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94th National Congress of the Italian Society for Experimental Biology

Torino, Italy, 6-9 April 2022

ABSTRACT BOOK

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94rd National Congress of the Italian Society for Experimental Biology

Torino, Italy, 6-9 April 2022

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INVITED LECTURES

LECTURE "GAETANO QUAGLIARIELLO"

Prof. Valerio Orlando, KAUST, Saudi Arabia

"Human repeatome: from Junk to RNA therapeutics"

LECTURE "FRANCESCO REDI"

Prof. Timothy Ravasi, Marine Climate Change Unit, Okinawa Institute of Science and Technology (OIST), Australian Research Council Center of Excellence for Coral Reef Studies, James Cook University

"Adaptation and Acclimation of Coral Reef Fish as a Response to Climate Change"

LECTURE "FERDINANDO ROSSI"

Prof.ssa Michela Matteoli, Humanitas Clinical and Research Center, Milan, Italy

"Immuno-synaptopathies: how the immune system affects the synapse"

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Peripheral nerve injury has been used as a model to induce maladaptive changes in the central nervous system (CNS). The primers of this cascade-like events are glial cells (namely astrocytes and microglia) that rapidly undergo morpho-functional modifications, leading to a reactive state (reactive gliosis). Although reactive gliosis is well documented, the role of intermediate filaments (IFs) in maladaptive plasticity processes is yet to be established. Glial acid fibrillary protein (GFAP) is the hallmark of the reactive astrocytes and is significantly upregulated in reactive astrogliosis. However, how GFAP is linked to astrocyte's pathophysiology is far to be demonstrated. To verify the specific role of GFAP in spinal maladaptive plasticity, we used a GFAP-KO mice model of sciatic spared nerve injury (SNI) and compared it to wild type (WT) animals. Animals were studied with behavioral tests (von Frey and plantar test) and ex-vivo with immunohistochemistry and WB of the spinal cord lumbar tract for astrocytic (vimentin) and microglial (Iba1) markers. Glial and neuronal markers of the glutamate/GABA system (GLAST, GLT1, vGLUT, vGAT, GAD) were also analyzed. Our results demonstrated that normal phenotype, neuropathic behavior and reactive gliosis following SNI are GFAP-independent processes. However, GFAP influences spinal cord homeostasis and morpho-molecular characteristics such as microglial density, neurotransmitters metabolism and transport.

EARLY POSTNATAL TREATMENT WITH ESTROGEN RECEPTOR ANTAGONISTS: SEXUALLY DIMORPHIC ORGANIZATIONAL EFFECTS

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Many hypothalamic systems, controlling metabolism and reproduction, are programmed and stabilized during critical periods of development by many factors, including gonadal steroids [1]. In particular, estradiol (E_2) appears to have an important role on organization of these circuits [2-4]. E_2 acts through three different receptors: ERα, ERβ and GPR30. To understand the role of these receptors on organizational effect of E_2, we treated male and female CD1 mice from post-natal day (PND) 5 to PND12 with subcutaneous injections of vehicle (corn oil), E_2 and E_2 associated with selective antagonist of estrogen receptors (MPP; PHTPP; G15) alone or together (mix). We analyzed, during the development, different physiological parameters related to food intake (body weight, food eaten, daily feed efficiency, gonadal and brown fat), reproduction (gonads, puberty onset, estrus cycle) and behavior (Y-maze, sexual behavior). Furthermore, in the adult, we have immunohistochemically highlighted the expression of some hypothalamic neuronal circuits closely associated with food-intake and metabolism, but also with the reproductive sphere: Pro-opiomelanocortin (POMC), Neuropetide Y (NPY), Orexin and Kisspeptin systems. In general, E_2 induced effects mostly in females both on sexual and feeding behaviors. The treatments with G15 alone or in combination (mix) altered all the considered parameters in both sexes. On the contrary MPP and PHTPP showed sexually dimorphic effects. MPP modified, in males, feeding parameters, but not those related to reproduction, whereas PHTPP modified parameters related to reproduction, but not those related to feeding. In females the situation was exactly the reverse. In conclusion, our data demonstrate that E_2 has a strong organizational role on different neuroendocrine systems, acting primarily on GPR30 and, in a sexually different way, on ERα and ERβ.

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DEVELOPMENT OF A CHITOSA-BASED MEDICAL DEVICE FOR IMPROVING FUNCTIONAL RECOVERY AFTER RADICAL PROSTATECTOMY

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Prostate cancer is the most frequent cancer in males, the current most popular treatment of localized prostate cancer in patients with a life-expectancy >10 years is radical prostatectomy (RP). Unfortunately, in patients who undergo RP, frequently iatrogenic damage to the periprostatic neurovascular bundles (NVBs) occurs, leading to erectile dysfunction and impairment in quality of life. Chitosan is a derivative of chitin obtained from the exoskeleton of crustaceans and its useful properties in intra-operative field such as hypoallergenicity, biocompatibility, bioavailability and lack of toxicity has demonstrated to enhanced somatic nerve regeneration with effects compared to those elicited by nerve autografts. Recently, two patents about the clinical use of chitosan membranes for protection of periprostatic nerve plexus have been issued, while, from *In vitro* and *Ex vivo* experiments, the pro-regenerative effect of flat chitosan membrane on autonomic explant ganglia reported was very high and prostate cancer cells cultured in the presence of chitosan, showed a significant reduced proliferation rate. In order to improve the regenerative performance achieved by the flat membrane, the present project focuses on nanostructured chitosan membranes with two different topographies, a grating arrangement and a zig-zag pattern. At this purpose primary neuronal cultures and glial cell were cultured on the different membrane types in order to evaluate the ability of the membrane to sustain cell survival, adhesion and migration and, for the neuronal models, the neurite outgrowth. At the same time, preliminary *in vivo* experiments were perfomed to test the ability of different chitosan membranes to improve regeneration of cavernous nerve on adult male rats: 3 mm of cavernous nerve was bilaterally transected and repaired with chitosan membranes (flat, grating, zig-zag). At 30 and 60 days from the surgical procedure, samples were harvested and morphological analysis were carried out in order to identify the presence of nerve fibers. Samples were processed for immunofluorescence analy-