PANMINERVA MED 2010;52(Suppl. 1 to No. 2):1-7

Vitamin D concentrations, endothelial progenitor cells, and cardiovascular risk factors

N. A. MIKIROVA [1], G. BELCARO [2], J. A. JACKSON [1], N. H. RIORDAN [1]

[1]*Center for the Improvement of Human Functioning International, Inc. Bio-communication Research Institute Division Wichita, KS, USA*
[2]*Irvine3 Vascular Labs, CH-PE University, Pescara, Italy*

Our study aimed to establish the association of vitamin D status with the level of circulating endothelial progenitor cells (EPCs) and circulating angiogenic cells (CACs) and to demonstrate the effect of vitamin D on the level of lipoproteins responsible for increased cardiovascular risk and high blood pressure. 41 healthy adults were selected. EPCs were defined as CD34+/KDR+ cells, and CACs were defined as cells that expressed endothelial markers after incubation of mononuclear blood cells with endothelial growth factors during 5 days. We found a positive association between EPCs, CACs and the level of vitamin D and an inverse correlation between several subclasses of lipoproteins. The level of vitamin D higher than 40 ng/ml demonstrated a positive effect on regulation of blood pressure, and there was significant difference in cholesterol/HDL ratio, very low-density lipoproteins, and triglycerides for groups of subjects with varying levels of vitamin D.

KEY WORDS: Endothelial progenitor cells, Vitamin D, cardiovascular risk factors.

The purpose of this study was to establish the association of vitamin D status with the level of circulating endothelial progenitor cells (EPCs). Vitamin D deficiency is a common condition, present in approximately 30% to 50% of the general population. Low 25-hydroxyvitamin D levels may have an effect on cardiovascular health, cancer, and diabetes.[1-9]

Studies on the connection between ischemic heart disease, hypertension and vitamin D are conflicting. Some studies found an inverse relationship between levels of the active form of vitamin D, blood pressure, and plasma renin activity. [10, 11] Another study reported a positive association.[12]

Because the vitamin D receptor (VDR) is present in most cells, vitamin D has a wide range of therapeutic and health-related benefits. The active form of vitamin D3 is a steroid hormone shown to regulate more than 60 genes.[13,14] The translocation of $1\alpha,25(OH)_2D3$ into cells, where it binds with high affinity to vitamin D nuclear receptors, results in altering rates of gene expression. By this pathway, the active form of vitamin D influences a number of genes relevant to arterial wall functions. These include VEGF, matrix metalloproteinase, myosin, and structural proteins. Vitamin D receptors are densely distributed in the endothelium, and vitamin D_3 modulates vascular tone by reducing calcium influx into the endothelial cells. $1,25(OH)_2D$ is a very effective modulator of the immune system. In animal models, it has been demonstrated that pretreatment with $1,25(OH)_2D$ is effective in preventing the onset of type 1 diabetes, multiple sclerosis, rheumatoid arthritis, and Crohn's disease.[15]

Our goal was to prove that optimal levels of vitamin D could be correlated with the increased number of circulating EPCs and angiogenic cells. The number of

Acknowledgments.—This research was supported in part by Allan P. Markin.

Corresponding author: N. A. Mikirova, PhD, Center for the Improvement Human Functioning International, Inc., Bio-communication Research Institute Division, 3100 N. Hillside, Wichita, KS 67219, USA.
E-mail: nmikirova@brightspot.org