

## Vitamin D3, the “Sunshine Vitamin,” may Prevent and Repair Cardiovascular Damage



The endothelium is a thin layer of tissue which forms the inner lining of all blood vessels and lymphatic vessels in the body. However, until the 1980s, it was believed the endothelium works as a ‘wrapper’ around the blood and lymphatic vessels of the body, with no other specific functions than allowing the transport of water, electrolytes, and other essential nutrients in and out of the bloodstream. Research advances during the 1980s suggested that the endothelium, in fact, is a spatially distributed organ that lines the whole circulatory system from the “heart to the smallest capillaries.” Additionally, the endothelium was found to play a crucial role in several biological processes, such as vascular permeability, coagulation and anticoagulation cascades, regulation of vascular tone, immune response, and formation of new vessels.

Any changes in the endothelium, such as alterations of endothelial cells and the vasculature may lead to its dysfunction, which is associated with serious disease conditions, including high blood pressure, stroke, heart attack, diabetes, insulin resistance, chronic kidney failure, tumor growth, venous thrombosis, and severe viral infections.

### Role of Vitamin D3 in Cardiovascular Health

Recently, a team of scientists led by Dr. Malinski from Ohio University, Ohio, USA, demonstrated the beneficial role of Vitamin D3 (cholecalciferol), the “sunshine vitamin,” in improving cardiovascular health. This new study got published in the *International Journal of Nanomedicine* in January 2018. The study results suggested that treating damaged human endothelial cells with vitamin D3 resulted in a ‘reversal’ of damage and restoration of cardiovascular function.



Furthermore, the team also observed that Vitamin D3, the active form of the vitamin, significantly reduced the level of oxidative stress in the cardiovascular system. This made the researchers hypothesize that Vitamin D3 stimulates nitric oxide (NO), a major signaling molecule that regulates blood flow and prevents the formation of clots in vessels.

For this study, the team had developed unique methods and systems of measurements using nano-sensors, tiny probes which are about 1,000 times smaller than a human hair in diameter. With the help of these nano-sensors, the researchers were able to track the impact of Vitamin D3 on endothelial cells.

Overall, the authors suggested that treatment with the vitamin D3 may play a key role in preserving and restoring the damage to the cardiovascular system caused by several health conditions including hypertension, stroke, atherosclerosis, and diabetes, while also reducing the risk of heart attack. This recommendation is further corroborated by several clinical study findings which suggest that doses of Vitamin D3 higher than those currently used for the treatment of bone diseases may be beneficial in cardiovascular health management.

**Source:** Khan A, Dawoud H, Malinski T. Nanomedical studies of the restoration of nitric oxide/peroxynitrite balance in dysfunctional endothelium by 1,25-dihydroxy vitamin D3 – clinical implications for cardiovascular diseases. *Int J Nanomed.* 2018, DOI: <https://doi.org/10.2147/IJN.S152822>.