

2013

AKAP7 Regulates CaM Kinase Activation in MCF-7 Cells

John M. Schmitt

George Fox University, jschmitt@georgefox.edu


Hannah M. McFarland

George Fox University

Kimberly Dodge-Kafka

University of Connecticut School of Medicine and Dentistry

Follow this and additional works at: http://digitalcommons.georgefox.edu/bio_fac

 Part of the [Biochemistry, Biophysics, and Structural Biology Commons](#), and the [Biology Commons](#)

Recommended Citation

Schmitt, John M.; McFarland, Hannah M.; and Dodge-Kafka, Kimberly, "AKAP7 Regulates CaM Kinase Activation in MCF-7 Cells" (2013). *Faculty Publications - Department of Biology and Chemistry*. Paper 74.
http://digitalcommons.georgefox.edu/bio_fac/74

This Article is brought to you for free and open access by the Department of Biology and Chemistry at Digital Commons @ George Fox University. It has been accepted for inclusion in Faculty Publications - Department of Biology and Chemistry by an authorized administrator of Digital Commons @ George Fox University. For more information, please contact arolfe@georgefox.edu.

AKAP7 Regulates CaM Kinase Activation in MCF-7 Cells

Hannah M. McFarland¹, Kimberly Dodge-Kafka² and John M. Schmitt¹

1 Biology, George Fox University, Newberg, OR

2 Cell Biology, University of Connecticut Health Center, Farmington, CT

Abstract

Estrogen (E2) activates calcium/calmodulin-dependent protein kinases (CaM Kinases) in MCF-7 breast cancer cells. In particular E2 activates a CaM KK, CaM KI, and ERK pathway to promote proliferation. CaM Kinase activation of ERK may be blocked by PKA in certain cell types through direct phosphorylation and inhibition of CaM KK. The ability of PKA to phosphorylate its cellular targets may be dictated by protein kinase A anchoring proteins (AKAPs). Hormones that elevate cAMP and activate PKA may utilize AKAPs to regulate signal transduction. Our goal was to evaluate the role of AKAPs in regulating E2 activation of the CaM KK and CaM KI pathway in MCF-7 cells. We also examined the ability of vitamin D (VitD) working through cAMP and PKA to block CaM KK signaling in breast cancer cells. Our results suggest that E2 activates CaM KK and CaM KI within 5 minutes. VitD promoted PKA-dependent phosphorylation of CaM KK. VitD and epinephrine treatment of cells triggered a potent increase in cAMP levels. Interestingly, purified GST-R11 pulled down both CaM KK and CaM KI. Similarly, purified AKAP7 but not AKAP5 bound CaM KK and CaM KI an effect that is enhanced with E2. Endogenous AKAP7 and CaM KK associated in E2-stimulated but not in VitD-treated cells and VitD also blocked CaM KK activation in MCF-7 cells. Our results suggest that VitD blocks E2 activation of CaM Kinases and their association with AKAP7 in MCF-7 cells.