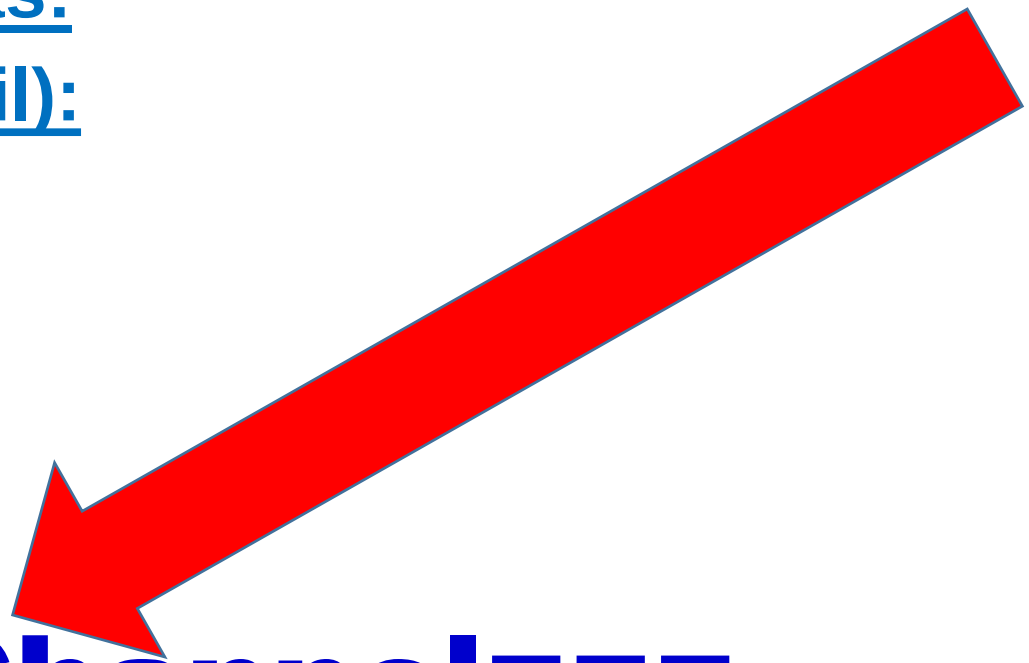
Side effects :

1. -Gastrointestinal disturbances
2. -Lactic acidosis = rare fatal toxic effect
3. -Anemia= decrease absorption of vitamin B12
4. Weight Loss

2.... اسم فصيلة الدواءSulfonylureas:

اسم الدواءGlibenclamide (Daonil):

- ♣ Gliclazide كليكلازايد
- ♣ +Glipizide كليبيزايد
- ♣ + Glyburideكلايبورايد
- ♣ + Glimepiride كليميبرايد



♣ MOA :

Inhibit K-ATP Channel===Promote β-cell ♣

B يشجع على افراز الانسولين من خلايا البنكرياس نوع insulin secretion.=

♣ Adverse Effects:

1. Hypoglycemia

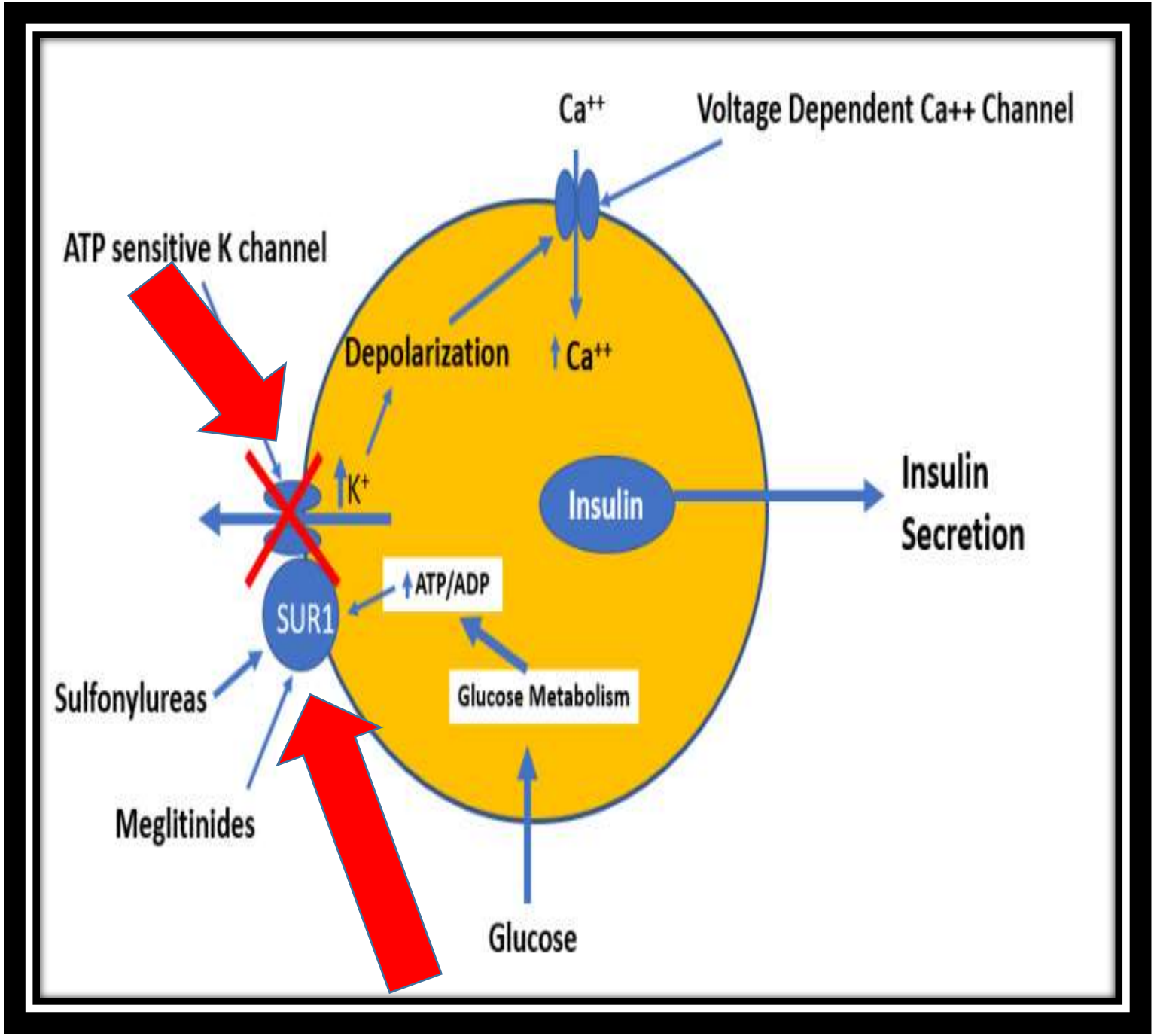
=most common and most serious

2. Weight gain

♣ 3) MEGLITINIDES:

- ♣ Repaglinide ریباکلیناید
- ♣ Nateglinide ناتیکلیناید
- ♣ Inhibit KATP Channel= Stimulating Insulin Secretion like Sulfonylureas
- ♣ ↓risk of Hypoglycemia than Sulfonylureas

Sulfonylureas and meglitinides === by their effects on **(ATP)-sensitive-potassium channel (K_{ATP})** expressed in the pancreatic β cells, leading to **calcium influx → → → stimulate the release of insulin secretion** from the beta cells



♣ 4) Thiazolidine diones :

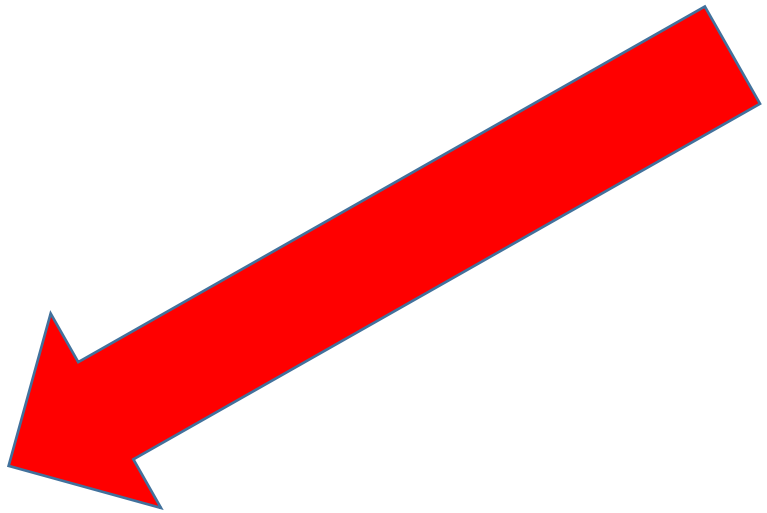
♣ Pioglitazone بايوكليتازون

♣ Rosiglitazone روزيكليتازون

♣ **MOA :**

♣ **↓ hepatic gluconeogenesis.**

♣ **↓ Insulin resistance**



♣ **Side effects :**

♣ ممنوع يعطى لمريض السكري و عنده عجز قلب

1. Fluid retetntion, Congestive heart failure.
2. Weight gain

♣ 5) α-GLUCOSIDASE INHIBITORS::

Acarbose= اكاربوس = miglitol مكليتول , Prandaseبراندیس .

♣ MOA :

enzymes aid digestion of dietary carbohydrates to produce glucose for intestinal absorption, which in turn, leads to increase in blood glucose levels. Inhibiting the function of these enzymes in patients with type-2 diabetes may reduce hyperglycemia.

α glucosidase inhibitors

♣ Side effects :

1. Bloating
2. Flatulence
3. Diarrhea
4. Abdominal pain.

♣6) DDP-4 inhibitors:

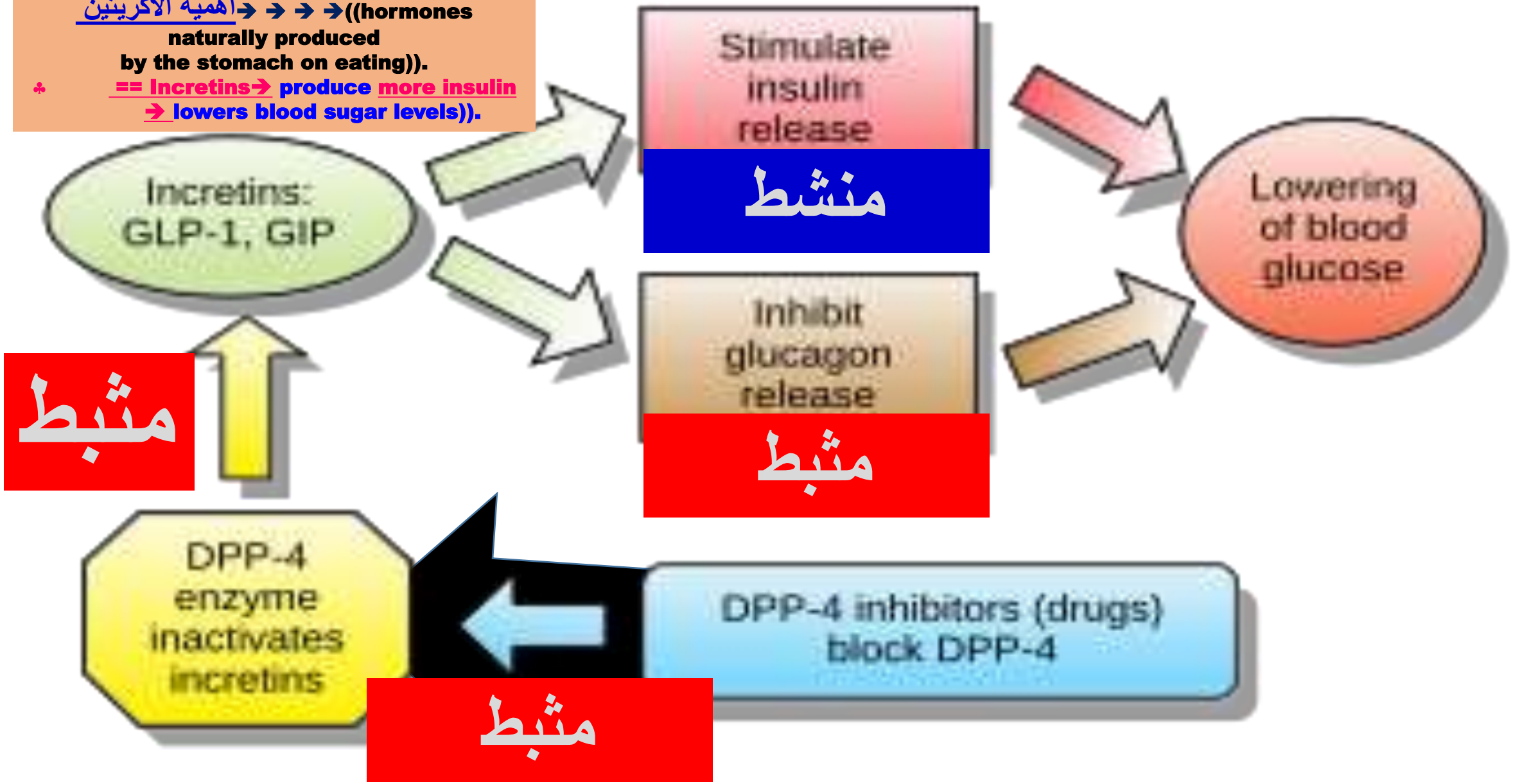
normal body weight.

- ♣ saxagliptin, vildagliptin and sitagliptin.
- ♣ الاهميه للاكريتين➔ ➔ ➔ ➔((hormones naturally produced by tl eating)).
- ♣ == Incretins➔ produce more insulin ➔ lowers blood sugar levels)).
- ♣ **MOA:**
- ♣ Block the action of the DPP-4 enzyme that destroys incretins
- ♣ So:➔ ➔ ➔ ➔

1) Increasing incretin (GLP-1 and GIP) levels ➔ ➔ ➔ in turn increases insulin secretion ➔ ➔ ➔ ➔ **decrease blood glucose levels**
2) Inhibit glucagon release
3) Decrease gastric emptying

اهميه الاكريتين➔ ➔ ➔ ➔((hormones naturally produced by the stomach on eating)).

♣ == Incretins➔ produce more insulin ➔ lowers blood sugar levels)).



7) Sodium-glucose cotransporter-2 inhibitors(SGLT2i)

❑Gliflozins=

1. Empagliflozin
2. Dapagliflozin

SGLT2 inhibitors:

- ❑ **Inhibit the coupled reabsorption of sodium and glucose from the renal tubules, by blocking the SGLT2 co-transporters thereby increasing excretion of glucose and sodium in the urine.**
- ❑**Reduction in heart failure events in patients with type 2 diabetes & chronic kidney disease.**

Insulin therapy

The basic treatment of type 1 diabetes

1) Human or animal origin
2) Various forms:

1. **short-acting** [soluble' or 'regular' insulin) = clear solution]
2. **intermediate-acting**
3. **long-acting insulins**

(Lente insulins) >>>>>>> The 'depot' insulins are cloudy preparations)))

3) insulin half-life = a few minutes.

4) Insulin analogues:

have been modified to produce a very rapid-onset and very long duration of activity➔(((Duration of action of short-acting insulin can be extended by the addition of protamine and zinc (isophane) or excess zinc ions)))

5) The main complications of insulin therapy are:

A. Hypoglycemia (insulin shock =Excess of insulin).
B. Weight gain
C. Peripheral edema.

Thank You For Your Attention

Any questions ?