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Prostates protected by vitamin D: study

By Stephen Daniells, 14-May-2008

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The benefits of vitamin D for prostates may be due to the action of the vitamin on a specific gene, suggests new research that deepens our understanding of how nutrients and genes interact.

Researchers from the University of Rochester Medical Center report that the active form of vitamin D in the body, 1,25-hydroxylvitamin D3 (1,25(OH)2D), may link with a gene known as G6PD, which releases an antioxidant enzyme and protect DNA from damage.

"Many epidemiological studies have suggested the beneficial properties of vitamin D," said lead researcher Yi-Fen Lee. *"Our findings reflect what we see in those studies and demonstrate that vitamin D not only can be used as a therapy for prostate cancer, it can prevent prostate cancer from happening."*

The study is published in the *International Journal of Cancer*.

The link between vitamin D intake and protection from cancer dates from the 1940s when Frank Apperly demonstrated a link between latitude and deaths from cancer, and suggested that sunlight gave *"a relative cancer immunity."*

Vitamin D refers to two biologically inactive precursors - D3, also known as cholecalciferol, and D2, also known as ergocalciferol. Both D3 and D2 precursors are hydroxylated in the liver and kidneys to form 25- hydroxyvitamin D (25(OH)D), the non-active 'storage' form, and 1,25-dihydroxyvitamin D (1,25(OH)2D), the biologically active form that is tightly controlled by the body.

There is growing evidence that 1,25(OH)2D has anticancer effects, but the discovery that non-kidney cells can also hydroxylate 25(OH)D had profound implications, implying that higher 25(OH)D levels could protect against cancer the local sites.

The new study, supported by a grant from the U.S. Department of Defense, appears to provide further compelling evidence of the potent anti-cancer benefits of 1,25(OH)2D.

Normal healthy prostate cells (BPH-1 and RWPE-1) and prostate cancer cells (CWR22R and DU 145) were subjecte to oxidative stress. The researchers found that 1,25(OH)2D induced G6PD (glucose-6-phosphate dehydrogenase), key antioxidant enzyme, in the healthy but not cancer cells. G6PD scavenges reactive oxygen species (ROS) associated with DNA damage.

"If you reduce DNA damage, you reduce the risk of cancer or aging," said Lee said. *"Our study adds one more beneficial effect of taking a vitamin D supplement. Taking a supplement is especially important for senior citizens and others who might have less circulation of vitamin D, and for people who live and work areas where there is les sunshine."*

"In this study, we have demonstrated that 1,25-(OH)2D can protect nonmalignant human prostate epithelial cells against H2O2-induced cell death through modulating the ROS defense systems, suggesting a possible role of 1,25-(OH)2D in prostate cancer prevention," stated the researchers in the journal.

Vitamin D - bad for cancers, good for you

Lee and co-workers noted that 1,25(OH)2D may act both as an antioxidant and a pro-oxidant, depending on the cellular environment, with a subtle pro-oxidant activity found in cancer cells, while it appears to behave as an antioxidant in normal healthy cells.

"[Our] data suggest that vitamin D might exert a subtle oxidative stress, which could stimulate the detoxification mechanisms to protect cells from the subsequent stress challenges; yet cancer cells lose the 1,25-(OH)2D-induced detoxification responses, therefore, 1,25-(OH)2D acts as a pro-oxidant in cancer cells," they said.

"Our results provide one mechanism to explain how 1,25-(OH)2D protects nonmalignant human prostate epithelial cells from oxidative stress to attenuate the accumulation of oxidative damages during the life.

"Therefore, vitamin D might be beneficial for preventing the development of age-dependent diseases," they concluded.

Source: *The International Journal of Cancer*

122, 2699-2706 (2008)

"Protective role of 1a, 25-dihydroxyvitamin D3 against oxidative stress in nonmalignant human prostate epithelial cells"

Authors: B.-Y. Bao, H.-J. Ting, J.-W. Hsu, Y.-F. Lee