

# The Effects of Valproic Acid on Viability of MCF-7 Cell Line

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**Abstract:** Valproic acid is used in the epilepsy, bipolar and migraine therapy. As a histone deacetylase inhibitor, valproic acid has been recently under investigation in cancer treatment. This study was done to determine the effect of valproic acid on viability of MCF-7 breast cancer cell line. In this experimental study, MCF-7 cell line was obtained from the Iranian Pasteur Institute. The cells were treated and incubated by different concentrations of valproic acid (1, 2, 4, 8, 16, 32 and 64 mM). Cell viability was evaluated with trypan blue staining. There was a significant dose-dependent correlation between reduction of MCF7 cell viability with valproic acid concentration ( $P < 0.05$ ). Valproic acid caused a significant decline in the viability of MCF-7 breast cancer cell line.

**Keywords:** Breast cancer, MCF-7, Valproic acid, Viability..

## 1. Introduction

Breast cancer is a complex disease that genetic and environmental factors contribute a lot in it. Chance of getting breast cancer goes up with age. In addition, female gender is a risk factor for breast cancer. Breast cancer is the most common cancer in women after skin cancer (non-melanoma) and the second leading cause of death cancer in women after lung cancer. Women's risk of developing invasive breast cancer in women is about 13 percent [1]. Nowadays, for breast cancer treatment methods such as surgery, chemotherapy and radiation therapy are used [2]. Valproic acid is an inhibitor of histone deacetylase that in treating certain types of epilepsy and depression is used [3]-[5]. This compound has been studied as an anti-cancer agent that can be used both alone and in combination with other conventional cancer treatments such as chemotherapy and radiation [6]-[8]. However, some studies have shown that valproic acid protective effect against apoptosis in some of cancer cells creates that is still not known of the mechanism [9]. Given the widespread prevalence of breast cancer and the importance of dealing with it, further studies are necessary to discover new anticancer drugs and compounds that can increase the effectiveness and to reduce possible side effects. This study was carried out to determine the effect of Valproic acid on viability of MCF-7 breast Cancer cell line, and the results of this study will be useful in the treatment of breast Cancer.

## 2. Material and Method

In this study, MCF-7 cell line in growing was obtained from the Iranian Pasteur Institute. Cells were placed in, incubator 37 ° C and 95% humidity and carbon dioxide 5%. After counting cells under a microscope by Neubauer slide, 5000 cells were transferred to plate. The cells were treated and incubated by different concentrations of valproic acid (1, 2, 4, 8, 16, 32 and 64 mM). Cell viability was evaluated with trypan blue staining. Data were analyzed using ANOVA.

### 3. Results

Figure I shows MCF7 cell viability at different concentrations (1, 2, 4, and 8 mM) of valproic acid at different periods (24, 48, and 72 h).

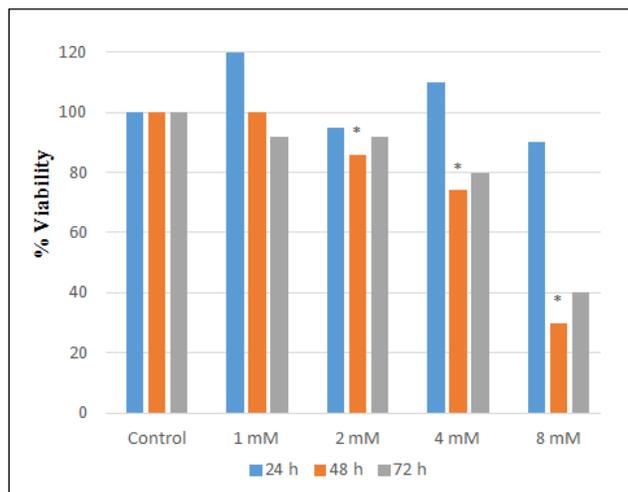


Fig. 1: Viability of MCF-7 cell Line compared to control group.

Our results indicated that 2, 4 and 8 mM of valproic acid started to exert significant cytotoxic effects on MCF7 cells exert 48 hours after incubation show ( $P < 0.05$ ).

### 4. Discussion

The results of this study showed that appropriate doses of valproic acid caused a significant decline in viability of MCF-7 breast cancer cell line. In this regard, in study Byun and et al, valproic acid therapy resulted in a significant decrease leading to a significant reduction in colony -forming ability and cell invasion , and the effect of the drug in different types of medication were different [10]. Our results are also consistent with the results of Arakawa and et al, showing that the use of valproic acid can stop the cell cycle in phase G1, and stop cell proliferation. The effectiveness of valproic acid in cancer cells sensitive to estrogen also has been established[11]. There are also studies showing that simultaneous use of valproic acid and anticancer drugs induces apoptosis in various cancer cells [11], [12].

### 5. Conclusion

The results of this study showed that valproic acid caused a significant decline in viability of MCF-7 breast cancer cell line.

### 6. Acknowledgment

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