Turmeric and Resveratrol Effect on HeLa Cell Viability

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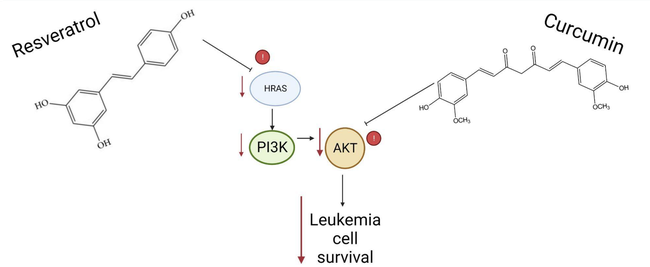
Abstract

Why are we investigating using turmeric and resveratrol?

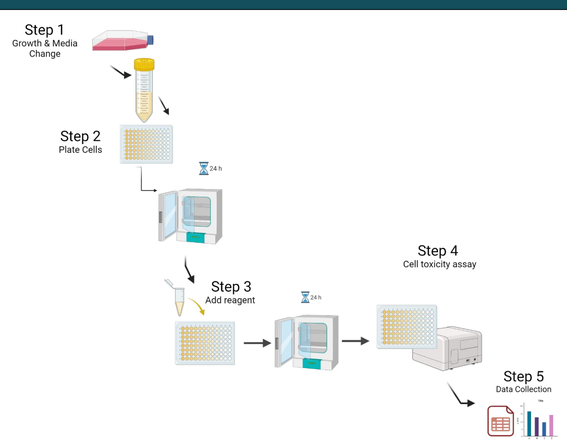
Cancer is a major health concern worldwide, and the development of effective treatments is a top priority in the scientific community. Turmeric and resveratrol are natural compounds derived from plants, and previous studies have shown promise in their anticancer properties. This study aims to investigate turmeric and resveratrol's effectiveness in reducing the viability of human cervical cancer cells, specifically HeLa cells. We hypothesize that both turmeric and resveratrol will be more effective at reducing HeLa cell viability at increasing concentration.

Introduction



- Resveratrol and Curcumin (a compound found in turmeric) have inhibitory effects on leukemia cell survival
- Both affect the PI3K/AKT signaling pathway.
- Resveratrol effects are upstream of AKT on HRAS, whereas curcumin directly inhibits AKT

Materials and Methods



Results

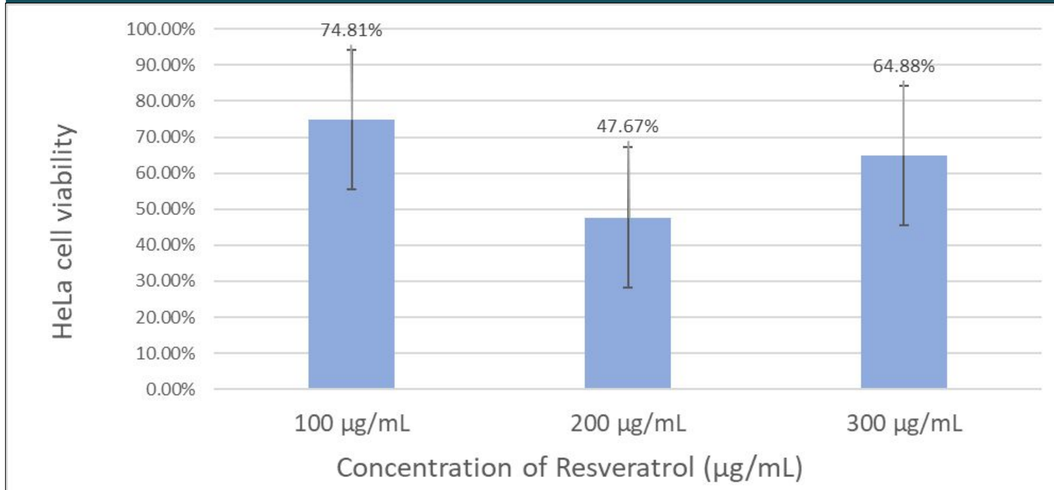


Figure 1. Resveratrol effect on HeLa cell viability at increasing concentration.

Each bar represents the percent viability of HeLa cells under increasing concentrations of resveratrol (µg/mL). Each resveratrol concentration was subjected to three trials in triplicate, with the average vitality of HeLa cells computed from the results. The error bars are standard deviations directly calculated from the data at all three concentrations of resveratrol.

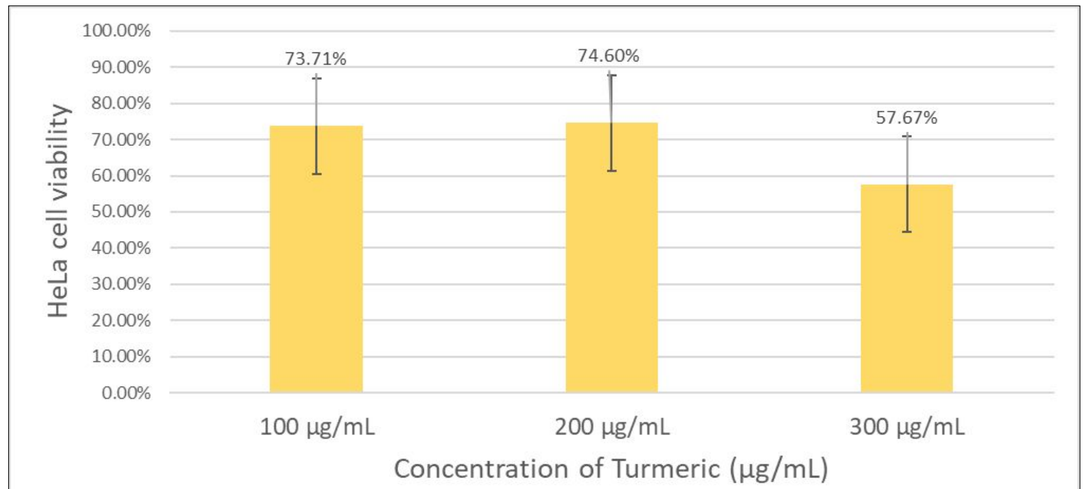


Figure 2. Turmeric effect on HeLa cell viability at increasing concentration.

Each bar represents the percent viability of HeLa cells under increasing concentrations of turmeric (µg/mL). Each turmeric concentration was subjected to three trials in triplicate, with the average viability of HeLa cells computed from the results of those trials. The error bars are standard deviations directly calculated from the data at all three concentrations of turmeric.

Graph Interpretation

- Inhibition of HeLa cells expressed in both turmeric and resveratrol
- At 200 µg/mL, resveratrol exhibited a higher effect in lowering HeLa cell viability than turmeric
- At 300 µg/mL, turmeric showed a higher impact in reducing HeLa cell viability than resveratrol
- Minor differences in HeLa cell viability for turmeric at 100 µg/mL and 200 µg/mL.
- Turmeric and resveratrol expressed similar inhibition of HeLa cells at 100 µg/mL

Discussion & Conclusions

- Both resveratrol and turmeric inhibit HeLa cell viability
- Cannot conclude that one is better than the other at inhibiting HeLa cell viability due to varied results expressed at all three concentrations used
- Turmeric data showed a minor standard deviation in inhibition, meaning that data shows less variability than the resveratrol data.

Future Research

- Further studies are needed to determine how resveratrol effects HeLa cell viability compared to turmeric.
- An increase in the dose-response relationship between turmeric and resveratrol can be established with various concentrations.
- HeLa cells could be tested to see if turmeric combined with resveratrol enhances viability reduction.
- Explore the effects of turmeric and resveratrol on other cancers in the future.

References

- Kuttikrishnan, S., Siveen, K. S., Prabhu, K. S., Khan, A. Q., Ahmed, E. I., Akhtar, S., Ali, T. A., Merhi, M., Dermime, S., Steinhoff, M., & Uddin, S. (2019). Curcumin Induces Apoptotic Cell Death via Inhibition of PI3-Kinase/AKT Pathway in B-Precursor Acute Lymphoblastic Leukemia. *Frontiers in oncology*, *9*, 484. https://doi.org/10.3389/fonc.2019.00484
- Li, L., Qiu, R. L., Lin, Y., Cai, Y., Bian, Y., Fan, Y., & Gao, X. J. (2018). Resveratrol suppresses human cervical carcinoma cell proliferation and elevates apoptosis via the mitochondrial and p53 signaling pathways. *Oncology letters*, *15*(6), 9845–9851. https://doi.org/10.3892/ol.2018.8571
- Sun, X., Fu, P., Xie, L., Chai, S., Xu, Q., Zeng, L., Wang, X., Jiang, N., & Sang, M. (2021). Resveratrol inhibits the progression of cervical cancer by suppressing the transcription and expression of HPV E6 and E7 genes. *International journal of molecular medicine*, *47*(1), 335–345. https://doi.org/10.3892/ijmm.2020.4789
- Takashina, M., Inoue, S., Tomihara, K., Tomita, K., Hattori, K., Zhao, Q. ... Hattori, Y. (2017). Different effect of resveratrol to induction of apoptosis depending on the type of human cancer cells. International Journal of Oncology, 50, 787-797. https://doi.org/10.3892/ijo.2017.3859
- Zhang, X., Wang, R., Chen, G., Dejean, L., & Chen, Q. H. (2015). The Effects of Curcumin-based Compounds on Proliferation and Cell Death in Cervical Cancer Cells. *Anticancer research*, *35*(10), 5293–5298.