University of Naples Federico II
Department of Pharmacy
Doctoral Course in Pharmaceutical Sciences XL Cycle

BIOMARKERS AND TREATMENTS FOR NEUROLOGICAL DISEASES: THE LIPIDOMICS AND ROLE OF NEUROSTEROIDS.

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Neurological diseases, including mood disorders such as major depressive disorder, post-traumatic stress disorder and chronic pain, are associated with a significant economic burden and remain poorly diagnosed and poorly treated pathological conditions. There is a crucial need for a better understanding of the neurobiological alterations underlying CNS diseases, for uncover biomarkers, and for developing novel therapeutic strategies that will facilitate a better treatment of these conditions.

Lipidomics is the large-scale study of pathways and networks of cellular lipids in biological systems [1], and it is a distinct discipline due to the uniqueness and functional specificity of lipids relative to other metabolites. Short and long chain fatty acid, endocannabinoids systems and PPARs represent important mediators involved in several CNS disorder, linked to lipidomics. Among the polyunsaturated fatty acids, docosahexaenoic acid (DHA) is considered a serum biomarker (2), such as N-palmioylethanolamide (PEA), is considered a PPARs agonist and it is able reduce inflammation (3). Several studies show the crosstalk between neurosteroids and PPARs; like PEA, the neurosteroid Allopregnanolone has potent anti-inflammatory actions by inhibiting the toll-like receptor 4-mediated signalling, which results in decreased proinflammatory cytokines and chemokines in glia, neurons, and peripheral immune cells (3,4).

Using a multi-model approach, we propose a multidisciplinary project involving neuroscience, immunology, and pharmacology to study the neuronal control of the defence mechanisms of CNS and the role of lipidic mediators and neurosteroids and the possible interaction between these systems. Indeed, neurological diseases and increased of neuroinflammatory factors appear to be interconnected to both alterations in neurosteroids biosynthesis and in lipidi signaling. Thus, these neurobiological alterations could provide new biomarker candidates for a more accurate diagnosis, and supplementation of these endogenous modulators may offer a valid treatment opportunity to counteract both the inflammatory and the behavioral component underlying mood disorders.

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