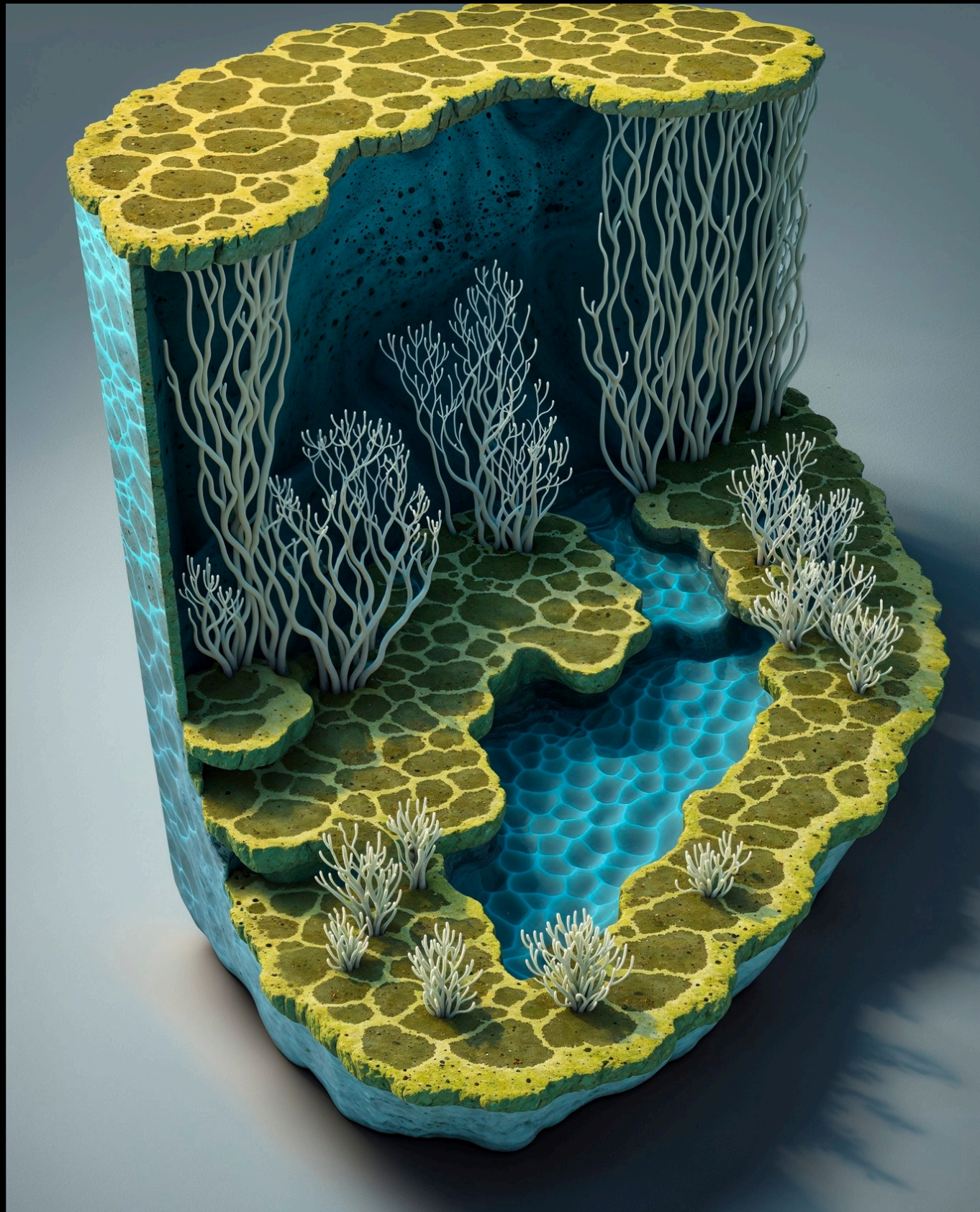




Dr. Asif Ahmad

Essential Microminerals for Bone Health: The Roles of Calcium and Phosphorus



Introduction to Microminerals (Calcium & Phosphorus)

Microminerals play a **crucial role** in maintaining **bone health**. Among them, **calcium** and **phosphorus** are essential for the structure and strength of bones. This presentation will explore their roles, sources, and importance in our diet.

Calcium is the most abundant mineral in the body and greater than 99 percent of it is stored in bone tissue. Although only 1 percent of the calcium in the human body is found in the blood and soft tissues, it is here that it performs the most critical functions. Blood calcium levels are rigorously controlled so that if blood levels drop the body will rapidly respond by stimulating bone resorption, thereby releasing stored calcium into the blood.



Understanding Microminerals

Microminerals are trace elements required by the body in small amounts. They contribute to various physiological functions, including **bone formation** and **maintenance**. Understanding their roles is vital for promoting overall health.

Increased calcium intake helps to increase the mineralized content of bone tissue. Greater mineralized bone tissue corresponds to a greater bone mineral density (BMD), and to greater bone strength. The remaining calcium plays a role in nerve impulse transmission by facilitating electrical impulse transmission from one nerve cell to another. Calcium in muscle cells is essential for muscle contraction because the flow of calcium ions are needed for the muscle proteins (actin and myosin) to interact. Calcium is also essential in blood clotting by activating clotting factors to fix damaged tissue.



Role of Calcium in Bone Health

Calcium is the most abundant mineral in the body, primarily found in bones and teeth. It is vital for **bone density** and strength, helping to prevent conditions like **osteoporosis**. Adequate intake is essential throughout life.

Sources of Calcium

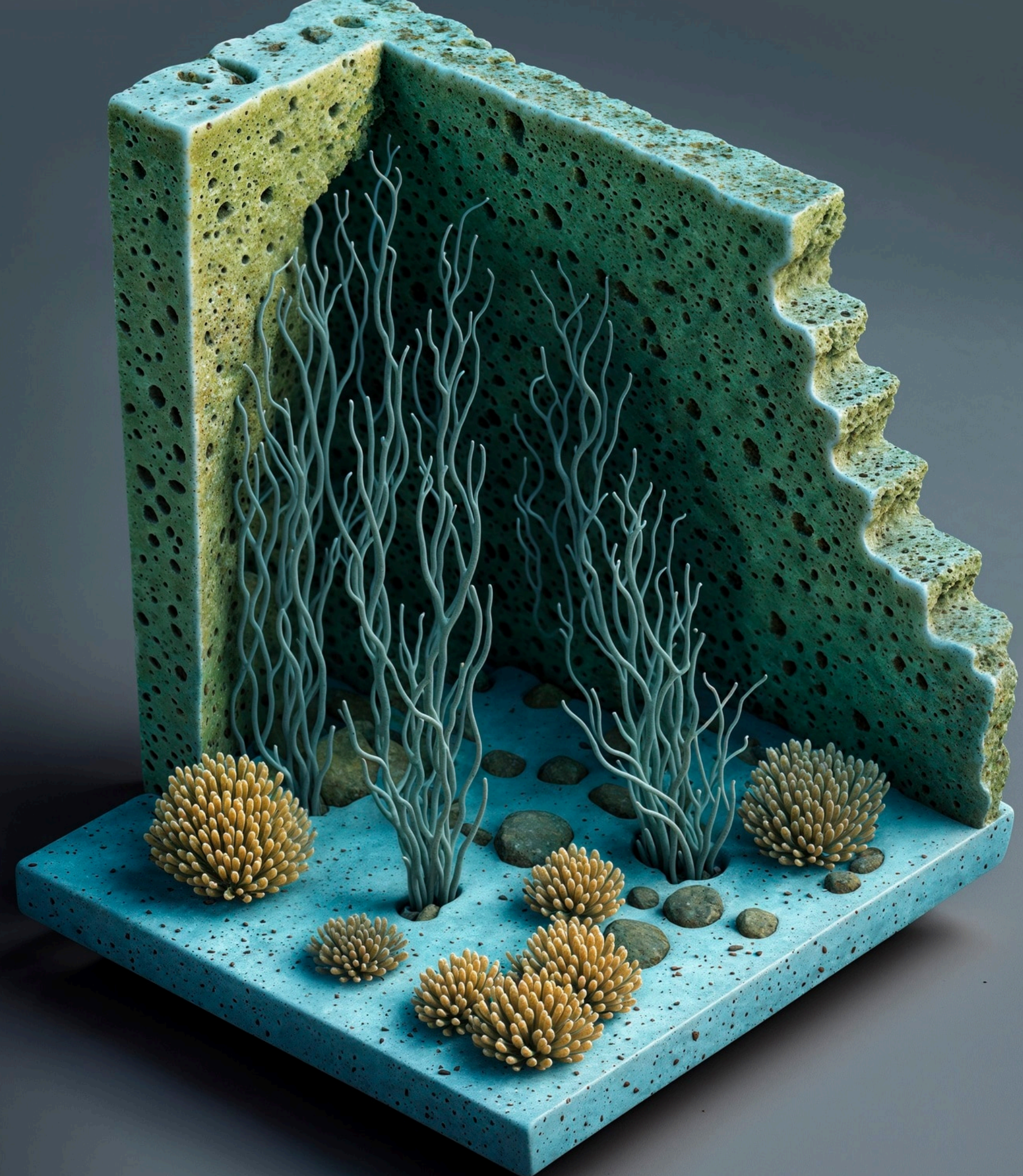
Calcium can be obtained from various **dietary sources** including dairy products, leafy greens, and fortified foods. Understanding these sources helps ensure adequate **calcium intake** for optimal bone health.



Role of Phosphorus in Bone Health

Phosphorus works closely with calcium to form **hydroxyapatite**, the mineral complex that gives bones their strength. It is also involved in energy production and cellular function, making it essential for overall health.

Calcium performs such vital functions in the body, blood calcium level is closely regulated by the hormones parathyroid hormone (PTH), calcitriol, and calcitonin. When blood calcium levels are low, PTH is secreted to increase blood calcium levels via three different mechanisms. First, PTH stimulates the release of calcium stored in the bone. Second, PTH acts on kidney cells to increase calcium reabsorption and decrease its excretion in the urine. Third, PTH stimulates enzymes in the kidney that activate vitamin D to calcitriol. Calcitriol is the active hormone that acts on the intestinal cells and increases dietary calcium absorption. When blood calcium levels become too high, the hormone calcitonin is secreted by certain cells in the thyroid gland and PTH secretion stops. At higher nonphysiological concentrations, calcitonin lowers blood calcium levels by increasing calcium excretion in the urine, preventing further absorption of calcium in the gut and by directly inhibiting bone resorption.



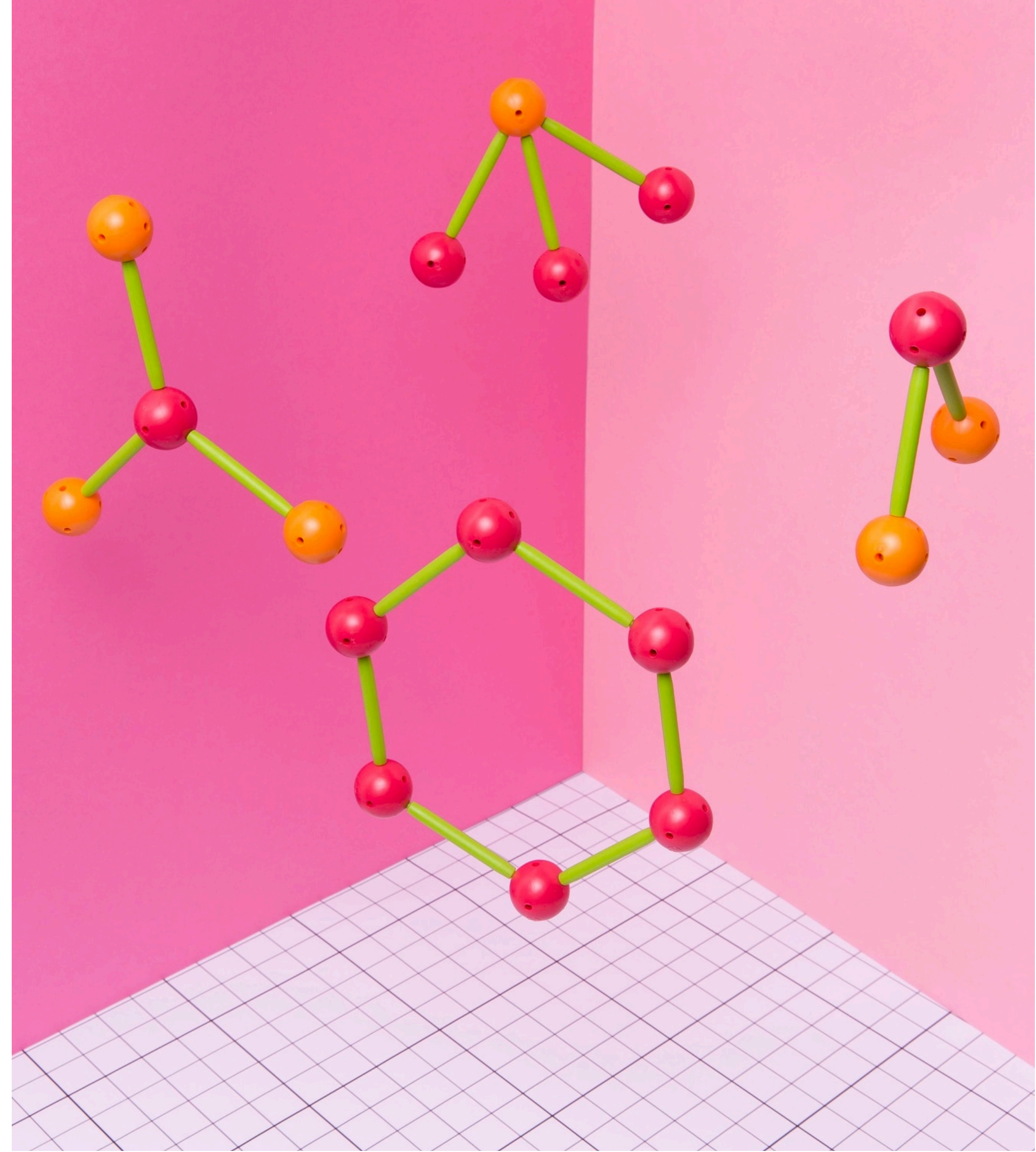
Sources of Phosphorus

Phosphorus is abundant in **protein-rich foods** such as meat, fish, poultry, nuts, and legumes. Incorporating these foods into your diet can help maintain adequate phosphorus levels for optimal bone health.



Calcium and Phosphorus Balance

A proper balance of **calcium** and **phosphorus** is crucial for maintaining bone health. An imbalance can lead to bone disorders. Understanding their relationship helps in managing dietary intake effectively.





Impact of Deficiency

Deficiencies in calcium or phosphorus can lead to serious health issues, including **weakened bones**, increased fracture risk, and **osteoporosis**. Regular monitoring of dietary intake is essential to prevent these deficiencies.



Recommended Daily Intake

The **recommended daily intake** varies by age and gender, with adults generally needing about 1000 mg of calcium and 700 mg of phosphorus. Meeting these recommendations is vital for sustaining bone health.



Supplementation Considerations

While obtaining nutrients from food is ideal, **supplements** may be necessary for some individuals. It's important to consult with a healthcare provider before starting any supplementation to avoid potential **overdosage**.

Conclusion: Importance of Microminerals

In conclusion, **calcium** and **phosphorus** are essential microminerals that play a significant role in maintaining bone health. Ensuring adequate intake through diet or supplements is vital for preventing bone-related disorders.

Thanks!