

Vitamin D + TB vaccine: Allies in fight against bladder cancer?

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The tuberculosis vaccine is often used as a treatment for bladder cancer, and adding vitamin D might improve the vaccine's effectiveness, according to new research from the University of Rochester Medical Center presented today at the American Urological Association annual meeting.

Yi-Fen Lee, Ph.D., associate professor of Urology at URM, has conducted a pre-clinical study in a mouse model showing that a combination of [vitamin D](#) therapy and the *Bacillus Calmette-Guerin* (BCG) [vaccine](#) greatly improves bladder [cancer survival](#). The next phase, an early clinical trial in patients, will begin soon as part of a collaborative research project between the URM's James P. Wilmot Cancer Center and the Roswell Park Cancer Institute in Buffalo.

The connection between vitamin D and tuberculosis was established long ago, when ancient societies sent people with TB into the sunlight for therapy. Increasing vitamin D levels is known to wake up cells and trigger an immune response whenever infection or inflammation is present.

Also well established is the use of the [TB vaccine](#) to treat several forms of bladder cancer. The vaccine works by pushing the body's immune system to fight the [cancer cells](#). However, approximately 30 to 40 percent of people with bladder cancer who receive the vaccine do not respond to it.

Lee is investigating whether a lack of vitamin D in these patients might explain the poor response.

Prior studies have shown that BCG, the modified bacteria that causes TB, turns on a toll-like receptor signal that makes more vitamin D receptors and induces a key enzyme that converts to the most potent, bioactive form of vitamin D, or 1,25-hydroxylvitamin D3. So Lee thought it was likely that boosting the levels of vitamin D in the body would activate this process, enhancing the vaccine.

The mouse study involved four arms: a control group, a group that received vitamin D treatment alone, a group that received BCG treatment alone, and a fourth group that received the combination of vitamin D and the [BCG vaccine](#). The latter (combination therapy) group was the only group in which 100 percent survived bladder cancer, Lee said.

"Vitamin D appears to be critical to the success of BCG immunotherapy," Lee said, although she does not advise taking high doses of vitamin D unless under medical supervision. "Just as importantly, though, we have shown the migration and signaling involved in establishing vitamin D as a biomarker that can be easily measured."

The Elsa U. Pardee Foundation funded Lee's research. An estimated 73,500 new cases of bladder cancer will be diagnosed in the United States in 2012, and more than 14,000 deaths are likely to occur. Cigarette smoking is implicated in about half of all cases of [bladder cancer](#) in men and women.

Provided by University of Rochester Medical Center

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