

# The Antihelminthic Drug, Mebendazole, Induces Apoptosis in Adult T-Cell Leukemia/Lymphoma Cancer Cells: *In-Vitro* Trial

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## ABSTRACT

**Background:** Adult T-cell leukemia/lymphoma (ATLL) is a poor prognostic Hematopoietic malignancy with various therapeutic challenges, which had been classified as non-Hodgkin lymphoma. The Drug switching, as a novel, innovative and promising approach, is an opportunity to overcoming on therapeutic challenges of hard-treating disease, e.g. ATLL. Our aim is evaluating the antiproliferative and apoptotic effect of Mebendazole (MBZ) on ATLL cancer cells in *in-vitro* conditions.

**Materials and Methods:** We used Jurkat cell-line as ATLL cancer cells. After treatment of MBZ in different concentrations on jurkat cells, the cell viabilities were determined by MTT assay. After IC<sub>50</sub> value determination, the 24-, 48- and 72-h treatments had been performed in IC<sub>50</sub> concentration and control to evaluating the quantitative apoptosis rate by Annexin/PI Flowcytometry and qualitative apoptosis by DAPI Nuclear staining. Also, Glucose spectrophotometry were performed to evaluate the reduced amount of glucose uptake through MBZ treatment.

**Results:** MBZ inhibits proliferation of jurkat cells and IC<sub>50</sub> value had been estimated 10 µM ( $P < 0.01$ ). According to the flowcytometric results, increasing in drug concentration is associated with decrease cell viability and the percentage of full-apoptosis. However, it inversely correlates with percentage of early-apoptosis rate. Also, the microscopic captures of DAPI Nuclear staining confirms the flowcytometry results in qualitative manner. In addition, it was found that inhibition of glucose uptake was inversely correlated with increased MBZ concentration ( $P < 0.05$ ).

**Conclusion:** MBZ potentially inhibits the proliferation of ATLL cancer cells in *in-vitro* condition. MBZ inhibits the growth of Jurkat cells by inducing apoptosis. Also, we suggest that indirectly inhibition of Glucose transporting occurs by MBZ, which could induce apoptosis in cancer cells.

**Keywords:** Adult T-cell leukemia/lymphoma; Mebendazole; Drug switching; Apoptosis

## INTRODUCTION

Adult T-cell Leukemia/Lymphoma (ATLL) is an aggressive hematopoietic malignancy associated with Human Lymphotropic virus 1 (HTLV-1) with a

poor prognosis<sup>1,2</sup>. Currently, treatments of ATLL are based on Azacytidine and Interferon-alpha (combined chemotherapy), zidovudine and Cyclophosphamide-Hydroxydaunorubicin-Oncovin-

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