

Title: The experimental significance of isorhamnetin as an effective therapeutic option for cancer: A comprehensive analysis

Author Names: Partha Biswas , Md Abu Kaium , Md Mohaimenul Islam Tareq , Sadia Jannat Tauhida , Md Ridoy Hossain , Labib Shahriar Siam , Anwar Parvez , Shabana Bibi , Md Hasibul Hasan , Md Moshir Rahman , Delwar Hosen , Md Ariful Islam Siddiquee , Nasim Ahmed , Md Sohel , Salauddin Al Azad , Albaraa H Alhadrami , Mohamed Kame, Mariam K Alamoudi , Md Nazmul Hasan , Mohamed M Abdel-Daim

Abstract: Isorhamnetin ($C_{16}H_{12}O_7$), a 3'-O-methylated derivative of quercetin from the class of flavonoids, is predominantly present in the leaves and fruits of several plants, many of which have traditionally been employed as remedies due to its diverse therapeutic activities. The objective of this in-depth analysis is to concentrate on Isorhamnetin by addressing its molecular insights as an effective anticancer compound and its synergistic activity with other anticancer drugs. The main contributors to Isorhamnetin's anti-malignant activities at the molecular level have been identified as alterations of a variety of signal transduction processes and transcriptional agents. These include ROS-mediated cell cycle arrest and apoptosis, inhibition of mTOR and PI3K pathway, suppression of MEK1, PI3K, NF- κ B, and Akt/ERK pathways, and inhibition of Hypoxia Inducible Factor (HIF)-1 α expression. A significant number of in vitro and in vivo research studies have confirmed that it destroys cancerous cells by arresting cell cycle at the G2/M phase and S-phase, down-regulating COX-2 protein expression, PI3K, Akt, mTOR, MEK1, ERKs, and PI3K signaling pathways, and up-regulating apoptosis-induced genes (Casp3, Casp9, and Apaf1), Bax, Caspase-3, P53 gene expression and mitochondrial-dependent apoptosis pathway. Its ability to suppress malignant cells, evidence of synergistic effects, and design of drugs based on nanomedicine are also well supported to treat cancer patients effectively. Together, our findings establish a crucial foundation for understanding Isorhamnetin's underlying anti-cancer mechanism in cancer cells and reinforce the case for the requirement to assess more exact molecular signaling pathways relating to specific cancer and in vivo anti-cancer activities.

Keywords: Apoptosis; Isorhamnetin; Nanomedicine; ROS; Signaling Pathways; Synergistic Effects.

<https://pubmed.ncbi.nlm.nih.gov/38861855/>

DOI: [10.1016/j.biopha.2024.116860](https://doi.org/10.1016/j.biopha.2024.116860)