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## Cannabinoids and endocannabinoids as potential therapeutic drugs for multiple sclerosis

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Multiple Sclerosis (MS) has been recognized as a neurodegenerative disease that is triggered by inflammatory attack of the CNS. When MS has been active for some years it can cause muscle stiffness and spasms, pain, fatigue, difficulty passing urine and tremors. The cannabinoid system has been found to be neuroprotective in the allergic encephalomyelitis model, an animal model of MS. Cannabinoid receptors type 1 are involved in the pathophysiology of MS and cannabinoid receptor agonists have been found to reduce spasticity and tremor in animal models of allergic encephalomyelitis (chronic relapsing experimental allergic encephalomyelitis). In allergic encephalomyelitis and, at least initially, in MS, axonal damage and demyelination occur at least concurrently with inflammation, which produces many potentially damaging elements such as cytokines and oxidative stress. Several studies suggest that cannabinoids and endocannabinoids may have a key role in the pathogenesis and therapy of MS. Indeed, endocannabinoids can down-regulate the production of T helper 1-associated pathogenic cytokines, enhancing the production of T helper 2-associated protective cytokines. A shift towards T helper 2 has been associated with therapeutic benefit of cannabinoids in MS. Recently, a distinct immunomodulatory effect of the endocannabinoid anandamide has been shown in dendritic cells from MS patients, which may pave the way for the design of new endocannabinoid-based immunotherapeutic drugs for the treatment of MS.

### Biography

Panagiotis Zogopoulos is a resident of Neurosurgery at the General Hospital of Nikaia-Piraeus "Agios Panteleimon", Athens, Greece. He has received a 6-month advanced clinical training (clinical fellow) at the Neurosurgery Department of Osaka University Hospital in Japan. Several of his papers have been published in reputed peer-review journals and he has presented various researches in international conferences.

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