13.4: Exhaled Air

Exhaled Air

The lungs are an important route of excretion for xenobiotics (and metabolites) that exist in a gaseous phase in the blood.

Passive Diffusion

Blood gases are excreted by passive diffusion from the blood into the alveolus, following a concentration gradient. This type of excretion occurs when the concentration of the xenobiotic dissolved in capillary blood is greater than the concentration of the substance in the alveolar air. Gases with a low solubility in blood are more rapidly eliminated than those gases with a high solubility. Volatile liquids dissolved in the blood are also readily excreted via the expired air.

For example, breathalyzer devices can measure blood alcohol concentration because as alcohol in the blood moves across the alveoli the alcohol in the blood evaporates and is exhaled. The concentration of alcohol in the exhaled air relates to the level of alcohol in the blood.

Impact of Vapor Pressure

The amount of a liquid excreted by the lungs is proportional to its vapor pressure. Exhalation is an exception to most other routes of excretion in that it can be a very efficient route of excretion for lipid soluble substances. This is due to the very close proximity of capillary and alveolar membranes, which are thin and allow for the normal gaseous exchange that occurs in breathing.

Knowledge Check

1) Xenobiotics are eliminated in exhaled air by:

a) Passive diffusion
b) Active transport
c) Facilitated transport

Answer

Passive diffusion - **This is the correct answer.**
Blood gases are excreted by passive diffusion from the blood into the alveolus, following a concentration gradient. This occurs when the concentration of the xenobiotic dissolved in capillary blood is greater than the concentration of the substance in the alveolar air.