



Endocrine
System



PHARMACOLOGY
432 TEAM



TREATMENT OF DKA & HYPOGLYCEMIC COMA

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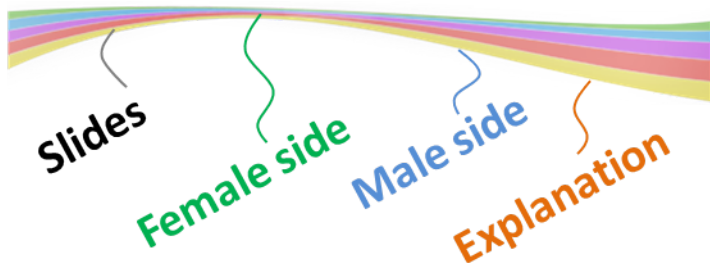
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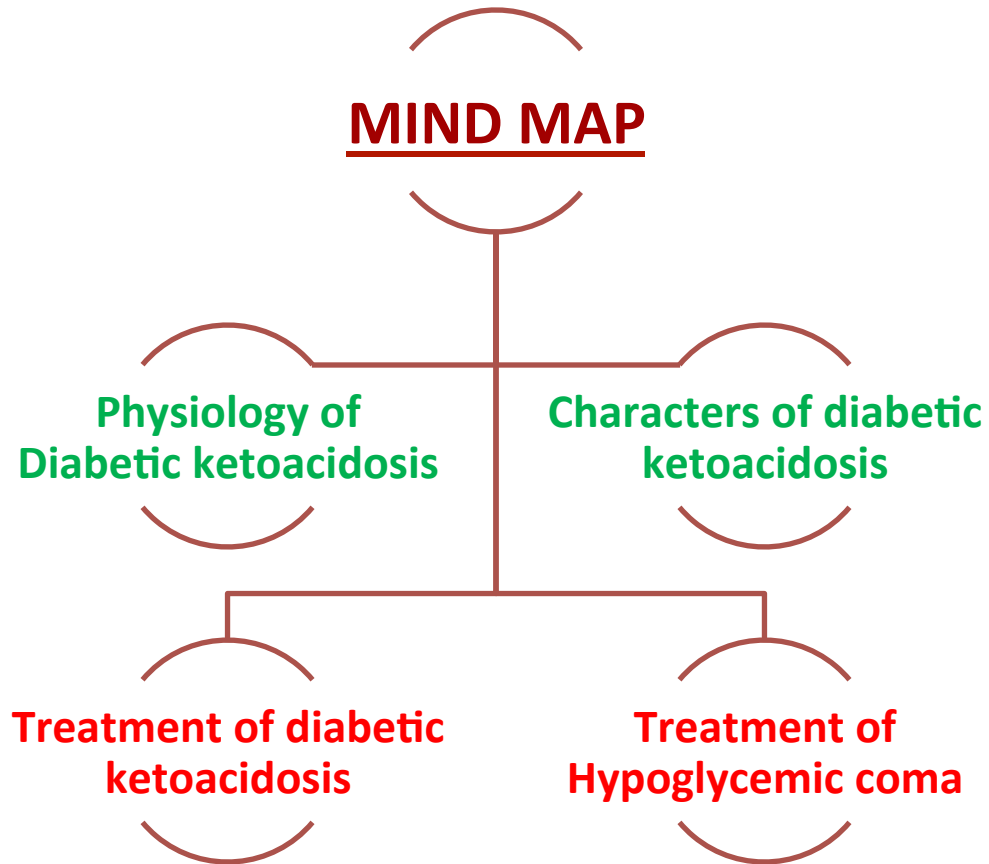
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Learning Objectives:

Were NOT given







serious acute emergency situation that requires admission to hospital with a risk of death. develops as a result of insulin deficiency

causes insulin deficiency in type I diabetes but may occur with type II especially during stress.

In absence of insulin, many metabolic changes occur:

Carbohydrates	↑ glycogenolysis, ↑ gluconeogenesis
Protein	↑ proteolysis thus providing amino acid as precursors for gluconeogenesis. (hyperglycemia)
Fats	↑ Fat breakdown to free fatty acids then to acetyl-CoA that is converted to acetoacetic acid and β-hydroxybutyric acid and acetone (ketone bodies). (ketonemia, ketonuria & metabolic acidosis).

Diagnostic Criteria in diabetic ketoacidosis

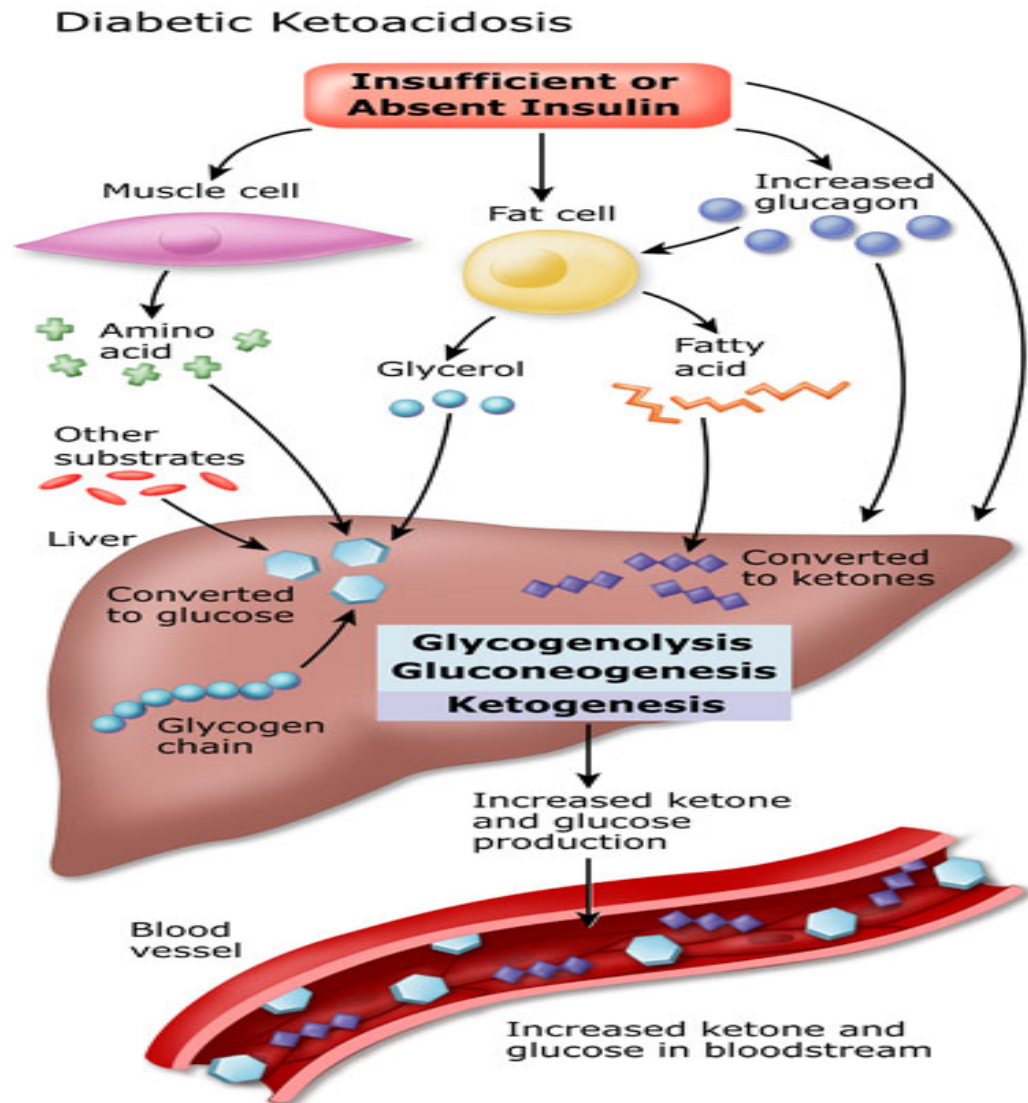
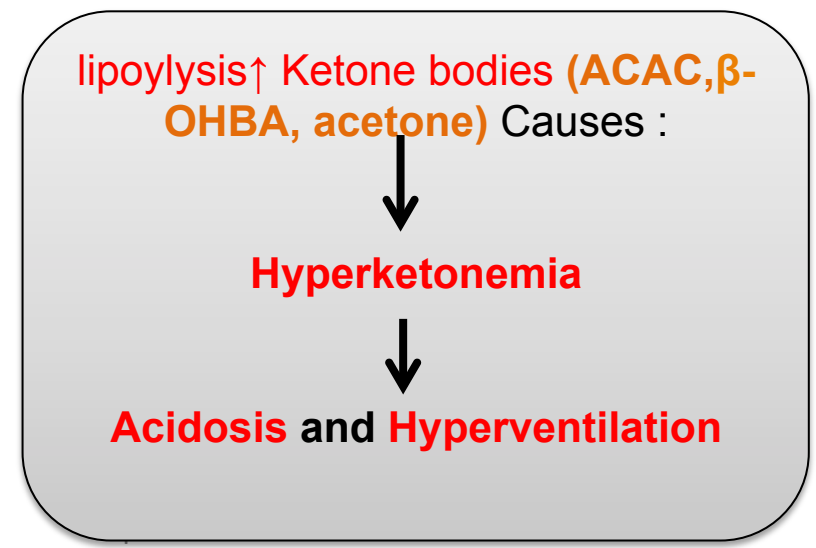
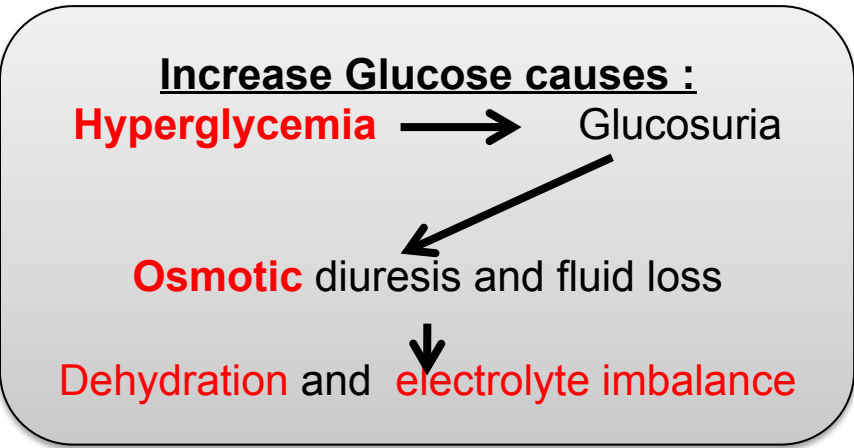
1) Blood glucose > 250 mg/dl	2) pH < 7.35
3) HCO ₃ < 15 mEq/L	4) Ketonemia

Precipitating factors for diabetic ketoacidosis

- 1) Infections
- 2) Missed insulin treatments
- 3) Newly diagnosed diabetes.
- 4) Use of medications: **as steroids, thiazide diuretics.**
- 5) Trauma, stress, surgery

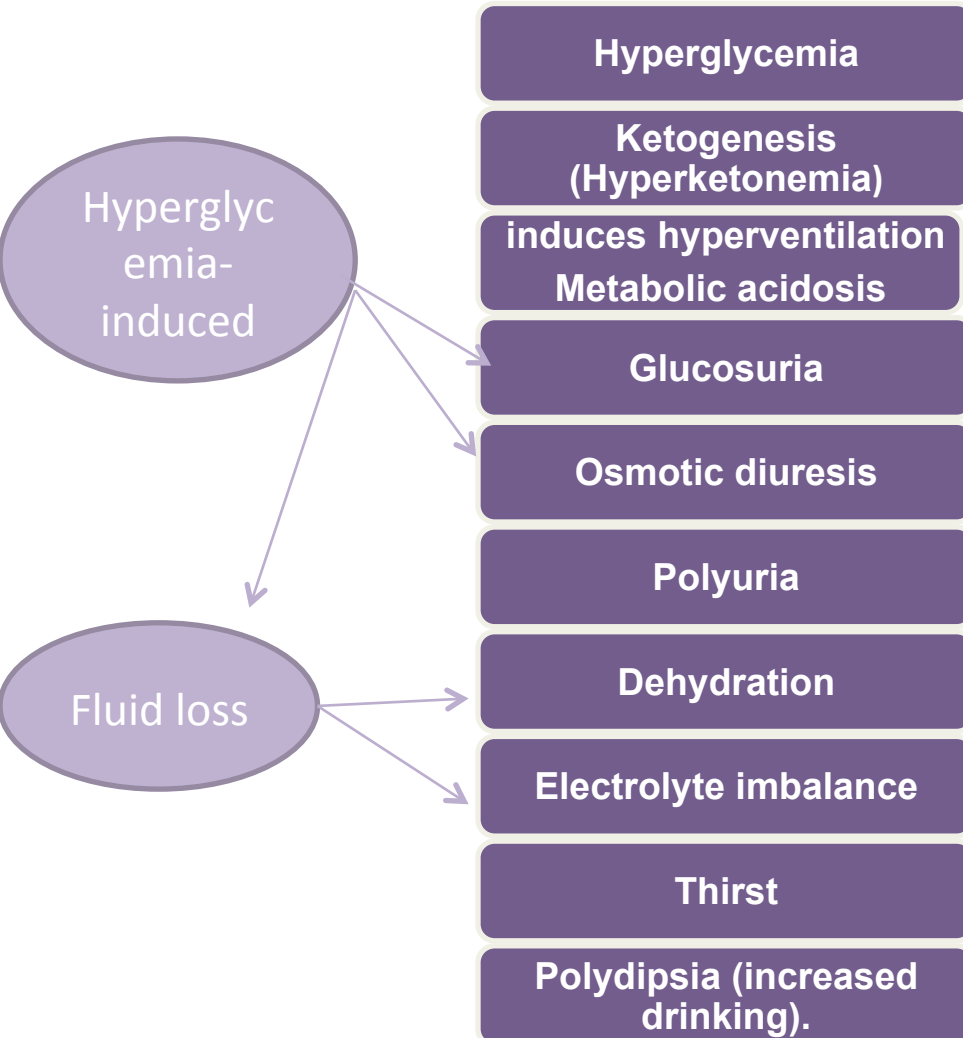


Physiology of Diabetic ketoacidosis





Characters of diabetic ketoacidosis



Clinical symptoms for diabetic ketoacidosis

- 1) Classic features of hyperglycemia
Thirst, polyuria
- 2) Vomiting/abdominal pain
- 3) **Ketotic breath** (fruity, with acetone smell)
- 4) **Confusion**
- 5) **Coma**



4 Different Therapy Targets :

1- Insulin therapy (For hyperglycemia):

We use “**Short acting insulins**”

Ex: Regular insulin is given **IV (till specific range then S.C)** should be administered by means of continuous intravenous infusion in small doses through an infusion pump (0.1 U/kg/h).

– **Insulin stops lipolysis and promotes degradation of ketone bodies..**

2- Fluid therapy (for Dehydration):

Infusion of isotonic **saline** (0.9% sodium chloride) at a rate of 15–20 mL/kg/hr. to restore blood volume and renal perfusion.

3-Potassium therapy (to correct Electrolyte Imbalance):

potassium replacement is added to the infusion fluid to correct the serum potassium concentration.

4- Bicarbonate therapy (For Acidosis) :

Only if the arterial pH < 7.0 after 1 hour of hydration, bicarbonate therapy should be used (**sodium bicarbonate** should be administered every 2 hr until pH is at least 7.0).



Blood sugar of less than 70 mg/dl is considered **hypoglycemia**. **critical hypoglycemia less than 50 mg/dl**. One of the common side effects of insulin in treating type I diabetes.

Causes

- **Overdose** of **insulin** or oral hypoglycemic drugs (sulfonylureas - meglitinides).
- Excessive physical **exercise**
- Missed or **delayed meal**.
- **Drug**-induced hypoglycemia.
- Hypoglycemia can be an early manifestation of other **serious disorders** (sepsis, congenital heart disease, brain hemorrhage).

Characters of Hypoglycemia

- Autonomic features**
- **sympathetic**: tachycardia, palpitation, sweating, anxiety, tremor.
 - **parasympathetic**: nausea, vomiting.
 - **Neurological defects**: Headache, visual disturbance, slurred speech, dizziness. Tremors, mental confusion, convulsions.
 - **Coma** due to ↓ blood glucose to the brain.

Precautions

- Hypoglycemia can be prevented by:
- 1) Blood sugar level should be checked routinely
 - 2) Patients should carry glucose tablets or hard candy to eat if blood sugar gets too low.
 - 3) Diabetic patient should wear a medical ID bracelet or carry a card.
 - 4) Patient should not skip meals or eat partial meals.
 - 5) Patient should eat extra carbohydrates if he will be active than usual.



Treatment of Hypoglycemic coma

Two Situations :

1- *(if patient is conscious) :*

Treated by **oral glucose tablets, juice or honey**

– **Sugar containing beverage or food (30 g orally).**

2- *(if patient is unconscious):*

– **Glucagon (1 mg S.C. or I.M.)**

– **20-50 ml of 50% glucose solution I.V.**

infusion (risk of possible phlebitis). .



<u>IMPORTANT TABLE</u>	Hypoglycemic coma (Excess insulin)	Hyperglycemic coma Diabetic ketoacidosis (Too little insulin)
Onset	Rapid	Slow - Over several days
insuline	Excess	Too little
Acidosis & dehydration	No	Ketoacidosis
B.P.	Normal	Subnormal or in shock
Respiration	Normal or shallow	Air hunger:: thus,(Hyperventilation)
Skin	Pale & Sweating	Hot & dry
CNS	Tremors, mental confusion, sometimes convulsions	General depression
Blood sugar	Lower than 70 mg/100cc	Elevated above 200 mg/100cc
Ketones	Normal	Elevated



1. Diabetic ketoacidosis is treated with :

- a) Semi lente insulin
- b) Lente insulin
- c) Regular insulin
- d) Glipizide

2. In addition to Insulin , you need to administrate which of the following Electrolyte Balancing agents :

- A. K
- B. Na
- C. Cl
- D. Saline

3. The main purpose of prescribing K to a DKA patient is :

- A. To avoid Hyperkalemia
- B. To prevent Hypokalemia
- C. To Decrease intracellular K
- D. To increase Extracellular K



4. An unconscious patient is brought to the ER with shallow breath, sweating and convulsions, which of the following do you expect to find :

- a) Ketone bodies
- b) Acidosis
- c) Blood Sugar Lower than 70 mg/100cc
- d) Low B.P.

5. What is the treatment for the previous case:

- A. Insulin
- B. glucose solution I.V
- C. oral glucose tablets
- D. Saline

Answers: (C _ A _ B _ C _ B)



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