

## Abstract

# Extraction of Anthocyanins from Black Currants and In Vitro Testing for the Determination of Antioxidant Activity <sup>†</sup>

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<sup>†</sup> Presented at the 8th International Electronic Conference on Medicinal Chemistry, 1–30 November 2022; Available online: <https://ecmc2022.sciforum.net/>.

**Abstract:** Black currants have antioxidant, anti-inflammatory and chemoprotective properties. Anthocyanins, which are components of black currants, are powerful antioxidants that are able to inhibit the growth of tumor cells and induce apoptosis. In this context, our study was designed to investigate the antitumoral effects following exposure to the total ethanolic extract obtained from blackcurrant powder, rich in anthocyanins, on cervical cancer. The content of total phenolic compounds was analyzed using Folin-Ciocalteu reagent, and the concentration of anthocyanins was determined by HPLC. The in vitro characterization of the extracts included common tests to measure antioxidant capacity, cell viability and inflammation tests on HeLa cervix cells, and measure reduced glutathione level and catalase and glutathione S-transferase activities, as well as flow cytometry analysis to evaluate the cell cycle phases. Our study demonstrated that the extract with the highest concentration in anthocyanins (delphinidin and malvidin), with an antiproliferative capacity, was the one obtained after 48 h of extraction with ethanol, which induced a time- and dose-dependent decrease in cancer cell viability. An increase in enzyme activity of catalase and glutathione S-transferase was noted after the first 24 h of incubation, suggesting a tendency of the cells to counteract the oxidative stress induced by anthocyanins. Incubation of cells with blackcurrant extract resulted in cell cycle arrest in the G1 and sub-G1 phases after 24 and 72 h, respectively. These data support the antioxidant and antiproliferative efficiency of anthocyanins from black currants, which is valuable for further in vivo studies.

**Keywords:** black currants; anthocyanins; antitumoral effects; HeLa cells; antioxidants

**Citation:** Popa, V.; Avramescu, S.; Stan, M.S. Extraction of Anthocyanins from Black Currants and In Vitro Testing for the Determination of Antioxidant Activity. *Med. Sci. Forum* **2022**, *14*, 137. <https://doi.org/10.3390/ECMC2022-13146>

Academic Editor: Alfredo Berzal-Herranz

Published: 1 November 2022

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**Supplementary Materials:** The presentation material of this work is available online at <https://www.mdpi.com/article/10.3390/ECMC2022-13146/s1>.

**Author Contributions:** Conceptualization, V.P. and M.S.S.; methodology, V.P. and S.A.; investigation, V.P. and S.A.; writing, V.P. and M.S.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded by UEFISCDI, grant number PN-III-P2-2.1-PED-2019-1471 (363PED/2020).

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** Data are available on request from corresponding author.

**Conflicts of Interest:** The authors declare no conflict of interest.