Characterizing the Effects of Benzyl-Amino Alcohol on Cell Growth, Viability, and Migration

Abstract

Although our understanding of cancer becomes increasingly advanced each year, it is still the leading cause of death around the world. Specifically, immunotherapies are not as effective in tumors like breast and prostate cancer. One of the many reasons causing this phenomenon is the sophisticated pathogenesis of both cancer types, particularly in early-and-late-stage prostate and triple-negative breast cancer. However, some biological compounds are in development for their antitumor characteristics. Dr. Jeff Hansen and his laboratory at DePauw have successfully synthesized many compounds exhibiting these antitumor behaviors. Tests performed on the slow-growing MCF-7 cancer cell line outline the positive outcomes for these new biochemical compounds.

The research we are performing investigates a new compound classified as benzyl-amino alcohol and begins a new endeavor into the effects of this class of compound. In gastric cancer and lung cancer, amino alcohols have been shown to demonstrate anti-cancer properties. This research shows this compound causes cell death, affecting the tumor cells while leaving the healthy cells unaltered. This compound would work well in chemotherapies because affecting healthy cells can lead to a patient's health decline.

Background

Breast Cancer

Breast cancer remains a widespread affliction affecting women across the globe. Despite the availability of various treatments such as surgical procedures, hormonal therapy, chemotherapy, and radiation, the evolution of breast cancer varies. Some metastatic tumors exhibit resistant qualities to therapeutic approaches, which emphasizes the urgency of conducting research and advancing the development of novel treatments.

MCF-7

MCF-7 is a human breast cancer cell line containing mostly estrogen and progesterone receptors. These cells are used in laboratory settings because of their ability to process estrogen.

Benzyl-amino alcohol

A compound derivative of other amino alcohols, which contain anti-cancer properties. This compound is soluble in ethanol and therefore safer for cells in high concentrations. Drugs delivered via ethanol create easier and safer environments in clinical settings.

Results

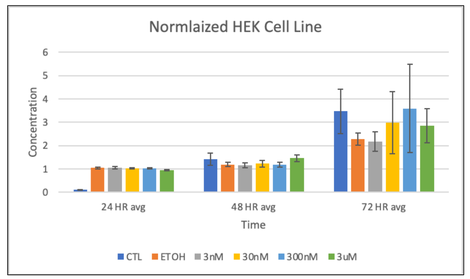

Fig. 1: HEK cell concentration in relation to time, with each time interval indicates the average concentration normalized to the three 24-hour control plates.

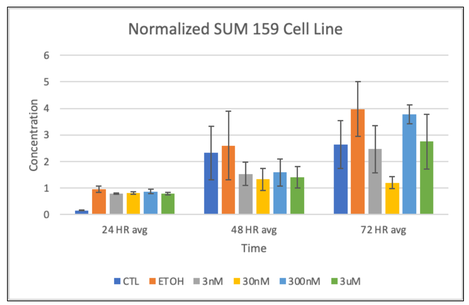

Fig. 2: SUM cell concentration in relation to time, with each time interval indicates the average concentration normalized to the three 24-hour control plates.

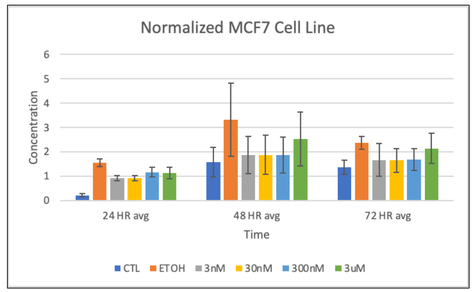

Fig. 3: MCF7 cell concentration in relation to time, with each time interval indicates the average concentration normalized to the three 24-hour control plates.

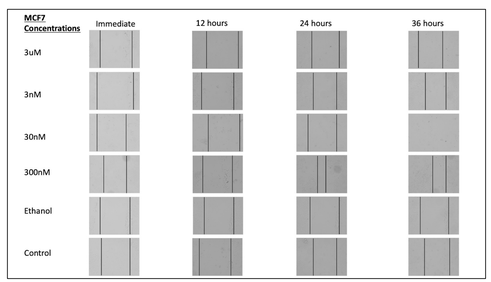

Fig. 4: Depicts cell migration of the MCF7 cell line in different concentrations of benzyl-amino alcohol at four different time intervals.

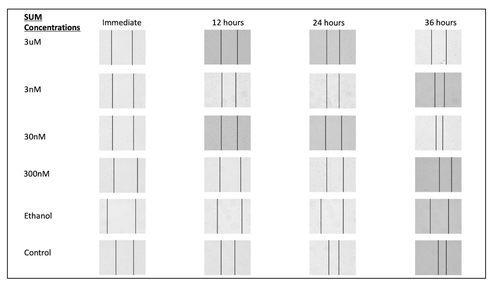

Fig. 5: Depicts cell migration of SUM cells in different benzyl-amino alcohol concentration at four different time intervals.

Results Continued

Figures 1-3 illustrate the average concentration of cells in three 24-well plates in comparison to the control group. In the initial three figures, there is no difference in absorbance levels between healthy and cancerous cells during the 24-hour incubation period. However, during the 48-hour incubation period for SUM and MCF7, there is a slight increase in absorbance levels, specifically in relation to ethanol concentration. In contrast, HEK cells show similar trends in both the 24-hour and 48-hour incubation periods. The 72-hour incubation period reveals an overall increase in absorbance across all concentrations, but MCF7 and SUM cells exhibit differing concentrations and absorbance levels. Notably, MCF7 cells display a decrease in absorbance levels, with the highest decline observed in response to ethanol. Conversely, SUM cells exhibit the highest absorbance levels during this incubation period, with 30nM concentration significantly surpassing all other concentrations. Figures 4 and 5, these graphs depict cell migration for all concentrations and cell lines. In comparison, the migration of MCF7 cells appears to be less pronounced than that of SUM cells. The SUM cell line consistently exhibits greater migration than MCF7 cells, and these migration patterns do not converge at any point.

Conclusion

Higher absorbance levels is directly proportional to an increase in cell concentration. This was observed in the HEK cells, while the SUM and MCF7 lines absorbance levels decreases. 30nM is the only significant concentration within the SUM cell lining. Reducing cancer cells is favorable for continued research. Based on the results, we can conclude that benzyl-amino alcohol not only allows healthy cells to survive and grow but mitigates migration and cell growth in SUM and MCF7 cells.

Acknowledgments

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