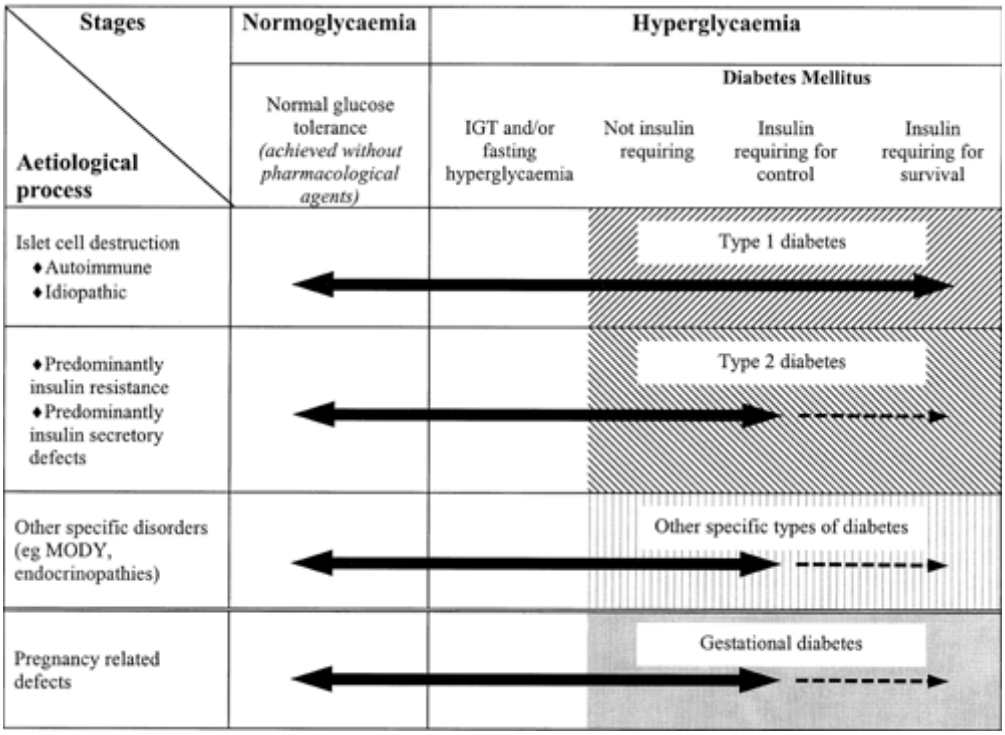
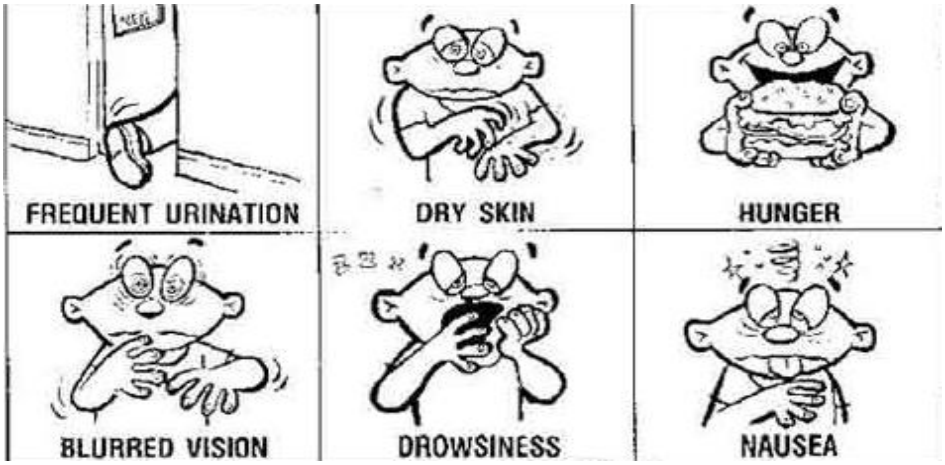
Unit IV – Problem 1 – Clinical: Clinical Presentation of Type-I Diabetes Mellitus

- **Classification of diabetes:**
  - **Type-I**: insulin dependent – polygenic.
  - **Type-II:** insulin-independent – Polygenic
  - **Gestational**: which is transient (مؤقت) and occurs only during pregnancy.
  - **Secondary diabetes**: due to disease in the pancreas such as pancreatitis.
  - **Hormone-induced**: with increased cortisol (Cushing syndrome) or increased growth hormone (Acromegaly).
  - **Drug-induced:** with glucocorticoids.



- **Type-I diabetes:**
  - It is an autoimmune disease characterized by destruction of β-cells of islet of Langerhans (has to reach 80% for clinical manifestations to appear).
  - There has to be a genetic susceptibility (HLA-DR3 and HLA-DR4) + environmental triggers (such as viral infection) → resulting in insulitis (T cell-mediated) → destruction of β-cells.
  - Autoantibodies which can be found in the blood: anti-GAD and anti-IA2
  - **Onset**: usually during childhood or puberty. There is no family history and it is not associated with obesity.
  - **LADA (Latent Autoimmune Diabetes in Adults):**
    - ✓ Latent onset of type-I diabetes in adults.
    - ✓ Initially diagnosed as type-II but when patients will be treated with insulin they will not respond.
    - ✓ Positive autoantibodies.
- **Clinical manifestation of hyperglycemia:**
  - Polyuria and nocturia (leading to dehydration).
  - Polydipsia (thirst): resulting from dehydration.
  - Polyphagia (preferring sweet food).
  - Fatigue and lethargy.
  - Weight loss (especially in type-I diabetes).
  - Blurred vision.
  - Poor wound healing.



- **Diagnosis of diabetes:**
  - Fasting blood glucose ≥ 7 mmol/L (needs conformation by repeating).
  - Random plasma glucose > 11.1 mmol/L
  - Oral glucose tolerance test (OGTT) > 11.1 mmol/L
  - $HbA_{1c} \geq 6.5\%$

	A1C (percent)	Fasting Plasma Glucose (mg/dL)	Oral Glucose Tolerance Test (mg/dL)
Diabetes	6.5 or above	126 or above	200 or above
Prediabetes	5.7 to 6.4	100 to 125	140 to 199
Normal	About 5	99 or below	139 or below

- **Diabetic ketoacidosis:**
  - It is a medical emergency associated with type-I diabetes.
  - **Cardinal biochemical features:**
    - ✓ Hyperglycemia.
    - ✓ Hyperketonemia.
    - ✓ Metabolic acidosis.
  - **Pathogenesis**: lack of insulin leads to increased lipolysis with availability of free fatty acids which are used in the synthesis of ketone bodies.
  - **Clinical manifestations:**
    - ✓ Abdominal pain, nausea and vomiting.
    - ✓ Blurred vision.
    - ✓ Dehydration, which if severe, can lead to hypovolemia and hypotension.
    - ✓ Tachycardia.
    - ✓ Kussamal breathing (rapid and deep → this helps in washing out CO_2 thus compensating for metabolic acidosis).
    - ✓ Fruity breath odor (due to acetone).
    - ✓ if the condition is very severe, this can result in: confusion or even coma.
  - **Laboratory investigations:**
    - ✓ Arterial blood gases: to check if there is metabolic acidosis or not.
    - ✓ Anion gap must be calculated to conclude that the patient is suffering from metabolic acidosis. How to calculate the anion gap?
      - ❖ Anion gap = $(Na^+ + K^+) – (HCO_3^- + Cl^-)$
      - ❖ *What are the causes of metabolic acidosis with high anion gap? → MUDPILES:*

- **M**ethanol.
- **U**remia (indicating chronic renal failure).
- **D**iabetic ketoacidosis.
- **P**ropylene glycol.
- **I**nfection, Iron, Isoniazid.
- **L**actic acidosis.
- **E**thylene glycol.
- **S**alicylates.

✓ Urinalysis: looking for ketones.
✓ ECG (why?) → because hyperkalemia can lead to cardiac arrhythmias.

- **Why is the total body potassium low?**
  - ✓ Due to polyuria (which leads to loss of potassium).
  - ✓ These patients usually have abdominal pain and vomiting (loss of potassium).
- **Why is the potassium high when we initially draw blood from the patient?**
  - ✓ Lack of insulin leads to accumulation of potassium extracellularly.
  - ✓ In acidosis, H ions go intracellularly while the potassium goes to the extracellular compartment.
- **Management?**
  - ✓ Hydration to replace the lost volume.
  - ✓ IV insulin. If blood glucose level drops don't stop infusion of insulin, instead you can administer dextrose.
  - ✓ Infusion of potassium.