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Physiological functions of Vitamin D in adipose tissue.

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Abstract

Adipose tissue has long been identified as the major site of vitamin D storage. Recent studies have demonstrated that VDR and vitamin D metabolizing enzymes are expressed in adipocytes. Furthermore, it has been shown that vitamin D regulates adipogenic gene expression as well as adipocyte apoptosis. Vitamin D is active in adipocytes at all levels. It interacts with membrane receptors, adaptor molecules, and nuclear coregulator proteins. Several functions of unliganded nVDR were discovered by studying human samples from patients having hereditary vitamin D resistant rickets, transgenic mice overexpressing the VDR and VDR knockout mice. Through its genomic action, vitamin D participates in the regulation of energy metabolism by controlling the expression of uncoupling proteins. In vitro, vitamin D stimulates lipogenesis and inhibits lipolysis by interacting with mVDR. mVDR is present in caveolae of the plasma membrane and is the same as the classic nVDR. In addition, vitamin D affects directly the expression of the appetite regulating hormone, leptin. Some researchers reported also that vitamin D regulates the expression of the insulin sensitizing hormone, adiponectin. Vitamin D reduced cytokine release and adipose tissue inflammation through the inhibition of NF-κB signaling. Scientific research investigating the role of adipose tissue resident immune cells in the pathogenesis of obesity-associated inflammation is scarce. Obesity is associated with vitamin D deficiency. However there is no scientific evidence to prove that vitamin D deficiency predispose to obesity. Vitamin D supplementation may prevent obesity but it does not lead to weight loss in obese subjects.

KEYWORDS:

Adipogenesis; Adipokines; Adipose tissue; Obesity; VDR

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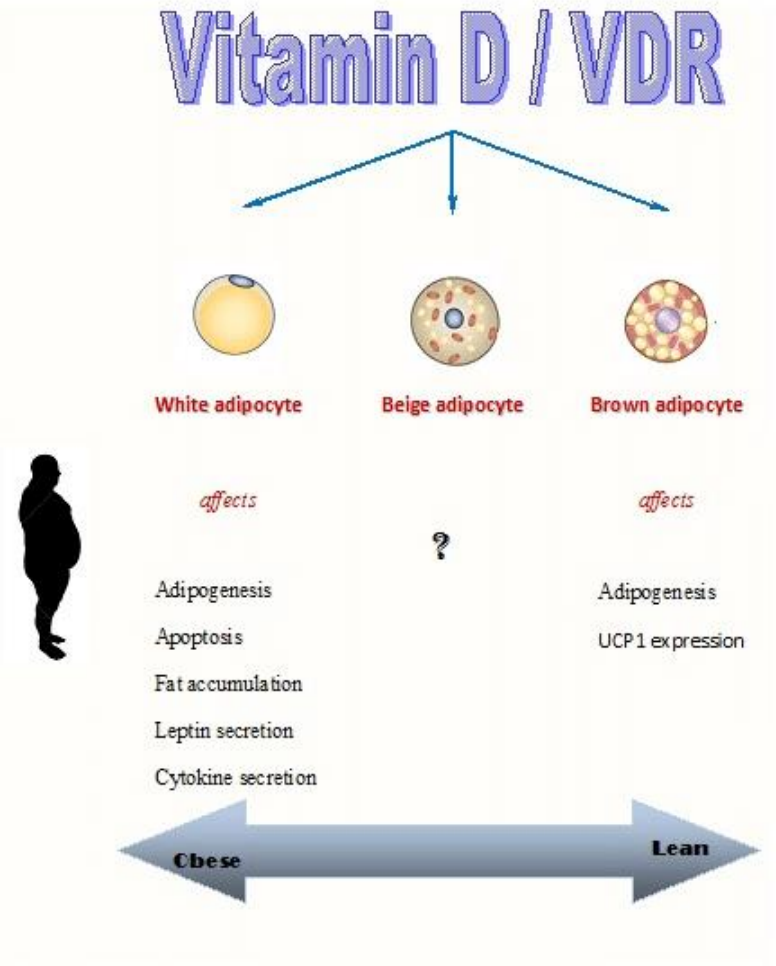
Vitamin D / VDR
White adipocyte
Beige adipocyte
Brown adipocyte
affects
affects
?
Adipogenesis
Apoptosis
Fat accumulation
Leptin secretion
Cytokine secretion
Adipogenesis
UCP1 expression
Obese
Lean