

Chemopreventive Effects of Magnesium Chloride Supplementation on Hormone Independent Prostate Cancer Cells

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Abstract

BACKGROUND: Lifestyle significantly impacts the risk factors of prostate cancer, of which diet appears to be the most influential. An emerging chemopreventive approach, which involves the adequate intake of dietary constituents, has shown great potential in preventing the occurrence or progression of cancer. Magnesium is known to be an essential cofactor for more than 300 enzymatic processes, and is responsible for the regulation of various cellular reactions in the body. A plethora of studies have shown evidence that changes in the intracellular levels of magnesium could contribute to cell proliferation, and apoptosis in some normal and malignant cells.

OBJECTIVES: The aim of the study was to investigate the effects of magnesium chloride ($MgCl_2$) in DU-145 prostate cancer cells.

METHODOLOGY: Cultured DU-145 cells were subjected to graded concentrations (50-500 μM) of $MgCl_2$ for 48 hours. The cell viability was assessed using MTT and Resazurin reduction assays.

NBT assay was also used to assess the treatment-induced intracellular ROS levels. Acridine Orange/Ethidium Bromide (AO/EB) and Rh123/EB fluorescent stains were used to assess the cell death type and mitochondria membrane potential ($\Delta\psi_m$) respectively.

RESULTS: The results revealed a dose-dependent decrease ($P < 0.05$) in cell viability in treated DU-145 cells after 48 hours. The NBT assay also revealed a dose dependent biphasic response ($P < 0.05$) in intracellular levels of ROS. There was a drop ($P < 0.05$) in ROS levels in all groups except at 100 μM , where ROS level was higher than the control. Apoptosis was the primary mode of cell death as observed in the fluorescence analysis.

CONCLUSION: Our finding suggests that $MgCl_2$ may be potentially chemopreventive for prostate cancer. This justifies further studies into its mechanism of action in DU-145 and other prostate cancer cell types.

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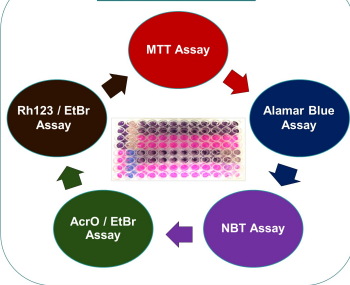
INTRODUCTION

- In 2015 alone, an estimated 220,800 new cases and 27,540 deaths are expected to occur due to prostate cancer in US men, adding to the burden of the over 2.6 million men currently living with the disease [1].
- Magnesium is an essential cofactor for more than 300 enzymatic processes, and it is responsible for the regulation of various cellular reactions in the body [2].
- Recent studies have suggested that changes in the intracellular levels of magnesium could contribute to cell proliferation and apoptosis in some normal and abnormal cells [3].

OBJECTIVES

- To investigate the chemopreventive effects of Magnesium Chloride (MgCl₂) on DU-145 prostate cancer cells in vitro.

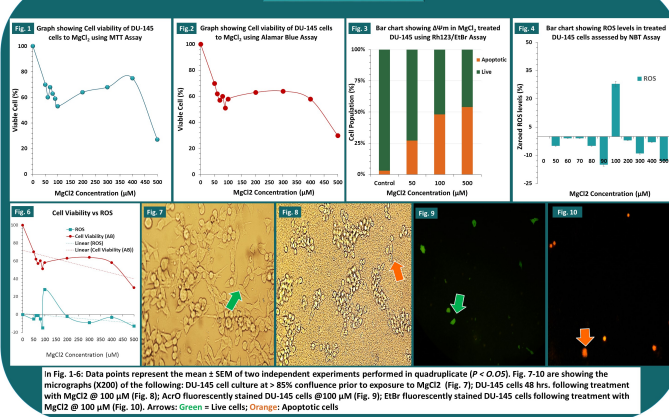
MATERIALS AND METHODS



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RESULTS



DISCUSSION & CONCLUSION

- The results show a dose-dependent decrease (P < 0.05) in cell viability in treated DU-145 cells after 48 hours.
- The NBT assay also show a dose-dependent biphasic response (P < 0.05) in intracellular levels of ROS.
- Apoptosis appears to be the primary mode of cell death.
- Our findings suggest that MgCl₂ may be potentially chemopreventive for prostate cancer due to its anti-proliferative and apoptotic effects in DU-145 cells.
- This justifies further studies into its mechanisms of action in DU-145 and other prostate cancer cell types.

REFERENCES

- America Cancer Society. Cancer facts and figures, 2015. Atlanta, USA. www.cancer.org/acs/groups/content
- Guerrera M, P, Volpe S. L. et al. Therapeutic Uses of Magnesium. American Family Physician, 2009; 80: 1-6.
- Cappadone C, Merolle L et al. Intracellular magnesium content decreases during mitochondria-mediated apoptosis induced by a new indole-derivative in human colon cancer cells. Magnes. Res., 2012; 25(3): 104-11 doi:10.1684/mrh.2012.0319.