Volume 98/Supplement 1 - 2025

Journal of Biological Research

Bollettino della Società Italiana di Biologia Sperimentale

97th National Congress of the Italian Society for Experimental Biology

Palermo, Italy, 10-13 April 2025

ABSTRACT BOOK

www.jbiolres.org

jbr

pagepress

phosphorylated ERK1/2, phosphorylated p38, and phosphorylated JNK1/2 proteins. The activation of these pathways was strongly connected with the cell cycle-related genes p53 and p21 and the activation of apoptotic cascade. These results imply that the Nrf-2/HO-1, p38-JNK1/2-ERK1/2, Bax/Bcl-2 signaling pathways are responsible for inducing cellular damage and accelerating neuronal aging in response to CMIT/MIT exposure.

This work was in part supported by Ministero dell'Istruzione, dell'Università e della Ricerca (MIUR) PRIN: PROGETTI DI RICERCA DI RILEVANTE INTERESSE NAZIONALE – Bando 2022 PNRR Prot. P2022BH28Y.

THE DARK SIDE OF PLASTICS: ECOPHYSIOLOGICAL IMPACTS ON ANIMALS

Serafina FERRARA[1], Cristiana Roberta MULTISANTI[2], Irene VAZZANA[3], Caterina FAGGIO[1,4]

[1]Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina; [2]Department of Veterinary Sciences, University of Messina; [3]Zooprophylactic Institute of Sicily, Palermo; [4]Department of Eco-sustainable Marine Biotechnology, Stazione Zoologica Anton Dohrn, Naples, Italy

Nowadays, plastic pollution is one of the most significant issues affecting the environment, posing a serious threat to marine biodiversity, ecosystem stability, and human health [1]. Millions of tons of plastic waste enter the oceans every year, and these products are continuously subjected to chemical and biological degradation, resulting in the formation of micro- and nano-plastics (MPs and NPs) whose dimension are, respectively, in the ranges of 0.1 µm to 5000 µm (MPs) and 1 nm to 100 nm (NPs). The impact of these smaller particles is much more worrying than visible contamination. The presence of these tiny particles puts a strain on ecological dynamics, causing a significant impact on the health of aquatic organisms and also affecting human health due to the interconnection existing with the environment and the food chain [2]. This work examines the different ways in which MPs can interact with aquatic life, the mechanisms that drive this pollution, and the cascading consequences for the health of organisms and ecosystems. It also highlights the critical links between plastic pollution and human health. Also, it underlines the urgency of a global and coordinated approach to address this growing crisis. Only through deeper understanding, increased awareness, and collective action it will be possible to hope for mitigating the significant impact of plastic pollution and ensure a sustainable future for oceans and our planet.

REFERENCES

1. Banaee, M., Multisanti, C. R., Impellitteri, F., Piccione, G., & Faggio, C. (2025). Environmental toxicology of microplastic particles on fish: A review. *Comparative Biochemistry and Physiology Part C: Toxicology & Pharmacology*, 110042.
2. Multisanti, C. R., Merola, C., Perugini, M., Aliko, V., & Faggio, C. (2022). Sentinel species selection for monitoring microplastic pollution: A review on one health approach. *Ecological Indicators*, *145*, 109587.

VALORIZATION OF SICILIAN WHITE AND RED GRAPE SEED OILS IN THE CONTROL OF GLUCOSE UPTAKE AND CONSUMPTION *IN VITRO*

Daniela GANCI[1], Federica BELLISTRÌ[1,2], Roberto CHIARELLI[1], Manuela MAURO[1], Vincenzo ARIZZA[1,2], Mirella VAZZANA[1,2], Claudio LUPARELLO[1,2]

[1]Department of Biological, Chemical and Pharmaceutical Sciences and Technologies (STEBICEF), University of Palermo; [2]NFBC, National Biodiversity Future Center, Palermo, Italy

Grape seed oil, a by-product of wine production, is rich in polyunsaturated fatty acids, particularly linoleic acid, and abundant in antioxidants like polyphenols, which contribute to its notable health-promoting properties[1]. These bioactive compounds provide anti-inflammatory, antioxidant, and antidiabetic effects, making grape seed oil a promising natural agent for the management of metabolic disorders. This study aimed to evaluate the impact of 24-hexposure to the maximum non-inhibitory concentration of grape seed oils, obtained from Sicilian white (WGSO) or red grapes (RGSO), on glucose consumption and uptake in HepG2 liver cancer cells, which retain several differentiated hepatic functions and are a suitable *in vitro* model to study liver metabolism[2]. PAS reaction and glucose uptake assays[3] were performed and the results revealed that both oils induced an increase in the storage of intracellular glycogen and in the uptake of 2-NBDG, a fluorescently labeled deoxyglucose analogue, indicating an improved glucose utilization. Additionally, a decrease in glucose levels in the cell medium was observed, similar to that obtained after treatment with insulin. Furthermore, Western blot analysis was performed to evaluate the expression of key proteins involved in glucose uptake and metabolic regulation, that is, GLUT-2, GLUT-4, AKT-2, pAKT-2 and HNF-1α, in HepG2 cells under the different experimental conditions. The results obtained demonstrated that different molecular mechanisms were involved in the similar glucose-lowering effects of WGSO and RGSO. In fact, exposure to WGSO determined the increase of the sole GLUT-4 and of pAKT-2/AKT-2 ratio, involved in the GLUT-4 expression pathway, whereas treatment with RGSO induced the up-regulation of both GLUT-2 and -4 and of HNF1α, a GLUT-2 transcription factor. Our results highlight the potential of grape seed oil as a modulator of glucose metabolism, particularly in conditions of insulin resistance or metabolic dysfunction, underscoring its relevance in the management of metabolic disorders such as diabetes. Given that grape seed oil is a by-product of wine production, its reuse not only adds value to an otherwise discarded resource but also promotes sustainability, further supporting the need for continued research into its therapeutic applications.

REFERENCES

1. Garavaglia J, *et al.*, Nutrition and Metabolic Insights 2016; 9: 59-64.
2. Donato MT, *et al.*, Methods Mol Biol 2015; 1250:77-93.
3. Abruscato G, *et al.*, Biology 2024; 13(6), 378.