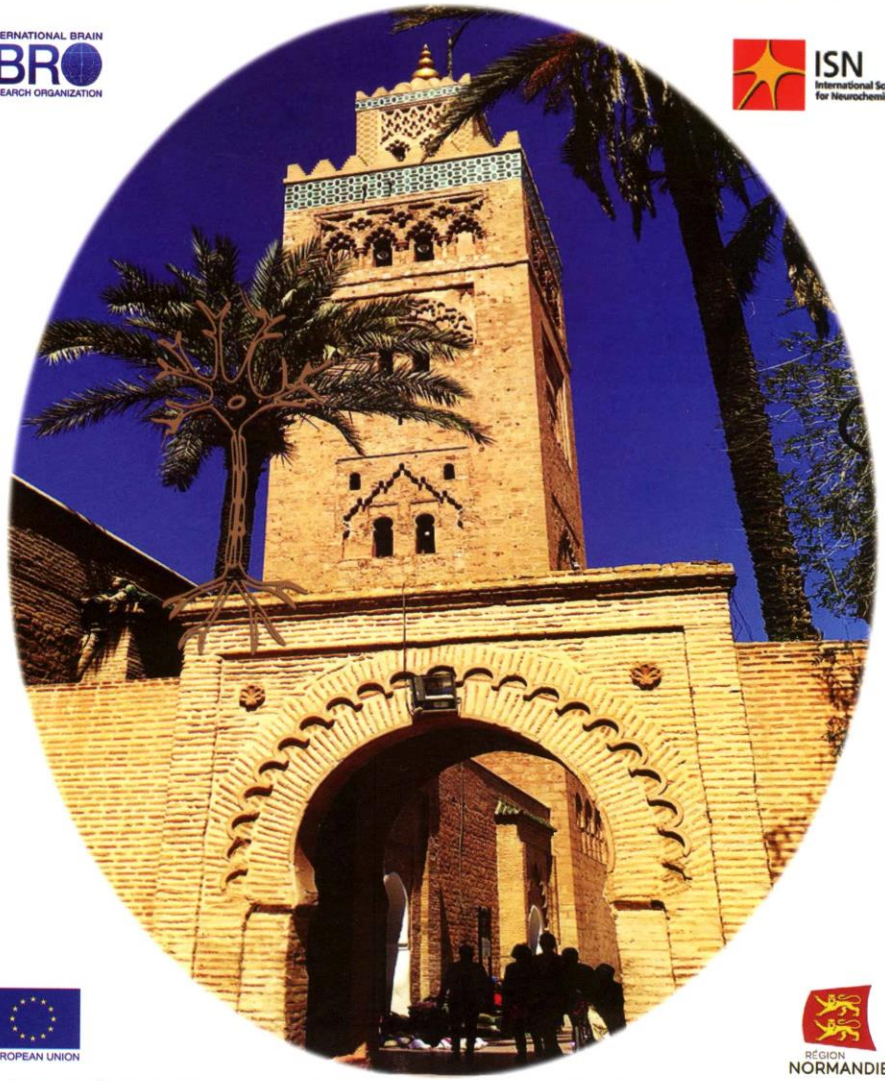
Mediterranean Neuroscience Society

IUBMB Focused Meeting

Proceedings of the 7th Mediterranean Neuroscience Society Conference

MNS 2019, MARRAKECH



Atlas Medina and Atlas Asni Hotels, 23-27 june 2019, Marrakech, Morrocco

https://www.mnsmeeting2019.com/

Organizing committee

Youssef Anouar (France, Chair)
Souad Bamhamed (Morocco)
Mohamed Bennis (Morocco)
Loubna Boukhzar (France)
Nicolas Chartel (France)
Hicham Chatoui (Morocco)
Fatiha Chigr (Morocco)
Giuseppe Di Giovanni (Malta, MNS Vice-President)
Khalid El Allali (Morocco)
Mohammed Errami (Morocco)
Liana Fattore (Italy, MNS President)
Taoufiq Fechtali (Morocco)
Halima Gamrani (Morocco)
Isabelle Lihrmann (France)
Rabia Magoul (Morocco)
Mohamed Merzouki (Morocco)
Maïté Montero-Hadjaje (France)
Mohamed Najimi (Morocco)
Marie Picot (France)

Scientific Council

- **Liana FATTORE (President)**, University of Cagliari – CNR (Italy). Behavioural Science, Neuropsychology, Neuroscience of cannabinoid addiction, new psychoactive substances.

- **Giuseppe DI GIOVANNI (Vice-President)**, University of Malta (Malta). Pathophysiology of monoaminergic systems using electrophysiological and neurochemical approaches.

- **Sherine ABDEL-SALAM (General Secretary)**, University of Alexandria (Egypt). Learning and dopamine system, regulation by microRNA, neuropathic pain, neurobiology.

- **Goran ŠIMIC (Vice-Secretary)**, University of Zagreb (Croatia), Neuropathology, neurology & translational neuroscience, emotion-cognition integration in the brain.

- **Saïd BOUJRAF (Treasurer)**, University of Fez (Morocco). Magnetic Resonance Imaging, Diffusion-based Imaging, Neurological diseases, Cognitive neuroscience.

- **Marc LANDRY (Vice-Treasurer)**, University of Bordeaux (France). Balance between excitation and inhibition in the spinal cord and its role in pain, synaptic transmission and excitability.

- **Azza SELLAMI,** cellular basis of cognition and behavior, hippocampus function, formation of memory.

- **Youssef ANOUAR**, University of Rouen (France). Molecular neuroscience, neuropeptides, neuro-endocrinology, neuronal differenciation and communication.

- **Demian BATTAGLIA (Webmaster)**, Aix-Marseille University – CNRS (France). Computational and theoretical neuroscience, information theory and network analysis

- **Patrizia CAMPOLONGO**, Sapienza University of Rome (Italy). Pharmacology and Toxicology, role of the endocannabinoid system in the modulation of memory and emotion.

- **Ali JAHANSHAHI**, Maastricht University (The Netherlands). Neurosurgery, neuroscience of tinnitus, stimulation and neuromodulation, technologies for drug delivery.

- **Radwa KHALIL**, Jacobs University, Bremen (Germany). Computational Neuroscience, associative learning and epilepsy, decision making.

- **Olfa MASMOUDI-KOUKI**, University of Tunis El-Manar (Tunisia). Cellular and molecular neurosciences, astroglial cells physiology, oxidative stress, neuropeptides.

- **Francisco OLUCHA BORDONAU**, University of Jaume I, Castello de la Plana (Spain). Neuroanatomy, Medial septum control on cognitive and emotional function.

- **Amira ZAKY**, University of Alexandria (Egypt). Neuroinflammation and neuroprotection, neurogenesis and neuropathic pain, cellular neuroscience.

The Genetic Absence Epilepsy Rats from Strasbourg (GAERS), derived from the Wistar strain, are a well-established animal model of absence seizures (ASs) and their neuropsychiatric comorbidities. In this study, we investigated the behavioural characteristics of Wistars, Non-Epileptic Control (NEC) rats, also derived from the Wistar strain, and GAERS in the Hole-Board test, which is a very well-known tool to study exploration, anxiety and locomotion in rodents. Animals from each strain (Wistar, NEC and GAERS) received vehicle and the anti-absence drug ethosuximide (200 mg/kg i.p.) in a randomized manner, and were then tested in the Hole-Board apparatus. Quantitative and multivariate analysis approaches were applied. Multivariate T-pattern analysis was carried out to investigate the existence of possible temporal relationships among different events during the test. The results show higher anxiety levels both in GAERS and NEC rats, compared to Wistar, with GAERS being more anxious than NEC. The analysis of the T-patterns shows that the behaviour of NEC and Wistar is to some extent similar, whereas GAERS exhibit a different behaviour both in terms of complexity (i.e. longer T-patterns) and variability (i.e. more different T-patterns), which is an indicator of an increased anxiety level. Ethosuximide treatment had an anxiolytic effect in GAERS and NEC, and an anxiogenic effect in Wistars. We confirmed that GAERS rats have increased anxiety-like behaviour and highlighted the importance to include Wistar rats as an additional control strain. Our results show that acute ethosuximide treatment reverses the anxiety phenotype of GAERS and NEC but is anxiogenic in normal WISTAR rats.

SESSION # 4 (29-36) Rissani Room

Chairs : Eiden LE and Llorens C

OC-29

Rule vs. contextual generalization: insights into hippocampal-entorhinal involvement in posttraumatic stress disorder (PTSD)

Salman A[1], Sawalma AR[1] and Herzallah M[1,2]

[1] Palestinian Neuroscience Initiative, Al-Quds University, Abu Dis, Palestine ; [2] Center for Molecular and Behavioral Neuroscience, Rutgers University, Newark, USA

Post-traumatic Stress Disorder (PTSD) is a common psychiatric illness that develops as a result of exposure to trauma, and is assessed as a function of three main symptoms, re-experiencing, avoidance, and hyper-arousal. Individuals with PTSD tend to overgeneralize past trauma stimuli in new similar contexts. Rodent lesion studies have demonstrated a role for the entorhinal cortex (EC) in rule generalization, and for the hippocampus (HC) in contextual generalization. Previous studies have also shown that individuals with PTSD exhibit structural and functional changes in both medial temporal lobe structures, the HC and the EC. In this study, we used two computerized cognitive tasks that assess contextual generalization through sequence learning, and rule generalization through acquired equivalence. We tested 251 subjects; 43 with PTSD, 31 trauma-exposed without PTSD, and 177 healthy controls. All trauma-exposed subjects were administered the clinician-administered PTSD scale IV (CAPS-IV) to quantify re-experiencing, avoidance, and hyper-arousal. Subjects with trauma-exposure made significantly more errors in rule generalization than healthy controls. Individuals with PTSD showed a significant and negative relationship between avoidance and hyper-arousal symptoms and rule generalization errors; the higher the severity of symptoms the better the performance in rule generalization. Individuals with trauma-exposure without PTSD did not show the same correlational pattern. There was no difference between the groups in contextual generalization. These results shed the light on the importance of the medial temporal lobe in the pathogenesis of PTSD. Higher severity of PTSD symptoms was associated with better performance in rule generalization, a potential reflection of higher functionality of the entorhinal cortex.

OC-30

Alzentia^{tm} : a non-invasive hidden-goal test for spatial orientation impairment detection in patients with possible neurocognitive disorder

Bažadona D[1], Fabek I[1], Babić Leko M[1], Bobić M[1], Hof PR[2] and Šimić G[1]

[1] Croatian Institute for Brain Research, University of Zagreb Medical School, Zabreb, Croatia ; [2] Fishberg Department of Neuroscience, Icahn School of Medicine at Mount Sinai, New York, USA

We have developed a new device that helps in early diagnosis of mild cognitive impairment (MCI, minor neurocognitive disorder) and dementia (major neurocognitive disorder, mainly caused by Alzheimer's disease, AD). Our ALZENTIA^{TM} system consists of original software and hardware, together with several other structural and non-specific elements (3-m diameter tent with 8 laser pointers, 8 displays used as orientation landmarks, camera, and stick) important for assembly of the instrument and carrying out the testing. The system is based on the hidden goal task test in which the aim is to find a target that is not visible, but instead the navigation must be based on previously memorized target position in relation to the starting position or other

navigation markers. In this respect it resembles the Morris water-maze task for rodents. The testing procedure is based on the navigation of subjects with average test duration of 20 minutes, which allows for a fast and non-invasive diagnostic procedure. The system automatically calculates orientation errors and displays the results for easy subsequent interpretation. It is intended for the clinical and scientific community, pharmaceutical industry, healthcare institutions and other organizations caring for the elderly and other populations for which early detection of dementia is important, as is ongoing monitoring of their status and the success of therapeutic procedures. During the meeting, we will present preliminary results obtained in 91 healthy controls, 33 MCI patients, 8 AD patients and 4 patients with vascular dementia. *Supported by the Croatian Science Foundation grant no. IP-2014-09-9730.*

OC-31

NCX1 and NCX3 as potential factors contributing to neurodegeneration and neuroinflammation in the A53T transgenic mouse model of Parkinson's disease

Sirabella R[1], Sisalli MJ[1], Omura K[1], Costa G[1], Ianniello G[1], Pinna A[2], Morelli M[2], Di Renzo GM[1], Annunziato L[1] and Scorziello A[1]

[1] Division of Pharmacology, Department of Neuroscience, Reproductive and Dentistry Sciences, School of Medicine, "Federico II" University of Naples, Naples, Italy ; [2] Department of Biomedical Sciences, Section of Neuropsychopharmacology, University of Cagliari, Cagliari, Italy

Na^+-Ca^{2+} exchanger (NCX) isoforms constitute the major cellular Ca^{2+} extruding system in neurons and microglia. We herein investigated the role of NCX isoforms in the pathophysiology of Parkinson's disease (PD). Their expression and activity were evaluated in neurons and glia of mice expressing the human A53T variant of a-synuclein (A53T mice), an animal model mimicking a familial form of PD. Western blotting revealed that NCX3 expression in the midbrain of 12-month old A53T mice was lower than that of wild type (WT). Conversely, NCX1 expression increased in the striatum. Immunohistochemical studies showed that glial fibrillary acidic protein (GFAP)-positive astroglial cells significantly increased in the substantia nigra *pars compacta* (SNc) and in the striatum. However, the number and the density of tyrosine hydroxylase (TH)-positive neurons decreased in both brain regions. Interestingly, ionized calcium binding adaptor molecule 1 (IBA-1)-positive microglial cells increased only in the striatum of A53T mice compared to WT. Double immunostaining studies showed that in A53T mice, NCX1 was exclusively co-expressed in IBA-1-positive microglial cells in the striatum, whereas NCX3 was solely co-expressed in TH-positive neurons in SNc. *In vitro* experiments in midbrain neurons from A53T and WT mice demonstrated a reduction in NCX3 expression, which was accompanied by mitochondrial Ca^{2+} overload. Collectively, *in vivo* and *in vitro* findings suggest that the reduction in NCX3 expression and activity in A53T neurons from midbrain may cause mitochondrial dysfunction and neuronal death in this brain area, whereas NCX1 over-expression in microglial cells may promote their proliferation in the striatum.

OC-32

Lack of 26RFa alters the central anti-hyperglycemic action of insulin in mice

El Mehdi M[1], Cherifi S[1], Berrhamoune H[1,2], Arabo A[1], Maucotel J[1], Leprince J[1], Anouar Y[1], Prévost G[1,2], Chartrel N[1] and Picot M[1]

[1] Normandie Univ, UNIROUEN, INSERM U1239, Laboratory of Neuronal and Neuroendocrine Differentiation and Communication (DC2N), Mont-Saint-Aignan, France ; [2] Normandie Univ, UNIROUEN, Rouen University Hospital, Department of Endocrinology, Diabetes and Metabolic Diseases, Rouen, France

26RFa is a hypothalamic orexigenic neuropeptide also expressed at periphery where it regulates glycaemia by exerting an incretin effect. Recently, we observed that 26RFa also regulates glycaemia *via* a brain action as central administration of 26RFa induces an anti-hyperglycaemic effect, similar to that observed in periphery. Moreover, we found that insulin, known to exert a powerful central hypoglycemic action, strongly stimulates 26RFa release by hypothalamic explant, induces c-fos expression in 26RFa neurons, and that the central hypoglycaemic effect of insulin is partially abolished by a 26RFa-receptor antagonist. These results led us to assume that 26RFa neurons are a relay of the central action of insulin on glucose homeostasis. To understand the mechanisms of action underlying the central anti-hyperglycaemic effect of 26RFa, we used a newly generated mouse model deficient in 26RFa. First, we found that 26RFa-/- mice display an altered glycemic phenotype. Indeed, although insulinemia do not show any alteration, the glucose-tolerance is impaired in mice lacking