

## Accepted Manuscript

Vitamin D<sub>3</sub> decreases glycolysis and invasiveness, and increases cellular stiffness in breast cancer cells

J.M. Santos, Z.S. Khan, M.T. Munir, K. Tarafdar, S.M. Rahman, F. Hussain

PII: S0955-2863(17)30358-3  
DOI: doi: [10.1016/j.jnutbio.2017.10.013](https://doi.org/10.1016/j.jnutbio.2017.10.013)  
Reference: JNB 7875

To appear in: *The Journal of Nutritional Biochemistry*

Received date: 21 April 2017  
Revised date: 1 September 2017  
Accepted date: 18 October 2017



Please cite this article as: Santos JM, Khan ZS, Munir MT, Tarafdar K, Rahman SM, Hussain F, Vitamin D<sub>3</sub> decreases glycolysis and invasiveness, and increases cellular stiffness in breast cancer cells, *The Journal of Nutritional Biochemistry* (2017), doi: [10.1016/j.jnutbio.2017.10.013](https://doi.org/10.1016/j.jnutbio.2017.10.013)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# **Vitamin D<sub>3</sub> decreases glycolysis and invasiveness, and increases cellular stiffness in breast cancer cells**

Santos, J.M.<sup>#1</sup>; Khan, Z. S.<sup>#1</sup>; Munir, M. T.<sup>#2</sup>; Tarafdar, K.<sup>3</sup>; Rahman, S. M.<sup>\*2</sup>; Hussain, F.<sup>\*1</sup>

<sup>1</sup>Texas Tech University, Mechanical Engineering Department, Lubbock, Texas, USA

<sup>2</sup>Texas Tech University, Nutritional Sciences, Lubbock, Texas, USA

<sup>3</sup>Covenant Medical Center, Lubbock, Texas, USA

<sup>#</sup>Equal contribution <sup>\*</sup>Corresponding Authors

Breast cancer is one of the major causes of death in the USA. Cancer cells, including breast, have high glycolysis rates to meet their energy demands for survival and growth. Vitamin D<sub>3</sub> (VD<sub>3</sub>) is important for many important physiological processes such as bone mineralization, but its anticancer role is yet to be proven. We find that VD<sub>3</sub> treatment significantly downregulates glycolytic enzymes, genes, and decreases glucose uptake - for both lowly metastatic MCF-7 and highly metastatic MDA-MB231 (MB231) breast cancer cells. VD<sub>3</sub> also significantly decreases cell viability by inducing apoptosis - consistent with decreased expression of mammalian target of rapamycin (mTOR), which regulates glycolysis and cancer cell survival, and increases 5' adenosine monophosphate-activated protein kinase (AMPK) activation. These changes accompany a significant reduction of cell migration and increased cell stiffness - presumably a consequence of reversal of the epithelial to mesenchymal transition resulting in increased E-cadherin and F-actin expression. High levels of cytoskeletal and cortical F-actin may cause high cell stiffness. VD<sub>3</sub> induced mechanical changes are stronger in highly metastatic MB231 than in lowly metastatic MCF-7 cells. Our results suggest therapeutic and preventive roles of VD<sub>3</sub> in breast cancer.

**Keywords:** Breast cancer, Vitamin D<sub>3</sub>, glycolytic enzymes, cell mechanics, cell migration, EMT.

Download English Version:

<https://daneshyari.com/en/article/8336433>

Download Persian Version:

<https://daneshyari.com/article/8336433>

[Daneshyari.com](https://daneshyari.com)