Autologous transplantation of enteric astrocytes in Alzheimer's disease- related neuropathology in rats: a novel approach to counteract beta amyloid induced neurodegeneration

R. Cuomo*, E. Capoccia^, L. Steardo^, G. Sarnelli*, F. Turco*, C. Scuderi^, C. Cirillo*, J. Lu° and G. Esposito^

(*) Dept of Clinical and experimental medicine, Faculty of Medicine II Policlinico University of Naples Federico II Via Pansini, Naples (Italy)
(^) Dept of Human Physiology and Pharmacology 'V. Erspamer', Faculty of Pharmacy and Medicine University of Rome La Sapienza P.le A.Moro 5 Roma (Italy)
(°) Dept of Neurology, Beth Israel Deaconess Medical Center, Harvard Medical School, Blackfan Circle-Longwood, Boston,MA (USA)

A profound progressive mulfunctioning of astrocytes is responsible for the appearance of the most important neuropathological changes featuring Alzheimer's Disease (AD) brains, such as senile amyloid plaques and neurofibrillary tangles. The possibility to transplant brand functioning 'new'astrocytes in AD scenario has been, at least in theory, thought as a possible way for new therapies making that may counteract the disease progression. However, astrocytes transplantation has been for years strongly limited in a possible translational clinical route because of several aspects, including i.e. ethical aspect following isolation from post-mortem donor, low efficiency of engrafting in receiver's brain due to rejection, risky and difficult neurosurgical isolation if the transplantation thought from donor's brain biopsy. In theory, enteric astrocytes, isolated by the enteric glia populating the myenteric Auerbach and Meissner's plexi, can be isolated by the gut and subsequently transplanted in the CNS and for this reason may overcame the above mentioned limitations. Once induced a well defined AD-related neuropathological scenario in rats, through Abeta intraventricular crhonic infusion, we developed an autologous isolation of enteric astrocytes from caecum colon of the same animals, and through a simple and fast appendectomy we are able to isolate a large number of astrocyte that have been afterward intracerebroventricularly delivered in the CNS in Abeta challenged rats. Results of the present research demonstrate that autologous transplantation of enteric astrocytes may significantly improve AD-related fetures, reducing senile plaques and neurofibrillary tangles formation in the cortex and hippocampi of Abeta challenged rats. Moreover, autologous transplantation reduces markedly the mnemonic and cognitive impairment induced by Abeta and promotes neurogenesis thus producing a profound amelioration of AD-related neuropathology.