Natural chromones targeting autophagy signalling pathways as potential anticancer interventions: a systematic review

Results in Chemistry • Review • *Open Access* • 2025 • DOI: 10.1016/j.rechem.2025.102601

Shamsudin, Nur Farisya [a] ; Mat Nawi, Amira Rusyda [a] ; Jantan, Ibrahim [b, c] ; Salim, Emil [c] ; Abdullah, Maryam Aisyah [a] ; +8 authors

[a] Department of Pharmaceutical Chemistry, Kulliyyah of Pharmacy, International Islamic University Malaysia (IIUM), Bandar Indera Mahkota, Pahang, Kuantan, 25200, Malaysia

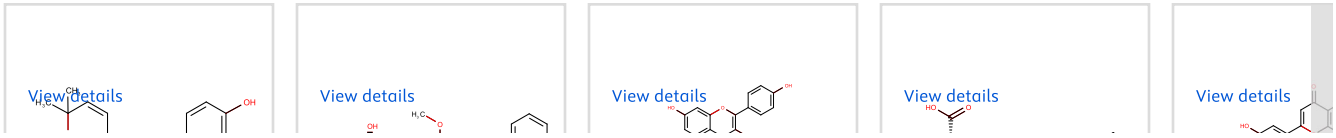
Abstract

Chromones, a class of natural product-based compounds, have garnered considerable interest due to their potential anticancer properties, particularly through the modulation of autophagy. Autophagy is a cellular process involved in both cancer progression and suppression, making it a promising therapeutic target. This systematic review aimed to evaluate the role of chromone-based compounds in regulating autophagy for cancer treatment. A comprehensive search from 2004 to early 2024 yielded 568 records, from which 44 eligible studies were selected based on defined inclusion criteria. These studies collectively investigated 23 distinct phytochemicals, including isoflavones, biflavonoids, prenylated flavones, flavone glycosides, and flavones, providing a robust dataset for evaluating the role of chromones in autophagy modulation. Most compounds activated autophagy, leading to cancer cell death, while a minority triggered autophagic activation with cytoprotective effects. Mechanistically, these compounds primarily inhibited the PI3K/AKT/mTOR pathway, a key regulator of autophagy initiation. This inhibition resulted in increased expression of LC3-II and Beclin-1, which are involved in autophagosome formation, and a decrease in p62 levels, a marker of autophagic degradation. Although the findings demonstrate a strong link between natural chromones and autophagy activation, none of the compounds were found to inhibit autophagy as a means to promote cancer cell death. This strategy, however, has been reported for synthetic derivatives. These results highlight the potential of chromones as anticancer agents and support future research into designing analogues that can selectively activate or inhibit autophagy depending on therapeutic needs. © 2024

Author keywords

Anticancer; Autophagy; Chromone-based compounds; Phytochemicals; PI3K/AKT/mTOR pathway

Reaxys Chemistry database information



Powered by Reaxys

Funding details

Details about financial support for research, including funding sources and grant numbers as provided in academic publications.

Funding sponsor	Funding number	Acronym
Universitas Andalas See opportunities		
Universitas Hasanuddin See opportunities		
Universitas Sumatera Utara See opportunities by USU		USU
International Islamic University Malaysia See opportunities by IIUM	14/UN5.4.10, K/PT.01.03/RKI/2025	IIUM
International Islamic University Malaysia See opportunities by IIUM		IIUM
Ministry of Higher Education, Malaysia See opportunities by MOHE	FRGS/1/2022/STG04/UIAM/02/2	MOHE
Ministry of Higher Education, Malaysia See opportunities by MOHE		MOHE

Funding text

This work was supported by Universitas Sumatera Utara, Universitas Hasanuddin, Universitas Andalas, and the International Islamic University Malaysia through the Indonesia Research Collaboration (RKI) scheme 2025 (Grant/Award Number: 14/UN5.4.10.K/PT.01.03/RKI/2025). Additional funding was provided by the Ministry of Higher Education (MOHE) Malaysia under the Fundamental Research Grant Scheme 2022 (Grant/Award Number: FRGS/1/2022/STG04/UIAM/02/2).

Corresponding authors

Corresponding author	E. Salim
Affiliation	Department of Pharmacology and Clinical/Community Pharmacy, Faculty of Pharmacy, Universitas Sumatera Utara, North Sumatera, Medan, 20155, Indonesia
Email address	emilsalim@usu.ac.id

Abstract

Author keywords

Reaxys Chemistry database information

Funding details

Corresponding authors

About Scopus

What is Scopus

Content coverage

Scopus blog

Scopus API

Privacy matters

Language

日本語版を表示する

查看简体中文版本

查看繁體中文版本

Просмотр версии на русском языке

Customer Service

Help

Tutorials

Contact us

ELSEVIER