



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

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Project Title Effects of Dietary Vitamin D on the Progression of Breast Cancer Tumors in Mice	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Breast cancer is one of the leading causes of death among women in the USA, and numerous studies have shown a correlation between low levels of vitamin D in the blood and increased risk of cancer. Objective: To determine whether the anti cancerous properties calcitriol exhibits will affect the progression breast cancer (calcitriol is the active hormonal form of dietary vitamin D in the body) Hypothesis: If a subject diagnosed with breast cancer is treated with high concentrations of dietary vitamin D (vitD), then the progression of tumor growth will be slowed.</p> <p>Methods/Materials Female mice were divided into 3 groups that differed on dietary concentrations of vitamin D. There was a control group with normal diet;a high vitD diet group to induce high vitD levels in the system;a low vitD diet group to induce low vitD levels in the system. After one week, the mice were injected with breast cancer cells and monitored weekly for changes in body weight, tumor size and appearance. At the end of 7 weeks, tumors from 15 mice were excised and processed for determination of specific gene expressions. Treatment was continued in the remaining animals for an additional 2 weeks to assess differences in tumor growth rates. Methods for gene expression include RNA isolation and quantitative real-time PCR.</p> <p>Results There was no apparent difference between low vitD group and the control. Mice that were fed a high vitD diet demonstrated smaller tumor size and a two week delay in the appearance in the tumors. Using six genes for gene expression analysis, it was determined that the vitD was significantly inhibiting the growth of the cancer cell from local synthesis of calcitriol. Genes were CYP27B1, CYP24, Estrogen, COX2, CYP19, and vitD receptors, all of which drive cell proliferation.</p> <p>Conclusions/Discussion The experiment successfully demonstrated the beneficial effects of high vitD on the progression of breast cancer. With the results from the gene expression analysis, it was shown that a local synthesis of calcitriol within the tumor decreased cancer cell proliferation. Due to time constraints, the low vitD diet group was not sufficiently deficient in vitD levels and therefore exhibited similar characteristics to the control diet group. However, comparing the high vitD diet group to the control still helped to formulate the conclusion that the progression of breast cancer was slowed for mice treated with high vitD diets.</p>	
Summary Statement Derived from numerous studies, calcitriol exhibits anti-cancerous properties which provides the basis for the experimental setup that dietary vitamin D will slow the progression of breast cancer	
Help Received Used lab equipment at Stanford University under the supervision of Dr. Srilatha Swami and Dr. David Feldman	