IJAE
Vol. 116, n. 1 (Supplement): 198, 2011
ITALIAN JOURNAL OF ANATOMY AND EMBRYOLOGY

# Loss of spinal motor neurons and alteration of alpha-synuclein subcellular localization in MPTP induced parkinsonism in mice

Giorgio Vivacqua[1,3], Francesca Biagioni[2], Shun Yu[3,4], Arianna Casini[1,6], Domenico Bucci[2], Francesco Fornai[2,5], Loredana D'Este[1,6]

[1] Department of Anatomic, Histologic, Forensic and Locomotor Apparatus Sciences, Sapienza University of Rome, Via A. Borelli 50, 00161, Rome, Italy;
[2] Laboratory of Neurobiology of Disease, IRCCS I.N.M. Neuromed, Via Atinense, Pozzilli (IS),Italy;
[3] Department of Neurobiology, Beijing Institute of Geriatrics, Xuanwu Hospital and [4]Key Laboratory for Neurodegenerative Diseases of Ministry of Education, China Capital Medical University, 100053 Beijing, China.;
[5] Department of Human Morphology and Applied Biology, University of Pisa, Via Roma 55, 56126, Pisa, Italy;
[6] Research Center "Daniel Bovet", Sapienza University of Rome, Italy.

1-methyl, 4-phenyl, 1, 2, 3, 6-tetrahydropiridine (MPTP) is a neurotoxin, widely used to produce experimental models of Parkinson Disease in rodents and primates. Although dopaminergic neurons are the most sensitive to MPTP neurotoxicity, different neuronal subtypes could be affected. In particular, noradrenergic neurons of the Locus Coeruleus may be involved as well as nigral dopaminergic neurons. Moreover, apart from catecholamine-containing nuclei, recent studies indicate that MPTP may produce pathological effects within the spinal cord. This point deserves compelling interest since it suggests, at experimental level, commonalities between Parkinson Disease and Amyotrophic Lateral Sclerosis. For instance, recent reports demonstrate that MPTP activates apoptotic proteins at the level of spinal cord. However, to our knowledge, none of these studies so far analyzed whether motor neuron loss really occurs following MPTP administration. Therefore, in the present study we evaluated the effect of a robust dose of MPTP (20 mg/Kg X3) in the nigro-striatal system and spinal cord. Along with a severe dopaminergic cells loss within the substantia nigra, quantified by stereology and a marked decrease of striatal catecholoamine fibers measured by semi-quantitative densitometry, we found a significant (roughly 30 %) depletion of motor neurons in the lumbar spinal cord of MPTP-treated C57BL/6J mice. At the same level, spared motor neurons often present an altered morphology, being dysmorphic and vacuolated. Furthermore, using four different antibodies (tree monoclonal, one polyclonal), recognizing distinct epitopes in the sequence of alpha-synuclein, we found that alpha-synuclein immunostaining is markedly altered in the spinal cord of MPTP-treated mice.

The present data shed new lights on similarities between dopaminergic neurons and spinal motor neurons, while suggesting that MPTP might be a neurotoxin diverse from what originally considered.

Keywords: Parkinson Disease, Amyotrophic Lateral Sclerosis, neurodegeneration, immunohistochemistry, spinal cord.