**Project Title:** How does the Vitamin D Receptor Control Breast Cancer Invasiveness and Proliferation?  
**Code:** ANZAC7

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**Project Type:** Laboratory based

**Project Category:** Bone, Cancer

**Project Keywords:**
1. Breast Cancer  
2. Vitamin D receptor  
3. Metastasis  
4. Microarray

**Project Description:**
Breast cancer is the most prevalent malignancy in Western industrialised countries. Although diagnostic and therapeutic strategies have consistently improved over the past decades, up to 40% of breast cancer patients will develop metastatic bone disease. Bone metastases are amongst the most frequent sites of cancer spread with significant adverse effects on the patients’ quality of life and survival.

Over the past few years, our lab demonstrated that both calcium and vitamin D deficiency promotes the growth of human breast cancers in bone. We found that this effect is in part attributable to changes in the bone microenvironment, specifically to increased osteoclast activity, leading to an acceleration of the self-amplifying “vicious cycle of bone metastasis”. Our recent preliminary research indicates that not only vitamin D but also surprisingly the vitamin D receptor (VDR) itself exerts direct control over the behaviour of breast cancer cells. By knocking down the VDR in human breast cancer cells, we demonstrated that these cells showed reduced proliferation, but increased expression of markers of malignancy. However, the exact mechanisms by which the VDR exerts these regulatory effects remain to be investigated. Comparing VDR knockdown cells with parental control cells, we have identified by gene array analysis significant changes in the expression levels of genes associated with invasiveness (metastatic potential) and proliferation.

In this project you will help determine by which mechanisms the VDR controls breast cancer cell proliferation and invasiveness, via further gene array analysis and gene expression validation studies.