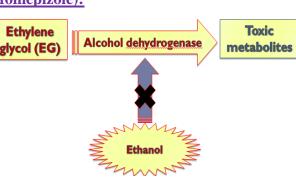
## **Unit I – Problem 3 – Pharmacology: Ethylene Glycol Poisoning**



- <u>Ethylene glycol</u>: is a polyalcohol (glycol) containing more than one hydroxyl group (OH).
- Main commercial uses of ethylene glycol include:
  - Coolants (engine-cooling liquids).
  - Antifreeze (مضاد النجمُّد).
  - Softener for textiles (مُنَعِم الأقمشة).
- <u>Beside it is found in many commercial products, ethylene glycol has a sweet taste</u> and an attractive color.
- Human ingestion of this poison is through:
  - Suicide attempts.
  - Accidentally by children.
  - As an alcohol substitute (by alcoholics).
- Poisoning potential:
  - A toxic dose is: 0.5 ml/kg.
  - A lethal dose is: 1.4 ml/kg (for a 70 kg person, 98 ml of ethylene glycol is enough to cause death)
- The administration of this poison is usually by the enteral route and a rapid absorption occurs from the whole GI tract. To control this, gastric lavage (غسيل المعدة) can be done.
- <u>Distribution</u>: ethylene glycol is rapidly distributed in the total body water. volume of distribution is 0.6 0.8 L/kg.
- <u>Metabolism</u>: ethylene glycol is metabolized to glycolic acid and oxalic acid. Oxalic acid reacts with calcium ions to produce (calcium-oxalate crystals) which will cause damage to the kidney.
- <u>Treatment of ethylene glycol poisoning (ethanol and fomepizole):</u>
  - Ethanol:
    - ✓ <u>Metabolism</u>: ethanol is metabolized to acetaldehyde and then to acetate.
    - ✓ It competes with ethylene glycol for the same enzyme which has a greater affinity to ethanol (alcohol dehydrogenase) and thus ethylene glycol's metabolites are not formed.



- Fomepizole:
  - $\checkmark$  It inhibits the formation of acetaldehyde and thus ethylene glycol's metabolites are not formed.
- Elimination of ethylene glycol:
  - In poisoned patients, ethylene glycol is metabolized within 3-6 hours by alcohol dehydrogenase to form the metabolites.
  - During treatment with ethanol and fomepizole, renal elimination of ethylene glycol occurs within 15-17 hours (hemodialysis).
- Effects of ethylene glycol on the body:
  - Initial phase: CNS depression (altered mental status).
  - **Cardiopulmonary phase**: within 12-24 hours (dyspnea).
  - **Renal phase**: within 25-36 hours (anion gap metabolic acidosis).