Cancer Science-2013
OMICS Group Conferences
Accelerating Scientific Discovery
3rd World Congress on
Cancer Science & Therapy
October 21-23, 2013 DoubleTree by Hilton Hotel San Francisco Airport, USA

Effect of calcium ions on neuroblastoma differentiation

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Abstract

Most neuroblastomas are undifferentiated tumors that consist of small, round cells called neuroblasts that have little or no neural differentiation. Neuroblastomas develop when normal fetal neuroblasts fail to become mature nerve cells, but instead continue to grow and divide. Current research focuses on finding small molecules that induce differentiation of neurons to produce nerve cells which otherwise would undergo proliferation and become malignant tumors.

To test this a small ion calcium (Ca) was selected as it is known to induce neuroblastoma differentiation. N2a cells were treated with Ca ions in the form of Calcium chloride and effect of Ca ions was evaluated morphologically and through phase contrast microscopy.

Calcium alone at 10mM was sufficient to generate an extensive web of neurite outgrowth. The efficacy of calcium in eliciting the morphological change in mouse neuroblastoma cells was comparable with or even better than that of Bt2cAMP. Thus as a function of dose response and time course it was determined that Ca ions specifically and selectively induced neurobalstoma differentiation and constant presence of Ca ions was eminent for neurite outgrowth. If calcium was depleted during the course of differentiation, n2a cells failed to differentiate into neurons.During the course of the proliferation assay using N2a neuroblastoma cells, we noticed that the presence of calcium in the culture appeared to promote neurite outgrowth, a hallmark of neuroblastoma cell differentiation. Calcium ions selectively and specifically induce differentiation of neuroblastoma cell.

This is the first study to show that in the absence of an external constant calcium source neuroblastoma cells continued to proliferate.

Biography

Priti Tiwari is pursuing a PhD at Rutgers University in the Chemistry & Chemical Biology. She is working on finding small molecule modulators of cellular differentiation processes particularly in the field of tumors and obesity.