Abstract


Real-time cell analysis of the inhibitory effect of vitamin K2 on adhesion and proliferation of breast cancer cells.

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BACKGROUND: Breast cancer is the most prevalent cancer type worldwide. Continued efforts to improve treatment strategies for patients with breast cancer will be instrumental in reducing the death rates associated with this disease. In particular, the triple-negative breast cancer subtype of breast cancer has no targeted therapy available so it is essential to continue to work on any potential therapies. Vitamin K (VK) is known for its essential role in the clotting cascade. The antitumor properties of VK derivatives have been reported in both hepatocellular carcinoma and glioblastoma.

OBJECTIVE: Our hypothesis was that menaquinone-4, the most common form of vitamin K2 (VK2), is an effective anticancer agent against breast cancer cell types.

METHODS: In this study, we used a novel impedance-based live cell monitoring platform (xCELLigence) to determine the effects of VK derivatives on the triple-negative breast cancer cell line, MDA-MB-231, and the HER2+ breast cancer cell line, MDA-MB-453. Cells were treated with varying concentrations of menaquinone-4 (VK2) previously reported to have an antiproliferative effect on human glioblastoma cells. After initial testing, these concentrations were adjusted to 100, 125, and 150 μmol/L.

RESULTS: A significant dose-dependent, growth inhibitory effect was found when cells were treated at these concentrations. These effects were seen in both adhesion and proliferation phases and show a dramatic reduction in cell growth. Additional analysis of MDA-MB-231 cells treated with VK2 (100 μmol/L) in combination with a low-glucose nutrient media showed a further decrease in adhesion and viability.

CONCLUSION: This is the first study of its kind showing the real-time effects of VK derivatives on breast cancer cells and suggests that dietary factors may be an important consideration for patients.

PMID: 26082424