

A novel strategy for glioblastoma treatment by natural bioactive molecules showed a highly effective anti-cancer potential.

Giammona Alessandro¹⁻², Comisso Mauro²⁻³, Bonanomi Marcella¹, Remedina Sofia¹, Avesani Linda²⁻³, Cerasa Antonio¹⁻², Porro Danilo¹⁻², Gaglio Daniela¹⁻², Bertoli Gloria¹⁻² and Lo Dico Alessia¹⁻²

¹ Institute of Molecular Bioimaging and Physiology (IBFM), National Research Council (CNR), Segrate, Italy.

² NBFC, National Biodiversity Future Center, Palermo 90133, Italy.

³ Department of Biotechnology, University of Verona, 15, Strada Le Grazie, 37134, Verona, Italy

Background: Glioblastoma is a severe form of brain tumor that has a high fatality rate, due to drug-resistance. [1-2] Biodiversity represents a resource for human well-being, providing natural compounds that have shown great potential as anticancer drugs. Many of them significantly slow GBM progression by reducing proliferation rate, inflammation also modulating oxidative stress. [3-4].

Methods and Results: In our experiments, we explored some natural compounds and their properties observing a significant decrease in cell number, partially given by a cell cycle quiescence. Furthermore, we reported a reduced cell migration ability accomplished by morphological cytoskeleton changes highlighting a mesenchymal-epithelial transition, and metabolic studies showed an induced cell oxidative stress modulation and a massive metabolic rearrangement.

Conclusions and Significance: Therefore, we propose to overcome the limitations of conventional treatments and thus improve patient outcomes using biomolecules that could, in fact, support standard therapies, increasing responsiveness to or allowing the use of lower doses of chemotherapy thus reducing side effects.

Keywords: Oxidative stress, inflammation, resistance, biodiversity, brain tumors

References:

1. Stupp R, et al; European Organisation for Research and Treatment of Cancer Brain Tumor and Radiotherapy Groups; National Cancer Institute of Canada Clinical Trials Group. Radiotherapy plus concomitant and adjuvant temozolomide for glioblastoma. *N Engl J Med.* 2005 Mar 10;352(10):987-96. doi: 10.1056/NEJMoa043330. PMID: 15758009.
2. Yalamarty SSK, et al Mechanisms of Resistance and Current Treatment Options for Glioblastoma Multiforme (GBM). *Cancers (Basel).* 2023 Apr 1;15(7):2116. doi: 10.3390/cancers15072116. PMID: 37046777; PMCID: PMC10093719.
3. Naeem S, et al Biodiversity and human well-being: an essential link for sustainable development. *Proc Biol Sci.* 2016 Dec 14;283(1844):20162091. doi: 10.1098/rspb.2016.2091. PMID: 27928039; PMCID: PMC5204155.)
4. Cragg, G.M.; Newman, D.J. Plants as a Source of Anti-Cancer Agents. *J. Ethnopharmacol.* 2005, 100, 72–79