

ID No.	K1007
Project Title	Mesenchymal Stromal Cell Therapy to Prevent Neurodevelopmental Disorders Related to Low-Birth-Weight
Principal Investigator	Jacques-Olivier Coq (Senior Researcher, Institut de Neurosciences de la Timone (INT, UMR7289 CNRS/Aix-Marseille Université))
Project Members IMSUT Host Researcher  Members	<p>Tokiko Nagamura-Inoue (Associate Prof., IMUST)</p> <p>Marine Kochmann (PhD Student, AMU)</p> <p>Takeo Mukai (Assistant Prof., IMSUT)</p> <p>Masahiro Tsuji (Prof., Kyoto Women's Univ.)</p>
Report	<p>In our rat model of prematurity and low birth weight (LBW), rat pups display hyperexcitability in the spinal cord and cortex, responsible for spasms and spasticity that have a deleterious impact on locomotion. These LBW rats also exhibit spontaneous hyperexcitability, deficits in information processing and memory deficits (Delcour et al., 2011, 2012ab; Ohshima et al., 2016; Coq et al., 2018, 2019; Tsuji et al., 2018). Our preliminary results show that neonatal administration of mesenchymal stromal cells (MSCs) in LBW rat pups restore within a few days spinal excitability based on Hoffmann reflex assessment and KCC2 levels to control-like levels. KCC2 is an ubiquitous chloride pump that regulates homeostasis of chloride and cell excitability. Experiments to confirm these results are currently on going. These promising results suggest a restoration of normal organization of sensorimotor circuitry. Therefore, we expect to find a recovery of normal gait and muscle synergies without spasticity and spasms, contributing to restore the organization of the sensorimotor circuitry. We also suppose that reduced levels of inflammation and restored normal levels of ubiquitous KCC2 will prevent the emergence of neurodevelopmental disorders, such as brain damage, white matter injury and subsequent deficits in behavior, cognition and emotional reactions, in relation to the restoration of typical organization of the central nervous system.</p>