ORAL COMMUNICATIONS

MODULATION OF NEUROINFLAMMATION IN IL-1BETA-INDUCED HUMAN ASTROCYTES: EFFECTS OF GREEN LEAVES AND RHIZOMES EXTRACT FROM *POSIDONIA OCEANICA* (L.) DELILE

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Marine-derived bioactive compounds have attracted increasing attention due to their antioxidant, anti-inflammatory and neuroprotective properties. Extracts from leaves (GLE) and rhizomes (RE) of *Posidonia oceanica* (L.) Delile are rich in polyphenols and have demonstrated anti-inflammatory effects in an in vitro model of the human blood–brain barrier. Based on this evidence, the present study aimed to further investigate the antioxidant, anti-inflammatory and mitochondrial protective effects of these extracts in primary human astrocytes exposed to IL-1β, which disrupts redox balance and mitochondrial function. No cytotoxic effects were observed following 24-hours of treatment with GLE or RE. Both extracts significantly reduced intracellular reactive oxygen species, as confirmed by redox analyses and MitoSOX Red imaging, which showed decreased mitochondrial superoxide production. Gene expression analyses revealed down-regulation of the pro-inflammatory cytokines IL-6 and TNFα. At the protein level, IL-6 expression was more reduced by GLE, while RE had a stronger effect on TNFα. The analysis of mitochondrial morphology showed a partial recovery of network integrity following co-treatment, although limited by the short observation time. Consistently, the expression of dynamin-related protein 1 (DRP-1), a key regulator of mitochondrial fission, was significantly reduced, suggesting the inhibition of inflammation-induced fragmentation. Overall, *P. oceanica* extracts mitigated IL-1β-induced oxidative stress, inflammation and mitochondrial alterations in human astrocytes, thus supporting their potential as neuroprotective agents in neuroinflammatory conditions. Further studies are needed to clarify the molecular mechanisms and long-term effects.

Acknowledgments: Dr. Giulia Abruscato is supported by Fondazione Umberto Veronesi.