Mechanism of vitamin d action

Science, Biology

Introduction

Once absorbed, active elements of vitamin D, such as calcitriol, attach themselves to intracellular receptors and then act as transcription factors so as to modulate gene expression (Holick, 2010). The vitamin D receptors are similar to thyroid hormones and steroid hormones receptors and contain DNA- binding and hormone-binding domains. According to Holick (2010), these receptors bind with the retinoid-X receptors, another intracellular receptor, forming a complex bond. This heterodimer is what binds to cellular DNA and activates a biological reaction. The biological reaction can either be the stimulation of proteins that perpetuate intestinal absorption of calcium or providing the appropriate balance of elements crucial for bone function and growth (Holick, 2010).

Vitamin D and BoneHealth.

Numerous studies have demonstrated that vitamin D has important ramifications on bone health, not only in life, but even in the course of fetal development. For instance, DeLuca & Schnoes (1976) cite Dr. Cooper’s research that studied the key factors associated with normal patterns of skeletal growth and established that maternal vitamin D deficiency, coupled with other dynamics, inhibited bone mineral absorption during intrauterine life, and was linked to stuntedchildhoodgrowth and weak bones in adulthood (DeLuca & Schnoes, 1976). Lack of vitamin D has insidious consequences on the skeleton since it inhibits the accumulation of optimal levels of calcium that is genetically prearranged for the skeleton (Holick, 2010). Watson (2013) also retaliates that once peak bone mass is reached, adults lacking

vitamin D in their system will annually loose approximately 0. 5% of their skeletal mass if they lack sufficient vitamin D and calcium in their systems (p. 18). In addition, vitamin D deficiency can also lead to osteomalacia (DeLuca & Schnoes, 1976); a mineralization defect of the collagen matrix. This condition is often accompanied by throbbing bone pain and aching (DeLuca & Schnoes, 1976).

Holick (2010) points out another research at the University of Pittsburgh that also established a correlation between vitamin D deficiency and increased susceptibility to bone fractures. The study measured the vitamin D levels of 400 participants with hip fractures and compared the results with the vitamin D levels of 400 other healthy women. The outcome demonstrated that individuals with the lowest levels of Vitamin D were 71 percent susceptible to bone fractures compared to those with the highest levels of vitamin D. Consequently, the role played by vitamin D in sustaining bone health can never be overemphasized. Not only does it aid in mineral absorption and bone development in intrauterine growth and childhood, but is also responsible for strong bones in adults as well.

References

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