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Editorial

Vitamin D and Viral Hepatitis: The New Issue in Pathogenesis and Outcomes

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Searching the term "vitamin D" in a database like PubMed results in about 80 000 articles and shows that the number of submitted articles has raised exponentially in recent years. This number about equals the results for "hepatitis B", indicating that new roles for vitamin D in the body have been proven in recent years. Vitamin D is a vital substance that plays a lot of important roles in the body, e.g., it reduces mortality risk in the elderly,[1] it displays anticancer properties,[2] and has a regulatory role in calcium and bone homeostasis. Vitamin D is also an important immune modulator that plays important roles in infectious diseases such as viral hepatitis.[3,4]

Changes in Vitamin D Serum Levels in Different Types of Hepatitis

Vitamin D as an immune modulator is associated with various chronic liver disorders. The catabolism of vitamin D also increases in chronic liver disorders. About 82% of HBV-infected patients are associated with vitamin D deficiency, and the rate of death increases with vitamin D deficiency.[5] The serum levels of 25 (OH) vitamin D decrease in patients with hepatitis C. Furthermore, low vitamin D levels in the blood lead to severe fibrosis of the liver and reduce the virological responses to interferon-based therapy in hepatitis C patients.[6] There are not enough articles on the association between vitamin D and hepatitis E, but there are more cases of vitamin D deficiency in pregnant women infected with hepatitis E than in healthy pregnant women.[7]

Immunology of Vitamin D

This response of vitamin D deficiency is accompanied by immunological responses. The effects of vitamin D in the immune system are numerous and include all parts of the innate and adaptive immune system, such as antibacterial effects, effects on dendritic cell maturation and function, effects on neutrophils and other cell classes of innate immunity, effects on T cell activation and proliferation including all three classes of helper, cytotoxic, and regulatory, and effects on B cells.[4]

Immunology of Hepatitis Infection

As is known, cytotoxic T cells are the most important ones to inhibiting viral replication and hepatocyte lysis during chronic HBV infection; both innate and adaptive parts of the immune system participate in fighting against viral infection. Moreover, the presence of a lag between HBV inoculation and viral load for the initial 5 weeks can show probable responses of the innate immunity system.[8]

The humeral and cellular adaptive immune system takes part in the immune responses involved in viral clearance. Major histocompatibility complex (MHC) class II interacts with CD4+ helper T cells to clear circulating virus particles, and MHC class I interacts with cytotoxic T cells to eliminate infected hepatocytes.[9,10] T regulators are a type of lymphocytes that increase in viral infections. Their function is to down-regulate effective T cells, leading to chronicity.

The innate immune system also plays some important roles in immunity to viral infections. It can control infections immediately by limiting the spread of infections and coordinating with the adaptive immune system. The innate immune system activates by recognizing the structures of pathogens by using pattern-recognition receptors (PRRs). In viral infections, the most important PRRs are Toll-like receptors (TLRs).[11] After recognition of viral particles in innate immunity, the early phase of viral infection characterized by the production of cytokines, type 1 interferon (IFN)-α/β, and the activation of natural killer (NK) cells are activated.[12] Liver macrophages (Kupfer cells) and liver sinusoidal endothelial

cells are the other parts of the innate immune system. These cells have the ability to respond to TLRs and can recognize viral particles. Kupfer cells produce cytokines and interleukins to oppose infections.[13,14]

Vitamin D and hepatitis play similar roles in different parts of the immune system, but the immunological effects of vitamin D on hepatitis are not completely obvious. Thus, it is suggested that more studies on the immunological pathogenesis of vitamin D and hepatitis infection be conducted.

Authors' Contributions

All authors contributed equally to this study.

Conflict of Interest Disclosures

The authors declare they have no conflicts of interest.

Ethical Approval

Not applicable.

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