# Assessing the Anticancer Properties of Ethyl Acetate Extract from *Ruta graveolens* in lung cancer by *in vitro* and cell-based assays.

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## Abstract (300 word limit)

Over a decade, there have been considerable advances in treating patients with EGFR mutant NSCLC, but the high toxicity and resistance acquired remains an important challenge in treatment warranted for developing new TKIs. Currently available TKIs eventually develop resistance within 9-13 months of the after-use along with high toxicity profile. This study aims to identify a plant based inhibitor to reduce the toxicity and to increase the overall survival rate. We have counted the *Ruta graveolens* plant for our study. On developing several extract, study revealed that ethyl acetate extract is the potent extract to inhibit the lung cancer. This study involves the identification of potent extract against lung cancer with low toxicity. Extraction was done using soxhlet extraction method. The identified extract's efficacy was determined by *in vitro* kinase inhibition assays with purified protein and Cell viability assays i.e., MTT assay with A549, A431 and H1299 cell lines also the validation has been done by flow cytometry Annexin/PI assays and TUNEL assays. 8 extracts prepared were polar and nonpolar, which were validated by *in vitro* enzyme studies, showing that Ethyl Acetate Extract has shown excellent inhibition activity. In cell based assays in MTT and cell cytotoxicity assays, ethyl acetate extract was able to inhibit A431 and H1299 cells in a potential manner, the apoptotic property was validated by flow cytometry Annexin/PI assays and TUNEL assays. Our findings revealed that the ethyl acetate extract from *Ruta graveolens* demonstrated effects on lung cancer cells with IC50 values in the low microgram range. Mechanistic studies showed that it induced cell cycle arrest at early phases of cell cycle at G0/G1 phase phases and triggered apoptosis in a dose dependent manner. Importantly it exhibited selectivity for lung cancer cells than lung cells suggesting a favourable therapeutic index.In all tested extracts, ethyl acetate extract has shown promising activity. This extract will be further carried for pull down assay to identify the potent molecule.

## Recent Publications

- Singh, D., Kushwaha, T., Kulandaisamy, R., **Kumar, V.,** Baswal, K., Tiwari, S. H.,& Inampudi, K. K. (2023). Interaction of SCoV-2 NSP7 or NSP8 alone with NSP12 causes constriction of the RNA entry channel: Implications for novel RdRp inhibitor drug discovery. bioRxiv, 2023-07.
- Kulandaisamy R, Kushwaha T, Dalal A, **Kumar V** , Singh D, Baswal K, Sharma P,Praneeth K, Jorwal P, Kayampeta SR, Sharma T. Repurposing of FDA Approved Drugs Against SARS-CoV-2 Papain-Like Protease: Computational, Biochemical, and in vitro Studies. Frontiers in microbiology. 2022;13.
- Kulandaisamy R, Kushwaha T, **Kumar V** , De S, Kumar S, Upadhyay SK, Kumar M, Inampudi KK. Characterization of active/binding site residues of peptidyl-tRNA hydrolase using biophysical and computational studies. International journal of biological macromolecules. 2020 Sep 15;159:877-85.
- Batra, R., Agarwal, P., Tyagi, S., Saini, D.K **., Kumar, V.** , Kumar, A., Kumar, S.,Balyan, H.S., Pandey, R., and Gupta, P.K. (2019). A study of CCD8 genes/proteins in seven monocots and eight dicots. PLoS ONE 14, e0213531. |https://doi.org/10.1371/journal.pone.0213531 March 12, 2019.

**Photograph**



## Biography (150 word limit)

He is deeply engaged in the realms of protein chemistry and structural biology, where his expertise shines in the intricate art of crafting drug-like compounds. His skills extend to the discerning task of identifying active compounds within plant extracts, conducting meticulous in vitro assays, and delving into cell-based studies. Driven by a fervent enthusiasm for groundbreaking advancements, He has set his sights on developing innovative drugs sourced from plant extracts to combat Lung cancer. Impressively, he has already pinpointed a specific plant and its extract that exhibit promising potential in the fight against Lung cancer. Beyond his individual pursuits, he embodies the spirit of collaborative research. As a dedicated and passionate researcher, he generously lends his knowledge and support to fellow colleagues, aiding them in the thoughtful design and execution of their projects. His commitment to advancing scientific exploration extends beyond personal ambitions, creating a dynamic and collaborative research environment.

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**Notes/Comments:**