

Week 3 Discussions

Topic 3 DQ 1

Aug 1-3, 2024

Choose a medical condition from the fluid, electrolyte, or acid-base system and explain the pathophysiological changes that may occur. What patient education would need to be included relating to this disorder? Make sure that you select a different medical condition than your peers. Include the name of the medical condition (bolded) above your answer so that the medical condition can easily be identified. Cite your references in APA style.

Hypocalcemia

“Hypocalcemia occurs if the serum calcium concentration drops below the lower limits of normal” (Banasik, 2022). True hypocalcemia is really a decrease in “ionized calcium (Suneja, 2022). This level would be considered low if it drops below 8.8 mg/dl if plasma protein levels are normal (Suneja, 2022). “Calcium regulation is critical for normal cell function, neural transmission, membrane stability, bone structure, blood coagulation, and intracellular signaling” (Suneja, 2022).

Pathophysiology Changes:

Calcium levels are vital to the function of the cardiac and nervous system. Fluctuations in calcium levels can affect the neurons and cardiac cells. A decrease in concentrated calcium can be caused malabsorption and/or excretion of calcium in the intestines. Ionized calcium is a necessary plasma fraction for normal physiologic processes. Calcium is the conductor for nerves and relaxes muscles. It is vital for bone mineralization and is plays a part in hormonal secretion in endocrine organs (Suneja, 2022). Calcium levels are controlled by the parathyroid (PTH), vitamin D, calcitonin, and FGF23 (Goyal et al., 2023).

PTH helps the bones to communicate for the reabsorption of calcium. It also signals renal excretion of phosphorus and vitamin D which will ultimately stimulate the intestines to absorb calcium. Calcitonin does the opposite and inhibits lowering the calcium levels. FGF23 also inhibits the conversion of vitamin D and ultimately reduces calcium absorption (Goyal et al., 2023).

Calcitonin, on the other hand, lowers calcium levels by inhibiting osteoclast activity. FGF23 inhibits the conversion of vitamin D to its active form, 1,25-dihydroxy vitamin D, thus reducing intestinal calcium absorption. “Acidosis reduces calcium binding to albumin, causing increased ionized calcium levels, while an alkaline environment has the opposite effect. An acidic environment also promotes the exchange of extracellular hydrogen ions for intracellular calcium, increasing ionized calcium levels and vice-versa for alkaline environments” (Goyal et al., 2023).