Study: Vitamin D may play a role in prostate cancer disparities

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Vitamin D deficiency could be the reason African American men experience more aggressive prostate cancer at a younger age compared with European American men, new research from Cedars-Sinai Cancer

suggests. The multi-institutional study, published today in *Cancer Research Communications*, could pave the way for revised nutritional guidelines.

While previous research has investigated vitamin D in the context of health disparities, this is the first study to look at its functions in a genome-wide manner in African American versus European American men.

"African American men are more likely than European American men to develop prostate cancer, and are twice as likely to die from the disease," said Moray Campbell, Ph.D., research scientist at Cedars-Sinai Cancer and senior author of the study. "Large-scale studies have shown that differences in access to health care do not fully account for this health disparity, and our study identifies biological factors that might explain it."

Vitamin D helps the body absorb calcium, which is essential for bone health, but it also helps stimulate the maturation of cells, Campbell said. Unlike normal cells, cancer cells do not mature and die. They continue to divide, creating more and more abnormal cells.

"Without sufficient levels of vitamin D to cause them to mature, the cells in a tumor continue to multiply out of control," Campbell said.

Campbell and fellow investigators found that the vitamin D receptor, a protein that helps the body use vitamin D, appears to have adapted differently in people of African ancestry.

"The forebears of African American and European American men adapted to the climates where they originated," Campbell said. "African men retain higher melanin levels in the skin to protect against the strong sun—which also helps the body produce vitamin D. Because of this,

their descendants in the U.S., which receives fewer hours per year of bright sunshine than African countries do, are often vitamin D deficient."

When investigators examined prostate cancer cells from patients of African and European descent, developed in the lab of Clayton Yates, Ph.D., at Johns Hopkins School of Medicine, they noted differences between how these groups of cells reacted to exposure to vitamin D.

"Their response to vitamin D was very, very different, including which genes the vitamin D receptor was controlling and the magnitude of that control," Campbell said. "In African American men, this differing response made them more vulnerable to prostate cancer."

Campbell noted that further research along these lines could lead to a revision of nutritional guidelines for vitamin D intake—for both bone and prostate health—based on genetic ancestry. Further work, he said, is needed to determine the level of vitamin D that would be most beneficial for each group, and to examine how the vitamin D receptor works with other proteins associated with prostate cancer.

"Cedars-Sinai Cancer delivers care to one of the most diverse populations in the U.S., and this study is an example of the many initiatives underway to unlock the root causes of health disparities," said Dan Theodorescu, MD, Ph.D., director of Cedars-Sinai Cancer and the PHASE ONE Distinguished Chair. "It also shows how multi-institutional collaboration can maximize the potential of our work and why we place so much importance on our Community Outreach and Engagement (COE) team to engage diverse populations in cancer research."

Campbell and colleagues plan further investigation of a group of microRNAs—small molecules that help regulate gene expression—in regions of the genome regulated by the vitamin D receptor. They found

an association between these microRNAs and prostate cancer that could eventually be used to develop blood tests that offer a more complete picture of prostate health. The team also plans to examine vitamin D and its relationship to health disparities in other hormone-dependent cancers, such as breast cancer.

More information: African American Prostate Cancer Displays Quantitatively Distinct Vitamin D Receptor Cistrome-transcriptome Relationships Regulated by BAZ1A, *Cancer Research Communications* (2023).

Provided by Cedars-Sinai Medical Center