II CONGRESO INTERNACIONAL
DE PSICOBIOLOGÍA

2nd INTERNATIONAL CONGRESS OF PSYCHOBIOLOGY

ÁVILA, SPAIN

July, 2017

ABSTRACT BOOK

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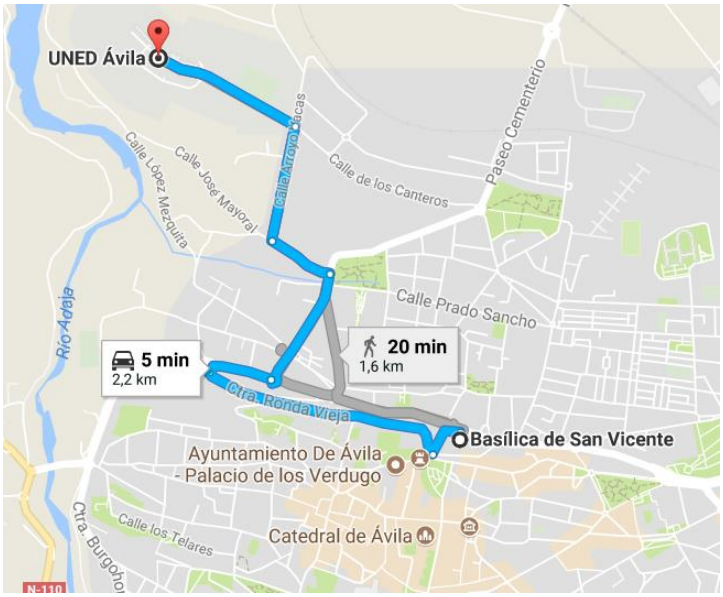
The celebration of the II International Congress of Psychobiology is a continuation of the one previously held in Oviedo in July 2015. The objective is to bring together senior and young researchers from Spain and abroad in an event where the latest findings in the field of Psychobiology can be presented and discussed. The Congress will be held at the Associated Centre of UNED in Ávila on July 19-21, 2017:

HOW TO GET THERE



Address: C/ Canteros s/n
Phone number: +34 920 20 6212
e-mail: info@avila.uned.es

The Associated Centre is within walking distance from the city centre (20 min approx.), but you can also get there:

By city bus: line 2 stops at the Associated Centre of UNED and you can buy the ticket on the bus. You can find all information about the bus line, including the App in this link: http://www.avilabus.com/

By taxi: you can book it at the hotel or at Radio Taxi Ávila: +34 920 35 35 45

By car: The Associated Centre of UNED has free parking space available.

During the event a shuttle provided by the congress will leave from the Tourism Office (Av. de Madrid, 39) to the Associated Centre of UNED ten minutes before the beginning of each sessions and from the Associated Centre of UNED to the Tourism Office 10 minutes after the end of the sessions. Detailed information regarding bus schedules will be available in the registration desk.

Welcoming cocktail, Thursday lunch, coffee breaks, and Congress dinner are included in the registration fee. Congress dinner will take place in *Restaurante El Lienzo*, Av. De Madrid, 102.

CONGRESS ORGANIZATION

There will be four plenary lectures in the Congress. The Opening Lecture will be given by Dr. Nuno Sousa (*School of Health Science, University of Minho, Portugal*), and the Closing Lecture by Dr. Adrea Chiba (*Department of Cognitive Science, San Diego, California, USA*)

Additional plenary lectures will be given by Dr. GianCarlo Panzica (*Department of Anatomy, Pharmacology and Legal Medicine, University of Torino, Italy*), by Dr. Gaetano DiChiara (*Department of Biomedical Sciences, University of Cagliari, Italy*) and also a conference by Dr. Ignacio Morgado (*Department of Psychobiology and Methodology of Health Sciences, Institut de Neurociències*, *Autonomous University of Barcelona, Spain*).

SIMPOSIA AND ORAL COMMUNICATIONS

There will be 8 scientific symposia and 10 oral communication sessions that will be chaired by senior scientists in the Psychobiology field.

POSTER EXHIBITION

There will be two Poster Sessions taking place during coffee breaks.

Session 1: Poster set up between 10:00h and 11:30, Wednesday 19th. Removal on Thursday 20th, 14:00. Authors will be by their poster on Thursday 20th, from 11:45h to 12:45h during the coffee break.

Session 2: Poster set up by 14:00h, Thursday 20th. Removal on Friday 21st, 11:00. Authors will be by their poster on Thursday 20th, from 17:15h to 17:45h and on Friday 21st from 10:30 to 11:00.

YOUNG RESEARCHERS WORKSHOPS

Workshop (1) and (2) will have limited seats, 12 and 40 respectively, which will be occupied on a first-come, first-served basis, according to the reservations at the reception desk when collecting the conference documentation. Although all those attending the congress will be welcome to attend the workshops, young researchers will have priority.

Programme at a glance

WEDNESDAY 19th OF JULY	
09:30	**On-site registration**
11:30 – 12:00	**ASSEMBLY HALL Opening ceremony with local and UNED authorities**.
12:00 – 13:30	**ASSEMBLY HALL Opening Lecture: The stress neuromatrix dynamics** *Nuno Sousa. School of Health Science, University of Minho, Portugal*
13:30	**Welcome reception**
14:30 – 16:00	**Young Researchers Workshop (1):** Event-related potentials as a high-temporal resolution technique to explore the human brain. *Ela I. Olivares. Autonomous University of Madrid* **Young Researchers Workshop (2):** Watching the brain in action: In vivo voltage-sensitive optical imaging *Francisco Ocaña, Isabel Martín-Monzón, Tamara del Águila y Antonia Gómez. Laboratory of Psychobiology. University of Sevilla.*
16:00 – 17:30	**CONFERENCE ROOM 5 Symposium (1): Pain and Emotions** **Moderator**: *Pedro Montoya. University of the Balearic Islands* • **Physiological activity in blood phobia** *José María Martínez Selva and Juan Pedro Sánchez Navarro. University of Murcia* • **Affective modulation of brain changes associated with chronic pain** *Pedro Montoya. University of the Balearic Islands* • **Pharmacogenetic Dissection of Neural Mechanisms Underlying the Anxiodepressive Comorbidity in Chronic Pain** *Esther Berrocoso, University of Cádiz* **CONFERENCE ROOM 6 Symposium (2): Sex-environmental interactions on behavior expression** **Moderatores**: *Mª Teresa Colomina. Rovira i Virgili University/Fernando Sánchez-Santed. University of Almería* • **Neurodevelopment and spatial memory: laboratory experiments and findings in preterm infants** *Marta Méndez López. University of Oviedo* • **The effects of postnatal exposure to chlorpyrifos are sex-dependent** *Cristian Pérez Fernandez. University of Almería* • **Behavioural responses to toxic and pharmacological exposures are influenced by sex and APOE genetic background** *Laia Guardia Escoté. Rovira i Virgili University, Tarragona* • **Maternal separation in anorexic rats: a sexually dimorphic effect** *Stefano Gotti. University of Turin*
17:30 – 18:00	**Coffee Break**

18:00 – 19:15	**<u>CONFERENCE ROOM 7</u> Lecture: The nature of consciousness** *Ignacio Morgado. Autonomous University of Barcelona* **<u>CONFERENCE ROOM 5</u> Oral Communications (1)** **Moderator***: Marta Miquel. Jaume I University* **<u>CONFERENCE ROOM 6</u> Oral Communications (2)** **Moderator***: Juan Ramón Ordoñana. University of Murcia*
20:00 – 20:30	**Ávila´s Town Hall Reception (Palacio de los Verdugo)**
20:30 – 21:30	**Guided Tour around Ávila city centre**

THURSDAY 20th OF JULY

09:00 – 10:15	**<u>ASSEMBLY HALL</u> Plenary Lecture (1): Dopamine and hedonia: new evidence for an old debate** *Gaetano Di Chiara, Ph.D. Department of Biomedical Sciences, University of Cagliari, Italy.*
10:15 – 11:45	**<u>CONFERENCE ROOM 5</u> Symposium (3): New perspectives in animal models of stress and aggression: neurobiological and behavioural changes** **Moderator:** *Rosa Redolat. University of Valencia* • **Early-life neglect: effects on the developing adult rat brain** *Nélida Conejo. University of Oviedo* • **Isolation and social instigation in animal models of aggression: Effects of an mGLU1 receptor antagonist administration** *Mercedes Martín-López. University of Málaga* • **Social stress and environmental enrichment: how environmental conditions influence on experimental results?** *Patricia Mesa-Gresa. University of Valencia* • **Social instability: Towards a model of depression in female mice** *Larraitz Garmendia. University of the Basque Country* **<u>CONFERENCE ROOM 6</u> Symposium (4): Experimental Models in Research** **Moderator***: Jorge Arias. University of Oviedo* • **The teleost fishes as an animal model in Psychobiology and Neurosciences** *Antonia Gómez. University of Sevilla* • **Taste and object recognition in rodents: reference models for understanding memory brain circuits** *Alejandro Grau-Perales. University of Granada* • **From clinic to basic science: How to understand brain dysfunction in cirrhosis** *Natalia Arias. University College London* • **The 6-OHDA-rat model of Parkinson's disease: motor and behavioural implications** *Camino Álvarez-Fidalgo. University of Zaragoza*

	• **Which mechanisms are altered in the abused children brains? Experimental models for social problems** *María Banqueri. University of Oviedo*
11:45 – 12:45	**Coffee Break and Poster Sessions (1)**
12:45 – 14:00	**CONFERENCE ROOM 5 Oral Communications (3)** **Moderator***: Mª Ángeles Zafra. University of Granada* **CONFERENCE ROOM 6 Oral Communications (4)** **Moderator***: Mª Victoria Perea. University of Salamanca* **CONFERENCE ROOM 7 Oral Communications (5-6)** **Moderator***: Fernando Sánchez-Santed. University of Almería*
14:00 – 16:00	**Lunch**
16:00 – 17:15	**ASSEMBLY HALL Plenary Lecture (2): Environmental modulation of neural circuits: how genistein or other endocrine disruptors may interfere with the neuroendocrine brain and related behaviors.** *GianCarlo Panzica. Department of Anatomy, Pharmacology and Legal Medicine, University of Torino, Italy*
17:15 – 17:45	**Coffee Break and Poster Sessions (2)**
17:45 – 19:15	**CONFERENCE ROOM 5 Symposium (5): Psychobiology of Motivated Behavior and Addiction** **Moderator***: Raquel Gómez de Heras. Complutense University of Madrid* • **Effects of highly caloric palatable diet during the perinatal period and the endogenous cannabinoid system** *Fernando Rodríguez de Fonseca. Complutense University of Madrid* • **Maternal separation induces neuroinflammation and long-lasting emotional alterations in mice. Effects on addictive behavior** *Olga Valverde. Pompeu Fabra University* • **Long-lasting effects of social defeat during adolescence on ethanol and cocaine abuse** *Marta Rodríguez Arias. University of Valencia* • **Understanding the Long-Term Consequences of Marijuana Use by Adolescents on Addictive Behaviour: A Psychobiological Perspective** *Alejandro Higuera Matas. National Distance Education University, UNED* **CONFERENCE ROOM 6 Symposium (6): Psychobiology of Motivation: Mechanisms of deficit and reward** **Moderator:** *María José Simón. University of Granada* • **Rewarding effects of MDMA in mice: environmental influences and neurochemical substrates** *M. Asunción Aguilar. University of Valencia* • **Reward loss, emotional self-medication and addiction** *Carmen Torres. University of Jaén*

	• **Increased sodium appetite in Median Eminence hypovolemic rats after systemic oxytocin administration** *Javier Mahía. University of Granada*
19:15 – 20:30	**AULA MAGNA General Meeting of the Spanish Society of Psychobiology**
21:30	**Congress Dinner**

FRIDAY 21st OF JULY

09:00 – 10:30	**CONFERENCE ROOM 5 Oral Communications (7)** **Moderator***: Concepción Vinader. University of Valencia* **CONFERENCE ROOM 6 Oral Communications (8-9)** **Moderator***: Cosme Salas. University of Sevilla*
10:30 – 11:00	**Coffee Break and Poster Sessions (2)**
11:00 – 12:30	**CONFERENCE ROOM 5 Symposium (7): Cognitive Enhancement** **Moderator:** *Margarita Martí. Autonomous University of Barcelona* • **Learning improvement by dietary choline supplementation** *Milagros Gallo. University of Granada* • **Novel synthetic peptides with nootropic properties** *César Venero. National Distance Education University, UNED* • **Targeting the glutamatergic system to enhance cognition** *Gemma Guillazo. Institute of Neurosciences. Autonomous University of Barcelona* • **Novelty for enriching the brain: A bridge between human and animal research** *Rosa Redolat. University of Valencia* **CONFERENCE ROOM 6 Symposium (8): Brain electrical correlates of cognitive and affective processes of human face recognition** **Moderator:** *Jaime Iglesias. Autonomous University of Madrid* • **Prosopagnosic individuals don´t use efficiently featural information in the formation of new face representations as revealed by ERPs** *Ela I. Olivares. Autonomous University of Madrid* • **Implicit and explicit trustworthiness detection in patients with Williams's syndrome** *Manuela Costa. Marc Jeannerod Laboratory on Language, Brain and Cognition, Bron, Lyon* • **Psychophysiological correlates of eyewitness performance during lineup identifications** *Isabel M. Santos. CINTESIS.UA - Centre for Health Technology and Services Research, University of Aveiro* • **Brain potentials underlying access to familiarity and identity in acquired and developmental prosopagnosia** *Ana S. Urraca. University Center Cardenal Cisneros, Alcalá de Henares, Madrid*

12:30 – 13:45	**ASSEMBLY HALL Closing Lecture: The Basal Forebrain and Adaptive Behavior** *Andrea Chiba, Department of Cognitive Science, University of California, San Diego, USA*
13:45 – 14:00	**ASSEMBLY HALL Award Winners Announcement for best posters and oral communications**
14:00 – 14:15	**ASSEMBLY HALL Closing Ceremony**
14:15	**Lunch**

ORAL COMMUNICATIONS

	PRESENTING AUTHOR	TITLE
SESSION 1: WEDNESDAY 19 18:00-19:15	Andrea Lebeña	Melanoma tumor development and inflammation: physiological alterations and depressive behavior in mice
	Julia Folch-Schulz	The analysis of socioemotional behaviour as a differential diagnosis instrument in children with primary autism
	Javier Orihuel	Acute cannabidiol dose prevents induced withdrawal after chronic Δ9-tetrahydrocannabinol treatment during adolescence and the expression cocaine CPP during adulthood
	Laura Orio	Women alcohol binge drinkers show a higher immune/inflammatory response that correlates with worse neuropsychological performance
	Mª Teresa Ramirez-López	Sex-dependent effects on behavior and metabolism after perinatal exposure to undernutrition: involvement of the endocannabinoid system
	William Patarroyo	Cocaine seeking and self-administration responses in rats after operant and pavlovian training contingencies
SESSION 2: WEDNESDAY 19 18:00-19:15	David Moranta	Improvement of cognitive abilities by α-tocopherol in old rats was paralleled with modulation of SIRT1 in the hippocampus
	Estíbaliz Herrera	Effects of maternal separation and environmental enrichment on the limbic system metabolic capacity
	Mercedes Fernandez-Ríos	Perceived stress, resilience and gains in caregivers of patients with Alzheimer's disease
	Eider Pascual Sagastizabal	The influence of empathy and hormone levels on aggressive behavior in school-age children
	Shishir Baliyan	The role of supplemental thyroid hormones in cognitive and social capacities at aging
SESSION 3: THURSDAY 20 12:45-14:00	Ainitze Labaka	Effects of chronic social instability stress and venlafaxine on behavior, the HPA axis, monoaminergic activity and immunity parameters in female mice
	Ana Merchán	Tryptophan depletion by diet alters gut microbiota of compulsive drinker rats in schedule-induced polydipsia
	Olatz Goñi	Effects of tumor and stress coping strategies on inflammation, the tryptophan metabolic pathway and depressive-like behavior in mice
	Raquel Rives	The relationships between exercise and cortisol levels on chronic pain perception and experimental pain sensitivity in women with fibromyalgia
	Ricardo Sánchez	Alterations on the hypothalamic feeding system in the Activity-Based Anorexia (ABA) rat model

	Sara Higarza	Neurobehavioral characterization of a Non- Alcoholic Fatty Liver Disease (NAFLD) animal model
	Matthew Lennol	Mating-related attentional changes during the menstrual cycle
	Inés Ferrer	Mild Cognitive Impairment in patients with and without depression
SESSION 4: THURSDAY 20 12:45-14:00	David Roura	Changes in noradrenergic system after consumption and withdrawal of cocaine, heroin and sucrose using a paradigm that induces incubation of craving
	Joana Pérez-Tejada	Psychological distress, quality of life and serotonin levels in breast cancer survivors
	Julián Guarque-Chabrera	Glutamatergic changes around cerebellar golgi cells expressing a perineuronal net in cocaine-induced preference conditioning
	M Carmen Blanco-Gandía	Effects of bingeing on fat during adolescence on the reinforcing effects of cocaine
	Marina D. Reguilón	The effects of repeated social defeat stress on ethanol abuse: Role of neuroinflammation
	Roberto Capellan	Cocaine addiction study in a two-hit model of schizophrenia: Maternal immune activation and peripubertal chronic stress
	Santiago Mora	Dealing or yielding: evidence of neuroplastic changes in an animal model of compulsivity
	Teresa Montoliu	Evening cortisol levels, loneliness, depression and cognitive function in healthy elderly
SESSION 5-6: THURSDAY 20 12:45-14:00	José Morosoli	Genetic and environmental contributions to the relationship between chronic pain and symptoms of depression
	Rosa Fernández	Genetic vulnerability in gender dysphoria: The role of androgen and the estrogen receptors
	Andrés Molero	Modulatory effects of tdcs applied over broca's and wernicke's areas on verbal recognition task performance
	Fabiola Ávila-Gamiz	Relevance of the object shape in rat object exploration
	Emilio Durán	Is there a neural signature for pain in fish?
	Ferrán Suay	Action vs. State Orientation and performance at Brain-Computer Intefaces
	Isabel Martín-Monzón	Cerebellar bases of classical conditioning in teleost fish
	Tamara del Águila	Pain processing in the goldfish telencephalic pallium: Heart rate conditioning by electrical microstimulation in the DM2 area

	Isabel Trujillo	Intracarotid propofol procedure for assessing hemispheric lateralization of cognitive, physiological and emotional functions on epileptic patients
SESSION 7: FRIDAY 21 9:00-10:30	Aránzazu Duque	Subchronic ethanol does not significantly impair emotional memory in mice
	Carmen Ferrer	Role of CRF receptors in the effects of social stress on cocaine reward
	Laura Prieto-Arenas	Tobacco use and smoking-related attitudes among medical students in valencia: A descriptive study
	Lidia Blazquez-Llorca	Cocaine self-administration enhances hippocampal synapses size in Lewis rats
	Marcos Ucha	Modulation of the mTOR pathway after morphine self-administration and subsequent extinction training in male Lewis rats
	Miguel Morales-Navas	Prenatal chlorpyrifos and valproic acid in relation to development of ASD
	Román D Moreno-Fernández	The limbic brain under stress: A role for the LPA1 receptor.
	Sergio Castaño-Castaño	Effects of tdcs on visual performance and parvalbumin labelling in visual cortex of amblyopic long-evans
SESSION 8-9: FRIDAY 21 9:00-10:30	Aalejandro N. Expósito	Role of medial prefrontal cortex and central amygdala in the attenuation of taste neophobia
	Francisco M. Ocaña	The hippocampal pallium of teleost fish: A specialized area for spatial and temporal dimensions of memory
	Hugo Marte	Electroencephalographic correlates of cognitive load. A study with portable electroencephalographic device
	Raisa Rabadán	Relationship between anxiety-like behavior and pain sensitivity in mice reared in different enriched environments
	Ángeles Prados	Postnatal development of oxygen consumption and electrophysiological parameters (ECG, EMG, EEG) during sleep-wake cycle in EAR2 mice
	Candela Zorzo-Vallina	Low-level light therapy and its effect in the oxidative metabolism on the brain limbic system: Differences between types of administration
	Sergio Menchén-Márquez	Gustatory thalamus role in the rat taste neophobic response

POSTER EXHIBITION

Session 1: Poster set up between 10:00h and 11:30, Wednesday 19th. Removal on Thursday 20th, 14:00. Authors will be by their poster on Thursday 20th, from 11:45h to 12:45h during the coffee break.

POSTER SESSION 1

THURSDAY 20 11:45-12:45	PRESENTING AUTHOR	TITLE
POSTER 0	Joselyn Cortés-Cortés	Descriptive and Molecular analysis of a Gender Dysphoric population
POSTER 1	Juan Visa-Bombardo	Effects of D-cycloserine administration in the prefrontal cortex on working memory in aged rats
POSTER 2	David Moranta	Long-term treatment with polyphenon 60 or catechin improves cognition in aged rats and revert the age-induced reduction of SIRT1 protein in rat hippocampus.
POSTER 3	José Mata	Early postnatal exposure to no-observed adverse effect level doses of chlorpyrifos in rats: Cholinergic and GABAergic effects and its behavioral implications.
POSTER 4	Divita Inge Rojic-Becker	Caloric restriction attenuates short and long term memory decline in aged rats
POSTER 5	Elisabet Alzueta	Self-face recognition: At one end of the familiarity continuum or an special processing?
POSTER 6	Patricia Sampedro-Piquer	Glucocorticoid receptor expression after environmental enrichment in the dorsal hippocampus: Relations to spatial memory, exploration and anxiety-related behaviors.
POSTER 7	Mª Ángeles Zafra	Neurobiology of conditioned food preferences: Relevance of the nucleus of the solitary tract, gelatinous part
POSTER 8	Xabier Soto-Goñi	Physiological responses to emotional and pain related film clips in bruxism
POSTER 9	Ángeles Agüero	Role of the central portion of Medial Parabrachial Nucleus (PBNmc) in Lithium Chloride (LiCl)-induced long-term Taste Aversion Learning (TAL) and gusto-olfactory compound conditioned stimuli…
POSTER 10	José Manuel Cimadevilla Redondo	Age and gender differences in the reaching space in a virtual reality-based memory task
POSTER 11	Nora del Puerto	The relationship between hormone levels and observed behavior moderated by the 2D:4D index
POSTER 12	Marilena Marraudino	Early postnatal genistein administration has a sexually dimorphic obesogenic effect and organiational effects on hypothalamic neuroendocrine circuits in CD1 mice

POSTER 13	Blanca Laffon	Psychoimmunological depletion in frailty status in older adults is related to alterations in neopterin and tryptophan breakdown
POSTER 14	David Ladrón de Guevara	LPA1/3 receptor antagonist KI16425 as a novel treatment for the neurobehavioral effects of ethanol
POSTER 15	Pablo Galeano	Effects of palmitoylethanolamide in cocaine-induced behaviours
POSTER 16	José Miñarro	Longitudinal study of prepulse inhibition of startle reflex in male and female mice
POSTER 17	Antonio González-Rodríguez	Improvement on emotional facial expression recognition with differential outcomes procedure in schizotypy
POSTER 18	Sara Tabbai	Role of LPA1 receptor in mood regulation
POSTER 19	Alejandra G. Torre	Study of Non-Motor Symptoms of Parkinson's disease in the 6-OHDA-rat model
POSTER 20	Isis Gil Miravet	An inhibitory prefrontal-cerebellum network for drug-related memories

POSTER EXHIBITION

Session 2: Poster set up by 14:00h, Thursday 20th. Removal on Friday 21st, 11:00. Authors will be by their poster on Thursday 20th, from 17:15h to 17:45h and on Friday 21st from 10:30 to 11:00.

POSTER SESSION 2

THURSDAY 20 17:15-17:45 FRIDAY 21 10:30-11:00	PRESENTING AUTHOR	TITLE
POSTER 21	Andrea Álvarez	A neuropsychological study on global/local visual processing in elderly people without and with cognitive impairment.
POSTER 22	Susana Esteban	Motherhood improves cognition in female aged rats. Role of 5-HT1A receptors
POSTER 23	Vanessa Valdiglesias	Changes in psychoneuroendocrine system in frail Spanish older adults in association with phenylalanine, tyrosine and nitric oxide serum concentrations
POSTER 24	Isabel Trujillo	Spatial and Non-spatial functions of the teleost fish hippocampal pallium
POSTER 25	Pilar Fernández	Neuropsychological profiles of attention and inhibitory control in Neurodevelopmental disorders through a virtual reality test.
POSTER 26	Carlos Fernández	Neuronal metabolic activity alterations induced by maternal alcohol binge consumption in offspring mice
POSTER 27	Joaquín Ibañez	A multimodal system for functional assessment of brain and systemic responses
POSTER 28	Sergio Ortuño	Mapping startle response onto forehead: a NIRS approach
POSTER 29	Marcos Mirete	Mapping mental load onto forehead: a NIRS approach
POSTER 30	Sergio Molina	Mapping conflict onto forehead: a NIRS approach
POSTER 31	Paula Pazo	Modulation of change detection components by central retro-cueing: an ERP and time-frequency study.
POSTER 32	Olga Pellicer	Cardiac variability as a predictor of witnesses memory: implications in the quality of testimony
POSTER 33	Lucía Utrera	Cognitive function, loneliness, and salivary cortisol levels in elderly men and women

POSTER 34	Valentina Ladera	A Normative Study of The 5 Objects Test in a Large Spanish Community Sample
POSTER 35	Pía Basaure	Contribution of apoE genotype on the expression of neurobehavioral effects induced by postnatal exposure to chlorpyrifos
POSTER 36	Jose M. Lerma-Cabrera	Enrichment effects on anxiety, impulsivity and cognitive flexibility in adult male rats exposed to binge-like ethanol exposure during adolescence.
POSTER 37	Santiago Monleón	Indomethacin counteracts the effects of acute ethanol on emotional memory in mice
POSTER 38	Mª del Carmen Arenas	Prepulse inhibition of startle reflex as a predictive endophenotype of sensitization to cocaine-induced motor effects in male mice
POSTER 39	Elisa Rodríguez-Ortega	Topiramate reduces ethanol binge Drinking in the Dark, compulsivity and anxiety responses in C57BL/6J mice
POSTER 40	Concepción Vinader	Blood alcohol concentration and working memory (spatial and letters-numbers memory) in adolescent binge drinkers
POSTER 41	Elena Martín	Potential therapeutic effect of psychoactive drugs in compulsivity
POSTER 42	Juan José León	Decision making and motor inhibition: the role of the orbitofrontal cortex through tDCS.
POSTER 43	Alberto Marcos	Simultaneous cocaine and alcohol intravenous self-administration in young-adults rats
POSTER 44	Eduardo Pásaro	Association between frailty syndrome and micronucleus frequency in an older adult population. Influence on cognitive impairment

PLENARY LECTURES & CONFERENCES

Wednesday 19th **Opening Lecture**

THE STRESSED NEUROMATRIX

Nuno Sousa

Life and Health Science Research Institute (ICVS/3Bs), University of Minho, Braga

Stressful stimuli in healthy subjects trigger activation of a consistent and reproducible set of brain regions; yet, the notion that there is a single and constant stress neuromatrix is not sustainable. Indeed, after chronic stress exposure there is activation of many brain regions outside that network. In the last decades the field has been mapping the effects of chronic maladaptive stress on the fine structure of the brain and, in parallel, determining its behavioral and functional correlates. This suggests that there is a distinction between the acute- and the chronic-stress neuromatrix. The emerging view is that several factors modulate a dynamic interplay in brain connectivity. Its comprehension will allow for a more holistic perspective of how the brain shifts “back and forth” from a healthy to a stressed pattern and, ultimately, how the latter can be a trigger for several neurological and psychiatric conditions.

DOPAMINE & HEDONIA: NEW EVIDENCE FOR AN OLD DEBATE

Gaetano Di Chiara

Department of Biomedical Sciences, University of Cagliari

No doubt, one of the most debated issue in the psychobiology field is that of the relationship between dopamine (DA) and hedonia. Thus, although everybody will accept that DA transmission in certain brain areas such as the ventral striatum/ nuclus accumbens is strongly linked to hedonia, the direction of this relationship has been hotly debated. Does activation of DA transmission elicits hedonia or activation of DA transmission is the consequence of hedonia? In the past, the first hypothesis was proposed on the basis of the observation that rats will rapidly learn to self-stimulate along the course of the DA pathway and that DA receptor antagonists impair food reinforcement in an extiction-like fashion. However, this evidence was criticized on the basis of the unspecificity of intracranial electrical stimulation and on the ability of neuroleptics to impair motor function. Also against a role of DA in hedonia was the observation that DA receptor blockade does not impair hedonic taste reactivity. However, selective silencing of D1 receptor expression as well optogenetic stimulation or depression of DA neurons have now provided direct evidence for a causal role of DA in hedonia. It is proposed that the relationship between DA and the motivational valence, positive or negative, of stimuli is different depending on the area where DA acts but in the shell of the n.accumbens DA codes for hedonic valence. Accordingly, while its activation is sufficient to promote positive reinforcement, its reduction promotes aversion. This hypothesis is not in contrast with an incentive role of DA except that it assigns to DA, in addition to the driving force, also its valence.

Thursday 20th **Plenary Lecture 2**

ENVIRONMENTAL MODULATION OF NEURAL CIRCUITS: HOW GENISTEIN OR OTHER ENDOCRINE DISRUPTORS MAY INTERFERE WITH THE NEUROENDOCRINE BRAIN AND RELATED BEHAVIORS

GianCarlo Panzica, Marilena Marraudino, Alice Farinetti, Giovanna Ponti, Stefano Gotti

Department of Neuroscience, University of Torino, Italy and Neuroscience Institute Cavalieri Ottolenghi (NICO), Orbassano

Steroid hormones, in particular estrogens, are among the most important factors to regulate the development of the central nervous system (CNS). In fact, they may regulate neurogenesis, process outgrowth and synaptogenesis, concurring in this way to the development of specific pathways and functions. In many cases these functions as well as the neural pathways are sexually dimorphic and steroid sensitive also in the adulthood.

In the last 30 years, it has been progressively discovered in the environment that several substances of synthetic or natural origin may bind to hormone receptors. These substances are now called endocrine disrupting chemicals (EDCs) and may impact all those organs having hormonal receptors, including the brain. Many EDCs bind to steroid hormone receptors and this may impact brain and behavior differentiation.

Our and other data, collected in the last 10 years, demonstrate that the effects of EDCs on the brain are dependent by the age, the sex, and the region. The analysis of these effects is therefore not simple. In addition, the effects of a particular EDC will vary over the lifecycle of the animal and exposure during embryonic development may have short and/or long-term consequences. EDCs may permanently alter neural circuits and physiological properties, including the behavior. These effects may take place at dosis that are considered no effect by the actual legislation.

In our studies we tested the effects of several EDCs during the embryonic development of birds or during pregnancy and early postnatal period in mice. In both models we observed gender-oriented alterations of sexually dimorphic circuits and behaviors. Our data suggest that precocious exposure to EDCs through maternal administration (in mamamls) or in egg deposition (in birds) may permanently alter some sexually dimorphic circuits and influence in a gender-oriented way some behaviors. In particular, the timing of exposure to EDCs is a critical factor, such that the effects of a particular EDC will vary over the lifecycle of the animal as well as across species and phyla. Therefore, exposure to the estrogenic chemicals during embryonic development has consequences beyond impaired function of the reproductive axis. This makes it very challenging to evaluate the short and long-term effects of EDCs.

Many EDCs are of synthetic origin (i.e Bisphenol A, DDT and its derivatives, trybutiltin, phthalates and others), however some bioactive natural compounds (nutraceuticals) may act as EDCs and interfere with the neuroendocrine circuits. Isoflavones are an important group of nutraceuticals highly present in many animal feed and nutritional supplements which are soy based, being this plant an important source of proteins. Among the isoflavones present in soy, genistein is one of the most interesting molecules. It has an estrogenic effect which may interfere with hypothalamic circuits in different ways. The use of soy based formulas for neonates has increased in the recent

years. Different studies explored the effects of genistein in human infants, and in rodents but its long-term effects are still poorly understood. In our experimental models, pre- or post-natal exposure to genistein induced alteration of both behavior and neural circuits, and in many cases the effects were also sexually dimorphic.

Due to the large presence of EDCs in the environment and the food, as well as to their peculiar action during the brain differentiation, it seems reasonable that these compounds may concur to the development of some neural diseases that depends by alterations of brain circuits that are influenced by hormones during their normal development. In particular, due to the large number of EDCs that may bind to sex hormones' receptors, all neurological diseases that show a sex-ratio different from 1:1 are potentially affected by EDCs.

Therefore, exposure to the EDCs during embryonic development has consequences beyond impaired function of some neuroendocrine circuits. This makes it very challenging to evaluate their short and long-term effects. These compounds are therefore a third player within the nervous system and the evolutionary implications of having them in the normal food supply for certain human populations (i.e. phytoestrogen derivatives from soy), as well as for wild and farm animals should stimulate a wide discussion about their beneficial or adverse role.

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THE BASAL FOREBRAIN AND ADAPTIVE BEHAVIOR

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Adapting behavior to the changing demands of the environment relies on the ability to favor processing of some aspects of the environment over others. Rodent models of attention have relied on the notion of surprise, uncertainty, or probabilistic inference, to explain how learning of specific stimuli or features of the environment are favored at particular points in time. Yet, the important role of timing, itself, has remained a tangential topic. Beginning to understand how subcortical structures of the brain contribute to cortical processing, and ultimately towards maintaining fluid behavior in a changing world, relies on the synthesis of theoretical work and results from behavioral, neurochemical, and neural recording studies.

THE NATURE OF CONSCIOUSNESS

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Would you agree that are not your conscious thoughts and decisions that you make with them which determine your behaviour? Would you accept that your consciousness is not more than an irrelevant illusion, an imaginative reflection of what makes your brain? Would you accept then that consciousness is an epiphenomenon, i.e., a side effect of the physiological work of your brain, with little or no practical value, something comparable to the noise of the engine of a car or a machine? This talk attempts to answer these questions explaining the current knowledge about the scientific nature of consciousness and considering a possible alternative to this way of understanding it.

SYMPOSIA

SYMPOSIUM 1

PAIN AND EMOTIONS

Wednesday, July 19th, 2017

Chair: Pedro Montoya, University of Balearic Islands

SYMPOSIUM 1

PHYSIOLOGICAL ACTIVITY IN BLOOD PHOBIA

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In contrast with other types of phobia, like spider or snake phobia, blood phobia is characterised by an increase in sympathetic activity followed by a surge in parasympathetic activity that can eventually lead to fainting. However, recent studies, including those from our laboratory, point to an autonomic imbalance in the reaction to the phobic stimuli, and also possibly to a problem in the central regulation systems descending from the frontal cortex. Taking together all the available data, a coactivation of the sympathetic and parasympathetic systems seems to be at the centre of the physiological reaction in this kind of phobia.

SYMPOSIUM 1

AFFECTIVE MODULATION OF BRAIN CHANGES ASSOCIATED WITH CHRONIC PAIN

Pedro Montoya

Research Institute of Health Sciences (IUNICS), University of Balearic Islands

Clinical and experimental research indicates that chronic pain patients have enhanced somatic pain sensitivity, together with abnormal activation of pain-related brain regions. Psychophysical and neurophysiological studies further suggest the existence of specific disturbances in affective and cognitive processing and indicate that affective mood can modulate central nervous excitability thresholds without conscious cognitive processing in these patients. These findings point toward the importance of considering a biopsychosocial model, integrating affective, cognitive, and social factors, to understand the brain mechanisms involved in the origin and maintenance of chronic widespread pain.

It is further postulated that if the neurobiological basis of a disorder is already known in terms of abnormal activity pattern in certain brain regions, a training targeted to specifically modify neural activity in those regions could be effective for improvement of clinical symptoms. In this sense, a long tradition of neurobiological research has clearly shown that animals are able to learn volitional control of their own brain activity through feedback and reward. During the last decades, several studies have also provided increasing evidence that humans can be trained to gain voluntary control of brain activity with high specificity by using feedback from neurophysiological signals (EEG, fMRI, near-infrared-spectroscopy).

The present work will review some data about abnormalities in brain information processing associated with the maintenance of pain over time in chronic pain patients and will discuss new ideas about the implementation of such knowledge for the management of persistent chronic pain through neurofeedback.

The work was supported by a grant from the Spanish Ministry of Economy and Competitiveness and European Regional Development Funds (reference: #PSI2010-19372)

SYMPOSIUM 1

PHARMACOGENETIC DISSECTION OF NEURAL MECHANISMS UNDERLYING THE ANXIODEPRESSIVE COMORBIDITY IN CHRONIC PAIN

Esther Berrocoso

Psychobiology Area. Department of Psychology Neuropsychopharmacology & Psychobiology Research Group PAIDI-CTS-510 CIBER of Mental Health, CIBERSAM Group G18 Universidad de Cádiz

Anxiety and depression are frequently observed in patients suffering from chronic pain, which dramatically adds to the patients' pain burden. I will show that the noradrenergic-Locus Coeruleus is a critical hub for the development of the anxio-depressive consequences of long-term neuropathic pain. Furthermore, the LC can increase but also decrease pain hypersensitivity in neuropathic pain. These data stimulate interest in novel therapeutic options that modulate the noradrenergic and amygdalar circuits.

SYMPOSIUM 2

SEX-ENVIROMENTAL INTERACTIONS ON BEHAVIOR EXPRESSION

Wednesday, July 19th, 2017

Chairs: Mª Teresa Colomina, Rovira I Virgili University
Fernando Sánchez-Santed, University of Almeria

SYMPOSIUM 2

NEURODEVELOPMENT AND SPATIAL MEMORY: LABORATORY EXPERIMENTS AND FINDINGS IN PRETERM INFANTS

Marta Mendez[1,2], M. Méndez-López[3], C. Fernández-Baizán[1,2], L Alcántara-Canabal[1,2], G. Solís[2,4], JL. Arias[1,2]

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Several works have shown that males and females differ in the ability to learn spatial locations. Experimentally, the Morris water maze (MWM) is one of the most widely used tasks in behavioural neuroscience to explore spatial and episodic memory in rats. We used MWM to assess the acquisition of a spatial working memory task in young and adult male and female Wistar rats. The sex differences in the functional contribution of brain substrates were explored following acquisition of WM task using quantification of *c-Fos* protein and quantitative histochemistry of the cytochrome oxidase (COx). Two control groups for each sex and age were added to explore activation not specific to the memory process. Behaviourally, no age differences were found in number of days required by males to acquire the task, but females showed a delay in acquisition during adolescence (P30) that improved in adulthood (P90). Results indicated sex and age differences in brain functioning following working memory task. However, they could not be necessarily linked with differences in performance since similar results were found between males and females during adulthood. In humans, we have developed a new method to assess egocentric and allocentric spatial memory by card placing tasks. These tasks are performed better by male participants.

The hippocampus is especially vulnerable in preterm infants since the perinatal period is critical for its development. Learning and spatial memory depend on the hippocampal integrity. We applied card-placing tasks to assess spatial memory in a sample of very preterm children between 6-7 years of age. Very preterm boys performed poorly in the allocentric task in comparison with the control boys. They committed more errors than controls searching for the rewarded positions. However, no significant differences were observed in the egocentric task. These results could suggest that the hippocampal function is affected in this sample.

This research was supported by Project Grant of the Spanish Ministry of Economy and Competitiveness PSI2013-45924P, Gobierno del Principado de Asturias, Consejería de Economía y Empleo, GRUPIN 14-088 y Fundación Ernesto Sánchez Villares.

THE EFFECTS OF POSTNATAL EXPOSURE TO CHLORPYRIFOS ARE SEX-DEPENDENT

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Organophosphorous (OPs) compounds are a wide-range organic derivated of phosphorous substances commonly used as pesticides (insecticides, fungicides, herbicides, nematoicides and acaricides), which were selected in order to avoid chlorinated hydrocarbons usage due to their less environmental persistence. OPs are mostly applied for agricultural goals, above all after residential banning by United States and European Union governments. Chlorpyrifos (CPF) is one of the most widely OPs used from decades ago. As the rest of OPs compounds, CPF shows its toxicological effects by irreversevaly inhibiting cholinesterases (ChEs) by its -Oxon form. Such mechanisms lead to the accumulation of acetylcholine neurotransmitters into the synaptic cleft, ongoing in over stimulation of both muscarinic and nicotinic receptors. Such exposition has been related to different neurodevelopmental and psyquiatric disorders. However, large doses of CPF exposure have shown different (but possibly related) effects to inhibition of ChEs, mainly related to other mechanisms of action on central nervous system (CNS) such oxidative stress, microtubule alterations, cytotoxicity, effects on different elements of the Cholinergic pathway (muscarinic and nicotinic receptors, transmembrane proteins, enzymes of synthesis), Serotoninergic, GABAergic, Dopaminergic and Endocannabinoide systems alterations. At the same time, both early and recent research have found subtle alterations following low CPF exposure doses [known to not induce significant ChEs inhibition, under the no-observed adverse effect level (NOAEL)] both biochemical and behavioral outcomes, which cannot be explained by the significant inhibition of ChEs during critical neurodevelopmental stages. For this, our research group have focused on the study of the interaction of both minor dimensions (NOAEL doses impact on alternative mechanisms of effect) of CPF induced-alterations by the sub- chronic exposure during specific and critical neurodevelopmental stages (PND10-15) on both behavior (sociability, locomotor activity, food consumption, impulsive/compulsive behaviors, learning, sustained/selective attention and spatial memory) and biochemical (enzymatic, genetic and protein analyses) related-outcomes for the entire life-span of Wistar rats (adolescence, adulthood and senescence), analyzing the presumably sexual dimorphism effects of such exposure, and relating it with neuroinflamation mechanisms and gut microbiota composition.

This study was funded by a grant from the Ministerio de Economía y Competitividad, Spanish Government, PSI2014-55785-C2-1-R.

SYMPOSIUM 2

BEHAVIORAL RESPONSES TO TOXIC AND PHARMACOLOGICAL EXPOSURES ARE INFLUENCED BY SEX AND APOE GENETIC BACKGROUND

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Organophosphate pesticides –and in particular Chlorpyrifos (CPF) –are extensively used worldwide for agriculture and gardening purposes. A massive use of pesticides may cause adverse effects to the general population, exposed to low doses via food intake. Indeed, several studies related its exposure with neurobehavioral disorders, being of especial interest when the exposure take place during neurodevelopment. Human apolipoprotein E (apoE) is an important cholesterol carrier involved in lipid homeostasis. The apoE4 isoform has been identified as a susceptibility factor for cognitive impairment, higher cardiovascular risk and Alzheimer disease in humans. In this study, we aimed to assess whether genotype and sex differently modulate the effects of early CPF exposure on behavioral responses. Human apoE4 targeted replacement mice and wild C57BL/6 mice postnatally exposed to CPF were tested in an Object Recognition Test. This two-trial paradigm, coupled with a pharmacological challenge, enabled us to assess not only the associative recognition memory but also the contribution of the acetylcholine and GABA neurotransmitter systems. Sex, genotype and postnatal exposure to CPF were established as key factors in the modulation of general activity and exploration. The cholinergic antagonist scopolamine showed its effect decreasing exploration behavior in all groups and discrimination only in females. Postnatal exposure to CPF modulated the sensibility to scopolamine and alprazolam, especially in apoE4 mice. Discrimination in apoE4 males was lower than their wild corresponding partners but ameliorated with the administration of cholinergic agonist rivastigmine. Interestingly, the same drug worsened the discrimination on apoE4 female group, highlighting the importance of genotype and sex in the treatment outcome. Overall, these results provide evidences of differences between groups in neurotransmitter systems functioning upon pharmacological challenges and suggest complex interactions between sex, genotype and postnatal CPF exposure.

SYMPOSIUM 2

MATERNAL SEPARATION IN ANOREXIC RATS: A SEXUALLY DIMORPHIC EFFECT

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The anorexia nervosa (AN) is a severe mental disorder with a high risk of death, characterized by restricted food intake, a significant body weight loss and, commonly, an excessive physical activity.
It is known that the maternal separation (MS) during the neonatal period may influences the development of behavioural styles of patients with eating disorders, including AN.
Several animal models have been developed to study AN; in particular, the ABA (Activity Based Anorexia) model mimics in rat some key characteristics of the AN: reduced food intake, weight loss, and enhanced activity with physiological responses of malnutrition.
Previous experimental data have shown that MS produces in adolescent rats an anticipated onset of eating disorder. However, these studies did not deeply analyse the overall behaviour, especially regard of anxiety-like and stress behaviours, which are usually correlated with AN.
In our experiment we used a mild-stress ABA protocol and we tested the effect of emotional deprivation, induced by the MS. The groups included: male/female control groups, male/female ABA groups, male/female MS groups, and male/female ABA+MS group. To study the onset of the pathology we analysed body weight loss in relationship with the time spent by rats on the running wheel during the ABA protocol and with the quantity of food consumed during the feeding test. We tested anxious behaviour and hyperactivity by performing the open field (OF) and the elevated plus maze (EPM) tests. We found out that, in general, the loss of body weight is greater and faster in males than in females. Moreover, MS induces a sexually dimorphic effect: MS+ABA males are most susceptible to AN in comparison with ABA males. In the females groups, instead, MS+ABA rats are most hyperactive than ABA females. Behavioural tests show that the anorexic phenotype causes that rats are more physically active, exploring more and are less anxious compared to the control animals, both in males than in females. However there is a sexually dimorphic effect given by MS: MS+ABA female group show an even more hyperactive and less anxious behaviour than ABA females. In males, MS induces animals to be more anxious in comparison with ABA males.

At last, to understand the reason why rats maintained the anorexic phenotypes, we consider the strong influence of the physical activity on the reward system, considering the dopaminergic system in the VTA and the serotonergic systems in the DRN. In fact, the human AN phenotype is characterized by a strong satisfaction for thinness and hyperactivity in the anorexic patients.

In the anorexic rats, the two systems considered show a high sex-specificity: the dopaminergic system increases in ABA males, while the serotonergic system enhances in ABA females.

This study has potential translational implications for better understanding the role of early environment in the pathogenesis of AN.

SYMPOSIUM 3

NEW PERSPECTIVES IN ANIMALS MODELS OF STRESS AND AGGRESSION: NEUROBIOLOGICAL AND BEHAVIORAL CHANGES

Thursday, July 20th, 2017

Chair: Rosa Redolat, University of Valencia

SYMPOSIUM 3

EARLY-LIFE NEGLECT: EFFECTS ON THE DEVELOPING ADULT RAT BRAIN

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Many studies using animal models have shown that early exposure to stress, like prolonged adverse experiences during early postnatal development are often related with neurodevelopmental effects,that would affect emotional, behavioral, and cognitive functioning (Bick & Nelson, 2017). Similarly,early exposure to adverse life experiences is associated with increased risk of developing several mental disorders during the adolescence period or in adulthood.

One of the most common experimental model used to induce environmental stress in rodents is maternal separation during the early postnatal period, a period when pups require maternal care for normal brain development and, in particular, the development of the hypothalamic-pituitary-adrenal axis involved in the physiological stress response. On the other hand, environmental enrichment procedure exposes laboratory animals to novel and complex stimuli through alterations in the physical and social environment, which lead to enhanced sensory, cognitive and physical stimulation. These changes are closely correlated with increased brain plasticity, as shown by increased dendritic arborization, neurogenesis, synaptic density and long term potentiation (Simpsonet al., 2011).

Our main objective is to determine the benefits of environmental enrichment in rodents that have been previously exposed to prolonged postnatal maternal separation. We examined the effects of neonatal infant-mother separation (MS) for 4h/day during the first three weeks of life, as compared with a non-separated control group. After weaning, each group was also divided according to two different rearing conditions during four weeks: enriched environment rearing versus standard facility rearing. We will show results obtained in anxiety-like behaviour using a zero-maze, depression-like behaviour in the forced-swim test, and spatial learning and memory in a water maze. Anatomical changes detected in limbic regions using magnetic resonance imaging will be presented. Lastly, we will also discuss the changes found in brain energy metabolism using both cytochrome oxidase quantitative histochemistry and fluorodeoxyglucose positron emission tomography imaging.

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SYMPOSIUM 3

ISOLATION AND SOCIAL INSTIGATION IN ANIMAL MODELS OF AGGRESSION: EFFECTS OF AN MGLU1 RECEPTOR ANTAGONIST ADMINISTRATION

Mercedes Martín-López

University of Málaga

Isolate-induced aggression in male mice is a model widely used in psychoparmacology of aggression. Animals are usually isolated for 30 days and subsequently treated and confronted with an anosmic opponent in a neutral area. For 10 min, the complete agonistic repertoire exhibited by the experimental animals is examined, allowing a detailed analysis of aggressive behaviors and other exploratory and motor behaviors. We have recently investigated the role of glutamate metabotropic receptors (mGluR) in this experimental model. Glutamate is the major excitatory neurotransmitter in the brain and it acts both at ionotropic (NMDA, AMPA and kainate receptors) and mGluRs, which are members of the G-protein-coupled receptor family. Eight mGluRs have been characterized and grouped into three classes: group I (mGlu1 and 5), group II (mGlu2 and 3) and group III (mGlu4, 6, 7 and8). We have tested selective ligands available for the subtypes of mGluRs.

Group I antagonists were the most effective ones reducing aggression, being especially remarkable the antiaggressive action observed after the administration of JNJ 6259685 (an mGlu1 selective antagonist; 0.125-8 mg/kg i.p.), that produced a strong reduction of offensive behaviors (threat and attack), without affecting immobility with all doses. In this context, we wonder whether this drug could also reduce forms of intensified-heightened aggression. In recent years there is an increasing interest in studying excessive-abnormal forms of aggression in rodents, with the aim of providing a higher translational value to the observed violence in humans, in which aggression becomes intense, disproportionate and dysfunctional. We select a social instigation model, where mice are exposed to a brief territory intrusion of an adult male mice physically inaccessible.

After this social provocation mice are exposed to a second opponent which now is unprotected. Social instigation dramatically increases aggressive behaviors, which renders this model appropriate for investigating the neurobiological mechanisms of excessive aggressive behavior. Therefore, we implemented a social instigation procedure in the isolation-induced aggression model with a double objective: first, to examine whether “instigation” could increase the aggression obtained by social isolation; and second, to evaluate the antiaggressive effect of an mGlu1 antagonist in heightened aggression.

For this purpose, an acute dose of JNJ 6259685 (0.5 mg/kg) was administrated to socially instigated animals after isolation, as well as to animals only isolated. Our results revealed that social instigation reduced latency of attack and increased the frequency and duration of attacks against not instigated animals, without affecting

motor behaviors. Likewise, JNJ16259685 (0.5 mg/kg) administration significantly reduced aggressive behaviors in both cases. Taken together, this study shows that social instigation is an useful experimental procedure that increases significantly the levels of aggression observed in an isolated-induced aggression model, also demonstrating the involvement of mGlu1 receptors in the modulation of normal and heightened aggression in male mice.

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SYMPOSIUM 3

SOCIAL STRESS AND ENVIRONMENTAL ENRICHMENT: HOW ENVIRONMENTAL CONDITIONS INFLUENCE ON EXPERIMENTAL RESULTS?

Patricia Mesa-Gresa, Rosa Redolat

Departamento de Psicobiología, Universitat de València

Environmental enrichment (EE) is a model in which rodents are allocated in complex environments providing physical, cognitive, sensorial and social stimulation. The term 'enrichment' has been used to refer a challenging environment that improves the welfare of laboratory animals and counteracts some of the effects induced by stress. However, few studies have evaluated how different housing conditions may influencethe welfare of mice submitted to social stress. Previous findings obtained in our laboratory indicated that the exposure to EE conditions in mice submitted to social stress could have short- and long-term consequences. This study was carried out with a sample composed by 128 NMRI male mice that were randomly assigned to 4 experimental groups: 1) EE + STRESS, mice exposed simultaneously to EE and stress(stress protocol following a procedure based on a complete disruption of the established hierarchy in each cage); 2) EE + NO STRESS, mice allocated in EE conditions without stress; 3) SE + STRESS, mice housed in standard environment (SE) and submitted to stress; and 4) SE + NO STRESS. On PND 77, behavioral tasks and physiological analyses were obtained and main results indicated that animals allocated in EE conditions showed less body weight, higher water and food intake, lower exploratory and motor activity as well as diminished anxiety-like response. Regarding 'Stress' factor, stressed animals gained less body weight, showed higher food and fluid intake and displayed lower exploratory behavior than non-stressed ones. Corticosterone analyses showed an interaction effect, obtaining that EE+STRESS mice showed higher corticosterone levels than EE+NO STRESS group. However, EE+NO STRESS group displayed significantly lower levels of corticosterone that SE+NO STRESS. After this evaluation, animals were randomly housed into EE and SE cages during four weeks.

When long-term effects were considered (PND112), main results indicated that those animals that were allocated into EE conditions during Phase I showed higher corticosterone levels and those that were exposed to SE and animals submitted to social stress displayed lower exploratory behavior than non-stressed ones. These results suggest that housing conditions could induce both short- and long-term effects, especially in physiological measures and exploratory behavior. Taking into account the current Directive 2010/63/EU on animal experimentation, which establishes that all laboratory animals shall be provided some type of EE as well as the effects reported in a lot of studies carried out with different EE conditions, the question about the impact of EE on research data is mandatory. Some authors have expressed concern about the effects of EE exposure on experimental validity and reproducibility.

For that reason, greater standardization and a more detailed description of specific EE protocols are required. These issues need attention from the scientific community in order to improve animal welfare in our laboratories without endangering the research results integrity or reproducibility.

This work was supported by grants from “Ministerio de Economía y Competitividad (MINECO)” (Grant number: PSI2009-10410) and “Conselleria d'Educació i Ciència” from Generalitat Valenciana (Spain) (GVACOMP2010-273,PROMETEO/2011/048 and PROMETEOII/2015/019).

SYMPOSIUM 3

SOCIAL INSTABILITY: TOWARDS A MODEL OF DEPRESSION IN FEMALE MICE

Larraitz Garmendia, A. Labaka, E. Gómez-Lázaro

Deparment of Basic Psychological Processes and their Development,University of Basque Country, San Sebastian

Epidemiological data reveal the existence of sex differences in the prevalence of stressrelated anxious/depressive disorders. Women are approximately twice as likely as men to suffer from anxiety disorders and also have higher rates of depression. It therefore seems vital to analyze the causes of women's greater susceptibility to these conditions. To this end, basic research with animals provides excellent opportunities for studying the mechanisms underlying this greater vulnerability to stress-related disorders. Psychosocial stress is
considered the most common etiological factor in stress-related disorders. In rodents, social defeat has been used extensively as an animal model of depression, since it enables a fairly precise evaluation of the impact of social conflict between two members of the same species.

In this model, subjects interact aggressively in order to establish a social hierarchy andterritorial dominance. However, this model does not appear to be an adequate one in the case of females, since the majority of female rodents demonstrate no spontaneous aggression at all towards their conspecifics. In this sense, some findings suggest that females obtain greater benefits from social support than males when coping with stress, and may therefore undergo
more pronounced neurobiological changes in isolation, social instability and social ruptura models. In accordance with these data, the social instability stress model, which consists of interrupting subjects' social environment by alternating periods of isolation with periods in which they rotate around the different members of the group, may be better adapted to the social nature of females. Furthermore, sex differences have also been found in the potential biological markers of depression, as well as in response to antidepressants. These markers include the cytokines which are released by the immune system in situations of stress and which may contribute to the development of depressive disorders, generating long-lasting changes in neurotransmission, neurotrophic factors, neurogenesis mechanisms and the regulation of the HPA axis. Sex differences have also been found in relation to performance in
the behavioral tests traditionally used in animals to detect anxious/depressive-type behaviors.

Selecting a suitable stress model and appropriate behavioral indexes is therefore of vital importance in order to avoid the incorrect interpretation of a resilience, adaptation or recovery mechanism. Further research is required to help identify, from a biopsychosocial perspective, the mechanisms that underlie stress-related disorders in females.

SYMPOSIUM 4

EXPERIMENTAL MODELS IN RESEARCH

Thursday, July 20th, 2017

Chair: Jorge Arias, University of Oviedo

SYMPOSIUM 4

THE TELEOST FISHES AS AN ANIMAL MODEL IN PSYCHOBIOLOGY AND NEUROSCIENCES

Antonia Gómez, E. Durán, C. Broglio, F. Rodríguez, C. Salas

Laboratory of Psychobiology, University of Sevilla

The ray-finned fishes (Actinopterygii) represent the largest vertebrate radiation and display the most spectacular pattern of evolutionary diversification among vertebrates. Particularly, teleost fishes exhibit an enormous range of variation in brain and behaviour complexity and specific neurobehavioral adaptations, which offer an excellent vertebrate model in behavioral neuroscience. The value of teleost fish as an animal model in Psychobiology and Neuroscience has been enhanced by recent comparative neurobiological research revealing that despite morphological and cytoarchitectural diversity, the brain of every vertebrate group contains the same basic subdivisions and comparable neural centers that appear to play similar functional and behavioral roles. Among the teleost fish, goldfish (*Carassius auratus*) has been traditionally one of the most productive and thoroughly employed models in Psychology and Neuroscience research. The wide use of this species in fields such as neuroanatomy, neurophysiology, sensory physiology, sensory-motor integration, hormonal and vegetative control, sexual behavior and neural basis of learning and memory has an important comparative value to understand the evolution of brain and behavior in vertebrates and to indentify the basic neurobiological mechanisms of behavior. Additionally, the zebrafish (*Brachidanio rerio*), one of the best genetically characterized vertebrate species, is emerging as a new model for developmental and genetic studies, whole brain imaging, brain disorders and drug research among others, representing a fruitful field for further translational studies in neuroscience.

SYMPOSIUM 4

TASTE AND OBJECT RECOGNITION IN RODENTS: REFERENCE MODELS FOR UNDERSTANDING MEMORY BRAIN CIRCUITS

Alejandro Grau-Perales, B. Gómez-Chacón, E. Morillas, A. Navarro, M. Gallo

Departamento de Psicobiología. Instituto de Neurociencias. Centro de Investigación Biomédica (CIBM). Universidad de Granada

Visual recognition memory is studied in rodents by assessing the reduced exploration of a familiar object in comparison with a novel object simultaneously exposed. However, taste recognition memory is revealed by increased consumption of familiar-tasting liquids or foods after taste neophobia attenuation. Hence, each type of memory induce opposite behaviors and selectively involve specific brain areas depending of the sensory modality involved. In spite of that, taste and object recognition memory share brain memory systems, such as the perirhinal cortex among others, and are affected by aging. Evidence showing common features of both types of memory provide critical cues for the current theories of learning and memory.

Supported by the PSI2014-57643-P (MINECO, España)

SYMPOSIUM 4

FROM CLINIC TO BASIC SCIENCE: HOW TO UNDERSTAND BRAIN DYSFUNCTION IN CIRRHOSIS

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Hepatic encephalopathy (HE) is a neuropsychiatric disorder which involves alterations in cerebral function resulting from liver failure (LF), but HE is not an isolated syndrome. HE is a neuropsychiatric syndrome characterized by cognitive impairments, personality changes, depressed level of consciousness and motor disabilities. Moreover, hepatic encephalopathy (HE) in a hospitalized cirrhotic patient is associated with a high mortality rate and its presence adds further to the mortality of patients with LF. The exact pathophysiological mechanisms of HE in this group of patients are unclear but hyperammonemia, systemic inflammation, portal hypertension and oxidative stress remain as key factors. Before showing these symptoms, patients develop minimal HE (MHE), which can advance to clinical HE with the progressive deterioration of neurological function. Unfortunately, by definition, MHE has no obvious clinical manifestation and is clinically poorly characterized by neurocognitive impairments in attention, vigilance and integrative function through neuropsychological examination, psychometric tests, or the newer critical flicker frequency test.

My talk will explore the pros and cons of the current HE animal models, their variability, complexity, absence of reversibility and limitations in order to study further interventions of brain dysfunctions in cirrhosis. The talk will also explore the need to interrelate the presence of inflammatory factors such as chemokines and the existence of learning impairments, with morphologic changes in glial, neuronal cells and brain metabolic activity throughout the limbic system. Special emphasis will be given to neurotransmitters manipulation through PET/SPECT, receptors agonist/antagonist and newly engineered Designer Receptor Exclusively Activated by Designer Drugs (DREADD) and optogenetic tools as a way to expand and transform our understanding of brain dysfunction in cirrhosis and, perhaps, paving the way for new therapeutics.

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SYMPOSIUM 4

THE 6-OHDA-RAT MODEL OF PARKINSON´S DISEASE: MOTOR AND BEHAVIORAL IMPLICATIONS

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Parkinson's disease (PD) is the second most common neurodegenerative disorder which has traditionally been recognized as a motor dysfunction. However, PD patients also suffer from a variety of non-motor symptoms (NMS) that often appear in the early pre-motor phase, and progressively increase in intensity in the late phase. These symptoms, which were largely neglected in the past, severely impair patients 'quality of life and are major contributors to morbidity. Oral administration of the DA precursor L-DOPA represents the gold standard pharmacological treatment for PD, ameliorating the motor symptoms. However, L-DOPA-induced dyskinesia, a side effect defined as abnormal involuntary movements, develops following chronic use. On the other hand, and despite all the efforts invested in research in NMS of PD, there is relatively minor progress made up to date and no specific medication is available to treat them. Furthermore, development of novel therapies is needed, and it can be greatly facilitated by adequate preclinical models. Accordingly, in preclinical investigations, toxins such as the 6-OHDA, were used to create selective nigrostriatal DA lesions in animal models of PD. In addition, several studies have demonstrated clear cognitive consequences after unilateral and bilateral DA depletion in the dorsal striatum of PD animal models in working memory, novel object recognition paradigms or reference memory. The 6-OHDA-lesioned rat is the most common animal model used in the PD to investigate both motor and non-motor symptoms, due to the fact that this neurotoxin can be administered in various regions along the nigrostriatal tract resulting in a different extent of dopaminergic lesion. Here we will discuss how the 6-OHDA lesion rat model of PD could serve to extend current understanding of motor and NMS of PD.

SYMPOSIUM 4

WHICH MECHANISMS ARE ALTERED IN THE ABUSED CHILDREN BRAINS? EXPERIMENTAL MODELS FOR SOCIAL PROBLEMS

María Banqueri, M. Méndez, JL. Arias

Laboratorio de Neurociencias. Facultad de Psicología, Universidad de Oviedo. Instituto de Neurociencias del Principado de Asturias (INEUROPA)

Early chronic stress is a worldwide problem. Many children in the world suffer neglect parenting. The deleterious effects on the brain and behavior have been studied in the past decades, in which animal models have proved their usefulness. Different paradigms have been developed, being early repeated maternal separation one of the more fruitful ones. The lack of maternal care in rodents is a good model of neglect parenting in humans, nonetheless, little changes in the procedures could lead to big outcome changes. For example, the number of days used. Different developing processes are occurring, therefore, different behavioral and physiological effects will be found depending on the chosen period. Some data suggest that longer maternal separation periods like from birth to weaning (from postnatal day 1 until postnatal day 21) may lead to anxious phenotype, and shorter maternal separation period as from birth to postnatal day 10 could lead to more impulsive or addictive behaviors. Both of them model the effects found in human beings. More research is needed to refine the animal models of early stress, and thereby, try to solve or at least ameliorate human stress-derived problems.

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SYMPOSIUM 5

PSYCHOBILOGY OF MOTIVATED BEHAVIOR AND ADDICTION

Thursday, July 20th, 2017

Chair: Raquel Gómez de las Heras, Complutense University Madrid

SYMPOSIUM 5

EFFECTS OF HIGHLY CALORIC PALATABLE DIET DURING THE PERINATAL PERIOD AND THE ENDOGENOUS CANNABINOID SYSTEM

Fernando Rodríguez de Fonseca

Complutense University of Madrid

Obesity and metabolic syndrome prevalence are increasing worldwide. Although lifestyle factors contribute to this epidemic, it is becoming clear that nutritional conditions during critical windows of development, including the perinatal period, could impact the future health of offspring and increase the risk of metabolic diseases. This phenomenon has been defined as nutritional programming. Furthermore, it is well-known that maternal and postnatal nutrition tends to be excessive in Western societies. Based on this consideration, human and animal studies have focused on the effect of overnutrition during the perinatal period and the disease susceptibility of offspring later in life. Specifically, maternal exposure to hypercaloric diets has been linked to the development of features of metabolic syndrome in offspring such as increased adiposity, glucose, insulin and lipid metabolism alterations or higher blood pressure.

The endocannabinooid system (ECS) plays a pivotal role in brain development, which is particularly critical in important processes such as cell proliferation, lineage fate decisions, phenotypic acquisition, migration or synaptogenesis. Moreover, the ECS is involved in the modulation of food intake and energy homeostasis through central and peripheral mechanisms.

Given this background, we aim to study the contribution of the ECS in early life programming. We addressed the effect of maternal exposure to a highly palatable diet in male and female offspring that were weaned on a standard diet. The results strongly indicate that maternal exposure to a highly palatable food is associated to long-term alterations in the offspring of both sexes, even though these animals were weaned on standard chow diet. Specifically, we have found: a) Modifications in food preferences and in the behavioral response to a cannabinoid inverse agonist; b) Alterations in growing parameters, caloric intake, plasma metabolites and adiposity; c) Modifications on the profile of gene expression of ECS components and other metabolism-related genes; d) Sex-specific alterations. Date regarding effects of food restriction will be also presented.

SYMPOSIUM 5

MATERNAL SEPARATION INDUCES NEUROINFLAMMATION AND LONG-LASTING EMOTIONAL ALTERATIONS IN MICE. EFFECTS ON ADDICTIVE BEVAVIOR

Olga Valverde

Pompeu Fabra University

Early life experiences play a key role in brain function and behavior. Early life experiences are thought to play a key role in brain function and behavior. In humans, detrimental early life events, such as maternal neglect or abuse during childhood, are associated with increased risk of emotional disorders that may persist into adulthood. Experimental and clinical studies have shown that the immaturity and plasticity of the central nervous system during childhood make it particularly sensitive to stress at a young age, which may cause significant changes in brain structure and function. Maternal separation is a validated mouse model for maternal neglect, producing negative early life experiences that result in subsequent emotional alteration. Mood disorders have been found to be associated with neurochemical changes and neurotransmitter deficits such as reduced availability of monoamines in discrete brain areas. Emotional alterations like depression result in reduced serotonin availability and enhanced kynurenine metabolism through the action of indoleamine 2, 3-dioxygenase in response to neuroinflammatory factors. This mechanism involves regulation of the neurotransmitter system by neuroinflammatory agents, linking mood regulation to neuroinmunological reactions.

We investigated behavioral alterations induced by early life adversity in male and female CD1 mice, and explored the interplay between depressive manifestations in behavioral models, neuroinflammation, and alterations in the TRP-KYN pathway. Animals raised under the maternal separation model showed enhanced spontaneous maternal care, probably to compensate for maternal separation. However, increased maternal care failed to recover maternal separation-related impairment of neurobiological functions and behaviors during adolescence, like locomotion deficits, responses to stress and the manifestation of anhedonia related to a lack of preference for saccharine. We found that several of these alterations were more striking in females, reflecting their greater vulnerability to stress, as previous reported.
Finally, we have also demonstrated that effects related to maternal separation also modified the addictive behavior to different drugs of abuse, including alcohol and psychostimulants.

SYMPOSIUM 5

LONG-LASTING EFFECTS OF SOCIAL DEFEAT DURING ADOLESCENCE ON ETHANOL AND COCAINE ABUSE

Marta Rodríguez-Arias

University of Valencia

Stressful life situations have been widely linked to drug seeking and consumption. Several studies in humans and animal models have demonstrated that exposure to different kinds of stress increases abuse and relapse to abuse of certain drugs, such as cocaine and ethanol. Social environment constitutes a key factor of survival and maintenance of health in most animal species. In humans, experience of social stress, especially during childhood or adolescence, increases the risk of suffering mental disorders. The term bullying is defined as a conscious and willful act of aggression and/or manipulation by one person (bully) against another person (victim). Appropriate animal models are of great use when exploring the mechanisms by which social stress affects health. The social defeat paradigm has been successfully employed in laboratory rodents to throw light on the neurobiological, physiological and behavioral changes caused by acute or chronic social defeat experience.

Few reports have addressed the issue of how adolescent exposure to social defeat can increase the probability of compulsive drug taking later in life, as has previously been shown to occur in adult animals. Our results show that social defeat experience during adolescence reduces social behavior without increasing anxiety, and does not produce cognitive disturbances. In addition, it induces long-lasting alterations that increase the sensitivity to the reinforcing effects of cocaine and ethanol. We observed that adult animals socially defeated during adolescence increase the sensitivity to cocaine-induced CPP and alter cocaine self-administration. Moreover, defeated mice show heightens reinforcing and motivational effects of ethanol. Several mechanisms have been proposed to explain these effects, among them a neuroinflamatory response after social stress.

SYMPOSIUM 5

UNDERSTANDING THE LONG-TERM CONSEQUENCES OF MARIJUANA USE BY ADOLESCENTS ON ADDICTIVE BEHAVIOUR: A PSYCHOBIOLOGICAL PERSPECTIVE

Alejandro Higuera-Matas

National Distance Education University (UNED)

The adolescent brain is an unresolved mistery. Much remains to be known about the developmental challenges that it has to face in order to reach its maturity. A very delicate balance of forces drives its path to adulthood and yet this balance may be disturbed by a number of adverse events that typically occur during adolescence. Marihuana abuse might be one of such obstacles in the way. Indeed, marihuna is the ilegal drug most widely consumed by adolescents and by acting on cannabinoid receptors it may affect the developmental trajectory of the juvenile brain. It has long been suggested that early marihuana use might make individuals prone to addiction to other drugs later in life. This Gateway Hypothesis still lacks strong experimental evidence. In this talk I will discuss data from our research group and those of others that illuminate some of the consequences at the neurochemical, morphological, trancriptomic and behavioural level suggesting indeed that marihuana is, at least in some individuals, a Gateway Drug.

SYMPOSIUM 6

PSYCHOBILOGY OF MOTIVATION: MECHANISMS OF DEFICIT AND REWARD

Thursday, July 20th, 2017

Chair: Mª José Simón, University of Granada

SYMPOSIUM 6

REWARDING EFFECTS OF MDMA IN MICE: ENVIRONMENTAL INFLUENCES AND NEUROCHEMICAL SUBSTRATES

María Asunción Aguilar

Unidad de investigación Psicobiología de las Drogodependencias, Departamento de Psicobiología, Facultad de Psicología, Universitat de Valencia

Ecstasy or MDMA (3,4-methylenedioxymethamphetamine), a methamphetamine derivative with entactogenic properties, is a popular drug among adolescents and young adults. Most MDMA users stop consumption of this drug spontaneously; however, some individuals consume MDMA on a regular basis and can develop dependence. Currently, there does not exist an effective treatment for this disorder, thus, it is very important to identify the variables that increase the vulnerability of individuals to develop MDMA dependence. Similarly, a greater understanding of the neurochemical substrates of the rewarding effects of MDMA may contribute to the design of new pharmacotherapies for MDMA-related problems. In the last years, studies with animal models of reward have demonstrated the role of individual and environmental variables, mainly stress exposure, in the sensitivity to the rewarding effects of MDMA. Mice exposed to social defeat in an agonistic encounter with an aggressive conspecific showed an altered response to MDMA. Serotonin, dopamine, endocannabinoids, endogenous opiates and glutamate are the main neurotransmitter systems involved in the rewarding effects of MDMA in mice. One of the promising compounds to treat MDMA-related problems is the NMDA glutamate receptor antagonist memantine, which is effective in blocking the rewarding effects of MDMA as well as the negative behavioural consequences of social stress in mice exposed to this drug.

SYMPOSIUM 6

REWARD LOSS, EMOTIONAL SELF-MEDICATION AND ADDICTION

Carmen Torres

Department of Psychology, University of Jaén

The role of emotional distress on drug seeking and abuse behavior has been frequently reported in both human and nonhuman animals. This presentation will focus on experimentalsupport for the emotional self-medication(ESM) hypothesisof addiction. This hypothesis states that the consumption of psychoactive drugs that reduce negative emotions constitutes a key factor in the initiation of drug intake. To test this hypothesis, we analyzed the impact of frustrating reward-loss experienceson voluntary consumption of anxiolytics (ethanol, benzodiazepines). Reward-loss experiences included consummatory successive negative contrast (reward downshift; from 32% to 4% sucrose), appetitive extinction (reward omission; from 12 to 0 pellets) and partial reinforcement (uncertainty; 50% reinforcement with sucrose or pellets). After these reward-loss tests, animals were exposed to a two-hour free-choice preference test involving the presentation of ethanol (2%)vs. water, chlordiazepoxide(1, 2mg/kg) vs. water, or only water (control). Reward loss experiences significantly increased the preference for and consumption of anxiolytic drugs. Partial reinforcement training during acquisition abolished the impact of reward downshift and omission on self-medication. Additional studies testedthe anxiolytic assumption of the ESM hypothesis by giving the animalsfree access to anxiolytics followed by exposure to anxiogenic situations (open field, Barnes Maze, elevated plus-maze, reward downshift). It was found that previous anxiolytic consumption reduced the impact of repeated cycles of reward downshift on sucrose intake, without affecting other anxiety responses. The results will be discussed with respect to the usefulness of animal models of reward loss to understandthe connection between ESMand addiction.

Supported by the Ministry of Economy and Competitiveness, Spain (PSI-2013-44945-P), and University of Jaén (SCAI)

SYMPOSIUM 6

INCREASED SODIUM APPETITE IN MEDIAN EMINENCE HYPOVOLEMIC RATS AFTER SYSTEMIC OXYTOCIN ADMINISTRATION

Javier Mahía

University of Granada

Lesions in the medio basal hypothalamus induce an immediate and strong polydipsia and in addition a significant diuretic and natriuretic response during the first 8h post surgery. These effects have been related to a functional disruption of vasopressin (ADH) and Oxytocin (OT) neurohypophysial hormones. With respect to the latter neurohormone it has been proposed that it may act on specific receptors present in the median eminence (ME) and that OT may be critically involved in water and particularly sodium homeostasis. Thus, the main objective of the present work has been to examine if the diuretic/natriuretic effect of OT on ME rats, which apparently may aggravate the hypovolemic/natriuretic state of these animals, and may increase the consumption of water and sodium chloride (24-48h post surgery). In this (and in a previous experiment) it has been shown that systemic OT administration (at 8h post surgery) in the ME lesioned animals reduce both the intake of water and the associated polyuric response, increasing urinary osmolality and sodium excretion, a similar result to that obtained by the sham-lesioned animals injected with OT.

In contrast, recordings of the first 6h of the 24-48h period shows a higher water intake and hypertonic sodium chloride in lesioned animals compared to control animals and physiological saline injected ME animals.

Food availability (30-48h period), in this characteristically hyperphagic animal, induce a significant increase in water, but not in sodium intake which seems to counteract the generated osmotic challenge. Taken together, these results suggest that the additional derangement in body sodium regulation and in the appropriate natriuretic response induced by OT seems to exacerbate the hydromineral imbalances characteristic of ME polydipsia.

SYMPOSIUM 7

COGNITIVE ENHANCEMENT

Friday, July 21st, 2017

Chair: Margarita Martí, Autonomous University of Barcelona

LEARNING IMPROVEMENT BY DIETARY CHOLINE SUPPLEMENTATION

Milagros Gallo[1], H. Moreno[2], M. Gil[2], F. Gámiz[1], S. Recio[2], I. de Brugada[2]

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Diet is a relevant environmental factor modulating neural plasticity. Several dietary interventions has proven to impact on the learning and memory brain systems. Among them, choline availability plays an important role both regulating the acetylcholine synthesis and release and also influencing epigenetics throughout the methyl-group metabolism. We have assessed the role of choline availability in animal models of attention, learning and memory at different stages of the brain development. The results confirm long-lasting beneficial effects of prenatal choline supplementation on long-term object recognition memory which are evident during adulthood. In addition, we have demonstrated the relevance of choline availability during adulthood in a variety of learning tasks depending on the temporal lobe such as object and object-context recognition memory as well as LiCl-induced contextual learning and taste aversion. Also the attention processes underlying latent inhibition have been studied both in taste aversion learning and conditioned emotional response. In all, the evidence supports dietary choline along the life as a key modulator of learning and memory, thus prompting interventions for improving cognitive functions when required. Further research on the underlying mechanisms affecting brain structure and function is required.

Supported by the PSI2014-57643-P and PSI2015-63737-P (MINECO, España)

SYMPOSIUM 7

NOVEL SYNTHETIC PEPTIDES WITH NOOTROPIC PROPERTIES

César Venero[1], I. Pereda-Pérez[1], S. Baliyan[1], R. Rodríguez[1], C. Sánchez-Puelles[2], S. Knafo[3], J. Esteban[2]

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The present knowledge of the molecular mechanism underlying learning and memory has allowed to develop new "smart drugs" that can improve cognitive function and/or ameliorate neurocognitive deficits. In the last years, we have studied two different synthetic peptides with nootropic properties; i) FGL, a mimetic peptide of the neural cell adhesion molecule (NCAM) that activates fibroblast growth factor receptor 1 (FGFR1) and; ii) PTEN-PDZ peptide, that contains the last eight amino acids of PTEN, a lipid phosphatase, corresponding to the PTEN-PDZ binding motif.
NCAM and downstream growth factor-dependent signaling (i.e. FGFR) not only play a key role in brain development and synaptic plasticity, but also they have been linked to cognitive function in adult animals. FGL triggers a long-lasting enhancement of synaptic transmission in hippocampal CA1 neurons by facilitating synaptic delivery of AMPA receptors, and improves spatial learning and memory in young rats. In aged animals submitted to social isolation stress, systemic FGL administration rescues spatial memory impairment induced by social isolation.
In Alzheimer's disease, amyloid-β peptide (Aβ) induces synaptic malfunctions that lead to cognitive deficits. In hippocampal neurons, Aβ inhibits long-term potentiation (LTP) and facilitates long-term depression (LTD). We observed that inhibition of PTEN, a lipid phosphatase that is essential to long-term depression, rescued normal synaptic function, and that Aβ triggers a PDZ-dependent recruitment of PTEN into the postsynaptic compartment. Chronic central administration of a PTEN-PDZ peptide, that competes for PDZ interaction sites of PTEN and prevents LTD, rescued memory deficits in APP/PS1 mice, a transgenic animal model for Alzheimer´s disease.

In the future, these novel synthetic peptides may become viable therapeutic treatments to prevent cognitive impairment in neurocognitive disorders.

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SYMPOSIUM 7

TARGETING THE GLUTAMATERGIC SYSTEM TO ENHANCE COGNITION

Gemma Guillazo, A. Vale, M. Martí, M. Portero, J. Visa, D. Rojic

Departamento de Psicobiología y Metodología de les Ciencies de la Salud Instituto de Neurociencias. Universidad Autónoma de Barcelona

Cognitive decline associated with aging and the increased incidence of neurodegenerative disorders are major challenges to modern public health. The effort in developing effective treatments to reverse cognitive impairments entails the need to understand the neural mechanisms involved in cognitive processes and their enhancement. Learning, working memory and long term memory are among the pivotal functions that afford an optimal quality of life because they are paramount to multiple processes and, as a result, to the unerring cognitive function. These functions are significantly deteriorated in normal and pathological aging which, among other factors, can be due to alterations in neurotransmission mechanisms. So, what treatments are available to prevent cognitive decline and enhance wellbeing? The goal of our research is to understand the neurobiology behind these questions by using deep brain stimulation or cognitive enhancers in animal models. Our main working hypothesis is that brain stimulation resulting in enhanced glutamatergic transmission will favor synaptic plasticity mechanisms and neural network synchronization which, in turn, will promote mnemonic processes in healthy animals as well as ameliorate cognitive impairments stemming from aging or brain dysfunction. This talk will discuss our main results along with some theoretical aspects.

Supported by the PSI2011-26862 and PSI2014-52660R (MINECO, España).

SYMPOSIUM 7

NOVELTY FOR ENRICHING THE BRAIN: A BRIDGE BETWEEN ANIMAL AND HUMAN RESEARCH

Rosa Redolat, P. Mesa-Gresa, R. Rabadán

Departamento de Psicobiología, Universitat de Valéncia

Enriched environments in rodents that involve different degrees of novelty, complexity and voluntary physical activity may have different neurobiological and behavioral effects. Prior studies in our laboratory performed with Marlau cages (an standardized method for environmental enrichment) suggested that this complex environment reduced anxiety in lesser extent than a cage enriched with toys, tunnels and a running wheel. Our aim in the present study is to present experimental evidence evaluating behavioral effects of different enriched environments including novelty and voluntary physical activity. Mice were housed in four environments based on Marlau cages (MC), voluntary wheel running (PE only), physical activity+social enrichment (PEsoc) or standard environment (SE). The influence of environmental enrichment was evaluated on motor activity, anxiety-like behavior (elevated zero maze) and exploratory activity (hole-board test). Results indicated that in the elevated zero mice, PEonly and SE animals displayed lower levels of anxiety (evaluated with entries in open areas) than MC and PEsoc mice ($p<0.05$). ANOVA did not reveal any significant effect of housing conditions on the level of locomotor activity in a novel cage. In the hole-board test, animals housed in the PEonly cage displayed lower latency to the first head-dip than mice housed in SE cages ($p < 0.05$). Mice allocated in MC also performed more HD in 5MIN than PEsoc and PEonly mice ($p < 0.05$). These results suggest that the presence of running wheels in the cage and the complexity of the environment could modulate the behavioral effects of environmental enrichment. These studies could aid to explain how the novelty or complexity of the environment can promote neuroplasticity although it is difficult to differentiate between these two components. Enriching the environment in rodents can be considered as a “bridge” that allow us better understand the effects of novelty on neuroplasticity, anxiety and cognition. In human subjects, those activities that imply greater novelty and complexity as well as interventions based on physical exercise may induce changes effects on stress levels and anxiety and contribute to delay age-related cognitive impairment.

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SYMPOSIUM 8

BRAIN ELECTRICAL CORRELATES OF COGNITIVE AND AFFECTIVE PROCESSES OF HUMAN FACE RECOGNITION

Friday, July 21st, 2017

Chair: Jaime Iglesias, Autonomous University of Madrid

SYMPOSIUM 8

PROSOPAGNOSIC INDIVIDUALS DON´T USE EFFICIENTLY FEATURAL INFORMATION IN THE FORMATION OF NEW FACE REPRESENTATIONS AS REVEALED BY ERPs

Ela I. Olivares[1], AS. Urraca[2], A. Álvarez[1], L. Vizcaino[1], J. Iglesias[1]

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We present the preliminary results from an ERP study concerning the processing of unfamiliar faces (realistic drawings) in visual agnosic individuals (a brain damaged and a developmental) as compared with healthy people. Our aim was to investigate how specific face parts are integrated in both groups of participants to form new face representations. A three-stimuli-per-trial task was presented in which both internal and external facial features were delivered consecutively and then followed by a complete, target face. This third face could be a combination or not of those features presented previously. According to a previous study, we analyzed both late ERPs suggestive of an adequate integration of partial information for the construction of face representations, as well as those ERPs reflecting structural processing of those features presented previously at the beginning of each trial. We found, in the case of our acquired prosopagnosic patient, an anomalous ERP pattern of the earlier ERPs P1 and N170, in contrast with more typical early responses in our developmental prosopagnosic. Also, we found that our patients don´t make an optimal use of relevant information in the initial processing of facial features as reflected by a lack of a late positivity (P3-like) for both external and internal features at the beginning of the trial. Accordingly and, in contrast with healthy people, our patients did not reflect a conspicuous mismatch effect in the form of a late negativity component when external and then internal features were presented, suggestive of an inefficient detection of structural changes in new face representations.

This work was supported by "Ministerio de Economía y Competitividad" (Spain I+D+i National Programme, reference PSI2013-46007-P) and by "Proyectos de Cooperación Interuniversitaria UAM-Santander" (reference CEAL-AL/2017-16).

SYMPOSIUM 8

IMPLICIT AND EXPLICIT TRUSTWORTHINESS DETECTION IN PATIENTS WITH WILLIAMS'S SYNDROME

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Marc Jeannerod Laboratory on Language, Brain and Cognition, Bron, Lyon

Trust is strongly involved in human social interactions. When faced with unfamiliar individuals, humans make judgments of trust based on a fast and automatic processing of facial features. This ability may be altered in pathologies characterized by atypical social behaviour. In this study we aim investigating trustworthiness' detection from faces in patients affected by Williams-Beuren syndrome (WS). WS is a rare genetic disorder, characterized by mental retardation but preserved linguistic competence. Importantly, WSP present an exaggerated social appetence. WS (N=22) and typically developing (TD) participants (N=16), matched for age, participated in an eye movement experiment. Pairs of trustworthy and untrustworthy faces were presented. In a first session, participants looked at faces (implicit task) without any explicit instruction. In a second session, they were asked to choose the most trustworthy face (explicit task). During the implicit task, WSP did not show a preference towards one type of face. Differently TD participants spontaneously looked more trustworthy faces than untrustworthy ones. During the explicit task both groups significantly looked longer trustworthy faces. Hence, spontaneous/implicit detection of trustworthiness seems dissociable from explicit decisional mechanisms in WS patients. The result showed by the implicit task is coherent with their tendency to approach an unknown person. However, on explicit command, discrimination and detection of trust is improved at the group level both for WSC and TDC suggesting a potential tool for cognitive remediation in this pathology.

SYMPOSIUM 8

PSYCHOPHYSIOLOGICAL CORRELATES OF EYEWITNESS PERFORMANCE DURING LINEUP IDENTIFICATIONS

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Errors in eyewitness testimony are frequent and problematic, due to the ethical and social impact of false positives. As an attempt to reduce the number of errors, it has been suggested that identification markers based on methodologies that would provide more objective evidence should be developed. Hence, the aim of this study was to explore the psychophysiological markers of eyewitness testimony, considering both central (event-related potentials – ERPs) and peripheral (facial electromyography – EMG, recording the *corrugator supercilii* and the *zygomaticus major*; and heart rate – HR) measures. Twenty-nine participants (14 women), aged between 18 and 26 years old (M=21.9; SD=2.41) viewed eight crime videos, consisting of a scene of a robbery at an ATM, each followed by a short waiting period and a sequential lineup. Each lineup consisted of a target face and five distractors matched for resemblance with the target face, attractiveness and distinctiveness, all presented in random order, and repeated ten times. The identification of a distractor elicited a greater amplitude of the P100 than the correct rejection of a distractor. Source estimation analyses indicated that the act of identifying a distractor is, in the P100 latency, related to a stronger activation of the ventromedial and middle frontal cortices, areas usually involved in false memories, suggesting an early neural detection of false positive identifications. The N170 distinguished between correct and incorrect responses, with more negative amplitudes elicited by correct responses. This effect is mostly present for distractors. The P300 significantly differentiated positive from negative identifications, independently of the answer being correct or incorrect, with higher amplitudes elicited by hits and false alarms, compared to correct rejections and misses. Regarding the peripheral measures, no significant effects were found for HR. In terms of EMG, a significant effect of stimulus type suggested that the corrugator activity was able to distinguish between targets and distractors, with increased activity towards targets, independently of the judgement of the participants being correct or incorrect, which might be related to an automatic response towards threatening and unpleasant stimuli. Altogether these data suggest that there are relevant neural markers that should be carefully considered and further explored in eye witness testimony research, and that a conjugation of central and peripheral measures might be a powerful tool to identify objective correlates of performance.

This work was supported by ERDF (European Regional Development Fund) through the operation POCI-01-0145-FEDER-007746 funded by the Programa Operacional Competitividade e Internacionalização – COMPETE2020 and by National Funds through FCT - Fundação para a Ciência e a Tecnologia within CINTESIS, R&D Unit (reference UID/IC/4255/2013)

SYMPOSIUM 8

BRAIN POTENTIALS UNDERLYING ACCESS TO FAMILIARITY AND IDENTITY IN ACQUIRED AND DEVELOPEMTAL PROSOPAGNOSIA

Ana S. Urraca[1], EI. Olivares[2], J. Iglesias[2]

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Brain event-related potentials are a powerful tool to disentangle face perception and recognition processes, both in healthy and in prosopagnosic individuals. 25 healthy controls participated, in addition to two prosopagnosic patients. E.C. is a general acquired visual agnosic with impaired face, object and spatial processing, despite intact language functions. Her face processing impairment affected both perception (severe difficulties to integrate an image into a whole) and memory (impaired learning and recognition), i.e. a mixed, apperceptive and associative pattern. I.P. is a developmental prosopagnosic with intact language, spatial and object processing, and well preserved face perception, with a very specific impairment in face memory and recognition (i.e. associative). In an experimental design, participants had to view and name a set of personally acquainted faces (specific to each participant), famous faces (well-known celebrities, as had previously been proved in a famous judgement task), and unknown faces, all presented with and without hair. N170 was not influenced by task-relevant face familiarity. An N250 component was observed in the control group, in response to personally acquainted and famous, but not to unfamiliar faces, and an enhanced positivity (P600 or Late Positive Component) whose amplitude was directly, and whose latency was inversely, related to the degree of familiarity. Additionally, the presence of hair increased amplitude and decreased latency of such LPC. All these findings were interpreted in terms of the functional significance of each of the ERPs, i.e. of how they reflected, respectively, the processes of structural encoding and of access to face recognition units and to semantic information about the person.

This work was supported by "Ministerio de Economía y Competitividad" (Spain I+D+i National Programme, reference PSI2013-46007-P) and by "Proyectos de Cooperación Interuniversitaria UAM-Santander" (reference CEAL-AL/2017-16).

ORAL COMUNICATION

ORAL COMUNICATIONS
SESSION 1

Wednesday, July 19th, 2017

Chair: Marta Miquel, Jaume I University

MELANOMA TUMOR DEVELOPMENT AND INFLAMMATION: PHYSIOLOGICAL ALTERATIONS AND DEPRESSIVE BEHAVIOR IN MICE

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Comorbidity of depression in patients with diabetes, cancer, or heart disease is greater than in the general population (Evans et al., 2005). Depressive patients show higher levels of pro- inflammatory cytokines, such as, IL-1β, IL-6 and TNF-α (Dowlati et al., 2010; Howren et al., 2009). Furthermore, patients undergoing cytokine immunotherapy often develop depressive symptoms (Capuron et al., 2004; Raison et al., 2005, Maes et al., 2009).

The aim was to study the effect of tumor development on depressive behavior, and to analyze immune and neurochemical alterations as possible mediators of this relationship.

Male C57BL/6 mice were intravenously or subcutaneously inoculated with B16 melanoma tumor cells. After twenty-one days of tumor development, their behavior was assessed using the open field test (OFT), forced swimming test (FST) and sucrose preference test (SPT). mRNA expressions of pro-inflammatory interleukin (IL)-1β and IL-6, tumor necrosis factor-alpha (TNF- α) and indoleamine 2,3-dioxygenase (IDO) were determined in the whole brain by real time RT- PCR. Plasma levels of serotonin (5HT), tyrosine (Tyr), phenylalanine (Phe), kynurenine (Kyn), tryptophan (Trp) and 3-hydroxykynurenine (3HK), were analyzed by means of high- performance liquid chromatography (HPLC).

Tumor-bearing mice showed greater immobility in both the OFT and the FST, as well as a low sucrose preference. The observed depressive behavior was accompanied by greater mRNA expressions of IL1-β, IL-6, TNF-α and IDO, as well as a higher Phe/Tyr ratio and an increase in 3HK plasma levels.

In conclusion, tumor development generates changes in behavior that are characteristic of a depressive state. These changes can be attributed to a monoaminergic alteration, produced by a higher expression of pro-inflammatory cytokines by means of IDO enzyme activation or a reduction in BH_4 cofactor availability.

THE ANALYSIS OF SOCIOEMOTIONAL BEHAVIOUR AS A DIFFERENTIAL DIAGNOSIS INSTRUMENT IN CHILDREN WITH PRIMARY AUTISM

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Recent data suggest that primary autism is due to alterations in neural networks that sustain early socioaffective behaviour, being the consequence of deviations in cell differentiation (genes MTF and SLC25A12), while secondary autism seems to imply impairments in the neural networks involved in the development of general cognitive skills, normally due to general alterations in neurogenesis (genes NF1 and TSC1). Otherwise, cryptogenic autism seems to be the effect of environmental factors that act in late moments of postnatal development.

Facing the fact that primary autism results especially difficult to diagnose in early stages of life, we analysed the socioaffective behaviour of 7 children with primary and 6 with secondary autism with an average chronological age of 5 years and 7 months in its school context (children with cryptogenic autism were not available). Therefore, after detecting six main contexts (greeting, performing tasks, playing, luncheon, changing clothes and toilet) and being able to identify 14 salient stimuli and 61 socioaffective responses, we conducted a dissimilarity study for determining how the stimuli triggered emotions and other socioaffective responses in these autistic children.

We found that all children were able to show emotional expressions and other protocommunicative responses contingent on at least some socially relevant stimuli. But only children with primary autism displayed facial and vocal expressions of anger in highly demanding socioaffective contexts involving a large number of interactions and instructions, as during “greeting” and “changing clothes”. These situations triggered in children with secondary autism mainly facial expressions of joy together with gestural requests for help. These results sustain our initial assumption that observing socioaffective interactions of autistic children in their natural school context can be a key for a more effective differential diagnosis than only considering cognitive behaviours.

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ORAL COMUNICATIONS **SESSION 1**

AN ACUTE CANNABIDIOL DOSE PREVENTS ANTAGONIST-INDUCED WITHDRAWAL AFTER CHRONIC Δ9-TETRAHYDROCANNABINOL TREATMENT DURING ADOLESCENCE AND THE EXPRESSION COCAINE CPP DURING ADULTHOOD

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The derivatives of Cannabis Sativa are the most commonly used illegal drugs in the world, with special incidence and associated risks in the adolescent population. There is evidence of physical and psychological dependence, as well as cannabinoid withdrawal syndrome, especially associated with an abrupt stop in the continued use of strains with a high content of the phitocannabinoid delta-9-tetrahydrocannabinol (THC). Beyond the prompt harm directly derived from acute and chornic use of those high THC extracts there are also some long-term impairments and adverse effects, wich interacts with future substance use disorders. Cannabidiol (CBD), another phitocannabinoid without psychomimetic activity, has been successfully used at a therapeutic level in several psychiatric disorders including substance use disorders; but despite its widespread therapeutic approaches there is only one published clinical case that implemented cannabidiol on the treatment of cannabinoid withdrawal syndrome itself.

Male C57BL/6 mices (4 weeks old; n=8 per group) were treated i.p. during 4,5 days with a cannabinoid CB1 receptor agonist (THC 25mg/kg or WIN 5mg/kg) or it's vehicle twice a day. Animal response and tolerance was analyzed after first and last cannabinoid i.p. treatment. 4 hours after the last cannabinoid i.p. treatment mice received CBD (30 mg/kg ip) or it's vehicle i.p. and 1 hour later a cannabinoid antagonist (RIM (10 mg/kg) or AM-251 (1 mg/kg)) or it's vehicle i.p. to study the withdrawal induction. All animal testing were performed inside an actymeter arena, analyzed with anymaze software and videotaped. During adulthood (9 weeks old), THC and vehicle treated groups not exposed to CBD or any cannabinoid antagonist performed a cocaine (15 mg/kg i.p.) conditioned place preference (CPP) protocol to further testing the expression of preference on these groups and the effect of CBD prior testing. A single dose of CBD was able to stop the emergence of THC withdrawal signs on adolescent mice and the expression of cocaine CPP on adult mice.

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ORAL COMUNICATIONS **SESSION 1**

WOMEN ALCOHOL BINGE DRINKERS SHOW A HIGHER IMMUNE/INFLAMMATORY RESPONSE THAT CORRELATES WITH WORSE NEUROPSYCHOLOGICAL PERFORMANCE

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Alcohol binge drinking is a pattern of heavy alcohol consumption increasingly used by adolescents and young adults. Evidence indicates that alcohol binge induces peripheral inflammation and an exacerbated neuroimmune response that may participate in the alcohol-induced cognitive/behavioral dysfunctions. Here, we recruited 20 years old university students, identified as men and women binge drinkers for at least 2 years. Young alcohol binge drinkers had elevated levels of blood endotoxin compared with controls and an up-regulation of TLR4/NFκB inflammatory pathway in peripheral blood mononuclear cells, together with pro-inflammatory cytokine/chemokine release, oxidative stress and lipid peroxidation. These changes positively correlate with the estimated blood alcohol levels achieved during alcohol binge intoxication and negatively with the time elapsed from the last alcohol consumption. The immune/inflammatory changes were more prominent in women drinkers, who showed elevations in alcohol danger-associated molecules, such as HMGB1, indicating that there are sex-differences in the peripheral inflammatory response to alcohol. By contrary, cortisol levels were decreased in alcohol binge drinkers. Finally, higher levels of inflammatory markers - mainly MCP-1, but also LPS, HMGB1, TLR4, IL-6, and COX-2-correlated with worse episodic memory and executive functioning in women binge drinkers but not in men. These results emphasize possible risky consequences of alcohol use in binge episodes during the young period, and call attention to sex differences in the alcohol-induced immune/inflammatory and neurocognitive responses.

ORAL COMUNICATIONS **SESSION 1**

SEX-DEPENDENT EFFECTS ON BEHAVIOR AND METABOLISM AFTER PERINATAL EXPOSURE TO UNDERNUTRITION: INVOLVEMENT OF THE ENDOCANNABINOID SYSTEM

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Exposure to maternal undernutrition is associated to sex-dependent metabolic alterations in offspring later in life, including behavioral disturbances. The endocannabinoid system (ECS) is involved in the regulation of metabolism, feeding behavior and emotional responses. Here, we aimed to study the effects of a maternal calorie-restricted diet on male and female offspring. Therefore, we exposed female Wistar rats to a 20% calorie-restricted diet starting two weeks prior to mating up to gestational day 20. The feeding behavior, anxiety-related responses and plasmatic metabolites, as well as the gene expression of several components of the ECS in the hypothalamus, liver and perirrenal adipose tissue (PAT) in female and male offspring was evaluated during adolescence and/or adulthood. We found that the restricted male offspring exhibited subtle alterations in feeding behavior, increased anxiety-related responses, overweight¸ hyperleptinemia, enhanced adiposity and alterations in the plasmatic lipids compared to control male offspring. Moreover, the restricted offspring exhibited modifications in the feeding behavior and decreased alterations in the anxiety-related test in contrast to restricted males, although they showed a lean phenotype with increased glycemia and plasmatic lipid alterations. The modifications on the expression of the ECS exhibited a sex-dependent profile: The restricted male offspring showed disturbances in the main cannabinoid receptors (*Cnr1* and/or *Cnr2*) in the hypothalamus and decreased gene expression of ECS metabolism enzymes (*Faah*, *Dalg*, *Mgll*) in PAT compared to control male offspring. In contrast, the restricted females exhibited alterations in the expression of cannabinoid receptors (*Cnr1*) and endocannabinoid metabolic enzymes (*Faah, Mgll*) in the liver. Moreover, restricted females exhibited increased cannabinoid type 2 receptor expression (*Cnr2*) in the liver and PAT unlike male restricted offspring. These results indicate that the exposure to a moderate maternal calorie-restricted diet induces behavior and metabolic alterations, including ECS modifications, in a sex specific-manner, suggesting that the role of the ECS in these adaptations may be critical.

ORAL COMUNICATIONS **SESSION 1**

COCAINE SEEKING AND SELF-ADMINISTRATION RESPONSES IN RATS AFTER OPERANT AND PAVLOVIAN TRAINING CONTINGENCIES

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Studies reporting that repeated drug self-administration produces behavioral and physiological changes different from those produced by repeated passive administration of the same drug have been very important to understand mechanisms underlying drug abuse. This project main objective is to compare cocaine seeking and cocaine self-administration behaviors induced by a drug-related stimulus after an operant administration contingency and a Pavlovian administration contingency, as also compare the expression of FosB, D1 and D2 dopaminergic receptors and NMDA glutamatergic receptors after those learning contingencies. To do so it will be used a yoked administration model in rats. Subjects will be distributed in three groups: cocaine contingent (CCoc), yoked cocaine (YCoc) and yoked saline (YSal). CCoc subjects will be trained on a discrimination task while the other groups receive passive administrations on Pavlovian training. Responding (nose poke) in the presence of S+ (sound stimuli) will have as consequence an infusion and S+ presentation. S- will be presented simultaneously for all groups. Then subjects will be no longer yoked and will be trained in a two-response chain task, seeking and self-administrating cocaine using two retractile bars. After achieving infusion stability, subjects will be exposed to transfers test. S+ and S- will be presented in trials and both bars will be presented. Responses will be registered and compared between groups. Subjects will be processed for FosB gene expression immunohistochemistry and autoradiography for D1 and D2 dopaminergic receptors and NMDA glutamatergic receptors in selected brain regions and after different experimental phases will be quantified and compared between groups.

ORAL COMUNICATIONS
SESSION 2

Wednesday, July 19th, 2017

Chair: Juan Ramón Orduñana, University of Murcia

ORAL COMUNICATIONS **SESSION 2**

IMPROVEMENT OF COGNITIVE ABILITIES BY A-TOCOPHEROL IN OLD RATS WAS PARALLELED WITH MODULATION OF SIRT1 IN THE HIPPOCAMPUS

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It is well known the efficacy of vitamin E as antioxidant in protecting the brain against oxidative damage. In this sense, it was described previously that the treatment of old rats with α-tocopherol, the main component of vitamin E, improves cognitive and motors abilities with a parallel increase of the synthesis rate and levels of monoamine neurotransmitters in the hippocampus and striatum (Ramis et al., 2016. Rejuvenation Res 19:159–171). Some biological functions of α-tocopherol and polyphenols, including resveratrol, seems to be independent of its antioxidant/radical scavenging ability, and a potential mediator of these effects could be a NAD-dependent deacetylase sirtuin 1 (SIRT1). SIRT1 has been related with key cellular processes implicated in the maintenance of neural systems and behavior during normal aging, including the modulation of synaptic plasticity and memory, among inflammation and stress resistance. On the other hand, the decrease of the histone binding protein RbAp48 (also known as RBBP4 or NURF55; involved in histone acetylation complexes) in the dentate gyrus of the hippocampus seems to be implicated in the memory loss in normal aging. Thus, the aim of this study was assess the putative effect of the chronic treatment with α-tocopherol on the contents of SIRT1 and RbAp48 (immunodensities with specific antibodies) in the hippocampus (total homogenate) of old rats.

Young (3 months) and old (18 months) rats were used. The dosage and the administration regimen used in this study have been described previously (Ramis et al., 2016). Both SIRT1 and RbAp48 were reduced in the hippocampus of old rats when compared with young rats (38%, $p<0.01$; 40%, $p<0.05$; n=6, respectively). Chronic treatment with α-tocopherol (20 mg/kg/day, i.p., for 28 days, n=6) in old rats did not affect the levels of SIRT1 and RbAp48. However, higher doses (α- tocopherol 40mg/kg/day, i.p., for 28 days, followed by 60mg/kg/day, for 28 days, n=6) reverses the age-induced reduction of SIRT1 in the hippocampus of old rats (reaching 95% of young rats content), while RbAp48 remains reduced.

The results indicated that high doses of α-tocopherol, that are relevant in the improvement of cognitive abilities of older rats, also regulates the expression of SIRT1 in the hippocampus, as has been described for the sirtuin activator resveratrol and other polyphenols. Moreover, despite the results obtained with the RbAp48 protein in total hippocampus homogenates, a possible modulation in the more specific region of the dentate gyrus can not be excluded.

Supported by grant SAF2014-55903-R

ORAL COMUNICATIONS **SESSION 2**

EFFECTS OF MATERNAL SEPARATION AND ENVIRONMENTAL ENRICHMENT ON THE LIMBIC SYSTEM METABOLIC CAPACITY

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Several research groups reported that enriched environment is a widespread neuroprotective strategy during development and also in the aging process. To our knowledge, no studies have analysed the effects of enriched environment rearing after stress induced by maternal separation on regional metabolic capacity in the adult rat brain. In this study, a conventional model of 4- hour daily maternal separation (MS) was applied during the first 21 days of age in Wistar rats versus a control group of dams with pups of the same age, which was not handled during the same period. Male pups were randomly assigned after weaning to control and enriched groups according to their environmental conditions. Environmental enrichment was performed during six weeks, where animals were reared together in larger cages and exposed to a variety of complex stimuli. In order to evaluate brain metabolic capacity in control and enriched animals, we used quantitative cytochrome oxidase histochemistry, which reflects long-term changes in neural oxidative metabolism. Results showed that maternal separation reduced cytochrome oxidase activity in the medial prefrontal cortex and the dorsal hippocampus. Interestingly, environmental enrichment in MS and control groups significantly reduced regional metabolic capacity in the limbic regions analysed. These findings suggest that environmental enrichment causes specific changes in regional brain metabolism that may contribute to emotional, behavioural and cognitive changes later in life.

This work was supported by grants PSI2013-45924-P MICINN, PSI2015-73111-EXP and FC- 15-GRUPIN14-088.

PERCEIVED STRESS, RESILIENCE AND GAINS IN CAREGIVERS OF PATIENTS WITH ALZHEIMER'S DISEASE

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Informal caregiving for a patient with dementia has been considered as a chronic stressor which can have significant neurobiological and psychosocial effects. These effects can be modulated by different caregiver's variables such as resilience. Different studies have evaluated the main consequences of the caregiving task of Alzheimer's Disease (AD) patients, although few have analyzed the possible modulating role of resilience in the gains associated to this task.

The main purpose of this study was to analyze the relationship between perceived stress and gains related to the care for patients with AD as well as the role of resilience as a modulating variable.

The sample was composed by two groups: AD Caregivers group, informal primary caregivers of patients with AD (n=25); and Non-caregivers group, control subjects without previous experience as caregiver and with similar sociodemographic characteristics (n=21). All participants completed the following battery of tests: sociodemographic questionnaire, Perceived Stress Scale (PSS) and The Connor- Davidson Resilience Scale (CD-RISC-10). Moreover, GAC scale (Spanish scale that evaluates the gain associated with caregiving) was completed by AD Caregivers group.

Data indicated that AD Caregivers displayed higher perceived stress (23.2±9.6) than non- caregivers group (20.86±5) ($t=1.032$, $p = 0.028$). No differences for resilience were observed. Furthermore, results showed a positive correlation between resilience and gains associated to care in AD Caregivers group ($r=.418$; $p=.038$).

Our results are in consonance with previous studies and indicate that AD Caregivers displayed higher perceived stress than Non-caregivers. Moreover, resilience could be a modulating factor in determining if the person experience the gains associated to the caregiving task. Therefore, future interventions aimed to reduce the psychosocial effects of caregiving should consider both the possible benefits and perceived stress related to the caregiving task, trying to promote the resilience of caregivers.

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THE INFLUENCE OF EMPATHY AND HORMONE LEVELS ON AGGRESSIVE BEHAVIOR IN SCHOOL-AGE CHILDREN

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The aim of this study was to explore the relationship between biological and psychological variables in relation to aggressive behavior in 8-year-old children. To this end, a sample group comprising 139 subjects (80 boys and 59 girls) from four public schools in Guipúzcoa was used. Aggressive behavior was assessed using the Direct and Indirect Aggression Scale (DIAS), which is a peer-estimation test. Hormone levels (testosterone, cortisol and estradiol) were measured through saliva samples collected at 9 am in the school classroom. These samples were then analyzed using an enzyme immunoassay technique (ELISA) in the psychobiology laboratory of the University of the Basque Country's Faculty of Psychology. The psychological variable, empathy, was measured through the Empathy Quotient questionnaire. The results revealed a relationship between empathy and the different hormones studied, which may explain the aggressive behavior reported. Firstly, children with low empathy and high cortisol levels had a higher level of total aggression. And secondly, high testosterone levels in both low and high empathy girls was found to predict more aggressive behavior. These results highlight the importance and interest of determining the emotional and biological characteristics that may be related to aggressive behavior in children, in order to study the biopsychological mechanisms that underlie this behavior.

ORAL COMUNICATIONS **SESSION 2**

THE ROLE OF SUPPLEMENTAL THYROID HORMONES IN COGNITIVE AND SOCIAL CAPACITIES AT AGING

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Aging is associated to cognitive decline and to a general decrease in serum levels of thyroid hormones (TH) in humans and rodents. Models of normal aging can provide critical insight into the role of TH in the processes of cognitive decline. In order to further explore this, the present study used two groups of aged (19 months old) male C57Bl/6 mice. Treated animals received drinking water supplemented with T4 and T3 for 60 days. At the halfway mark of this treatment a battery of behavioural experiments was conducted, in order to evaluate anxiety (elevated plus maze), sociability (3-chamber sociability test) and spatial learning and memory abilities (Barnes maze) in both groups. In order to measure plasmatic TH levels, blood samples were collected at the beginning and at the end of the experimental procedure. Subsequently, subjects were sacrificed and brain samples collected for analysis of brain T3 and T4 levels using radioimmunoassay. Our results indicated no differences across groups in anxiety-like behaviour or locomotor activity. In the Barnes maze test, compared to controls, TH treated mice showed significantly lower number of false escape holes visited before arriving at the correct escape. Similarly, differences were noted during the sociability and social novelty tests, where treated mice spent significantly more time with the mouse *vs* the object and the novel conspecific *vs* the known conspecific. Analyses of plasmatic TH levels revealed significantly higher T3 levels in the treated group on day 60. In the brain, no significant differences in TH levels were observed in frontal cortex and hippocampus, however, treated mice showed higher T3 levels in the striatum and these levels positively correlated to social memory measurements. Overall, these results indicate that TH treatment at aging may be of therapeutical interest to prevent age-associated cognitive decline and low sociability.

ORAL COMUNICATIONS
SESSION 3

Thursday, July 20th, 2017

Chair: Mª Ángeles Zafra, University of Granada

EFFECTS OF CHRONIC SOCIAL INSTABILITY STRESS AND VENLAFAXINE ON BEHAVIOR, THE HPA AXIS, MONOAMINERGIC ACTIVITY AND IMMUNITY PARAMETERS IN FEMALE MICE

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The prevalence of depression among women is approximately twice that of men. Consequently, the majority of antidepressant prescriptions are targeted at the female population, even though most preclinical drug studies have been conducted on male experimental animals. The aims of this study were to analyze the depressive-like behavioral and physiological changes induced by chronic social instability stress in female mice, and to determine whether treatment with venlafaxine, an ISNSR, reverses these effects. To this end, CD-1 female mice were subjected to chronic social instability stress for 7 weeks, and were administered venlafaxine (20 mg/kg, ip) during the last 3 weeks of the stress period. The behavioral results reveal that stressed mice consumed less sucrose solution than controls, which is indicative of anhedonia, a core symptom of depression. Stress also resulted in higher corticosterone levels, along with increased GR mRNA expression in the hypothalamus, which may reflect glucocorticoid resistance. Stress also increased ERα mRNA expression in the hippocampus, suggesting low estrogen levels, while no changes were found in relation to ERβ. Stress was not found to affect hippocampal cytokines, but did generate different changes in monoaminergic activity, depending on the brain structure analyzed. Thus, social instability resulted in an increase in serotonergic activity in the PFC, but not in the HC, in which stressed mice showed lower levels of 5-HIAA and 5-HT. Stressed mice also had lower levels of MHPG and NE in the PFC and the HC, respectively, suggesting decreased noradrenergic activity in both structures. Regarding treatment with venlafaxine, not only did the applied drug pattern fail to reverse the effects of stress in this experiment, it also changed some variables in an unexpected way. In sum, the results indicate that this stress model produces behavioral disturbances and changes in several monoaminergic metabolic pathways in female mice, which were not reversed by venlafaxine. Further studies are necessary to test specific and effective pharmacological treatments for stress-related disorders in females.

TRYPTOPHAN DEPLETION BY DIET ALTERS GUT MICROBIOTA OF COMPULSIVE DRINKER RATS IN SCHEDULE-INDUCED POLYDIPSIA

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Compulsive behaviour, present in different psychiatric disorders, such as obsessive-compulsive disorder, schizophrenia and drug abuse, is associated with altered levels of monoamines, particularly serotonin (5-hydroxytryptamine) and its receptor system. An effective method to reduce central 5-HT is through nutritional depletion of the 5-HT precursor tryptophan (TRP). In fact, a previous study have shown that High Drinkers (HD) rats increase compulsive drinking after chronic TRP depletion by diet compared to Low Drinkers rats (LD) in Schedule-induced Polydipsia (SIP) (Merchán et al. 2017). Serotonin is a key element of the brain-gut axis, and gut microbiota may modulate serotonin synthesis. However, the involvement of gut microbiota in compulsivity remains unknown.
The present study investigated whether TRP depletion by diet alters the gut microbiota of compulsive *versus* non-compulsive Wistar and Lister hooded rats on SIP. The levels of dopamine, noradrenaline, serotonin and its metabolite were evaluated in different brain regions.
Wistar rats were selected as HD or LD according to their SIP behaviour, while Lister hooded rats did not show SIP acquisition. Both strains were fed for 14 days with either a TRP-free diet (T-) or a TRP-supplemented diet (T+). After SIP, rats were sacrificed and the faecal samples from the gut were collected. Diversity Shannon-Weaver (H´) index, Evenness (E) index and Pareto-Lorenz distribution were calculated from Denaturing Gradient Gel Electrophoresis profiles of the bacterial community of Wistar and Lister hooded rats. Chronic TRP depletion by diet produced, in Wistar HD compared to LD rats, a reduction of evenness index without affecting diversity index, indicating an increase of dominance of some species of the faecal microbiota. Moreover, a different functional organization of TRP depleted HD microbiota was found in the Pareto-Lorenz distribution, probing that the increase of compulsive drinking in TRP depleted HD rats is linked to a more vulnerable and less adaptive microbiota. Contrary, the TRP depletion by diet increased evenness and diversity indices in Lister Hooded rats. Regarding the non-treated groups, HD rats showed lower diversity of species than control LD rats. These results suggest that lower balanced microbiota could be linked to compulsive behaviour on SIP and reductions of serotonin may affect negatively to the microbiota of vulnerable populations.

This study was funded by grants from the Ministerio Economía y Competitividad (Spanish Government) and Fondo Europeo de Desarrollo Regional, PSI2015-70037-R and PSI2104- 55785-C2-1-R (MINECO-FEDER).

EFFECTS OF TUMOR AND STRESS COPING STRATEGIES ON INFLAMMATION, THE TRYPTOPHAN METABOLIC PATHWAY AND DEPRESSIVE-LIKE BEHAVIOR IN MICE

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Depression is associated with both cancer and social stress, with the way in which people deal with stress being of particular importance. Although the mechanisms underlying this relationship have not yet been fully clarified stress and tumor are known to be related to an increase in inflammatory markers, such as pro-inflammatory cytokines. Furthermore, these markers are linked to changes in the tryptophan metabolic pathway for kynurenine production, which may result in an increase in 3-hidroxikynurenine (3HK) and neurotoxins that affect brain activity, as well as in reduced serotonin (5HT) activity. These changes may contribute to depressive-like behavior. This study therefore aimed to analyze the effects of stress coping strategies on inflammation, tryptophan metabolic pathway activity and behavior in tumor inoculated mice.

To this end, OF1 male mice were inoculated with B16F10 melanoma tumor cells, and 6 days later, a subgroup was exposed to social stress, using a sensorial contact model. Interactions in the social stress model were recorded in order to analyze subjects' behavior and classify them into aggressive, active and passive groups. Depressive-like behavior was evaluated in two different tests; the Open Field Test (OFT), conducted 18 days after inoculation, and the Forced Swim Test (FST), carried out on day 21. Following the FST mice were sacrificed and the striatum and prefrontal cortex were dissected in order to establish Tumor Necrosis Factor alpha (TNFα) pro- inflammatory cytokine gene expression, along with 5HT, its metabolite 5-Hydroxyindoleacetic acid (5HIAA) and 3HK levels.

The results indicate that tumor inoculated mice have higher levels of TNFα in the striatum, and more over, that there is a positive correlation between TNFα levels and tumor development. Furthermore, tumor inoculated mice spend more time immobile in the OFT in comparison with tumor-free mice. As regards strategies for coping with stress, passive mice were found to have higher levels of 3HK in the striatum than their active and aggressive counterparts. Also, a lower 5HIAA/5HT ratio was observed in the prefrontal cortex of passive mice. These biological differences may be reflected in subjects' behavior, since passive mice spent more time immobile in the FST than the aggressive group and as a tendency more time than the active group as well.

This results support the inflammatory hypothesis of depression, since as observed, tumor inoculation may lead to inflammation which may in turn contribute to the appearance of depressive-like behavior. Furthermore, passive strategies for coping with stress may active the kynurenine neurotoxic pathway and decrease serotonin production, thus contributing also to the appearance of depressive-like behavior. We can therefore say that both tumor and passive strategies may lead to depressive symptoms.

ORAL COMUNICATIONS **SESSION 3**

THE RELATIONSHIPS BETWEEN EXERCISE AND CORTISOL LEVELS ON CHRONIC PAIN PERCEPTION AND EXPERIMENTAL PAIN SENSITIVITY IN WOMEN WITH FIBROMYALGIA

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Fibromyalgia (FM) is a musculoskeletal chronic pain disorder of unknown pathophysiology that mainly affects women. It is characterized by widespread pain, sleep disturbances, fatigue, tenderness, cognitive difficulties, and other somatic complaints (Wolfe, Clauw & Fitzcharles, 2010). Several researches reveal that physical activity is a vital component of FM management and care (Bircan et al., 2007; Busch et al., 2011; Jones et al., 2002; Brosseau et al., 2008; Busch et al., 2008; Kaleth et al., 2013). Studies focused on pain modulation supports the use of exercise as an effective tool to reduce pain, and it is often recommended as an adjunct therapy in the treatment of chronic pain (Hauser et al., 2010; Henchoz & Kai-Lik So, 2008). With regard to experimental pain induction (ie, pressure pain perception, CPT) many individuals with FM do not experience hypoalgesia and pain sensitivity and perception are often temporarily exacerbated after acute exercise (Hoeger et al., 2011; Lannersten & Kosek, 2010; Staud, Robinson & Price, 2005; Vierck et al., 2001). Additionally, FM syndrome has been related to disorders on self-regulation capacity of the HPA axis and altered responses of cortisol (Borchers and Gershwin, 2015; Tak et al., 2011; Turner-Cobb et al., 2010). There are data to suggest that cortisol rhythms predict pain symptoms (McLean et al., 2005). According to Yeung, Davis and Ciaramitaro (2016), adequate cortisol levels decline clinical pain. To our knowledge, no studies have examined experimental pain sensitivity in FM patients in relation to moderate exercise or cortisol responses to laboratory pain.

The aim of the present study was to investigate the relationship between exercise practice, cortisol reactivity and pain processes (chronic pain perception and subjective and objective experimental pain sensitivity). To this end, 20 women with FM (age: 58.06±1.18) and a control group (CG) composed by 28 healthy women (age: 57±1.21) were exposed to an experimental pain task (Cold Pressor Test). We evaluated their hormonal response to pain task (salivary cortisol), self-reported chronic pain and experimental pain sensitivity. The results indicated a significant relationship between exercise practice, cortisol response and pain processes. The hours per week exercise were positively associated with cortisol response and negatively with usual chronic pain intensity and experimental pain sensitivity in FM women. Cortisol response was inversely correlated with experimental pain sensitivity in FM group. These associations were not found in healthy women. These findings suggest that exercise and cortisol may have a role over the pain experienced in FM patients. In sum, future investigation should deepen the relationship between physical exercise and the function of the HPA axis in FM patients.

ORAL COMUNICATIONS **SESSION 3**

ALTERATIONS ON THE HYPOTHALAMIC FEEDING SYSTEM IN THE ACTIVITY-BASED ANOREXIA (ABA) RAT MODEL

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The Activity-based Anorexia (ABA) is an animal model used in rats to reproduce the conditions stated in anorexia. ABA consists in a progressive increase of the activity, linked to a fast decrease in weight. This model can be induced limiting one hour per day the access to food and allowing a free access to a wheel.
In the present experiment, we studied the possible unbalance in the expression of hypothalamic anorexigenic peptides in the brain of rats submitted to an ABA procedure. Specifically, we investigate if the number of neurons expressing proopiomelanocortin (POMC) in the different subdivisions of the hypothalamic arcuate nucleus (ARC) is altered in rats submitted to ABA model. 24 Wistar male rats divided into three groups: ABA group: with access to food 1 h per day and access to the activity wheel 22 h per day, Restriction group: with access to food 1 h per day and without wheel running access and the Control group: with food *ad libitum* and without access to the activity wheel. Every day during the induction of ABA, animals, and food was weighted. When body weight was at 75 % of the initial weight, the criterion of ABA was reached. Additionally, in the ABA group, the number of turns in the activity wheel was registered. Body weight, food intake, glucose levels and number immunoreactive-POMC (POMC-ir) neurons in the ARC were the parameters evaluated in this study. Results were submitted to an ANOVA and post hoc analyses were conducted with Student-Newman-Kleuss with significance level at 0.05.

The data showed a decrease in body weight in the ABA group (72%) and in the restriction group (84%), while an increase in the control group was detected (122%). Additionally, rats in the ABA group increased progressively the number of turns in the activity wheel. With respect to the number of POMC-ir neurons, both restriction and ABA group showed a significant decreased in the number of POMC-ir arcuate neurons, with respect to control groups ($p<0.05$). Moreover, ABA group showed a significant decrease in this parameter with respect to restriction group ($p<0.05$). No significant differences in glucose levels were observed.

This results demonstrate that food restriction can change POMC expression in the ARC, and this alteration is more pronounced in ABA group. This differential decrease might constitute one of the distinctive physiological characteristics of anorexia nervosa in this ABA model. In which is observed a progressive increase in number of turns in the wheel and an increase in the activity shortly after the food intake which can suggest that the pattern of the run is regulated by the delivery of food.

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ORAL COMUNICATIONS **SESSION 3**

NEUROBEHAVIORAL CHARACTERIZATION OF A NON- ALCOHOLIC FATTY LIVER DISEASE (NAFLD) ANIMAL MODEL

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Objectives: In patients with NAFLD, problems with memory, concentration and psychomotor function are frequently described but poorly characterized. At present the neuropsychological deficits observed and their relationship with severity of underlying liver disease are unknown. Purpose: Our work tries to conduct a characterization of an animal model of NAFLD to know the main physiological and behavioural alterations linked with this condition. Methods: 20 Sprague-Dawley male rats were divided in two groups of diet administration: chow (NC, n=10), and high-fat high-cholesterol (high fat (65%), high cholesterol (2%) (HFHC, n=10) at 16 weeks investigated. Histological staining such as H&E and Sirius red were employed for detection of hepatic architecture and collagen accumulation, respectively. We evaluated the motor coordination through the Rotarod-accelerod test, depression understood as behavioural despair by the forced swimming test, anxiety has been measured in the Zero Maze and cognitive function was assessed through spatial recognition memory and cognitive flexibility in the Morris Water Maze (MWM). Results: HFHC-fed rats showed massive collagen accumulation and increase in inflammatory infiltrates at 16 weeks. There were no differences between the high-fat, high-cholesterol group (HFHC) and the control group (NC) while assessing none of these competences at 16 weeks in the Rotarod-accelerod test, forced swimming test, Zero maze and in the MWM. Nevertheless, in the aforementioned test (MWM), although both animals were able to reach the behavioural criterion different strategies were identified with a predominantly thigmotaxis-driven behaviour in the HFHC groups compared to an efficient path in the NC animals. Conclusions: The results of this study show a trend in progressive neuropsychological dysfunction in a clinically-relevant rodent model of NAFLD even prior to cirrhosis stages. The data provide an explanation for the poor quality of life of NAFLD patients. Our future perspectives include the study of biochemical alterations due to the administration of the diet, in addition to the evaluation of more behavioural capacities.

ORAL COMUNICATIONS **SESSION 3**

MATING-RELATED ATTENTIONAL CHANGES DURING THE MENSTRUAL CYCLE

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Attraction towards masculine features has shown to be affected by the ovarian cycle (Gangestad and Thornhill, 2008; Jones et al., 2008) as well as by hormonal contraception (Little et al., 2013). The general consensus is that women in their fertile days seem to favour more masculine features (De Bruine et al., 2010), which can be considered as honest signals of a good genetic quality, which would include high testosterone levels.
In order to approach this issue, masculine faces can be manipulated by means of a computer programme makes it possible to increase and reduce the degree of masculinity in each face, so that women can respond to two different versions of the same face.
Although the mentioned preferences are products of a mostly unconscious process, the effect could be produced either at an initial moment of the attention process (automatic attention) or when women are consciously focused on the potential partner's face (full or conscious attention).
Participants (N= 170) were exposed to two different tasks. During the first one (Dot-Probe Task), 20 pairs of faces (one masculinized and the other feminized) were presented on the computer's screen for 0,4 seconds, a period considered to be below the threshold of conscious attention. An asterisk appeared beside one of the versions and subjects were asked to press a key as soon as they saw it. During the second one (Preference Task), participants were shown the two pictures without a time-limit and were asked to decide which one they considered to be more attractive.
The menstrual phase was calculated by counting 14 days backwards from their first period post-study and they were asked about their use of hormonal contraception.

ORAL COMUNICATIONS **SESSION 3**

MILD COGNITIVE IMPAIRMENT IN PATIENTS WITH AND WITHOUT DEPRESSION

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It is well known that depression is a risk factor for dementia. However, the effects of the interaction between depression and dementia on cognitive performance are understudied.

The aim of this pilot study was to investigate the effect of depression on cognitive performance in older people with Mild Cognitive Impairment (MCI). Twenty-one patients were included in this study, 12 patients with mild cognitive impairment (mean age 71.25 years) and 10 patients with mild cognitive impairment and depression (mean age 63 years). A neuropsychological battery was used to assess several cognitive domains: global cognitive functioning, declarative and working memory performance, language, visuospatial and executive functioning.

Our results showed no differences in cognitive performance between patients with and without depression. Importantly, patients with depression and MCI were younger than patients only with MCI. The findings of this study indicate that depression may worsen cognitive impairment in older people with MCI. Also, our results suggest that the age is an important factor to take into account in the incidence of depression in MCI. Further studies should consider the interaction between depression and MCI when investigating cognitive performance in patients with MCI.

ORAL COMUNICATIONS
SESSION 4

Thursday, July 20th, 2017

Chair: Mª Victoria Perea, University of Salamanca

ORAL COMUNICATIONS **SESSION 4**

CHANGES IN NORADRENERGIC SYSTEM AFTER CONSUMPTION AND WITHDRAWAL OF COCAINE, HEROIN AND SUCROSE USING A PARADIGM THAT INDUCES INCUBATION OF CRAVING

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Addiction is considered as a chronically relapsing psychopathology because of its high degree of relapse. Due to the multifactorial nature of addiction, no one model captures all its features, but extended access protocols seems to promote better addiction-like phenotypes in animal models. Cue-induced seeking of drugs of abuse and natural reinforcers increases throughout withdrawal after extended access to them, a phenomenon termed incubation of craving. This phenomenon has been observed also in humans, associated with an incubation of drug-paired cues induced anxiety. Because noradrenergic system has been associated with anxiety, the purpose of this investigation was to analyse the gene expression of three adrenergic receptors (alpha 1A, alpha 2A, beta 1A) in six brain regions associated with the incubation of craving: basolateral complex of amygdala, central and medial nuclei of amygdala, core and shell regions of nucleus accumbens, and dorsomedial and ventromedial profrontal cortex. Lewis male adult rats were used and brain regions were dissected by cryostat. Gene expression were analyzed from cytoplasmic mRNA. We also studied the correlations between behavioral parameters and noradrenergic receptor expression. Changes in noradrenergic system were observed but no common one among the three substances, although differences may be related due to the limbic nature of all the structures.

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PSYCHOLOGICAL DISTRESS, QUALITY OF LIFE AND SEROTONIN LEVELS IN BREAST CANCER SURVIVORS

Joana Pérez-Tejada, L. Garmendia, O. Vegas, A. Labaka, E. Gómez-Lázaro, A. Lebeña, A. Arregi

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Survival rates of women with breast cancer have increased in recent years due to the availability of effective treatments. However, many of these women continue to suffer from psychological problems such as anxiety and depression, even after the end of treatment. The specific psychological or physiological mechanisms that underlie the development of these symptoms are unknown, although it is thought that one of the physiological variables is serotonin, a neurotransmitter that plays an important role in the development of these disorders. Furthermore, the presence of psychological distress may influence the quality of life of breast cancer survivors. This study had a twofold aim: firstly, to analyze plasma levels of serotonin in a pilot sample of breast cancer survivors aged between 35 and 65, who had completed chemotherapy and radiotherapy treatments over one year previously; and secondly, to study the level of psychological distress, using the Hospital Anxiety and Depression Scale, and quality of life, using the Quality of Life of Adult Cancer Survivors questionnaire. The results indicate that breast cancer survivors suffering from psychological distress have lower levels of serotonin and a poorer quality of life. These findings may contribute knowledge that is useful to design interventions that minimize the psychological impact, as well as improve the quality of life of cancer survivors.

ORAL COMUNICATIONS **SESSION 4**

GLUTAMATERGIC CHANGES AROUND CEREBELLAR GOLGI CELLS EXPRESSING A PERINEURONAL NET IN COCAINE-INDUCED PREFERENCE CONDITIONING

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Área de Psicobiología. Universidad Jaume I. Castellón

A perineuronal net (PNN) is an aggregation of extracellular matrix molecules (versican, aggrecan, neurocan, brevican, hyaluronan, tenascin-R, link proteins, and semaphorin 3A) in a net-like manner that envelopes the perikaryon and proximal dendrites of some neurons. Only special subsets of neurons express perineuronal nets (PNN) in the brain. Moreover, in the cerebellum, only projection neurons of the deep cerebellar nuclei and Golgi inhibitory interneurons in the granule cell layer are surrounded by PNNs. PNNs begin to form at the end of the brain development and because of the stability of their components, they have been proposed as a candidate mechanism for long-term memory storage. In the adult brain, PNNs are a critical part of synaptic plasticity machinery because PNNs stabilize synaptic contacts and create the conditions to restrict synaptic plasticity modifications. Although very few studies have focused on the role of PNNs in drug addiction, it has been proposed that PNNs might contribute to the maintenance of drug-induced conditioned memories after prolonged drug abuse. Previous studies from the lab showed that the infralimbic cortex and dorsal cerebellum seem to be part of a functional network that would work on restraining drug seeking when drug-cue associations are acquired. We previously found that deactivation of the infralimbic cortex increased cocaine-induced preference conditioning and upregulated PNNs expression in the dorsal cerebellar cortex.

In the present research, we aimed to further explore this functional relationship between the infralimbic cortex and dorsal cerebellum by assessing PNN expression and glutamatergic changes around these Golgi cells expressing a PNN after infralimbic deactivation. We used vGluT1, vGluT2 expression in order to estimate changes in neural activity. Our results showed that the infralimbic deactivation reduced significantly glutamatergic activity around these fully condensed PNNs around Golgi cells. These findings suggest that the infralimbic cortex has the capacity to regulate activity in the dorsal cerebellar cortex.

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ORAL COMUNICATIONS **SESSION 4**

EFFECTS OF BINGEING ON FAT DURING ADOLESCENCE ON THE REINFORCING EFFECTS OF COCAINE

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Adolescence is a developmental stage where there is synaptic plasticity and special vulnerability to different environmental threats, such as inadequate dietary habits or drug abuse. Binge-eating is a specific form of overeating characterized by a dysfunctional appetite, marked by intermittent excessive eating. Like drugs of abuse, certain types of food activate common dopaminergic pathways, which is why hedonic eating affects neural mechanisms associated with reward and perpetuates binge-type eating behaviour.
Prolonged exposure to rewarding stimuli like drugs or palatable food can lead to physical dependence, and physical symptoms can appear when the stimulus is removed. Animal models of bingeing have enabled researchers to determine similarities and differences between drug addiction and overconsumption of food. Furthermore, teenagers eat large amounts of caloric high fat and sugar rich food sporadically and in a short period of time, what is named overeating or binge eating, and they are also vulnerable to drug abuse. This fact has encouraged a wide range of research to progress on the understanding of the problem of binge eating, with resembles what occurs with substance abuse.

In the present study we have been interested in the interaction between cocaine and binge eating on a high-fat diet. Thus, the aim of this study was to evaluate the effects of bingeing on a high-fat diet during adolescence on the subsequent cocaine reinforcing and motivational actions in adult mice. After 40 days of binge-eating for 2 h, three days a week (PND 29e69), the reinforcing effects of cocaine on conditioning place preference and intravenous self-administration paradigm were evaluated in adolescent male mice. Circulating leptin and ghrelin levels and gene expression analyses were also assessed.

Our results showed a significant escalation in the consumption of a high-fat diet between the first and last week. High-fat binge (HFB) animals were more sensitive to the reinforcing effects of a subthreshold dose of cocaine in the paradigms assayed, and animals under fat withdrawal were more vulnerable to the reinstatement of conditioned place preference. HFB mice also showed enhanced cocaine self-administration. After fat withdrawal, exposure to a new fat binge reinstated cocaine seeking. Although HFB did not modify leptin levels, a decrease in plasmatic ghrelin was observed. Moreover, this pattern of fatty diet resulted in a reduction of MOr and CB1 gene expression in the NAcc and an increase in GHSR expression in the VTA.
We propose that bingeing on fat during adolescence induces long-lasting changes in the brain through the sensitization of brain reward circuits, which predisposes individuals to seek cocaine during adulthood.

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ORAL COMUNICATIONS **SESSION 4**

THE EFFECTS OF REPEATED SOCIAL DEFEAT STRESS ON ETHANOL ABUSE: ROLE OF NEUROINFLAMMATION

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Stressful life situations have been associated with drug seeking and taking. Studies in both humans and animal models have revealed that exposure to different types of stress increases abuse and relapse in the use of drugs of abuse such as ethanol. Specifically, exposure to social stress induce behavioral and neurochemical long-lasting effects. Using preclinical models, our group has demonstrated that exposure to repeated social defeat in mice, an ethologically validate model of social stress, causes an increase in ethanol consumption. Exposure to repeated social stress activates the immune system producing neuroinflammation that eventually induces structural changes in the blood-brain barrier causing an increase in its permeability. Based on these studies we are currently evaluating the effect of various social or pharmacological interventions to reduce the excessive consumption of ethanol observed in defeated animals. To evaluate ethanol response we used oral ethanol self-administration, conditioned place preference and ethanol-induced motor sensitization. To demonstrate neuroinflammation in defeated animals we evaluate the levels of cytokines such as interleukin 6 or of chemokines such as fractalkine, both in plasma and in different brain structures. We also tested the effect of the administration of an anti-inflammatory drug such as indomethacin before each social defeat. Finally, we also tested the effect of several environmental enrichments to reverse the aforementioned effects of social stress.

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ORAL COMUNICATIONS **SESSION 4**

COCAINE ADDICTION STUDY IN A TWO-HIT MODEL OF SCHIZOPHRENIA: MATERNAL IMMUNE ACTIVATION AND PERIPUBERTAL CHRONIC STRESS

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Prenatal infection and traumatic experiences around puberty are environmental risk factors for schizophrenia development in adulthood, being more prevalent in men than in women (1.4:1). In addition, there is a high incidence of addictive disorders among schizophrenic patients. In the present study, a two-hit model was used to analyze the relationship between cognitive symptoms of the disease and propensity to consume cocaine in male rats. On one hand, either lipopolysaccharide (LPS, 100 µg / kg) or saline was intraperitoneally injected on gestational days 15 and 16. On the other hand, during postnatal days (PND) 28 to 38 rats were exposed to five episodes of either stress or handling on alternate days. Once early adulthood (PND70) was reached, the positive/cognitive symptoms of the disease were studied by analyzing the attentional filtering ability of the animals using the Prepulse Inhibition test (PPI). Subsequently, in PND90, a cocaine self-administration program was used to explore certain typical features observed in human patterns of addiction (acquisition of consumption, motivation for the drug, compulsiveness, escalation in consumption and drug craving incubation). The results showed that prenatal treatment with LPS leads to less attentional filtering during the PPI test, when there was pre-exposure to a weak stimulus of relative high intensity. Stress accentuated this disturbance when the time between pre-exposure to the weak stimulus and the mayor-eliciting stimulus intensity was diminished. Prenatal treatment with LPS facilitated the acquisition of stable cocaine consumption, while peripubertal exposure to chronic stress reversed the effect and decreased total drug consumption during all phases of the self-administration program. Given that the combination of prenatal infection and traumatic experiences around puberty seem to be critical for developing a worse attentional filtering, our results suggest that both factors modulate the acquisition of cocaine consumption. However, only the exposure to traumatic experiences around puberty decreases drug administration, search and consumption desire, once the behavior is established.

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ORAL COMUNICATIONS **SESSION 4**

DEALING OR YIELDING: EVIDENCE OF NEUROPLASTIC CHANGES IN AN ANIMAL MODEL OF COMPULSIVITY

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Background: Neuropsychiatric disorders such as schizophrenia and other compulsive spectrum disorders have shown differences in volume brain structures. Similarly, in preclinical models, the exposure to stress have been reported to induce hippocampal dendritic atrophy and amygdala hypertrophy. Therefore, the neuroplasticity changes in brain might be associated with a higher vulnerability to psychopathology. In our laboratory, we investigate a population of rats that are vulnerable to compulsive and schizophrenia symptoms with the aid of Schedule-induced polydipsia (SIP) procedure. This is defined as excessive drinking behaviour unrelated to physiological needs that appears under intermittent reinforcing program (Fixed Time 60s) in food-deprived animals. Previous evidence has linked the high compulsive drinking profile on SIP to alterations in serotoninergic activity, serotonin 5-HT2A receptor and myelin. *Goal:* The aim of the present study is to investigate if neuroplasticity changes measured through the brain volume in different areas is linked to a compulsive drinking phenotype on SIP. *Methods:* First, we selected high compulsive drinker (HD) and low drinker (LD) rats by the median of water intake after 20 sessions on SIP. Then, after one month of inactivity, half of HD and LD groups were re- exposed to SIP until they reached the previous drinking levels. We measured volume by stereology and serotonin 5-HT2A receptor levels by autoradiography in different brain structures related to inhibitory control and schizophrenia: prefrontal cortex (prelimbic -PrL- and infralimbic -IL- cortices), basolateral amygdala (BLA), dorsal hippocampus (HC), and corpus callosum (CC) of HD and LD animals. *Results:* HD rats re-exposed to SIP showed a significantly higher BLA and lower HC volume compared to re-exposed LD and to non-re-exposed HD and LD animals. In addition, re-exposed HD and LD rats and non-re-exposed HD showed lower 5-HT2A receptor binding levels in BLA compared to non-re-exposed LD animals. The present results indicate that SIP procedure could induce neuroplastic changes in HC and BLA to which the compulsive drinker rats might be more vulnerable, therefore pointing towards the implication of BLA, HC, and serotonin 5-HT2A receptors neuroplasticity as underlying mechanisms of vulnerability to compulsive disorders.

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EVENING CORTISOL LEVELS, LONELINESS, DEPRESSION AND COGNITIVE FUNCTION IN HEALTHY ELDERLY

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Cognitive impairment, loneliness and depression are some of the problems associated with aging, where the Hypothalamic-Pituitary-Adrenal (HPA) axis could play an important role. Previous studies have shown that chronic stress, and the subsequent release of the cortisol by the activation of the HPA axis, impacts negatively on cognition. On the other hand, it is known that depression affects the HPA axis function, and that there is a high correlation between depression and the feeling of loneliness. Besides, loneliness has been considered as a chronic stressor that could affect the function of the HPA axis. Thus, the aim of the present study was to assess the association between the HPA axis activity, the feeling of loneliness and depression, and cognitive function in healthy older people, taking into account the sex. The sample was composed of 87 healthy elderly (44 men and 43 women) ranging in age from 59 to 81 years (mean age= 69.20). A neuropsychological battery was administered to evaluate declarative (Rey Auditory Verbal Learning Test and Rivermead Stories Subtest) and working memory (Digit Span and Letter-Number Sequencing Test), and executive function (Trial-Making Test and Stroop Color-Word Interference Test). In addition, loneliness (UCLA-R Loneliness Scale) and depression (Beck Depression Inventory) were assessed. Moreover, participants provided saliva samples to obtain cortisol levels in the moment of the awaking and before going to sleep, during two consecutive weekdays. Our results show that higher evening cortisol levels are associated with higher feelings of loneliness and a poorer performance in working memory and executive function, both cognitive functions depending on the prefrontal cortex. When we take in account sex, we found that higher evening cortisol levels were related to higher negative feelings of loneliness and depression in women, as well as a poorer performance in a more basic cognitive function such as attention. However, in men, higher evening cortisol levels were related to a poorer performance in more complex cognitive functions such as working memory and executive function.

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ORAL COMUNICATIONS SESSIONS 5&6

Thursday, July 20th, 2017

Chair: Fernando Sánchez-Santed, University of Almería

ORAL COMUNICATIONS **SESSIONS 5&6**

GENETIC AND ENVIRONMENTAL CONTRIBUTIONS TO THE RELATIONSHIP BETWEEN CHRONIC PAIN AND SYMPTOMS OF DEPRESSION

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People suffering from chronic pain are more likely to experience symptoms of depression and anxiety. The prevalence of pain symptoms among people with depression can be as high as 65% and the concomitant presence of symptoms of depression, anxiety and pain is associated with worse health status for patients compared to the presence of one condition alone. However, the mechanisms underpinning this association remain largely unclear and could result from: genetic factors that contribute to the liability of both conditions (pleiotropy), familial environmental factors (shared factors), or individual environmental factors (unique factors) that could affect both conditions.
In light of the moderate to large effects of genetic factors on chronic pain and depression, our research group has recently investigated the relationship between
chronic low back pain and depression while accounting for family factors (genetic and environmental) by employing co-twin case-control designs. The findings from these studies showed that once genetic and environmental factors are accounted for the association between pain and depression disappears, what suggests a relevant role of genetic influences in this relationship. Next step in this endeavor was to estimate the relative contribution of environmental and genetic factors to the association between depression and pain. Using data from 2139 participants in the Murcia Twin Registry we have obtained heritability estimates of .26 for chronic low back pain and .45 for symptoms of depression and anxiety. The phenotypic, genetic and unique environment correlations in the bivariate analytical model were, respectively, r_{ph} = 0.26 (0.19, 0.33); r_A = 0.47 (0.42, 0.70); r_E = 0.14 (-0.04, 0.25). The percentage of covariance between pain and depression attributable to additive genetic factors was 63.6%, and to unique environment 36.4%.

We conclude that shared genetic factors affect significantly the covariation between these conditions, supporting the role of common biological and physiological pathways, and pointing to a pleiotropic effect over depression and chronic pain.

GENETIC VULNERABILITY IN GENDER DYSPHORIA: THE ROLE OF ANDROGEN AND THE ESTROGEN RECEPTORS

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In mammals, the brain and gonads begin as bipotential organs that differentiate as male or female during a sensitive perinatal period. In gonads, sex dimorphism is the result of the genetic complement, while, in the brain, it is the result of the exposure to gonadal steroid hormones, testosterone and estrogens. Exposure to testosterone is an essential requirement for masculinization of the brain via aromatization during prenatal life in males, while, in females, feminization of the brain develops under the influence of weak estrogen concentrations. But, sometimes “discordances” arise. Transsexuals are individuals who seek, or have undergone, a social transition from male-to-female (MtF) or female-to-male (FtM) in accordance with their self identity.

We analyzed 426 FtM, 588 MtF, 599 control XX women and 728 control XY males recruited from two Units of Gender Identity from Spain. The subjects were diagnosed with Gender Dysphoria (GD) in adults (302.85) according to DSM-5 or with Transsexualism (F64.0) according to ICD-10. The control male and female groups consisted of Caucasians individuals free of any neurological, systemic, or psychiatric illness, as verified in a detailed interview. The polymorphisms analyzed for the *ESR1* gene were: (TA)n-ERα (rs3138774), PvuII-ERα (rs2234693) and XbaI-ERα (rs9340799); for the *ESR2* gene: (CA)n-ERβ; for the *AR* gene: (CAG)n-AR; for the aromatase *CYP19A1* gene: (TTTA)n-CYP19A1; and for the *CYP17A1* gene: MspA1-CYP17A1 (rs743572). Analyses were performed using SPSS® 23.0, with a *p* value below 0.05 being taken as significant. The mean number of tandem repeats was analyzed by the Mann–Whitney U-test. Allele and genotype frequencies were analyzed by chi-squared test. Association and linkage disequilibrium analyses were performed using SNPStats software.
The main finding in the MtF population was that the (CAG)n-AR polymorphism is involved in the expression of GD, in a necessary but not sufficient manner. AR must interact with specific ERβ genotypes or in a specific combination with the XbaI-ERα and the CYP19A1 polymorphisms. Thus, there is high risk for GD when the short (S) allele for AR is associated with the L/L genotype for ERβ, and inversely, when the long (L) allele for AR is associated with the S/S genotype for ERβ.

Our data indicate estrogen receptor involvement as a key element in brain sexual differentiation in XY and XX populations. The fact that the AR is not associated to a brain phenotype that presents masculine traits, supports the role of the estrogen receptor in normative masculinization, and the probability that human female brain differentiation is actively sexually differentiated.

ORAL COMUNICATIONS **SESSIONS 5&6**

MODULATORY EFFECTS OF TDCS APPLIED OVER BROCA'S AND WERNICKE'S AREAS ON VERBAL RECOGNITION TASK PERFORMANCE

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Visual discrimination of verbs from different semantic categories involves the activation of memory and language mechanisms in which several cortical areas have a specific role, depending on the category. Broca's area is a cortical region mainly, but not exclusively, related to language expression. Its anatomical proximity to the cortical areas of voluntary movement and lesion studies suggest that this area has a major role in the motor component of language, which might not only involve speech production, but also processing of words related to movement. Wernicke's area is also a language area that, in addition to its classical auditory sensory function, seems to be involved in the visual recognition of different word categories. Non-invasive brain stimulation is a useful tool for exploring the impact of both areas on word categorization, considering their suggested specific functions. The main objective of the present study was to analyze, via a verbal decision task, whether the visual recognition process of different verb categories is altered when the excitability of Broca's or Wernicke's area is modulated by anodal transcranial direct current stimulation (tDCS), and therefore to disentangle discernible contributions of these areas to word recognition. The results indicated that stimulation over Broca's and Wernicke's areas facilitates recognition of emotional verbs but not movement verbs. Interestingly, stimulation over Broca's area interfered with recognition of movement verbs. These findings suggest that both areas are involved in verbal processing, although specific recognition of movement verbs seems to be related to Broca's area.

RELEVANCE OF THE OBJECT SHAPE IN RAT OBJECT EXPLORATION

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The novel object recognition task (NOR) is a one-trial learning test widely used for testing memory processes in rats and mice. The NOR task is based on the spontaneous tendency to explore novel stimuli versus familiar stimuli. However, scarce attention has been paid to the role of potential previous preferences for specific shapes of the objects used. The aim of this study is to investigate the relevance of the number of angles in determining preference for certain object. Two experiments were carried out.

In Experiment 1, thirty male adults Wistar rats were exposed simultaneously in a square arena to two geometric three-dimensional simple plastic figures. Five pairs of figures were used, being each pair similar in color and distinct in shape. The forms included cubes, cylinders, pyramids, cones, spheres and prisms. The animals were allowed to explore for five minutes or an accumulated time of 40 seconds of active exploration. Object exploration was defined as having the rat's head within two cm of the object moving the vibrissae and snout. The exploration time of each object was recorded in situ. Also, an overhead camera was used to record animals' behavior for subsequent analysis.

In Experiment 2, three more variables were added: object complexity, sex and age. Thirty-two male adult Wistar rats and 16 male (n=8) and female (n=8) adolescent Wistar rats were exposed to two three-dimensional geometric white figures. Three figures were simple forms (cube, cylinder and sphere) and the other three complex forms consisting in a combination of three simple forms of decreasing size (tower of cubes, tower of cylinders and tower of spheres). Each pair of objects was made of plastic and similar in weight, height and color, only differing in shape. Experimental procedure was similar as that described in the previous experiment.

The results were as follows: (1) When using simple forms those with a higher number of angles were explored significantly longer both in Experiments 1 and 2. On the contrary, when using complex forms (Exp. 2) the animals explored significantly more those with a lower number of angles, except in the pair consisting in tower of cubes versus tower of cylinders. An additional experiment performing a NOR task showed that animals couldn't distinguish between them probably due to the high degree of similarity of both objects. (2) There were no significant differences concerning sex or age. These results point to the relevance of previous preference for specific object forms in object recognition memory tasks. In fact, the performance could be affected by the intrinsic features of objects as the number of angles. Further research is needed in order to determine how intrinsic preference for number of angles affects exploration behavior and memory.

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IS THERE A NEURAL SIGNATURE FOR PAIN IN FISH?

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Pain is a complex, unpleasant sensory and emotional experience associated with actual or potential tissue damage that includes not only nociception, but also emotional, affective and cognitive components and, even more, the subjective or phenomenic experience of the pain itself. Accordingly, neural basis of pain includes not only a peripheral nociceptors system allowing the receptiveness of the noxious stimuli and specific fibres at the spinal cord level conveying them, but also a collection of subcortical and cortical circuits and neural centres generating these emotional, cognitive and subjective states. Humans and other land vertebrates seem to share the brain circuits responsible for the nociceptive processing and pain experience. Teleost fish also seem to share with amniotes the mechanisms for pain processing at the peripheral, the spinal, and even at the sub-telencephalic pallium level, but little is known about the role of the fish telencephalic pallium in pain processing which has led some authors to consider that fish cannot experience pain. However, increasing evidence show that the dorsomedial subdivision of the area dorsalis telencephali (Dm) of teleosts is critical for affectivity and emotion.

To investigate the possible involvement of the goldfish Dm in nociceptive somatosensory processing and in the generation of affective and emotional states associated with noxious stimulation and pain, a series of four experiments using voltage-sensitive dye imaging, acute and chronic intracerebral electrical microstimulation, neural tissue damage, and conditioned place aversion behavioral procedures were conducted in goldfish. As a whole, the results of these experiments showed that Dm should not to be considered a single pallial area but instead, a region constituted by three different functional areas, Dm1, Dm2, and Dm3. Whereas Dm3 seemed to play a role in the processing of the sensory aspects of the noxious stimulation, Dm2 seems to codify and generate the painful attributes of the noxious stimuli. In contrast, Dm1 seemed not to be specifically involved in pain processing. These results are relevant because they demonstrate the existence of a pallial telencephalic network that could be part of the neural signature of pain in fish as it occurs in land vertebrates, disclosing the likelihood that fish could be able to subjectively experience pain. In addition, they suggest that the telencephalic pallium network supporting the experience of pain might have appeared very early during vertebrate evolution.

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ACTION VS. STATE ORIENTATION AND PERFORMANCE AT BRAIN-COMPUTER INTEFACES

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The orientation to State or Action, evaluated through the Action Control Scale (ACS, Kuhl, 1994) has shown to be related to the executive function, in the sense that action-oriented people (AO) tend to obtain better results than those state-oriented (SO) in a series of characteristics, such as low procrastination (Beswick & Man, 1994), affection regulation (Koole & Jostmann, 2004), basketball performance (Heckhausen & Strang, 1998), decision-making and initiative (Kazén,

Kaschel, & Kuhl, 2008), even in older people (Kaschel, Kazén, & Kuhl, 2016.) The best execution of OA can be observed especially in difficult or demanding tasks, which strongly suggests this personality trait may be closely related to executive function (Koole, Jostmann, & Baumann, 2012, see Kuhl & Beckmann, 1994).

In short, AO people are able to increase their own motivation when copying with difficult or laborious tasks (eg, those which are not well learned or requiere newnew sequences of action). On the other hand, SO people have a lower ability to self-motivate in order to perform those tasks.
What kind of tasks are difficult? Executive function is clearly required in the third of the five types of situations described by Shallice and Burgess (1991): "Those in which the answers have not been well learned or contain new sequences of action."

This is the case of the subjects who participated for the first time in a Brain Computer Interface (BCI) task, such as the one presented in this paper.
In this study we have compared the performances in the BCI-task known as Cursor Task, of participants who had completed the aforementioned scale. High scores indicate higher AO, while low scores indicate higher SO.

Methods:
A total of 145 students (mean age = 18.07; SD = 5.10) participated in a two-phased study. In the first phase, they performed a training task aimed to control the position of a cursor on the screen (Cursor Task), using a BCI (Enobio 8 channels), and then were evaluated for some psychological traits, which are described below. In the second phase, only the participants' performance at the Cursor Task was evaluated. This task is based on the modulation of the mu / beta rhythms to control the position of a cursor shown on the screen. The user's intent is reflected in changes of the cursor position.

Participants completed the Cursor Task on three separate occasions (trials), and used two different cognitive strategies. In one (Right-Left: RL), they had to think about squeezing the right
hand to make the cursor move in one direction, and pressing the left for the other. In the other (Hands-Feet: HF), they thought, either to raise their hands or to push down with their feet (such as when pressing the accelerator or the brake in a car). In both cases, they had strict instructions not to perform any muscle action. Each of the trials lasted 15 minutes, and the application of both strategies was counterbalanced.

For the acquisition of EEG data, the Enobio Neuroelectrics amplifier (Cester, Dunne, Riera and Ruffini, 2008) was selected. Enobio operates with wireless technology and allows dry electrodes
that facilitate experimental setup and user comfort. In order to acquire the signal, channels F3, F4, C3, Cz, C4, T7, T8, Pz according to the international system 10/20 on the sensory-motor area are chosen, based on the type of BCI motor imagery paradigm to be implemented . BCI2000 (Schalk et al., 2004) was used to implement the BCI system, which has provided consistent results (Schalk, 2009).

Psychological Testing

After answering the tests, the participants completed the CPT-II (Conners Continuous Performance Test, Conners and Sitarenios, 2011) and the Wisconsin test (Matthews and Clove, 1964). Status or action orientation (AO vs. SO) was assessed using the ACS (Action Control Scale; Kuhl & Beckmann, 1994), previously validated in Spanish (Beckmann & Kazén, 1994).

The results show that OA subjects obtained better scores (Hits) than OE subjects in all three tests, and using the two different strategies (RL and HF). This is consistent with previous results (Kaule & Jostmann, 2012; Kuhl & Beckmann, 1994) in relation to the executive function of AO, also evaluated by other procedures (Beswick & Man, 1994; Heckhausen & Strang, 1998; Kaschel et al., 2016; Koole & Jostmann, 2012). Recently it has been reported that AO compared to SO do not suffer from "ego depletion", which is the decrease in the execution of a second difficult task, after having previously performed a task that requires the concurrence of the executive function, such as Stroop task (Gröpel, Baumeister, & Beckmann, 2014).

CONCLUSIONS

Our results indicate that the personality trait of Action vs State is relevant for the assessed tasks, with an advantage for action-oriented individuals.

BCI tasks can be a good example of situations to test executive function (see Shallice & Burgess, 1991, on the five types of tasks requiring executive function).

The direct brain-computer connection possibly eliminates any interference due to neuromuscular aspects, such as those that can occur in tasks involving some kind of physical ability, or neuromuscular coordination, since the movement of the cursor on the screen is done exclusively by means of transduction of brain activity, while peripheral activity is assumed by the computer.

ORAL COMUNICATIONS **SESSIONS 5&6**

THE ROLE OF THE TELEOST FISH CEREBELLUM IN CLASSICAL CONDITIONING

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One of the most fascinating challenges in Neuroscience is to identify the presence of multiple memory systems in the brain. Over the years in this discipline, there have been successfull attempts to describe the neural circuits and mechanisms which underlie to specific learning and memory processes. A major research activity characterized by the employ of a wide methodological set including lesions studies, electrophysiological recording, and anatomical characterization, have identified the mammalian cerebellar circuits underlying different basic basics kinds of learning. However, studies in other vertebrate groups are relatively scarce. The aim of this study was to further analyze the role of the teleostean cerebellum in the pavlovian conditioning, as well as to identify whether the circuits and mechanisms which sustain the cognitive processes of learning and memory in classical conditioning in teleost fish are similar to those described for mammals. For this purpose two experiments were carried out. In a first experiment, the effects of corpus cerebellum lesions on the acquisition of a fear and a motor conditioned response under delay and trace classical conditioning procedures in goldfish (*Carassius* auratus) were analyzed. In the second experiment, synaptic plasticity underlying these forms of responses were analyzed using extracellular electrophysiological recording of cerebellar Purkinje cells in both a delayed and a trace procedure. The results of the present work show that the cerebellum of teleost fish, like the cerebellum of mammals, plays an essential role in motor and emotional learning and suggest that some of the basic behavioral phenomena in classical conditioning can be explained at the at cellular level as plastic changes in the cerebellar circuits. As a whole, these data show that comparable neural systems support delay and trace eyeblink conditioning in teleost fish and mammals, revealing that these separate memory systems and their neural bases could be a shared ancestral brain feature of the vertebrate lineage.

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ORAL COMUNICATIONS **SESSIONS 5&6**

PAIN PROCESSING IN THE GOLDFISH TELENCEPHALIC PALLIUM: HEART RATE CONDITIONING BY ELECTRICAL MICROSTIMULATION IN THE Dm2 AREA

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Acute pain involves the processing of nociceptive inputs by a network of cortical areas involved in the representation of the sensory as well as the emotional aspects of pain. Increasing evidence shows that teleost fish possess a nociceptive system similar to those found in mammals, comprising shared molecular mechanisms and nociceptive pathways at spinal and supraspinal levels. Nonetheless, pain in fish is a contentious issue and several authors claim that fish are unable to feeling pain because they lack a neocortical-like network involved in nociceptive processing. However, regions probably homologous to the pallial amygdala, the limbic cortex and the sensory neocortex can be recognized in the telencephalic pallium of the teleost fish, and recent evidence from our laboratory suggests an essential role for a network of pallial areas located in the dorsomedial telencephalic pallium (Dm) of goldfish in the processing of putative painful events. Thus, whereas the Dm3 subarea seems to codify the sensory and perceptual dimensions of the nociceptive somatosensory stimulation (for instance, stimuli location and strength) in a somatotopic neural representation of the body, the subregion Dm2 seems to be selectively involved in the representation and generation of the affective and emotional components of the noxious experience.

The aim of this work is to further analyze the differential involvement of the regions Dm2 and Dm3 of teleost fish in nociceptive processing. In this regard, goldfish were trained in a discriminative heart rate conditioning procedure in which two auditory stimuli of different frequencies were used as conditioned stimulus (CS+, CS-), and transdermal noxious electrical stimulation or intracerebral electrical microstimulation of the Dm2 or Dm3 region was provided as unconditioned stimulus (US). Stimulation of Dm2, but not Dm3, was enough to induce the acquisition of the conditioned bradycardia response to the CS+ in substitution of the transdermal noxious stimulation as US. Present results suggest an essential role of Dm2 in the generation of the aversive or negative valence of the noxious stimuli, and add further support to the hypothesis that separate regions of the goldfish Dm are involved in sensory processing and in the emotional aspects of a putative painful stimulation. In addition, these results, together with data about Dm connectivity, suggest that Dm2 might be the neural substrate for CS+ and US convergence, and thus, the location where the plastic changes associated with pain and emotional conditioning take place. Alternatively, it could be hypothesized that Dm2 could be a node on the US pathway. The present results suggest that the pallial mechanisms for pain processing could have appeared very early in the evolution of vertebrates and might have long preceded the mammalian radiation.

Supported by grant PSI-2014-56106P (MINECO and FEDER)

ORAL COMUNICATIONS **SESSIONS 5&6**

INTRACAROTID PROPOFOL PROCEDURE FOR ASSESSING HEMISPHERIC LATERALIZATION OF COGNITIVE, PHYSIOLOGICAL AND EMOTIONAL FUNCTIONS ON EPILEPTIC PATIENTS

Isabel Trujillo-Pozo, I. Martín-Monzón, F. Rodríguez, C. Salas, A. Gómez

Laboratorio de Psicobiología. Universidad de Sevilla

Epilepsy comprises a set of neurological disorders of diverse etiology, characterized by the development of gradual and progressive spontaneous seizures that increase in recurrence and severity with time. Temporal lobe epilepsy is the most common focal epilepsy disorder, and is often resistant to pharmacological treatment. This pathology has provided evidence of widespread network alterations that extend beyond the epileptogenic zone where seizures originate. Interestingly, cortical recruitment during seizures is not circumscribed to the areas immediately adjacent to a lesion. Recruitment of preexisting, contralateral connections may also occur, which appears to be related to the duration and severity of disease. In these cases, structural and functional neuroimaging, clinical, electroencephalographic, and behavioral protocols are necessary for improving the strategies for the precise localization of the epileptogenic zone, for surgical outcome prediction, and for a better understanding of the neuropsychological implications of recurrent seizures. In order to know whether different cognitive and emotional functions are lateralized in the hemisphere contralateral to the epileptogenic zone, it is relevant to assess these functions while one hemisphere is anesthetized (Wada test). Due to procedure reversibility, these tests are highly adequate to explore plasticity in neural circuits and in patterns of activity consequent to transitory hemisphere inactivation. In this talk we will present data obtained in a set of neuropsychological evaluations carried out on 24 patients that were considered as possible candidates for epilepsy surgery. These evaluations were performed while the patients were subjected to unilateral intracarotid injections of propofol. These tests provided reliable information for evaluating intrahemispheric and interhemispheric functional reserve and contributed significantly to the successful massive surgical resection of the epileptogenic focus without eliciting permanent cognitive sequelae and to post-surgical cognitive improvement.

ORAL COMUNICATIONS
SESSION 7

Friday, July 21st, 2017

Chair: Concepción Vinader, University of Valencia

ORAL COMUNICATIONS **SESSION 7**

SUBCHRONIC ETHANOL DOES NOT SIGNIFICANTLY IMPAIR EMOTIONAL MEMORY IN MICE

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We have previously observed impairing effects of acute ethanol on emotional memory in mice, which were counteracted by the anti-inflammatory indomethacin. The present study was designed to investigate the effects of subcronic ethanol and indomethacin on emotional memory in mice of both sexes. Male and female CD1 mice were randomly divided into four groups in each sex: SS (saline+saline), SI (saline+indomethacin), SE (saline+ethanol) and IE (indomethacin+ethanol). According to their pharmacological group, all subjects were treated with saline, ethanol (3 g/kg) and indomethacin (10 mg/kg), being daily injected (i.p.) for three days. After checking (in an actimeter for 30 min) that there were not significant differences in locomotor activity between the pharmacological groups, all subjects (n = 11-12 per group) were evaluated in an inhibitory avoidance task 96 h after the pharmacological treatment. Animals were also tested in a hot plate apparatus (analgesia measure). Inhibitory avoidance learning (test latencies significantly higher than training latencies) was confirmed in all groups, i.e. ethanol did not significantly impair this emotional memory. Sex differences were found in the memory task, with females performing better than males (significantly higher test latencies); as well as in the hot plate, with females showing a lower pain threshold (significantly lower latencies to lift their hind paws). In conclusion, subchronic ethanol does not significantly impair emotional memory in mice. Furthermore, females show a better emotional memory which could be due to sex differences in pain sensitivity.

PSI2013-44491-P from "Ministerio de Economía y Competitividad" and PROMETEO/2015/020 from "Generalitat Valenciana", Spain.

ORAL COMUNICATIONS **SESSION 7**

ROLE OF CRF RECEPTORS IN THE EFFECTS OF SOCIAL STRESS ON COCAINE REWARD

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Departament of Psychobiology University of Valencia

The aim of the present communication is to share our research about the role of the hypothalamic stress hormone, corticotropin releasing factor (CRF), in the effects that repeated social defeat induces on the conditioned rewarding effects and locomotor sensitization induced by cocaine.Drug addiction can be considered a multifactorial disorder of chronic relapse as a result of the interaction of biological and environmental factors, and is characterized by a loss of control over use of the drug. It has been repeatedly demonstrated that adverse life experiences or stressful events can render individuals more prone to addictive substances of abuse and make them more vulnerable to relapse after periods of detoxification. Thus, stress is considered a risk factor for this disorder that can influence all stages of drug addiction, as it plays a role in initiation, maintenance, escalation of intake and relapse to consumption. Emotional stressors are known to be the main source of stress in human beings. Social defeat in an agonistic encounter is a rodent model with ecological validity that closely mimics real-life situations in a human context. Numerous report show that exposure to different procedures of social defeat increases the rewarding and reinstating effects of psychostimulant drugs, such as cocaine, using the self-administration and the conditioned place preference paradigms. Defeated animals also show an enhanced sensitivity to cocaine-induced hyperactivity and cross-sensitization, with an augmented behavioural response to subsequent doses of cocaine after repeated drug exposure. These effects are associated with increased dopamine (DA) transmission in the corticolimbic system and these changes may be mediated by the action of neuropeptide corticotropin releasing factor, which interacts with two G-protein coupled CRF receptors, type 1 (CRFR1) and 2 (CRFR2). This factor is known as the principal mediator of a wide range of both acute and chronic neuroendocrine and behavioural responses to stress. CRF activates the hypothalamic-pituitary-adrenal axis and stimulates the release of glucocorticoids. In addition CRF axons project to extrahypothalamic areas such as the extended amygdala and VTA, thereby modulating DA function and causing neuroadaptations in DA neurons in the corticolimbic pathway.

Our research confirms that CRF modulates the effects of social stress on reinforcement and locomotor sensitization induced by cocaine, acting these receptors in opposing ways. These findings highlight CRF receptors as potential therapeutic targets to be explored by research about stress-related addiction problems.

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TOBACCO USE AND SMOKING-RELATED ATTITUDES AMONG MEDICAL STUDENTS IN VALENCIA: A DESCRIPTIVE STUDY

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Departamento de Psicobiología, Facultad de Psicología, Universitat de València

Tobacco smoking is one of the major preventable causes of disease and premature death in the world. It is a legal drug that kills many of its users and other non-users through the effects of second-hand smoke. Physicians and health professionals play an important role in helping their patients to stop smoking, since physician counselling increases smoking cessation rates. Unfortunately, physicians who smoke send a contradictory message to their patients. Studies on smoking prevalence in medical and health students are very limited and none exists in Valencia, to our knowledge. The main aim of this study was to assay the smoking prevalence and attitudes on tobacco use among health university students in Valencia.

The sample consisted of university students (n=159, 62.3% women and 37.7% men) from three universities in Valencia and from three degrees: 60 Medical, 46 Speech Therapy (ST), and 48 Computer Science and Business Management (CS-BM) students. The majority of students were in their first or second year with an average age of 19 years. They answered a questionnaire, which included questions regarding demographic characteristics, cigarette consumption, tobacco dependence (Fagerström Test for Nicotine Dependence), knowledge about anti-smoking programmes, and attitudes towards smoking and medical professionals who smoke.

The results show a low prevalence in smoking among university students. Only 10.1% are current smokers (6.3% Medical, 3.1% ST and 0.6% CS-BM) and with a low dependence. Some sex differences were observed: women considered smoking among health professionals to be less socially acceptable than men (92% women and 75% men), women showed a greater predisposition to join anti-tobacco programmes (53% women and 32% men), and women smoked primarily with friends (78%), while men smoked both alone (40%) and with friends (60%).

Differences were also observed among the different degrees: Most students cited health concerns as the main cause for not smoking. Medical students (42%) considered anti-tobacco advertisements to be effective, while the rest of students (>80%) did not. 90% of health students considered smoking among health professionals to be less socially acceptable, while less than 75% of non- health students hold this view. Only medical students (77%) believe that physicians are role models for their patients versus the rest of students (51% ST or 40% SC-BM), and they think that they will be perceived as behaving less professionally if they smoke. Medical students are more aware of anti-tobacco programmes and they are more willing to take part in them.

In conclusion, smoking prevalence among university students of this study was lower than the general population average. However, while medical students were fully aware of their role as future professionals in assisting with smoke cessation, they presented a greater prevalence for smoking.

ORAL COMUNICATIONS **SESSION 7**

COCAINE SELF-ADMINISTRATION ENHANCES HIPPOCAMPAL SYNAPSES SIZE IN LEWIS RATS

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Cocaine addiction is a chronic relapsing disorder associated with persistent changes in brain circuits. Perdurable changes in behavior such as learning are thought to depend on the reorganization of synaptic connections and it has been suggested that addiction could be a sort of non-adaptive learning. It has been reported different alterations in mesocorticolimbic circuits after cocaine treatment but the effects in the hippocampus are not well understood. Hence, we evaluated cocaine-induced changes in the neuropil of the stratum radiatum of the hippocampal CA1 field in Lewis (LEW) rats, an inbred rat strain that has been shown to be prone to reinforcing effects of abused drugs. For this purpose, Focused Ion Beam milling/Scanning Electron Microscopy (FIB/SEM) was used to reveal and quantify possible alterations in synaptic organization. FIB/SEM technology has the great advantage of permitting the automatic serial section of large tissue volumes. In addition, it enables the three-dimensional analysis of different elements in the sample. The synaptic density, morphometric characteristics and spatial distribution of the synapses were examined with ESPINA, a specific software tool. Preliminary results show changes in the size of the synaptic contacts after cocaine self- administration. The size of the synaptic contacts is equivalent to the synaptic apposition surface, which includes the presynaptic active zone and the postsynaptic density. We observed that the synaptic apposition surfaces were larger after cocaine self- administration. This is important because the size of the presynaptic active zone and the postsynaptic density correlates with the probability of synaptic release and the number of postsynaptic receptors. Thus, changes in synapses morphology are directly correlated to changes in synaptic function. Our preliminary data are contributing to the elucidation of the alterations that affect synapses that are crucial for better understanding the pathogenic mechanisms underlying cocaine addiction.

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ORAL COMUNICATIONS **SESSION 7**

MODULATION OF THE MTOR PATHWAY AFTER MORPHINE SELF-ADMINISTRATION AND SUBSEQUENT EXTINCTION TRAINING IN MALE LEWIS RATS

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Addiction is a chronic disorder with an elevated risk of relapse even after long periods of abstinence. Some of the neural mechanisms mediating addictions require protein synthesis, and this could be relevant for the development of more effective treatments. The mTOR signaling pathway is one of the regulators of protein synthesis that has been recently linked to drug addiction development. In our study, we assessed the effects of morphine self-administration and subsequent extinction in the gene expression of several mediators of this pathway and the levels of some of the phosphorylated proteins implicated. For this purpose, we analyzed three brain areas related to reward learning and extinction, the amygdala, the nucleus accumbens and the prefrontal cortex. We found an increase in the expression of RAPTOR and EIF4EBP2 in the amygdala in the rats which underwent morphine self-administration that was still evident after the extinction training. The expression of INSR in the amygdala of the control groups decreased over time while the opposite effect was seen in the rats that self-administered morphine. We found also strong correlations between some of the biochemical variables measured and the behavioral data suggesting an important role of the genes and phosphor-proteins involved in protein synthesis regulation related to memory formation and reconsolidation mainly in the amygdala.

Investigación financiada por el Ministerio de Ciencia e Innovación (Proyecto nº: PSI2016-80541-P); Ministerio de Sanidad, Servicios Sociales e Igualdad (Red de Trastornos Adictivos-Proyecto nº: RTA-RD16/020/0022 del Instituto de Salud Carlos III- y Plan Nacional sobre Drogas, Proyecto nº: 2016I073); Dirección General de Investigación de la Comunidad de Madrid (Proyecto nº: S-2011/BMD-2308; Programa de Actividades I+D+I CANNAB-CM); UNED (Plan de Promoción de la Investigación); y Unión Europea (Proyecto nº: JUST/2013/DPIP/AG/4823-EU MADNESS).

PRENATAL CHLORPYRIFOS AND VALPROIC ACID IN RELATION TO DEVELOPMENT OF ASD

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Organophosphorus pesticides (OPs) belong to a group of synthetic chemical compounds which has been used in agricultural industry, farms, public gardens, buildings and households. The main neurotoxic effect of these pesticides on the brain is the inhibition of acetylcholinesterase (AChE) blocking the degradation of acetylcholine (ACh). Chlorpyrifos (CPF) is one of the most widely known OPs and, at the same time, one of the most used. There are evidences that in utero exposure to sub-clinical doses of CPF is linked to a higher risk of delay in mental and motor development, and disorders such as Attention Deficit Hyperactivity Disorder (ADHD); but also with alterations in impulsivity, attention, anxiety and social and emotional responses of the pups. On the other hand, is highly known that exposition to Valproic Acid (VPA) during pregnancy induces ASD (Autism Spectrum Disorders). ASD are characterized by deficits in verbal and non-verbal communication, reduced social interactions, and restricted and stereotyped patterns of behaviours. Simultaneously, it is known that VPA model is also related to epileptic seizures due to an excitatory/inhibitory imbalance and disorders as ADHD. Thus, all together, we found that there are some significant similarities between these two models such as: excitatory/inhibitory imbalance, learning and cognitive problems, ADHD incidence, alterations in social and emotional responses, mental and motor retardation, etc.; that are important to considering with the aim of find some possible common bases between CPF and VPA.

In this context, we investigated the effects of a subtoxic dose of 1mg/kg of CPF and a dose of 400mg/kg of VPA in pregnant rats on their gestational day 12.5 (12.5GD), which is one of the most vulnerable time point to induce the altered social interactive behaviours as well as brain changings related to behavioural phenotypes of both, such as: ultrasounds vocalizations (USVs), three chambered social approach task, locomotor activity in an open field, and elevated plus maze (EPM).

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ORAL COMUNICATIONS **ESSION 7**

THE LIMBIC BRAIN UNDER STRESS: A ROLE FOR THE LPA1 RECEPTOR

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Adverse events can impact brain structure and function and are considered primary sources of risk for depression, anxiety, and other psychiatric disorders. In this sense, the neurobiological circuitry in charge of dealing with stressors has been widely studied in animal models. Our group has demonstrated a role for lysophosphatidic acid (LPA) through the LPA1-receptor in controlling anxious and depressive states, owing to aggravation of the detrimental consequences of stress in the brain. Indeed, our group has recently proposed the variant maLPA1-null mice, i.e. mice lacking the LPA1 receptor, as an endophenotype for anxious depression. In addition, we have previously reported hyperactivation of key stress-related brain areas after stress, such as basolateral amygdala.

Here, we seek to further examine the engagement of the LPA1 receptor in the regulation of the limbic circuit following an acute stressor, tail suspension test, in wild-type and knockout animals. To that end, c-Fos expression was evaluated as a measure of functional activity in both basal and stress conditions, followed by interregional correlation matrices to establish the brain map of functional activation. Additionally, we observed whether one single dose of the antidepressant treatment with desipramine is able to normalize the functional brain map.

Results revealed that the absence of the LPA1 receptor induce an anomalous pattern of brain functional activity after TST, which was reverted by desipramine administration.

These results provide further insight to the involvement of the LPA1 receptor in stress regulation and shed light on divergent brain pathways under normal and vulnerability conditions that can be implicated in depressive symptoms. Finally, how this pattern might be reverted by antidepressant treatment can be useful for developing new pharmaceutical targets regarding the LPA1 receptor.

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ORAL COMUNICATIONS **SESSION 7**

EFFECTS OF TDCS ON VISUAL PERFORMANCE AND PARVALBUMIN LABELLING IN VISUAL CORTEX OF AMBLYOPIC LONG-EVANS

Sergio Castaño-Castaño[1], G. Martinez-Navarrete[2,3], M. Morales-Navas[1], E. Fernadez-Jover[2,3], F. Sanchez-Santed[1], F. Nieto-Escamez[1]

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In this research we try to evaluate the visual functional improvement in amblyopic rats by using tDCS as a non-invasive treatment. A second aim is to get insight into the possible neurobiological mechanism involved. We have been able previously to verify how the treatment with tDCS significantly improves the monocular vision of the amblyopic eye evaluated through various experimental tests: visual acuity by optomometer reflex evaluation (Castaño and cols., 2017) and binocularity by the Cliff test.

The slow descent angle task (SLAG) is based on an innate response, where no memory- learning component is required and therefore presents a high validity for measuring sensory function. Our results show that amblyopic animals are impaired when amblyopic eye is tested but not when this task is performed binocularly. We do not know any previous work that has used the SLAG task to measure monocular vision in rodents. The significant differences obtained during the monocular evaluation would indicate that this task is a useful tool, besides being simple and economical, to detect amblyopia in rodent models, particularly the Long Evans rat. Treatment with tDCS significantly improved monocular performance. The most plausible hypothesis is that this result is due to the improvement in the visual acuity of amblyopic eye as it has been demonstrated in other experiments carried out in our laboratory.

We examined the changes in parvalbumin immunoreactivity in three areas of the visual cortex (V1M, V1B and V2L). No changes were observed in amblyopic animals but a significant increase in the number of parvalbumin-positive cells was found in the rats treated with tDCS. This effect occurs in both control and amblyopic animals. Unexpectedly, this increase is not limited to the stimulated hemisphere, but there is a significant increase in the marking of the three areas in the two cerebral hemispheres, both in control and amblyopic animals. The results of tDCS on the labeling of parvalbumin positive neurons are also somewhat unexpected and contrast with data in the literature. This suggests, given that GABA has a key role in controlling the duration of plasticity of neural circuits, so we would be increasing GABA levels. Such mechanisms could be due to depolarization below the threshold leading to a greater release of GABA.

ORAL COMUNICATIONS SESSIONS 8&9

Thursday, July 20th, 2017

Chair: Cosme Salas. University of Sevilla

ORAL COMUNICATIONS **SESSIONS 8&9**

ROLE OF MEDIAL PREFRONTAL CORTEX AND CENTRAL AMYGDALA IN THE ATTENUATION OF TASTE NEOPHOBIA.

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The attenuation of taste neophobia (AN) in rats is a model to investigate safe taste memory formation. It consists in the reduction of the neophobic response after repeated exposures to a novel taste without negative consequences. The amygdaloid complex is connected with the entire medial prefrontal cortex (mPFC). Lesion and c-Fos studies have clearly established a role of mPFC and amygdala during aversive taste memory acquisition, retrieval and extinction. Some c-Fos studies have assessed the activity of medial and basolateral amygdala during the expression of taste neophobia. However the involvement of these areas in taste neophobia and AN is still scarce.

The aim of the present study was to apply c-Fos immunohistochemistry (FLI) to assess changes in the mPFC (PrL - IL) and amygdala activity at various stages of taste neophobia and its attenuation. Given the fact that previous reports indicated that aging modifies the pattern of neural activity during taste memory, we also included aged rats. The effect of neurotoxic NMDA lesions of each area in AN were explored in adult rats.

In the first experiment, we used 21 adult male Wistar rats (n=7 per group) and 24 old rats aged 24 months (n=8 per group) which were exposed to a solution of cider vinegar (3%) and sacrificed after drinking during the first (Novel), second (Familiar 1) and sixth (Familiar 2) day. Then, we applied FLI as a marker of neural activity to assess the potential relationship between mPFC and amygdala activity at various stages of taste neophobia and its attenuation. Regardless of age the results showed greater number of c-Fos -positive cells in the Familiar 1 compared to the Novel group, both in PRL and IL. The adult Familiar 2 group exhibited greater number of c-Fos -positive cells compared to the Familiar 1 in the central nuclei of amygdala. This increased activity did not appear in aged rats.

In the second Experiment 48 adult male Wistar rats were subdivided in 4 groups: Group 1 (n=10) with bilateral mPFC lesion, Group 2 (n=11) with bilateral amygdala lesion, Group 3 (n=8) receiving contralateral unilateral mPFC and amygdala lesions and a Sham Group 4 (n=11). The side of the contralateral lesions was counterbalanced. All the subjects performed the behavioral procedure described in the first experiment. Lesions of the mPFC did not prevent the attenuation of taste neophobia, while amygdala lesions disrupted the neophobic response.

These findings support the involvement of the mPFC in the formation of taste memory at an early stage of AN although its integrity does not seem to be required. It also confirm previous results indicating that the amygdala integrity is required for the neophobic response. Further research is needed on the neural circuit involved in AN.

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THE HIPPOCAMPAL PALLIUM OF TELEOST FISH: A SPECIALIZED AREA FOR SPATIAL AND TEMPORAL DIMENSIONS OF MEMORY

Francisco M. Ocaña, A. Gómez, E. Durán, C. Salas, F. Rodríguez

Laboratorio de Psicobiología. Universidad de Sevilla.

The hippocampus is essential for some particular forms of relational memory, such as map-like spatial memories, which allow allocentric or world-centered navigation and the flexible expression of the spatial knowledge. Developmental, neuroanatomical and neurophysiological evidence indicate that the lateral part of the area dorsalis telencephali (Dl) of teleost fish is homologous to the hippocampus of mammals. Within Dl, the ventral subdivision (Dlv) is the most likely candidate as the specific homologue of the mammalian medial pallium. In this context, several experiments carried out in our laboratory have shown that Dlv lesions in goldfish produce severe performance impairments in a variety of spatial learning tasks requiring allocentric, relational spatial memory strategies, but not when the task can be solved by means of non-relational, egocentric strategies or non-spatial discriminations. Morphofunctional studies also revealed the involvement of the goldfish hippocampal pallium in spatial navigation since training goldfish in a spatial task produced selective memory-related increases in metabolic activity and in protein synthesis of Dlv neurons. Moreover, we have recently described two different functional regions within the goldfish hippocampal pallium that, like the DG and CA3 of mammals, operate in two modes; pattern separation at early acquisition and pattern completion or recall operation mode when the animals have mastered the task.
The role of the mammalian hippocampus is not limited to the spatial domain as it is also involved in episodic memories based on a temporal frame-work. Strikingly, the teleost Dlv is involved not only in the spatial dimension of the relational memories, but it is also involved in binding the temporally separate events that compose relational or episodic-like memories. In fact, using classical conditioning we have demonstrated that Dlv lesions severely impaired the acquisition of the conditioned response when a stimulus-free time gap was elapsed between the CS and the US (trace conditioning), but not when both stimuli overlapped in time (delay conditioning).

The essential involvement of the teleost hippocampal homologue in a relational, episodic-like memory system that preserve the spatial and the temporal dimensions of individual past events suggests that the emergence of the hippocampal functions likely long predated the mammalian radiation, having been retained through the separate evolution of the different vertebrate lineages.

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ELECTROENCEPHALOGRAPHIC CORRELATES OF COGNITIVE LOAD. A STUDY WITH PORTABLE ELECTROENCEPHALOGRAPHIC DEVICE

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Psicología Básica, Psicobiología y Metodología, University of Salamanca

In the study of cognitive demand, a large majority of published papers base their estimations on indirect measurements, such as the application of self-report questionnaires. Now days, an increasing number of studies show the relationship between the oscillations of brain electrical activity and the various forms of cognitive load.

In order to verify the relationships between electroencephalographic activity (EEG) and cognitive demand at different levels, we have put a number of subjects under experimental conditions with different levels of cognitive load, in form of load of the working memory and attentional load, under a double task paradigm.

For the collection of the EEG information, it has been used the electroencephalography system "Emotiv EPOCH®", which has 14 channels (AF3, AF4, F3, F4, F7, F8, FC5, FC6, T7, T8, P7, P8, O1, O2), and the software "TestBench" (Emotiv Systems, 2012, San Fransisco, CA). EEG data were analyzed using the EEGLAB v7.1.2.10b software.

We have found, in our preliminary results, a decrease in the amplitude of the activation Alpha band (8-12Hz) when subjects were under the working memory load task (N-Back), when this load was addressed with an attentional task, the recognition of geometric figures.

This trend is in agreement with the results obtained from the behavioral analysis, with a decrease in the accuracy of the execution and an increase in the reaction times, although it does not become significant, when in addition to the working memory load, it was added the attentional load.

When it comes to the analysis of the Alpha peak frequency (iAPF) a tendency to decrease the amplitude between the simple execution condition and the double execution was observed. There is a great individual variability that should be considered for further investigations.

RELATIONSHIP BETWEEN ANXIETY-LIKE BEHAVIOR AND PAIN SENSITIVITY IN MICE REARED IN DIFFERENT ENRICHED ENVIRONMENTS

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Introduction: Enriched environments and voluntary physical activity seem to be adequate animal models in order to evaluate the components of an active lifestyle in humans. The complex physical and social stimulation provided in these environments may induce emotional changes, although few studies have examined the influence of complex environments on animal's sensitivity to noxious stimuli.

Objective: The main aim of the present study was to evaluate whether the exposure to different housing conditions including voluntary physical activity could influence the level of anxiey-like behavior in the elevated zero-maze and pain sensitivity, and the possible relationship between these behavioral changes.

Methods: 64 NMRI male mice arrived at our laboratory at post natal day (PND) 21 and were randomly assigned to four different housing conditions (PND28): 1) Marlau cage (MC); 2) Physical exercise+social interaction (PEsoc); 3) Physical exercise (PEonly); and 4) Standard environment (SE). After 7 weeks, animals were evaluated in the Hot Plate (latency to the first reaction) (PND81), and in the Elevated Zero Maze (EZM) (PND77) (Frequency of entry into open sections, FO; Frequency of entry into close sections, FC; Percentage of time spent in open sections, %TO, Percentage of time spent in close sections, %TC).

Results: Data obtained in the Hot-Plate showed that mice allocated to the PEsoc environment showed diminished Latency to the first reaction compared to SE ($p=0.009$) and to PEonly mice ($p=0.064$). In animals allocated into Marlau cages, there was obtained a positive correlation between Latency to the first reaction in the Hot-Plate and the variables of frequency of entries into open ($r=.522$, $p=0.03$) and closed arms ($r=.538$, $p=0.3$) of the EZM. In mice allocated to the PEonly condition, Data indicated a trend toward a positive relationship between the latency displayed in the Hot-Plate and the percentage of time spent into open areas of EZM ($r=.490$, $p=0.054$) and a negative relationship between this latency and percentage of time spent into closed sections ($r=-.483$, $p=0.058$).

Conclusions: In line with previous research, our results suggest that the environmental conditions could modulate nocioceptive threshold to a thermal stimulus. Furthermore, this pain sensitivity could modulate anxiety-like response displayed by mice. In the present study, those animals that showed a more anxiogenic-like profile (i.e. perform more entries into close arms and spend more time in them) also tend to display higher sensitivity to the thermal nocioceptive

stimulus and vice versa. In

Marlau group, the positive relations observed between pain sensitivity and frequency of entrances into the areas of the maze could be related to the increase of locomotor activity observed in this group. These results could be of interest when evaluating behavioral effects of enriched environments in tests which require the administration of nociceptive stimuli such as the inhibitory avoidance test.

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ORAL COMUNICATIONS **SESSIONS 8&9**

POSTNATAL DEVELOPMENT OF OXYGEN CONSUMPTION AND ELECTROPHYSIOLOGICAL PARAMETERS (ECG, EMG, EEG) DURING SLEEP-WAKE CYCLE IN EAR2 MICE

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Thanks to numerous researches, we know that some neurological disorders affecting considerably the population, such as ADHD, epilepsy or Parkinson's disease concern a nucleus of the brainstem: The Locus Coeruleus. This fact motivates the study of the noradrenergic system, its normal functions and how different lesions are involved in diverse diseases.

During postnatal development, noradrenergic system has been proposed as possible regulators of different processes involved in cortical maturation. Ear2 mutant mice are born and survive with the absence of more than 70 % Locus Coeruleus' neurons. These mice have been demonstrated to present a functional impairment of the forebrain clock during adulthood, as well as other function like nociception, controlled by the noradrenergic projection.

Considering that this area is involved in the regulation of the sleep-wake cycle also in young animals, the aim of this work is to study how the respiratory and sleep parameters are affected by neuronal loss of the above mentioned region during early postnatal development. For such purpose, oxygen consumption, the electrical activities at the neck muscles, heart and brain of Ear2 mutant mice have been registered during the two first postnatal weeks.

Body weight and oxygen consumption (tested by an oxygen sensor during 5 minutes) were measured daily. On the day of electrophysiological recordings, at P3, P7, P10 or P14 mice were removed from the litter. Under anaesthesia (hypothermia) the pup was implanted with two EMG hook recording electrodes aimed to the nuchal muscle, with two ECG recording electrodes in the chest and two EEG electrodes (only at P14). The electrodes were fixed to the skin with the help of Cyanoacrylate adhesive. After recovery for at least 1 h in a humidified incubator maintained at thermoneutrality (35°C), electrodes (together with ground ones) were connected to differential amplifiers (Biopac MP35) and signals were recorded for 1 hour. EMG, ECG and EEG signals were digitized at 1 kHz with BSL 3.7 software. The EMG and EEG signals for each subject helped us to distinguish between REM sleep, no- REM sleep and wakefulness.

Our results demonstrate that Locus Coeruleus' neuronal loss affects the sleep-wake cycle maturation. As a result, at P14 we observe a reduction of time spent in NoREM sleep and an increase in time spent in REM sleep, together with an increase in Heart Rate and in oxygen consumption. We conclude that noradrenergic system controls these activities during the second postnatal week.

LOW-LEVEL LIGHT THERAPY AND ITS EFFECT IN THE OXIDATIVE METABOLISM ON THE BRAIN LIMBIC SYSTEM: DIFFERENCES BETWEEN TYPES OF ADMINISTRATION

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Low-level Light Therapy (LLLT) has been successfully applied in clinical medicine to the treatment of a wide variety of pathologies. This is due to the activating effect it produces on our body cells. In the past years its use has spread in the field of Neuroscience, so it could be applied to reduce symptoms of neuropsychological alterations and reinforce learning. LLLT consists of applying low intensity laser light to the brain, generating a mechanism of action that allows the absorption of light through the chromophores located in the mitochondrial enzyme cytochrome c-oxidasa, the main receiver that catalyzes the consumption of oxygen during the cellular respiration. Studies report the effectiveness of the LLLT in the reduction of cognitive deficits caused by stroke, improvement of spatial memory and facilitation of fear extinction. Since the brain's limbic system plays a key role in the human behaviour (emotional responses, addiction and motivation, memory and social cognition), the aim of this study is to compare the effect of two types of LLLT administration methods on the oxidative metabolism of the rat's brain limbic system.

For this purpose, a histochemical stain of the cytochrome c-oxidasa (COX) and its later densitometric analysis was carried out, comparing the activity of the COX during the two modalities of administration - distributed (one three minutes long pulse once a day during seven days) and massive (four three minutes longs pulses throughout thirty hours) in order to establish which would be optimal.

Results show that many of the brain regions under study (such as Frontal Cortex, Striatum, Thalamus, Lateral Septum, Granular, Dysgranular, Entorhinal and Perirhinal Cortex, Dorsal Hippocampus and Central Amygdala) showed the benefits of LLLT applied in a distributed administration form ($p \leq 0.05$) and some regions, such as Ventral Striatum and Lateral Septum also showed an increased activity after the massive administration ($p \leq 0.05$). Overall, we can come to the conclusion that the appliance of the LLLT on the rat brain provokes an increase in metabolic activity in regions of the limbic system.

In addition, the optimal administration of this method would be a distributed one, as we achieved greater benefits on a metabolic level than by applying a massive one. Therefore, these results might be considered beneficial in facilitating an appropriate
use of this method for the treatment, prevention and rehabilitation of neuropsychological disorders or disorders that involve neurodegeneration.

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ORAL COMUNICATIONS **SESSIONS 8&9**

GUSTATORY THALAMUS ROLE IN THE RAT TASTE NEOPHOBIC RESPONSE

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According to previous research, the gustatory thalamus has been related with taste- guided behaviors, such as taste detection and taste recognition memory. To examine this issue, Fos-like immunohistochemistry (FLI) was applied in the parvocellular part of the ventral posteromedial nucleus of the thalamus (VPMpc) as an index of neural activity during the attenuation of taste neophobia. The number of Fos-positive cells was examined in adult male Wistar rats during the first exposure (group Novel), the second exposure (group Familiar 1) and sixth exposures (group Familiar 2) to a saccharin solution (0.5%). A control group receiving water (group Control) was added. The results indicated a higher number of Fos-positive cells in VPMpc during the first exposure to the novel saccharin solution, this number decreased as the familiarity increased. No differences in the number of Fos-like positive cells between Familiar 2 group and Control group were found. These differences didn't appear on other thalamus nuclei. Thereby, these results suggest that the VPMpc activity during exposure to a novel taste might play a role in the neophobic response. The suggested role of the VPMpc in recognizing novel tastes allows us to study a neural circuit involved in taste recognition memory which is crucial for survival.

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POSTER SESSIONS

POSTER SESSION 1

Thursday, July 20th, 2017

SESSION 1 **POSTER 0**

DESCRIPTIVE AND MOLECULAR ANALYSIS OF A GENDER DYSPHORIC POPULATION

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Gender Dysphoria (GD) is commonly thought to arise from discrepant cerebral and gonadal sexual differentiation. Since testosterone and estradiol are known to be involved in brain masculinization, we hypothesized the interaction between the estrogen receptors ERα and ERβ, AR, CYP19A1, and CYP17A1 in GD. The aim of the investigation was the molecular analysis of seven polymorphisms [(TA)n-ERα (rs3138774), PvuII-ERα (rs2234693), XbaI-ERα (rs9340799), (CA)n-ERβ, (CAG)n-AR, (TTTA)n-CYP19A1, and MspA1-CYP17A1 (rs743572)] in a population of 426 FtM, 588 MtF, 599 control XX women and 728 control XY men. Genotype and haplotype frequencies were analyzed by SPSS® 23.0, with a *p* value below 0.05 being significant. The mean number of tandem repeats was analyzed by the Mann–Whitney U-test. The allele and genotype frequencies were analyzed by chi-squared test. The association and linkage disequilibrium analyses were performed using the free online software SNPStats.

Following Blanchard typology, the MtF group consisted of homosexual (erotic attraction to individuals with the same biological sex), non homosexual (erotic attraction to subjects with the other biological sex), or bisexual individuals, early or non-early onset. The analysis of the means was carried out with respect to biological sex (FtM *vs*. control XX and MtF *vs*. control XY), sexual orientation (homosexual, non homosexual and bisexual) and time of onset (early *vs.* non-early). The analysis showed significant differences for the (CA)n-ERβ polymorphism in the FtM group *vs*. the XX control population. Statistical differences were also found for allele and genotype frequencies for polymorphisms XbaI-ERα and ERβ in the FtM *vs*. control XX groups.

Interaction analysis between polymorphisms showed an association between ERα and β and GD in both biological sexes, but with some differences. *In biological females* we found a direct association between the number of CA repeats in ERβ and GD such that the greater the number of CA repeats, the greater the probability of GD in the FtM population. We also found that ERα is involved in the genetic basis of GD in the FtM group. The XbaI-ERα allele, genotype and also haplotype frequencies differed significantly between the FtM and XX control groups. The single nucleotide change A→G in the first intron of the *ESR1* gene seems to have a significant effect on the genetic basis of GD: the genotype A/A implied a great susceptibility to GD in the FtM group, while the genotype A/G conferred a protective effect.

In biological males the cross interaction between the polymorphisms ERβ, CYP19A1 and XbaI-ERα showed statistical significance only when adjusted by the AR polymorphism. In the case of XY individuals, carrying a short (S) allele from the ERβ polymorphism together with a long (L) allele for CYP19A1, a G allele for XbaI-ERα and an S allele for AR, imply a very high risk of GD.

SESSION 1 **POSTER 1**

EFFECTS OF D-CYCLOSERINE ADMINISTRATION IN THE PREFRONTAL CORTEX ON WORKING MEMORY IN AGED RATS

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Attention, cognitive flexibility and working memory are among those prefrontal-dependent processes that are the first to decrease during aging in humans. Similarly, aged nonhuman primates and rats also show deficits in tasks that require working memory. It has been demonstrated that when a delay is incorporated into the design of the task, aged animals are particularly disadvantaged. As N-methyl-D-aspartate glutamate receptors (NMDAR) have been shown to play an important role on such cognitive processes and are critically decreased in in natural aging, they are considered a main target for memory enhancement. It is well established that D-cycloserine (DCS), a partial agonist of the NMDAR glycine recognition site, may enhance learning and memory processes in diverse behavioral paradigms, both in young and old animals.

The present research explores whether DCS injected into the prelimbic cortex (PrL) would reverse working memory deficits observed in old rats, usign a *Delayed Matching To Position (*DMTP) task and its reversal (*Delayed Non-matching To Position, DNMTP*). For this purpose, we assessed the effects of pre-learning DCS infusions (10 µg/hemisphere) in 24-month old Wistar rats. Our preliminary results suggest that bilateral infusions of DCS in the PrL cortex may improve task performance in aged animals when long delays are applied. These results support DCS as a cognitive enhancer and corroborate that promoting NMDAR function may improve certain cognitive processes in aged animals. Present data may help in the search for strategies aimed at improving the alterations associated with the non-pathological process of aging.

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SESSION 1 **POSTER 2**

LONG-TERM TREATMENT WITH POLYPHENON 60 OR CATECHIN IMPROVES COGNITION IN AGED RATS AND REVERT THE AGE-INDUCED REDUCTION OF SIRT1 PROTEIN IN RAT HIPPOCAMPUS

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The green tea extract Polyphenon 60 is a mixture of polyphenol compounds enriched in different types of catechins. Catechins are brain-accessible flavanoids with large beneficial effects on health described, as protective effects on age-related memory decline and neurodegeration. In this context, chromatin remodeling has been postulated to contribute to aging-related brain dysfunction through histone acetylation imbalance. The aim of the present study was to evaluate the effects of catechin compounds on hippocampal levels of enzymes involved in histone acetylation modification and correlate it with brain neurochemical changes and cognitive effects.
Old rats (18 months) were treated with polyphenon 60 or with catechin (20 mg/kg) for 28 days, followed by 8 days of 40 mg/kg (i.p. once daily). Old control rats were treated with vehicle (corn oil, 1ml/kg, i.p. once daily). All animals also received a single dose of NSD1015 to determine brain tryptophan and tyrosine hydroxylase activities. Cognitive parameters were analyzed during this long-term treatment through different memory tests. After sacrifice the brain neurotransmitters serotonin, noradrenaline, and dopamine (and their metabolites and precursors) were quantified by electrochemical HPLC. Additionally, hippocampal levels of the deacetylase enzyme SIRT1 and the acetylase enzyme RbAp48 (also known as RBBP4) were analyzed by western-blot.
Both treatments similarly improved spatial working and episodic memory. Trial time and total errors on 8-arm radial maze test were significantly reduced at the end of both long-term treatment; and animals also increases four times the exploration of novel objects respect to familiar ones. Short-term memory was also improved assessed on Barnes test. Moreover, both treatment similarly reversed the age-induced deficits in monoaminergic neurotransmitters; enhancing the levels of hippocampal serotonin and noradrenaline and striatal serotonin and dopamine, probably due to the increased activity of tryptophan and tyrosine hydroxylases in both brain regions. In hippocampus, both treatments similarly reversed the age-induced reduction of SIRT1 protein levels; but no significant effects were observed on the age-induced reduction of RBBP4 protein levels by any of the treatments. In conclusion, long-term exposure to catechin increases SIRT1 levels in the hippocampus, improve brain monoaminergic neurotransmitter systems, and enhance cognitive functions in old rats, suggesting a beneficial effect of catechin against cerebral aging.

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SESSION 1 **POSTER 3**

EARLY POSTNATAL EXPOSURE TO NO-OBSERVED ADVERSE EFFECT LEVEL DOSES OF CHLORPYRIFOS IN RATS: CHOLINERGIC AND GABAERGIC EFFECTS AND ITS BEHAVIORAL IMPLICATIONS

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Organophosphorus compounds (OPs) are the set of xenobiotic and degradable substances containing phosphorus-carbon bonds, constituting a large group of synthesis compounds with a moderate to high general toxicity. After banning its residential use and as an antiparasitic for pets, its current most widespread use is that of agricultural pesticide. Of the set of OPs, the most common of these is called Chlorpyrifos (CPF), whose mechanism of toxicological action is based on the inhibition of cholinesterase enzymes (ECs) irreversibly, leading to over stimulation of cholinergic and muscarinic receptors . Exposure to this compound at different stages of development has been linked to problems in neurodevelopment and in the behavior of organisms. This type of problem is so extensive that it suggests mechanisms of action in neurochemical systems other than cholinergic, such as the GABAergic system. There are currently studies that relate exposure levels lower than those required to show these adverse effects (NOAEL) with these problems, which would reaffirm the implication of alternative mechanisms. The purpose of the present study is to delve into the behavioral impact that early exposure to NOAELs doses of CPF has on neurobiological substrates at the base of these studies to try to support the hypothesis of the implication of these alternative mechanisms of action. For this purpose, an animal model was used with adult Wistar-Albino rats postnally exposed to subchronic doses of CPF (1mg / kg), postnatal day (PND) 10 to PND 15 daily, using the 5-Choice Serial Reaction Time Task (5-CSRTT) as a behavioral measurement tool to evaluate the impact on inhibitory, attentional, learning, and compulsive / impulsive behaviors. Finally, administrations of alprazolam, a direct agonist of the benzodiazepine receptors, and of competitive muscarinic receptor agonist scopolamine were performed as a method to evaluate a possible interaction between CPF, the GABAergic system and the cholinergic system, following a latin square design; observing in turn if there are sexually dimorphic effects in relation to exposure to substances.

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SESSION 1 **POSTER 4**

CALORIC RESTRICTION ATTENUATES SHORT AND LONG TERM MEMORY DECLINE IN AGED RATS

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Caloric restriction (CR), defined as a reduction in the caloric intake without causing malnutrition, has been shown to be a good intervention to slow down aging and increase lifespan and health span in many species. CR also retards the progression of different age-related diseases, such as Alzheimer's disease. However, the potential benefits of CR on cognitive processes during aging has been scarcely studied. The aim of the present experiment was to analyze the role of CR in the short and long term memory decline that occurs during aging. For this purpose, the performance of old Wistar rats (24-27 months) fed under conditions of CR, with approximately 30% reduction of total food intake since four months old, was compared to old (24-27 months) and young rats (3-4 months) fed *ad libitum*. Two hippocampal-dependent tasks were assessed: Object Recognition (OR) in the Y-Maze, as a short-term memory test (30 m), and the Morris Water Maze (MWM), as a long-term memory test (48 h). In addition, in order to control age-dependent alterations in emotional variables, rats were tested in the Elevated Plus Maze (EPM). Results showed that a lifelong hypocaloric diet improved both memory tasks since old animals' performance did not differ from that of young rats. These results cannot be attributed to alterations in emotionality or reductions motor activity as no differences between aging rats were found and in the EPM and in swim speed in the MWM. Therefore, CR seems to attenuate age-dependent short and long term memory-decline. These results support that dietary interventions such as CR may prevent or slow down the progression of age-related cognitive deterioration.

SESSION 1 **POSTER 5**

SELF-FACE RECOGNITION: AT ONE END OF THE FAMILIARITY CONTINUUM OR AN SPECIAL PROCESSING?

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Contrary to the common belief, face perception research has shown that we are very good at recognizing the people we know whereas we are very poor at identifying people we do not know. Familiarity is an important aspect of face recognition, and for this reason, numerous studies have focused on the 'familiarity effect', some of them using the own face as the most familiar stimulus. However, behavioural and fMRI studies have shown that self-recognition seems to be dissociable from general face recognition, being consistent with the involvement of bilateral networks. The aim of this study investigates the temporality of the self-face recognition to understand if it is part of the familiarity effect or it is a unique phenomenon. To test this, 25 healthy participants matching by age and sex performed a face recognition task while EEG activity was recorded. They were asked to identify their own face, a familiar or an unfamiliar face. An ERP analysis indicated that first significant differences emerged at 200 ms between the own face and other faces. By contrast, statistical differences between the tree conditions only emerged between 250 – 300 ms. At this latencies, the amplitude of the N250 component is modulated by familiarity (the more familiar, the greater amplitude). We conclude that self-face recognition, even though it shares certain aspect with general familiar face recognition, seems to differ from it in an early stage of the visual processing. These differences have important implications not just for futures studies that use the own face in their experimental paradigms as highly familiar stimuli, but also for the general understanding of face recognition.

SESSION 1 **POSTER 6**

GLUCOCORTICOID RECEPTOR EXPRESSION AFTER ENVIRONMENTAL ENRICHMENT IN THE DORSAL HIPPOCAMPUS: RELATIONS TO SPATIAL MEMORY, EXPLORATION AND ANXIETY-RELATED BEHAVIORS

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Environmental enrichment (EE) produces a remarkable degree of structural and functional plasticity in the hippocampus and possible mediators of these changes, such as glucocorticoid receptors (GRs), are of considerable interest. GRs are richly expressed in the hippocampus and they are involved in the adaptation to stressors and facilitate active coping in anxious situations. In this study, we assessed the effect of an EE protocol (24 h/day during 69 days) in adult Wistar rats on the activity in the elevated-zero maze (EZM), performance in the holeboard task (HB) and we also examined the changes in the GRs expression in the dorsal hippocampus (CA1, CA3 and DG). Our EE protocol reduced anxious behaviors in the EZM, so the animals spent more time and made more entries into the open sections. In the HB task, the enriched group showed more explorative behavior, a reduction of anxiety-related behaviors and a better cognitive performance compared to non-enriched animals. With regard to the GRs expression, the EE condition produced an increase in the number of immunopositive cells for GRs in the hippocampal subfields analysed. We also found a negative correlation between this expression and the *anxiety component* revealed by principal component analysis (PCA) in the HB task. These results suggest that the better performance of enriched animals could be mediated in part, by the increase of GRs in the dorsal hippocampus, which may alter the hipocampal neuronal function and accordingly, the anxiety levels, the spatial memory performance and the exploration levels in these animals.

SESSION 1 **POSTER 7**

NEUROBIOLOGY OF CONDITIONED FOOD PREFERENCES: RELEVANCE OF THE NUCLEUS OF THE SOLITARY TRACT, GELATINOUS PART

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The biological basis of food preferences has been studied using different behavioral procedures. The "concurrent flavor preference task" particularly examines the relevance of rapid processing of visceral sensory information. This procedure involves the presentation of two non-nutritive flavor stimuli for a short time period, during which consumption of one of the stimuli is associated with the concurrent intragastric administration of a rewarding nutritive stimulus, while intake of the other stimulus is paired with the intragastric injection of a non-caloric and innocuous product, e.g., physiological saline (PS). The vagus nerve appears to be critical in learning this task, since perivagal administration of neurotoxin capsaicin disrupts the learning of preferences induced by intragastric administration of pre-digested (rewarding) nutrients. The vagus nerve projects almost exclusively to the nucleus of the solitary tract (NST), a brain medullary gateway for visceral signals. The objective of this work was to investigate the relevance of the lateral portion of the dorsomedial region, the gelatinous subnucleus, in the learning of a concurrent flavor preference task. Results show that, unlike neurologically intact animals, which learn the task correctly, animals lesioned in the gelatinous part of NST manifest a disruption of discrimination learning. Thus, intakes of the flavored stimulus paired with the predigested liquid diet and of the flavored stimulus associated with physiological saline were virtually identical. However, SolG- and Sham-lesioned groups consumed similar total amount of both flavors which seems to rule out the possibility of the presence of undesirable side-effects in the lesioned animals. These findings suggest that SolG, as a relay of the vagus nerve, along with its anatomical projection, the external lateral parabrachial subnucleus (LPBe), may constitute an anatomical axis that is important in the induction of concurrent flavor preferences. It also appears to be relevant in other behavioral processes that require rapid processing of information from the upper gastrointestinal tract.

SESSION 1 **POSTER 8**

PHYSIOLOGICAL RESPONSES TO EMOTIONAL AND PAIN RELATED FIL M CLIPS IN BRUXISM

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Bruxism is defined as a diurnal or nocturnal parafunctional activity that includes uncons cious clenching, grinding or bracing of the teeth, or even a constant low-intensity mandibular muscle contraction. It affects up to 30% of the population.

It is well known that emotional states affect masticatory muscle function, to such an ext ent that stress is often considered one the most important risk factors. It is also demon strated that emotional and pain film clips can elucidate emotional responds to a normal observer. Particularly, film clips can trigger different patterns of face muscle activity for positive and negative valences. In addition, pain film clips also trigger face muscular re sponses in the observer.

Our main aim is to study if mandibular electromyography (EMG) activity and skin condu ctance (SC) responses to emotional and pain film clips differs between bruxers and co ntrols. Film clips were chosen to elicit positive and negative emotional states. In additio n, a pain related film was also included. All films were equated in activation, and they o nly differ in emotional valence. Films clips were presented to 15 subjects with bruxism and 15 controls, while masseter EMG activity and SC was recorded.

Analyses did not reach significant differences for positive, negative and neutral films eit her for EMG or for SC. However, a significant effect was observed for the pain related f ilm in EMG activity. Therefore, bruxers showed an increase of mandibular muscle activi ty when observing a pain related film.This finding may parallel real live situations in which emotional distress might boost muscular activity in bruxers.

SESSION 1 **POSTER 9**

ROLE OF THE CENTRAL PORTION OF MEDIAL PARABRACHIAL NUCLEUS (PBNMC) IN LITHIUM CHLORIDE (LICL)- INDUCED LONG-TERM TASTE AVERSION LEARNING (TAL) AND GUSTO-OLFACTORY COMPOUND CONDITIONED STIMULI: SENSORIAL VERSUS ASSOCIATIVE ROLE

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The TAL is the avoidance or the rejection of a taste or flavor previously associated with an aversive visceral experience. It depends on the gustatory-visceral integration that takes place in some brain nuclei. In particular, PBNm has been related both with sensorial (visceral and/or gustatory) and associative processes implied in TAL formation. These functions would be segregated in different portions of PBNm. For instance, the central-medial region (PBNmc) has been related mainly with gustatory processing. In turn, the most external portion (PBNme) was, according with previous data of our laboratory, apparently implicated in the processing of visceral information as well as in that of convergent gustatory-visceral information. While lesions located in PBNmc cause different deficits, depending on the extent of such lesion, all of these deficits seem to be related with failures in the discrimination of the qualities and intensities of the gustatory stimuli. These deficits can disrupt the acquisition process and/or entail a more rapid extinction, but it seems that they are not enough to completely disrupt that acquisition save in case that the conditioned stimuli (CS) used were eminently olfactory stimuli (as coconut or strawberry extracts), such as we observed in previous studies. Specifically, we found that animals with bilateral PBNmc lesions who were not able to acquire a delayed TAL to eminently olfactory CSs, were instead able to acquire a TAL to the same CSs when de delay between the CS and the unconditioned stimulus (US; LiCl) was removed. In addition, we observed that animals with such a lesion could also acquire a delayed TAL to strong gustatory stimuli (saccharine, 0,2% and quinine, 0,005%). We interpreted these results as an evidence that in the basis of the deficit observed after lesions of the medial-central portion of the PBN is a sensorial problem that could be overcome using strong gustatory CSs or removing the delay. The present experiment was designed with the aim of verify whether the deficit of acquisition of the aversion learning to strawberry and coconut extracts, found in previous studies, is one of a sensorial nature and may be overcomed using the Potentiation of odor by taste paradigm. Thus, the extracts (coconut and strawberry) were conditioned in compound together with strong gustatory stimuli (saccharine, 0,2% and quinine, 0,005%). The obtained results seem to show that the PBNmc acts only in taste processing, not so in the associative processes. They also suggest that although odor could be potentiated by taste in animals that present gustatory deficits, this potentiation does not occur in intact animals.

SESSION 1 **POSTER 10**

AGE AND GENDER DIFFERENCES IN THE REACHING SPACE IN A VIRTUAL REALITY-BASED MEMORY TASK

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The brain suffers several anatomical and physiological changes with the pass of the years. The hippocampal system is affected by aging and volume loss is associated with decline in different cognitive functions. It is well known that the hippocampus is required for spatial orientation since hippocampal alterations lead to spatial memory disturbances in humans and other species. In addition, different spatial memories are formed for the near space (reaching distance) and far space (walking distance) and partially different brain circuits have been involved in their retrieval. Most of the virtual reality-based spatial memory tasks assess spatial memory in the far space. In this work we developed a virtual reality-based task for measuring spatial memory in the near space. The aim of this study was assessing spatial memory in the near space in men and women during aging.

Seventy participants were included in this study, 35 men and 35 women, divided in three groups according to age: 50-59, 60-69 and 70-79 years old. Several tests were administrated in the following order: Mini Mental State Examination (MMSE), Personal Space Memory Test, Trail Making Test (TMT) and Corsi Block Tapping Test.

Results did not show differences between Age neither Group in the MMSE, TMT nor Corsi block tapping test. However the Personal Space Memory Test disclosed age differences in a low difficulty condition whereas gender differences emerged when task difficulty increased.

This works demonstrates that spatial memory declines with age, with 50-59 year-old group outperforming the other groups. In addition, it is very important to adjust the level of difficulty to reveal the dimorphic performance. This gender differences were already described in the far space.

This work was supported by MINECO (PSI2015-67442-P).

SESSION 1 **POSTER 11**

THE RELATIONSHIP BETWEEN HORMONE LEVELS AND OBSERVED BEHAVIOR MODERATED BY THE 2D:4D INDEX

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The aim of this study was to explore whether the relationship between hormone levels and behavior observed in 5-year-old children is moderated by the 2D:4D index. To this end, a sample group comprising 129 subjects (60 boys and 69 girls) from 3 public schools in Guipúzcoa and Cádiz was used. To evaluate behavior, subjects were filmed in free play contexts, and these recordings were later analysed using the Observer 4.1 behavior analysis software package. Behavioral patterns were grouped into three main categories (aggression, government and affiliation) and, following a factor analysis for each one, 3 factors of aggression, 2 factors of government and 3 factors of affiliation were obtained. Hormone levels (testosterone, DHEA and androstenedione) were measured through saliva samples collected at 9 am in the classroom and analysed in the laboratory using an enzyme-linked immunosorbent assay (ELISA). Prenatal testosterone levels were studied indirectly using the 2D:4D index. Thus, the length of the second and fourth fingers of each hand was measured using digital Vernier's calipers. The results revealed that subjects with high testosterone levels scored higher for government behaviour (command and organization) if their prenatal testosterone levels had also been high. Furthermore, subjects with high DHEA levels were observed to engage in more aggressive behaviour (annoying) if their prenatal testosterone levels had been high. The results demonstrate the importance and interest of analysing behavior from a biological perspective taking into account prenatal variables, which may have an impact on neurobiological mechanisms.

SESSION 1 **POSTER 12**

EARLY POSTNATAL GENISTEIN ADMINISTRATION HAS A SEXUALLY DIMORPHIC OBESOGENIC EFFECT AND ORGANIZATIONAL EFFECTS ON HYPOTHALAMIC NEUROENDOCRINE CIRCUITS IN CD1 MICE

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Genistein (GEN), a phytoestrogen contained in soy and other legumes [1], may interfere with the endocrine system in multiple ways [2], including permanent morphological alterations of estrogen sensitive circuits in adult brain [3]. Several estrogen-sensitive systems are influencing food intake and energy expenditure (NPY, POMC, Orexin). Among them there is the Kisspeptin [4], originally identified as regulator of puberty and fertility. This system is a target for neuroendocrine disruption, in fact, exposure to EDCs altered the kisspeptin system in a region-,sex-and compound-specific manner, and induced effects on the timing of pubertal onset, estrous cycles, and socio-sexual behaviours [5].

We analysed the effects on adult CD1 mice of both sexes (age 2-months) of an early postnatal treatment (from PND1 to PND8) with GEN (50 mg/kg body weight dissolved in sesame oil) or with the vehicle (control, CON). We have immunohistochemically evidenced the expression of the anorexigenic POMC neuronal system within different hypothalamic nuclei [Paraventricular Nucleus (PVN), Arcuate Nucleus (ARC) and Dorsomedial Nucleus (DM)], of the Orexin system in the lateral hypothalamic area (LHA), and of the Kisspeptin system in the rostral periventricular area of the third ventricle (RP3V), PVN and ARC. In addition, we also tested different physiological parameters related to metabolism and reproductive system (fecal steroid hormones, mammary gland, gonads, uterus, vaginal opening).

Early postnatal exposure to GEN, in a dose comparable to the exposure level in babies fed with soy-based formulas, induced sexually dimorphic effects. GEN treatment induced

a significant increased body weight in adult GEN female (P<0,001), but there was no difference on food intake and daily feed efficiency. Moreover, still in GEN female we measured a significant decrease of plasmatic leptin (P<0,001) and T3 (P<0,05) concentration. POMC immunoreactivity was significantly reduced in adult GEN females compared to CON females only in PVN (FA, P<0,001), while we have not observed any significant difference in DM. We observed an increase of the positive cell number in the inner part of ARC only in GEN-treated females (P<0,01). The orexin system in the LHA is sexually dimorphic in CON mice (having males more cells than females), and this dimorphism was totally reverted in GEN mice: the cell number increased in GEN female (P<0,05) and decreased in GEN male (P<0,041). Kisspeptin immunoreactivity was significantly reduced in adult GEN females compared to CON females, whereas no changes were observed in males. Moreover, we measured many reproductive parameters. GEN treated males showed only a minor decrease of testicles' weight, probably related to the significant decrease of testosterone's concentration that we measured in feces (P<0,001). In females, GEN treatment induced an advanced pubertal onset (premature vaginal opening) and altered the development of reproductive system (increased urogenital distance and increased uterus' weight). In addition, GEN females showed an altered estrous cycle: in fact, the concentration of progesterone increased in the plasma (P<0,007) and the mammary gland present more tertiary branches (P<0,05).

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SESSION 1 **POSTER 13**

PSYCHOIMMUNOLOGICAL DEPLETION IN FRAILTY STATUS IN OLDER ADULTS IS RELATED TO ALTERATIONS IN NEOPTERIN AND TRYPTOPHAN BREAKDOWN

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The average age of populations around the world is rapidly increasing and rising health cost. Frailty is defined as a wasting syndrome with increased vulnerability to stressors, which leads to decline of different physiological systems. The prevalence of frailty in community-dwelling Spanish populations is 8.6-16.3%, but it can reach 68.8% in institutionalized older people. Frailty arises from the interplay of genetic, biological (hormonal, metabolic and immune-inflammatory), psychological, social and environmental factors. As a result of immune activation, the enzymes indolamine 2,3-dioxygenase 1 (IDO-1) and guanosine triphosphate cyclohydrolase I (GCH) are expressed under induction of inflammatory factors. IDO-1 converts tryptophan into kynurenine. *In vivo*, kynurenine/tryptophan (Kyn/Trp) ratio reflects tryptophan breakdown, and estimates IDO-1 enzyme activity. GCH is involved in the production of neopterin, which concentration in body fluids is considered as a marker of immune activation. The association between increased neopterin concentrations and enhanced tryptophan breakdown has been well documented in older adults. The objective of this study was to assess the possible role of chronic low-grade immune stimulation on frailty status in the elderly. A cross-sectional study was carried out in a population of Spanish older adults, aged 65 years and above, classified as frail, pre-frail and non-frail. The multivariate analyses of the obtained data adjusted by age, sex and smoking habits, showed significant increases in neopterin levels and Kyn/Trp ratio, and significant decreases in tryptophan concentrations, in frail subjects as compared with the non-frail group. Significant associations were also observed between immune biomarkers, indicating that they change in parallel, thus pointing to interrelated causes. Results obtained are consistent with the idea that frailty status in the elderly is associated with an additional degree of immune stimulation.

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SESSION 1 **POSTER 14**

LPA1/3 RECEPTOR ANTAGONIST KI16425 AS A NOVEL TREATMENT FOR THE NEUROBEHAVIORAL EFFECTS OF ETHANOL

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Aims. The lysophosphatidic acid (LPA) is an ubiquitous lysophospholipid that acts through G-protein coupled receptors (LPA1-6), and it is involved in the modulation of emotional and motivational behaviors. Recent literature suggests a relevant role of the LPA signaling system in alcoholism, specially through the LPA1 receptor. This work aims to elucidate whether systemic LPA1/3 receptor blockade with ki16425 would modulate ethanol effects on the brain and behavior.
Methods. This study consisted of four experiments assessing the effect of intraperitoneal ki16425 administration (20 mg/kg) on ethanol-related behaviors. Male Wistar rats or mice (Swiss, C57BL/6J or hybrid C57BL/6J×129X1/SvJ background) were employed in various procedures: I) oral ethanol self-administration; II) loss of righting reflex; III) ethanol-induced conditioned place preference (CPP) and IV) ethanol-withdrawal behavioral symptoms (by assessing nest building, physical signs and spatial working memory). Immunohistochemistry was carried out in order to evaluate basal neuronal activity (c-Fos) in the medial prefrontal cortex (mPFC) and in the hippocampus, as well as adult hippocampal neurogenesis (AHN) using proliferating cell nuclear antigen (PCNA) and doublecortin (DCX) markers.
Results. Systemic Ki16425 administration reduced oral self-administration of ethanol in previously trained rats. Likewise, ki16425 pretreatment in mice attenuated the sedation induced by ethanol, blocked ethanol rewarding effect in a CPP paradigm and reduced behavioral symptoms induced by ethanol withdrawal. Immunohistochemistry revealed a protective effect of ki16425 against ethanol actions on basal neuronal activity in the mPFC and on AHN.
Conclusions. Our results suggest a potential usefulness of systemic LPA1/3 receptors antagonists as a novel treatment for alcohol-related disorders.

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SESSION 1 **POSTER 15**

EFFECTS OF PALMITOYLETHANOLAMIDE IN COCAINE-INDUCED BEHAVIOURS

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Cocaine addiction is a chronically relapsing disorder characterized compulsive drug-seeking behaviour and. relapse. Previous investigations have demonstrated the implication of N-acylethanolamines (NAEs) to regulate addictive behaviours induced by several drugs of abuse. Moreover, brain levels of NAEs have shown to be sensitive to cocaine self-administration and extinction training in rodents. Against this background, this study aimed to investigate the effect of repeated and acute administration of palmitoylethanolamide (PEA), an endogenous NAE, on the behavioural effects of cocaine using mouse models of conditioned reward and psychomotor activation.

Methods. The potential ability of repeated PEA administration (1 or 10 mg/kg i.p) to modulate the development of cocaine-induced conditioned place preference (CPP) and behavioural sensitization (BS) was evaluated in male C57BL/6J mice. In addition, the expression of cocaine-induced CPP and BS after acute PEA administration (1 or 10 mg/kg) i.p) was also studied.

Results. Results showed that repeated administration of both doses of PEA significantly reduced the development of cocaine-induced BS, but did not modify the acquisition of cocaine-induced CPP. Furthermore, acute administration of both doses of PEA was able to reduce the expression of cocaine-induced BS and CPP.

Conclusions. Taken together, our results indicate that exogenous administration of PEA attenuated psychomotor activation and impaired the expression of CPP induced by cocaine. These findings could be relevant to understand the role of NAEs in the development and maintenance of cocaine addiction.

SESSION 1 **POSTER 16**

LONGITUDINAL STUDY OF PREPULSE INHIBITION OF STARTLE REFLEX IN MALE AND FEMALE MICE

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Prepulse inhibition (PPI) of the startle reflex is a widely used model of sensorimotor gating, which is a particularly informative measure of information processing and inhibitory function. The PPI paradigm consists in the normal reduction of the amplitude of the startle reflex in response to an intense startling stimulus (pulse) when this intense stimulus is shortly preceded by a weaker, non-startling sensory stimulus (pre-pulse). PPI is a common and robust phenomenon that occurs in all mammals tested to date and it has been viewed as a heritable trait sensitive to some environmental factors during the neurodevelopment period. A deficient PPI is considered as an endophenotype in schizophrenia, since an overlap has been revealed to exist between the alterations in the dopaminergic system in schizophrenia and a PPI deficit. Although PPI is considered a relatively stable neurobiological marker, there is no study that has evaluated PPI along a subject's lifespan. The present work is a longitudinal study of prepulse inhibition of startle reflex in male and female mice. For this purpose, PPI of OF1 mice (24 males and 24 females) were evaluated in five stages of their lives: late adolescence (T1, PND 32- 36), youth (T2, PND 53-57), adulthood (T3, PND 74-78) and maturity (T4, PND 102- 106 and T5, PND 144-148). To determine the value of the PPI, four types of prepulse- pulse trials were run (Two prepulses of 75 and 85 dB, with two intervals of 30 and 100 ms each, all followed by a 120 dB pulse).

Significant correlations were observed between the recorded times T1/T4 ($r=0.331$, $p<0.034$), T2/T3 and T2/T4 ($r=0.481$, $p<0.001$ and $r=0.339$, $p<0.037$), T3/T4 ($r=0.346$,
$p<0.031$). The box-and-whisker diagram shows a similar degree of dispersion in every recorded time. The ANOVA for the PPI did not reveal any significant differences in sex or time.

SESSION 1 **POSTER 16**

This is the first longitudinal study that has been carried out for PPI with a considerable number of measurements. In conclusion, the results show that PPI is similar in both males and females and it remains relatively stable throughout life, to a greater degree when it is compared in groups, although a decrease was observed in the last stage. This decrease during maturity seems to coincide with the age-related changes taking place in the dopaminergic system, since other studies have shown PPI to be very dependent on the levels of this system. All in all, this study supports the fact that PPI is a useful translational tool as a behavioral test of the alterations in the dopaminergic system.

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SESSION 1 **POSTER 17**

IMPROVEMENT ON EMOTIONAL FACIAL EXPRESSION RECOGNITION WITH DIFFERENTIAL OUTCOMES PROCEDURE IN SCHIZOTYPY

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Recent studies have shown that people with schizotypy, a subclinical expression of symptoms qualitatively similar to those found in schizophrenia, have a deficit in the recognition of emotional facial expressions. The present study aimed to explore whether the use of the differential outcomes procedure (DOP) might improve the recognition of emotional facial expressions in this population. The DOP consists in associating each stimulus to be related with a particular outcome. Participants were first administered the ESQUIZO-Q-A questionnaire to classify them into two groups: high and low schizotypy. Later on, two emotional facial recognition tasks were used under differential and non-differential outcomes conditions. The results showed that participants found (1) more difficult to recognize the emotions of fear and sadness than happiness, anger, disgust and surprise, and (2) easier to label emotions than to match two faces showing the same emotion. Regarding the DOP, we also found a significant main effect of the outcomes procedure, showing more accurate responses and lower reaction times when participants had to recognize the emotions when they were associated with a particular outcome. This is, to our knowledge, the first study to show that the DOP may be a useful tool to improve the recognition of emotional facial expressions in people with schizotypy.

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SESSION 1 **POSTER 18**

ROLE OF LPA1 RECEPTOR IN MOOD REGULATION

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LPA is an endogenous simple bioactive phospholipid that exhibits several biological functions acting by six well identified G protein-coupled receptors widely distributed, i.e. LPA1-6. Lately, LPA has emerged as a regulatory molecule in the brain, acting, mainly, the LPA1 receptor, that is widely expressed in the central nervous system (CNS) where it exerts a prominent role. A higher density of this receptor has been observed in the hippocampus, frontal cortex, amygdala and striatum, key emotion-processing regions. The brain distribution of the LPA1 receptor lead us to suspect that may be a role in controlling emotions.
In fact, experiments with knockout animals revealed a role for the LPA1 receptor in emotional regulation, in coping response to chronic stress and in controlling depression-like behaviours. Although knockout model is very useful in the study of the involvement of the LPA1 receptor in emotion, pharmacological approaches could provide important additional insight.
For this reason, we examined, using the Forced Swim Test (FST), behavioural despair in animals treated with LPA1 antagonist (Ki16425) or vehicle. Because in depression has been observed a high degree of dysregulation of hypothalamic-pituitary-adrenal axis activity, corticosterone levels have been assessed. Additionally, c-Fos expression, as a measure of functional activity has been determined. Our data indicated that the antagonism of the LPA1 receptor significantly increased immobility time, whereas reduced the latency to first immobility period. Experimental animals showed elevated corticosterone levels and an increment in activity

SESSION 1 **POSTER 19**

STUDY OF NON-MOTOR SYMPTOMS OF PARKINSON'S DISEASE IN THE 6-OHDA-RAT MODEL

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Parkinson's disease (PD) is the second most common neurodegenerative disorder, and it is typically characterized by motor symptoms (MS) such as bradykinesia, rigidity, postural instability, and resting tremor. However, PD patients also suffer from non-motor symptoms (NMS), which include olfactory dysfunctions, cognitive deficits, and sleep and psychiatric disorders. NMS often appear in the early pre-motor phase of the disease and severely impair patients' quality of life. Therefore, in recent years, research on NMS has increased exponentially. 6-hydroxydopamine (6-OHDA) is the most widely used toxin for the induction of PD in rats, and it has been observed to induce both motor and cognitive deficits. Here, we investigated whether a partial bilateral lesion of the dorsal striatum, using the 6-OHDA-rat-model of PD, correlates with the cognitive deficits observed in patients in the early-phase of PD, such as spatial reference memory impairment and anxiety. We used the rotarod-task in order to discard motor impairment, the open field task to assess anxiety-like behavior, and the Morris Water Maze (MWM) to investigate the effects of the lesion on spatial reference memory acquisition. Our behavioral results showed no significant differences in motor activity between the 6-OHDA-lesioned-rat group and the sham operated group on the rotarod or open field tasks, supporting the idea that we are using an animal model that mimics the early pre-motor phase of PD. Additionally, anxiety levels were similar in both groups because there were no significant differences in the percentage of time the animals spent at the periphery of the open field. Moreover, we found that spatial reference memory in the MWM was not impaired in the 6-OHDA-lesioned rat group, although this group showed a delay in task acquisition compared to the sham-operated group. In conclusion, our results show that the 6-OHDA-lesioned rat model could serve to extend current understanding of NMS in PD. However, further work should be carried out in order to understand how lesion extension and position correlate with cognitive impairment.

SESSION 1 **POSTER 20**

AN INHIBITORY PREFRONTAL-CEREBELLUM NETWORK FOR DRUG-RELATED MEMORIES

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Several memory processes underpin motivational trigger of drug-seeking and drug-taking behaviour. One of them is the acquisition of preference memories for drug-related cues. Recent studies support that the reorganization of prefronto-striatal-limbic networks underlies storage of these drug-induced memories. However, despite several data supporting the involvement of the cerebellum in the functional alterations observed after prolonged cocaine use, this brain structure has been traditionally ignored and excluded from the circuitry affected by addictive drugs. Recent findings from our laboratory have demonstrated that changes in activity and plasticity in the dorsal region of the granule cell layer of the cerebellar vermis are related to the expression of cocaine-induced preference conditioning.

The present study aimed to evaluate the effects of mPFC and cerebellar deactivations in the acquisition of cocaine-induced preference odour conditioning. We conditioned six experimental groups and their sham controls. Two groups of rats were subjected ten minutes before every conditioning trial to a temporary prelimbic or infralimbic inactivation by lidocaine to prevent acquisition/consolidation of drug-related memory. Another two groups were lesioned in the ventral or dorsal region of the posterior cerebellar vermis with quinolinic acid. Results showed that either the inactivation of infralimbic cortex or a dorsal cerebellar lesion increased up to 100% the percentage of animals acquiring conditioned preference for cocaine. Oppositely, the inactivation of prelimbic cortex or a ventral cerebellar lesion reduces this percentage regarding sham groups.

Then, we trained two groups of rats under double deactivation (infralimbic/dorsal region or prelimbic/ventral region). The combined lesions s prevented the effects of single deactivations on the acquisition of cocaine-induced preference conditioning. Therefore, these findings suggest that the infralimbic cortex and dorsal cerebellum work together on inhibiting behavioural responses triggered by drug-related emotional memories

POSTER SESSION 2

Thursday 20th & Friday 21st
July 2017

SESSION 2 **POSTER 21**

A NEUROPSYCHOLOGICAL STUDY ON GLOBAL/LOCAL VISUAL PROCESSING IN ELDERLY PEOPLE WITHOUT AND WITH COGNITIVE IMPAIRMENT

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How the processing of visual stimuli changes through the lifespan has been investigated in recent years, in particular those modifications due to neurobiological changes that occur during aging. This interest increases when performance of elderly people with mild cognitive impairment (MCI) or dementias as Alzheimer Disease (AD) are the subjects of research. The aim is to analyse neurocognitive differences between typical *versus* pathological aging for identifying early markers of these syndromes and to design the most appropriate neurocognitive intervention as early as possible. According with this approach, we present a neuropsychological study on global/local visual processing during typical aging, MCI and initial AD, with 75 participants from Adavir center for elderly people at Alcalá de Henares, Madrid. Taking into consideration the MEC scores and the GDS scale, the following four groups are studied: 30 participants without impairment (score of 25-30), 35 with mild impairment (score of 20-24), 14 with mild-moderate impairment (score of 16-19) and 14 with moderate impairment (score <16). A selection of tests with specific modifications elaborated by our research group was administered to assess the global/local processing: a) a classical Navon task, consisting of the presentation of global letters (H, S) composed of local (smaller) letters (h, s) in two blocks, the target being the global letter in one block and the local letter in the other one; b) a Navon task with abstract stimuli, that consisted of the presentation of abstracts figures composed of the same or different abstract figures (locals) to ask the participant to say “yes” when she or he perceives a pre-established target figure if it appears at global or local level (depending on the experimental condition), or to say “no” if any other figure appears; c) the so named 15 Objects test, asking the participant to identify 15 overlapping known objects; and d) the Poppelreuter task with abstract stimuli, in this case presenting figures composed of 4 or 5 overlapping abstract shapes (meaningless) so that the participant had to identify among 8 non overlapping abstract shapes presented (including both the target and irrelevant shapes). As a main result, it was found that elderly people didn’t show the global precedence as reported in previous studies with young people. Moreover, elderly people with cognitive impairment presented a performance closer to a local precedence. Taking account these results from a psychobiological perspective, we consider relevant to conclude by proposing a possible utility of those tests and tasks applied in the present study to detect neurocognitive changes characterizing pathological *versus* typical aging, and to define markers of clinical relevance for the development of neurocognitive intervention programs destined to elderly people with cognitive impairment.

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SESSION 2 **POSTER 22**

MOTHERHOOD IMPROVES COGNITION IN FEMALE AGED RATS. ROLE OF 5-HT1A RECEPTORS

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Working memory (WM) is a key function for several higher-order cognitive functions whose declines in late adulthood is considered one of the main contributing factors of cognitive impairment in elderly. As motherhood is accompanied by functional changes in the nervous system, the aim of this work was to analyze the impact of repeated motherhood on the cognitive decline associated to aging in female rats. In addition, serotonergic system was analyzed since exert profound influence on different elements of maternal behavior and cognitive processes. For this purpose, two groups of female rats (nulliparous and mothers) from 6, 10 and 20 months of age were used. The hippocampus dependent test 8-arm radial maze was used to analyze changes of the spatial WM throughout the age. In this test, trials were judged complete when rats had chosen all 8 arms or spent 20 min in the trial; re-entered or non-entered arms were computed as errors. After this, the levels of serotonin were measured in hippocampus by HPLC. Additionally, it was investigated the functionality of 5-HT1A receptors by comparing the effect of 8-OH-DPAT (0.3mg/ kg, i.p.) on spatial learning using the Barnes test in both experimental groups at the different ages. In the Barnes maze, strategies used to find the target were analyzed along with the time spent and errors committed. Behavioral results revealed a cognitive impairment associated with aging in nulliparous control rats. Thus, data from the radial maze showed that the time required to complete the test increased significantly from 6 to 20 months (64 % $p<0.05$) accompanied by a significant augment in errors (70 %). This impairment in WM was parallel to a decrease in the serotonin levels (23%, $p<0.05$). At contrary, multiparous females did not show significant differences in WM with age and showed greater levels of serotonin than control female rats at 10 and 20 months respectively (26%, 17% $p<0.05$). Finally, activation of the 5-HT1A receptor induced an improvement in the performance of the Barnes test that involved decrease in the time spent to complete the task and number of errors. The effect of 8-OH-DPAT was more pronounced in multiparous than in nulliparous rats respective to saline group at 20 months (time, nulliparous: 17%; multiparous, 50%; errors: nulliparous, 1%; multiparous: 76%). Moreover, multiparous rats used more efficient searching strategies (serial and direct respect to the random). Altogether, the results suggest that motherhood slows the cognitive decline associated to aging and part of this effect could be related to better functionality of the 5-HT1A receptor.

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SESSION 2 **POSTER 23**

CHANGES IN PSYCHONEUROENDOCRINE SYSTEM IN FRAIL SPANISH OLDER ADULTS IN ASSOCIATION WITH PHENYLALANINE, TYROSINE AND NITRIC OXIDE SERUM CONCENTRATIONS

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Nowadays, the world population is experiencing a dramatic aging situation. In Europe, by 2060, those aged 65+ will comprise 30% of the population, and up to one-third of those will be aged 80+. Due to the great heterogeneity in the aging manifestations, the term “frailty” represents an approach to describe age-related conditions displacing the obsolete concept of "chronological age". Frailty is an important geriatric syndrome characterized by multisystem dysregulation and is manifested by maladaptive response to stressors. This leads to functional decline and other serious adverse health outcomes, including falls, institutionalization, hospitalization and mortality. Key physiological systems involved in the frailty trajectory include musculoskeletal, hormonal, metabolic and immune-inflammatory systems. The pteridine derivative 5,6,7,8-tetrahydrobiopterin (BH_4) is a cofactor of amino acid monooxygenases, including phenylalanine 4-hydroxylase (PAH), which converts the essential amino acid phenylalanine (Phe) to tyrosine (Tyr), and nitric oxide synthases (NOS), which is involved in the conversion of arginine to nitric oxide ($NO^{\cdot}$). Phe/Tyr is considered to be an estimate of PAH activity, and increases in Phe/Tyr can serve as an indicator of impaired BH_4 availability. Inflammation and immune activation decrease BH_4 availability, and, as a consequence, reduce PAH and NOS activities. The present work aimed to evaluate the possible relationship between frailty status and Phe, Tyr and nitrite serum concentrations in a population of 259 Spanish older adults (aged 65 and over) classified as non-frail, pre-frail and frail. Significant increases in Phe/Tyr ratio, and significant decreases in Tyr and nitrite concentrations in frail individuals as compared with non-frail subjects were obtained. These results support that chronic immune system stimulation in frail older adults is higher than expected according only to their age.

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SESSION 2 **POSTER 24**

INTRACAROTID PROPOFOL PROCEDURE FOR ASSESSING HEMISPHERIC LATERALIZATION OF COGNITIVE, PHYSIOLOGICAL AND EMOTIONAL FUNCTIONS ON EPILEPTIC PATIENTS

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Epilepsy comprises a set of neurological disorders of diverse etiology, characterized by the development of gradual and progressive spontaneous seizures that increase in recurrence and severity with time. Temporal lobe epilepsy is the most common focal epilepsy disorder, and is often resistant to pharmacological treatment. This pathology has provided evidence of widespread network alterations that extend beyond the epileptogenic zone where seizures originate. Interestingly, cortical recruitment during seizures is not circumscribed to the areas immediately adjacent to a lesion. Recruitment of preexisting, contralateral connections may also occur, which appears to be related to the duration and severity of disease. In these cases, structural and functional neuroimaging, clinical, electroencephalographic, and behavioral protocols are necessary for improving the strategies for the precise localization of the epileptogenic zone, for surgical outcome prediction, and for a better understanding of the neuropsychological implications of recurrent seizures. In order to know whether different cognitive and emotional functions are lateralized in the hemisphere contralateral to the epileptogenic zone, it is relevant to assess these functions while one hemisphere is anesthetized (Wada test). Due to procedure reversibility, these tests are highly adequate to explore plasticity in neural circuits and in patterns of activity consequent to transitory hemisphere inactivation. In this talk we will present data obtained in a set of neuropsychological evaluations carried out on 24 patients that were considered as possible candidates for epilepsy surgery. These evaluations were performed while the patients were subjected to unilateral intracarotid injections of propofol. These tests provided reliable information for evaluating intrahemispheric and interhemispheric functional reserve and contributed significantly to the successful massive surgical resection of the epileptogenic focus without eliciting permanent cognitive sequelae and to post-surgical cognitive improvement.

SESSION 2 **POSTER 25**

NEUROPSYCHOLOGICAL PROFILES OF ATTENTION AND INHIBITORY CONTROL IN NEURODEVELOPMENTAL DISORDERS THROUGH A VIRTUAL REALITY TEST

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Attention Deficit Hyperactivity Disorder (ADHD) and Language Disorders (LD) are two of the most frequent neurodevelopmental disorders in preschool and school childhood population, but can continue in adolescence and adulthood, and affecting their quality of life. Although these disorders present clinical and etiological heterogeneity, evidence shows that they share deficits in executive functions, especially in attention, motor activity and inhibitory control. The virtual reality (VR) technology is proposed as an useful tool that allows a better and accurate assessment because of their greater sensibility and power of discrimination. The goal of the present study was to compare the attentional and inhibitory control profiles of ADHD and LD groups of children (6-12 years old), by a VR test (AULA de Nesplora) specially designed for the evaluation of attention, vigilance, inhibitory control and activity level. ADHD group showed higher attentional problems than LD group. The LD performance is influenced by the sensory modality in which the stimuli are presented, while ADHD performance is related to the response rate demanded by the task. In addition, both groups share high motor activity levels.

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SESSION 2 **POSTER 26**

NEURONAL METABOLIC ACTIVITY ALTERATIONS INDUCED BY MATERNAL ALCOHOL BINGE CONSUMPTION IN OFFSPRING MICE

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The exposure to alcohol during pregnancy can cause developmental abnormalities in the fetal brain, which can result in lifelong behavioural alterations known as fetal alcohol spectrum disorders (FASD), associated with neurodevelopmental disabilities. FASD are frequently associated with growth retardation, facial dysmorphology, central nervous system impairment, abnormal behaviour and cognitive deficits. The aim of the present study was to evaluate in mice whether binge drinking during gestation or in combination with the lactation period could cause impaired brain metabolic capacity in the offspring of these dams. 16 pregnant C57BL/6J female mice underwent an experimental protocol for binge-like ethanol drinking during the gestation period or during both the gestation and lactation periods. Quantitative cytochrome oxidase histochemistry was used to measure cumulative changes in brain metabolic capacity associated with binge-like alcohol drinking and evaluated the brain functional connectivity. Changes in cytochrome oxidase activity were found in dorsal dentate gyrus, medial habenula, central amygdala, ventral tegmental area and lateral mammillary nuclei. Functional brain connectivity evaluated by calculating significant interregional correlations in cytochrome oxidase activity showed that the control group showed a more closed reciprocal network of brain cross-correlations as compared to widespread brain networks in mice exposed to pre- and postnatal binge ethanol drinking. Further studies are required to understand the mechanisms involved in the modifications of functional brain networks as related to cognitive impairments caused by maternal alcohol binge drinking.

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SESSION 2 **POSTER 27**

A MULTIMODAL SYSTEM FOR FUNCTIONAL ASSESSMENT OF BRAIN AND SYSTEMIC RESPONSES

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Neuroimaging techniques have become essential research tools in cognitive and affective neuroscience due to their capabilities to provide useful insights into the brain activity. They include Near Infra-Red Spectroscopy (NIRS) and electroencephalography (EEG), that combined in a multimodal approach, with electrocardiography (EKG) and respiration monitoring, make feasible the evaluation of neuroelectrical, haemodynamic and autonomic responses underlying mental processes. We present here a system that possesses these co-registering capabilities.
The system comprises five, custom-made, elements: i) a wireless 28 channels, continuous wave, multi-distance, NIRS device for pre-frontal hemodynamic monitoring ; ii) a wireless device able to register 8/32 EEG channels plus EKG and breathing monitoring; iii) an integrative software application for multimodal signal acquisition, data processing, recording and visualization in real time; iv) a software application for stimulus presentation and experiment control, that synchronizes the whole system with a high temporal precision through a linked light coder; v) a response pad for the recording of subjects behavioral data such as response time and options selection.
The system was tested on volunteers that performed common cognitive and affective tasks paradigms: i) visual and auditory Oddball; ii) visual response inhibition Go-NoGo; iii) Mental arithmetic; iv) n-back working memory; v) emotional stimuli trough affective pictures.
Multimodal task-related signals were registered and analyzed using the system built-in capabilities. Furthermore, we performed a comparative analysis with the widely used toolboxes EEGLAB, HOMER and NIRS-SPM, obtaining highly comparable results and in good agreement with the literature data.
We demonstrate the feasibility of the proposed system and its potential usefulness for scientific and clinical applications.

MAPPING STARTLE RESPONSE ONTO FOREHEAD: A NIRS APPROACH

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Near-infrared spectroscopy (NIRS) has been used extensively to asses prefrontal cortex (PFC) activity during cognitive processes (Masataka et al.,2015;Balconi & Molteni,2015). Because NIRS is prone to be contaminated by extra-cranial hemodynamic of the forehead tissues (Takahashi et al.,2011;Kirilina et al.,2012), researchers have made considerable efforts to identify the putative cerebral signal, avoiding the potential information carried by the extra-cranial forehead layer. In fact, human forehead is an anatomical region with complex vasculature and autonomic nervous system (ANS) innervations. It is known that several neural mechanisms influence its vasomotor activity (Drummond, 1994), and that, among others, could be modulated by cognitive and emotional stimuli. This raises the possibility that sympathetic activation elicited by stressful events induces forehead vasomotor responses. In this way, the startle reflex is a sympathetic reaction with a great interest in both clinical and research fields. In this framework, the objective of the present work was to study the forehead blood flow changes in response to a stressful event.

A total of 12 young volunteers, men and women, age range 20-30 years, were recruited. Firstly, the participants performed a task in which they had to evaluate affective pictures. At the end of the task, subjects were asked to be relaxed and to close their eyes for several minutes. After 2 minutes, and suddenly, we trigger a loud sound by dropping a metallic tray on the floor. The main idea was to elicit a startle response.

NIRS signals were recorded through a custom-made, 28 channels device, that was centered onto forehead at Fpz (10-20 International Electrode Placement). Only the 16 short-channels (inter-optode distance 12 mm) were analyzed, as they mainly reflect forehead hemodynamic changes. Blood pulse amplitude (BPA) was extracted from NIRS signal Concurrently, heart rate (HR), respiration rate (RR) and electro-dermal activity (EDA) were recorded through a custom-made registering device. Signal relationships were evaluated by time-frequency wavelet cross-spectrum and coherence analysis, and by spectral decomposition as well.

Synchronized to the unexpected sound the NIRS oscillatory components changed abruptly and were highly correlated to changes of HR, RR and BPA, showing easily recognizable spatial and temporal patterns. We conclude that a good understanding of these patterns could be useful for a better assessment of startle response and could provide new insights into the trigger mechanisms underlying vasomotor abrupt disorders as in migraine.

SESSION 2 **POSTER 29**

MAPPING MENTAL LOAD ONTO FOREHEAD: A NIRS APPROACH

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Near-infrared spectroscopy (NIRS) has been used extensively to asses prefrontal cortex (PFC) activity during cognitive processes (Masataka et al.,2015;Balconi & Molteni,2015). Because NIRS is prone to be contaminated by extra-cranial hemodynamic of the forehead tissues (Takahashi et al.,2011;Kirilina et al.,2012), researchers have made considerable efforts to identify the putative cerebral signal, avoiding the potential information carried by the extra-cranial forehead layer. In fact, human forehead is an anatomical region with complex vasculature and autonomic nervous system (ANS) innervations. It is known that several neural mechanisms influence its vasomotor activity (Drummond, 1994), and that, among others, could be modulated by cognitive and emotional stimuli. This raises the possibility that mental load elicits task-related forehead vasomotor responses. In this framework, the objective of the present work was to study the forehead blood flow changes in response to periodic mental load elicited by arithmetic tasks.
A total of 10 young volunteers, men and women, (age range 20-30 years) were recruited. To reduce mental stress, all of them were accustomed to the experimental environment and to the task challenge. The basic task consisted in a iterative subtraction of a number (1-2 digit) from a 2-digit number during a fixed time and followed by a rest period of the same duration. This subtraction-rest periodic cycle was repeated 10 times. Subjects accomplished the task twice: A) Subtraction 15 secs.-rest 15 secs.; B) Subtraction 25 secs.-rest 25 secs. The main idea was to elicit a physiological response synchronized with the mental load in a reduced-stress condition, and thus limiting sympathetic outflow.
NIRS signals were recorded through a custom-made, 28 channels device, that was centered onto forehead at Fpz (10-20 International Electrode Placement). Only the 16 short-channels (inter-optode distance 12 mm) were analyzed, as they mainly reflect forehead hemodynamic changes. Blood pulse amplitude (BPA) was extracted from NIRS signal Concurrently, heart rate (HR), respiration rate (RR) and electro-dermal activity (EDA) were recorded through a custom-made registering device. Signal relationships were evaluated by time-frequency wavelet cross-spectrum and coherence analysis, and by spectral decomposition as well.
The NIRS oscillatory components were phase-locked to HR, RR and BPA and highly correlated with the task time periods, showing easily recognizable spatial

and temporal patterns. We conclude that these pattern could reflect a complex synchronization mechanism that links high cognitive brain areas to parasympathetic modulation, and its understanding could be useful to a better assessment of cognitive and ANS disorders.

MAPPING CONFLICT ONTO FOREHEAD: A NIRS APPROACH

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Near-infrared spectroscopy (NIRS) has been used extensively to asses prefrontal cortex (PFC) activity during cognitive processes (Masataka et al.,2015;Balconi & Molteni,2015). Because NIRS is prone to be contaminated by extra-cranial hemodynamic of the forehead tissues (Takahashi et al.,2011;Kirilina et al.,2012), researchers have made considerable efforts to identify the putative cerebral signal, avoiding the potential information carried by the extra-cranial forehead layer. In fact, human forehead is an anatomical region with complex vasculature and autonomic nervous system (ANS) innervations. It is known that several neural mechanisms influence its vasomotor activity (Drummond, 1994), and that, among others, could be modulated by cognitive and emotional stimuli. This raises the possibility that conflictive situations elicit forehead vasomotor responses. In this framework, the objective of the present work was to study the forehead blood flow changes under potentially conflictive- embarrassing stimuli.

A total of 52 volunteers, men and women, age range 20-30 years, were recruited. Response induction was performed through the presentation of affective pictures selected from the International Affective Pictures System (IAPS) in function of their arousal (A) and valence (V), and grouped in 4 blocks of 13 images each one: neutral (mid V-mid A); pleasant (high V-low A); erotic (high V-high A); violent (low A-high A). The presentation sequence was as follows: neutral-pleasant-neutral-erotic-neutral-violent-neutral. Each picture lasted for 5 secs. and by means of a button pad participants evaluated each one as "like", "don't like", or no responding for "don't care". Reaction times and response types were used to calculate an 'ad-hoc' conflict index.

NIRS signals were recorded through a custom-made, 28 channels device, that was centered onto forehead at Fpz (10-20 International Electrode Placement). Only the 16 short-channels (inter-optode distance 12 mm) were analyzed, as they mainly reflect forehead hemodynamic changes. Blood pulse amplitude (BPA) was extracted from NIRS signal Concurrently, heart rate (HR), respiration rate (RR) and electro-dermal activity (EDA) were recorded through a custom-made registering device. Signal relationships were evaluated by wavelet cross-spectrum and coherence analysis.

When compared to other categories, erotic images show significant higher conflict index, while signal analysis shows correlated spatial and temporal oscillatory patterns. We conclude that a proper combination of NIRS and systemic parameters could be a useful tool to evaluate ANS modulation related to conflict-embarrassment and to better understand ANS disorders.

SESSION 2 **POSTER 31**

MODULATION OF CHANGE DETECTION COMPONENTS BY CENTRAL RETRO-CUEING: AN ERP AND TIME-FREQUENCY STUDY

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Although change detection is essential for visual perception and performance in our environment, observers often miss changes that should be easily noticed. A failure in any of the processes involved in conscious detection (i.e. encoding the pre-change display, maintenance of information within working memory, and comparison of the pre and post change display) can lead to change blindness. Given that unnoticed visual changes in a scene can be easily detected once attention is drawn to them, it has been suggested that attention plays an important role in awareness. However, despite the importance of attention in change detection, its role during information maintenance within working memory and its impact in awareness has been less explored. Here we used behavioural, ERP, and time-frequency measures to study how directing spatial attention within working memory affects performance and modulates brain activity related to awareness of the change. Results showed that participants benefited from central retro-cueing at a behavioural level. Retrospective attention also modulated both ERP and oscillatory delta and theta activities. ERPs ranging from 360 to 440 ms (early part of the Late Positive component, LP) showed larger amplitudes in validly cued change detection conditions. Oscillatory activity in the same latency range showed an increase in synchronization of delta activity when the detected changes were validly retro-cued. However, theta activity showed larger synchronization when changes were detected regardless of the validity of the retro-cue. These results suggest that delta oscillations, as reported in the literature, seem to be more associated with P300-like components, and reflects both change detection and cue related modulations. Nevertheless, oscillatory activity in the theta band appears to be more related to change detection independently of the manipulation of retrospective attention, at least in the early part of the LP component.

SESSION 2 **POSTER 32**

CARDIAC VARIABILITY AS A PREDICTOROF WITNESSES MEMORY: IMPLICATIONSIN THE QUALITY OF TESTIMONY

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The memory of witnesses refers to the field of the study on memory processes associated with a criminal event or with an event that is relevant from the criminological point of view. Such memories are usually stored in the individual during a state of stress. However, witness memory has traditionally been studied using audio-visual stimuli, assuming that such stimuli generated a level of stress comparable to that of a real situation. The present investigation's goal is to analyze the mnesic consolidation of a criminal event during a psychophysiological state of stress. For this purpose, 30 young adults participated in the study, divided into a control group (N = 19), mean age: 22.32 years, D.T.: 3.9; and an experimental group (N = 11) being the mean age: 22.18 years, D.T .: 2.9. They were subjected to the control or stress version of the Mäastrich Acute Stress Test and subsequently viewed a video showing a criminal event while recording their cardiac activity with a Polar chest band. The mnesic coding during the process of viewing the video was incidental, therefore the subjects were not informed about the real motive in the investigation. Twenty-four hours later participants were asked to fill out a self-report of recognition on the details of the shown video. Heart rate variability was analyzed with the software "Kubios", using as predictors the indicators of the time domain, and a regression analysis was done to determine the contribution of cardiac variability in the recognition. Participants of the experimental group presented decreases in cardiac variability in the stress phase verifying the effectiveness of the stressor employed. The R2 for the control group was superior to that of the experimental group, so that high levels of physiological activation appear to impair mnesic coding. The results obtained allow us to consider that the method used by other investigations on the memory of witnesses in which a video is visualized without the presence of sympathetic activation does not prove to be the most adequate to study this phenomenon. On the other hand, we suggest using heart rate variability as an indicator of the credibility of the testimony.

SESSION 2 **POSTER 33**

COGNITIVE FUNCTION, LONELINESS, AND SALIVARY CORTISOL LEVELS IN ELDERLY MEN AND WOMEN.

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Cognitive function has been associated to changes in emotional and endocrine factors like feelings of loneliness and cortisol levels. Interestingly, loneliness prevalence is higher in elderly adults than in other age groups, and it has been also related to circadian rhythm of the hypothalamic-pituitary-adrenal (HPA) axis. The aim of this study was to investigate the relationship between cognitive function, loneliness and circadian rhythm of salivary cortisol in older men and women without depression. The neuropsychological assessment involved the application of an extensive battery of neuropsychological tests that evaluated attention, language, executive function and memory. Loneliness was measured using the Spanish version of the SELSA-S (Social and Emotional Loneliness Scale for Adults). Participants were administered the Geriatric Depression Scale to identify depression. Five cortisol circadian samples (upon waking, 30-min post-waking, 45 min-pots waking, 2 hours after lunch, and before bed) were taken from 52 elderly subjects (26 men and 26 women). Loneliness scores were associated to gender, showing women higher feelings of total and romantic loneliness than men. Correlation analyses indicated that some key elements of cognitive function (memory, executive function, and speed processing) were inversely related to feelings of loneliness and night cortisol levels. In men, night cortisol levels were negatively associated not only with cognitive function, but also with social, familiar and romantic loneliness. In women, awakening and night cortisol levels were negatively correlated to executive function, but circadian cortisol levels were not related to feelings of loneliness. Our results indicate that in elderly men, the impact of loneliness on cognitive function may be mediated, in part, through dysregulation of the stress-sensitive hormone cortisol.

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SESSION 2 **POSTER 34**

A NORMATIVE STUDY OF THE 5 OBJECTS TEST IN A LARGE SPANISH COMMUNITY SAMPLE

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Introduction: Inferring the degree of cognitive decline from measurement of cognition on a single occasion can be compromised by various sources of variability among individuals such as level of education, age and gender. A very brief memory screening test should make limited language demands, and be easy to administer, without being affected by the cited factors. Methods: This study examined the relationship of the 5 Objects Test scores with both demographic variables and some other neuropsychological test scores by carrying out a secondary analysis of data from 427 participants (age 15 to 95 years old, of which 220 were females; educational level range: 2 -17 years). The 5 Objects Test measures immediate and delayed recall of the locations of five everyday objects: a coin, a lighter, a watch, keys, and a pen.
Results: Normative data are provided, as well as correlations with test scores from the Benton Visual Retention test, the Rey-Osterrieth Complex Figure and the MMSE.
No significant correlation (Bonferroni-corrected) was found between delayed recall scores and level of education, age and gender. The only demographic variable associated with immediate recall was age. As expected, both immediate and delayed recall of the 5 Objects Test significantly correlated with the Benton Visual Retention test, the Rey-Osterrieth Complex Figure and the MMSE scores, evidencing concurrent validity.
Conclusion: Given the above results, as well as the short application time and the low linguistic demands of the 5 Objects Test, it could be used for assessing persons in primary care, including those from different linguistic backgrounds or with limited language use.

SESSION 2 **POSTER 35**

CONTRIBUTION OF APOE GENOTYPE ON THE EXPRESSION OF NEUROBEHAVIORAL EFFECTS INDUCED BY POSTNATAL EXPOSURE TO CHLORPYRIFOS

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Perinatal exposure to organophosphate pesticide chlorpyrifos (CPF) has been associated with cognitive and social behavior impairments in childhood, youth and adulthood. In humans the *APOE* gene is polymorphic being *APOE3* and *APOE4*, the most frequent forms. Apolipoprotein E (apoE) isoforms have been shown to differentially affect neurobiological functions and cognitive performance. We have also previously reported different effects of CPF depending on apoE genotype in adult mice. Thus, we aimed to explore the influence of the APOE genotype on the detrimental effects in behavior caused by postnatal exposure to CPF. Human targeted replacement apoE3 and apoE4 mice of both sexes were orally exposed to CPF at 0 or 1 mg/kg/bw/day on postnatal days 10-15, and re-exposed to CPF at 0 or 2 mg/kg/bw/day from five to seven months of age. We assessed sociability and preference for social novelty in the three-chamber Crawley test in male mice at 15 days of CPF re-exposure and learning and spatial memory in the Barnes maze task at 30 days of CPF re-exposure in both sexes. At the end of the re-exposure plasma, frontal cortex and striatum cholinesterase activity was assessed. Differences between genotypes in both behavioral paradigms were observed. ApoE4 mice exhibited a lower preference for social stimuli and a worse performance in the acquisition of the spatial task in comparison to apoE3 mice. Postnatal exposure to CPF decreased the preference for social novelty in apoE3 male mice, deteriorated learning in apoE4 female mice and spatial memory in all the subjects. Adulthood exposure to CPF improved the learning process in apoE4 male mice and the spatial memory in apoE4 female mice. Re-exposure to CPF reversed some detrimental effects of postnatal exposure in apoE3 mice. Cholinesterase activity in the striatum was higher in apoE4 than apoE3 mice. In turn, adulthood exposure to CPF inhibited this enzyme only in apoE4 male mice. Overall, the results reinforce existing evidence on the detrimental effects of early CPF exposure in different behaviors. Nevertheless, these effects depend on sex and genotype. Also, our findings suggest that cholinergic system may contribute to the differences between genotypes.

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SESSION 2 **POSTER 36**

ENRICHMENT EFFECTS ON ANXIETY, IMPULSIVITY AND COGNITIVE FLEXIBILITY IN ADULT MALE RATS EXPOSED TO BINGE-LIKE ETHANOL EXPOSURE DURING ADOLESCENCE

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Adolescence is an important period of brain development during which binge-like ethanol exposure causes long-lasting neuroadaptive changes in neural pathways. Thus, adolescent heavy drinkers show a reduction in the volume of prefrontal and temporal cortices (hippocampus and amygdala), key regions in the modulation of attentional and cognitive processes, impulsivity, and anxiety. It has been demonstrated that an ethanol challenge diminished sensitivity to ethanol-induced disruptive effects on attention and decreased impulsivity (premature responses) and cognitive flexibility (timeout responses) in adolescent rats exposed to intermittent ethanol exposure (AIE) tested in the 5-choice serial reaction time task (5-CSRTT). Furthermore, AIE adult rats displayed more anxiety-like behavior. Recent studies pointed out that environmental enrichment (EE) is a successful protocol to improve cognitive functions and reduce anxiety-related behaviors. Also, EE seems to have a protective effect on drug-induced neural impairment (i.e. ethanol-induced) in the medial prefrontal cortex. We evaluated the effect of limited exposure to environmental enrichment (EE; 3h/day for 6 weeks) on anxiety and executive functions in adult rats exposed to binge-like exposure during adolescence. For that aim, adolescent Wistar rats were treated with ethanol (2.5 g/kg ip; BEP) or saline (SP) for 2 consecutive days at 48-h intervals over a 14-day period (PND30-PND43). After that, rats were subjected to EE or environment standard (ES) protocol and during adulthood (PND73-PND97) were tested in the elevated zero maze (EZM) and the 5-choice serial reaction time task (5-CSRTT).The results shown that BEP-EE group displayed decreased reward collection latency and correct response latency compared to SP-EE and SP-EN groups. Moreover, premature and timeout responses were increased by binge-ethanol exposure during adolescence without affecting accuracy. Regarding anxiety assessment, BEP group shown an increase in the number of entries into the open area, but no differences were found in the time spent on it, compared to SP group. This results are probably due to an increase in locomotor activity, as suggested by the higher distance traveled and velocity in the EZM. In addition, the SP-EE group exhibited an increase in distance traveled and velocity. Our results suggest that limited exposed to EE can reduce anxiety-like behaviors and diminish the disruptive effects of ethanol on attention, but has little effect on impulsivity and compulsivity exhibited by rats exposed to binge-like ethanol exposure during adolescence. The present findings extend the current knowledge, showing that EE may provide therapeutic value for treating alcohol abuse disorder.

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SESSION 2 **POSTER 37**

INDOMETHACIN COUNTERACTS THE EFFECTS OF ACUTE ETHANOL ON EMOTIONAL MEMORY IN MICE

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Alcohol consumption is prevalent among adolescents and has been associated with undermined learning and memory ability. On the other hand, inflammatory responses to alcohol may contribute to alcohol-related brain damage and to explain the cognitive consequences of alcohol. Considering this connection between alcohol and inflammation processes, we evaluated the effectiveness of the anti-inflammatory indomethacin in counteracting the detrimental effects of a high acute dose of alcohol (ethanol) on emotional memory in mice of both sexes. Male and female CD1 mice were randomly divided into four groups in each sex: SS (saline+saline), SI (saline+indomethacin), SE (saline+ethanol) and IE (indomethacin+ethanol). According to their pharmacological group, all subjects were acutely injected (i.p.) with saline, ethanol (3 g/kg) and indomethacin (10 mg/kg). After checking that there were not significant differences in locomotor activity between groups, all subjects (n = 8-12 per group) were evaluated in inhibitory avoidance 96 h after the pharmacological treatment. As complementary tests, animals were also evaluated in an actimeter for 30 min (locomotor activity measure) and in a hot plate apparatus (analgesia measure). Inhibitory avoidance learning (test latencies significantly higher than training latencies) was confirmed in all groups; but both males and females receiving alcohol (SE groups) showed test latencies significantly lower than controls (SS groups). Furthermore, test latencies of IE groups were significantly higher than those of SE groups (and similar to those of SS groups). No significant differences between groups were observed either in locomotor activity or in analgesia. In conclusion, acute ethanol impairs emotional memory in mice of both sexes; this impairment is not secondary to the effects of ethanol on locomotor activity or pain sensitivity; and these detrimental effects of alcohol can be counteracted by the anti-inflammatory indomethacin.

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PREPULSE INHIBITION OF STARTLE REFLEX AS A PREDICTIVE ENDOPHENOTYPE OF SENSITIZATION TO COCAINE-INDUCED MOTOR EFFECTS IN MALE MICE

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Prepulse inhibition (PPI) is the attenuation of startle reflex (SR) intensity that occurs when a low intensity stimulus (prepulse) precedes an intense stimulus (pulse). PPI is considered an operational measure of the preattentive inhibition process, which regulates sensory input by filtering distracting stimuli and fulfills an adaptive function. Previous studies indicate that SR of PPI is able to identify female mice with greater sensitivity to cocaine-induced motor effects. Therefore, PPI could be considered as a vulnerability marker in response to this drug, and it is necessary to analyze the interaction of PPI in males. The aim of this study was to evaluate if PPI can also be considered an endophenotype for the vulnerability to develop sensitization to cocaine-induced motor effects in male mice.

Male OF1 mice (N=48), categorized according to their higher or lower PPI level (PND 47-50), were used. Sensitization was induced by administering 25 mg/kg of cocaine once daily for three days (PND 60-64). After a five day interval, the motor activity of the animals was evaluated in response to 10 mg/kg of cocaine (PND 68-70). Spontaneous activity was recorded every ten minutes by an actimeter, one hour before (habituation) and after (test) drug administration. The ANOVA for activity during the habituation period showed significant differences in the Minutes Factor [$F(5,40)=29.194$; $p<0.0001$], demonstrating that all animals had decreased their spontaneous motor activity. The ANOVA for activity during the test showed significant differences in the Minutes Factor [$F(6,39)=18.895$; $p<0.0001$] and in the interaction Minutes*Pretreatment [$F(6,39)=5.594$; $p<0.0001$), revealing that males pretreated with cocaine presented greater cocaine-induced activity than the controls at 10 minutes ($p<0.0001$) and at 20 minutes ($p<0.0001$), which demonstrated that they had developed motor sensitization. Considering PPI categorization, mice with the higher PPI presented motor sensitization in the range 11-20, [$F(1,44)=6.759$; $p<0.013$], while males with the lower PPI showed sensitization at intervals 1-10 [$F(1,44)=14.621$; $p<0.0001$] and 11-20 [$F(1,44)=14.897$; $p<0.0001$].

In conclusion, cocaine-induced motor sensitization was higher in the Low-PPI mice than in their High-PPI counterparts. The development of behavioral sensitization after drug exposure is related to the transition from recreational use to the compulsive consumption of abuse drugs. Therefore, we consider that a PPI deficit may indicate a greater vulnerability to the motor action of cocaine. Thus, the PPI paradigm may also be considered an endophenotype predictive of vulnerability to cocaine effects in males as well.

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SESSION 2 **POSTER 39**

TOPIRAMATE REDUCES ETHANOL BINGE DRINKING IN THE DARK, COMPULSIVITY AND ANXIETY RESPONSES IN C57BL/6J MICE

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Current pharmacological therapies efficacy in Alcohol Use Disorders (AUDs) seems limited and clinical and experimental ethanol research have raised interest on topiramate, an anticonvulsive drug prescribed for epilepsy. EtOH binge drinking is a pattern of excessive EtOH consumption exhibited during early stages of the addiction cycle that represents a substantial risk factor predicting the development of AUDs in vulnerable organisms. Thus, the study of new pharmacological targets to modulate EtHO binge-consumption may protect vulnerable individuals from progressing to the point of EtOH dependence. Our first aim was to evaluate the ability of topiramate to reduce ethanol binge-like consumption in a DID task by adult C57BL/6J male mice. On days 1-3, (three hours into the dark cycle), mice had access to a single bottle of 20%(v/v) ethanol or sucrose (control solution), 10% (w/v), for two hours. On day 4, animals were randomly separated into two groups based on ethanol/sucrose consumption and 30 min prior to the test, they received an ip injection of vehicle or topiramate (0, 30 or 60 mg/kg). Then, animals had 4h access to EtHO/sucrose solutions and immediately after, individual tail blood samples (10□l) were collected for blood ethanol concentration (BEC) (mg/dL) analysis in the EthO group. Because experimental evidence suggests that premorbid behavioral traits and psychobiological risk factors such as impulsivity/compulsivity or anxiety significantly increase vulnerability to excessive EtOH intake, and clinical studies in humans have reported topiramate efficacy for anxiety, depression and obsessive-compulsive related disorders, the second aim was to assess: a) topiramate anxiolytic properties as measured by the Novel Object Exploration Test (NOE) and the Elevated Plus Maze Test (EPM) and b) Topiramate impact on compulsive-like behavior, as measured by the Marble Burying Test (MBT). *Results:* Topiramate (60mg/kg) effectively blunted EtHO, but not sucrose, binge-like drinking in a DID test; reduced basal anxiety as measured by a EPM, but not novelty-induced anxiety in a NOE test, and reduced compulsive digging behavior in a MBT. *Conclusions:* Topiramate inhibitory effect on ethanol binge DID might be mediated, at least in part by topiramate´s ability to reduce high basal anxiety and compulsivity traits. Topiramate could be a very promising tool to protect vulnerable individuals showing repetitive EtHO binge-drinking episodes from progressing to the point of EtOH dependence.

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SESSION 2 **POSTER 40**

BLOOD ALCOHOL CONCENTRATION AND WORKING MEMORY (SPATIAL AND LETTERS-NUMBERS MEMORY) IN ADOLESCENT BINGE DRINKERS

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Binge drinking (BD) is a pattern of alcohol consumption that is highly prevalent during adolescence. BD is characterized by intermittent consumption of large quantities of alcohol in short periods, in which blood alcohol concentration (BAC) levels of 0.8 g/L are reached. This typically occurs after intake of at least five standard beverage units (SBU = 10 g of alcohol) for men and four SBU for women (OED, 2016). The consequences of BD include critical changes to the structural and functional development of brain areas related with memory and cognition, such as the prefrontal cortex and hippocampus. In fact, alcohol-related cognitive impairments in the not-yet-adult brain are greater during adolescence and when there is BD, which makes the BD adolescent population a cohort at risk of cognitive damage. Thus, the aim of the present study was to evaluate the effects of different BACs on working memory (WM) during late adolescence in males and females with a history of BD. The sample consisted of 104 adolescents of both sexes (44 males and 60 females). Subjects were 18-19 years old healthy undergraduate students at the University of Valencia, recruited on the basis of their general health status and alcohol consumption habits, which were determined by a self-report questionnaire. Students were invited to participate in the study if they reported refraining from drinking alcohol in the past or if they reported a history of alcohol use (with early onset in consumption) classifiable as a BD pattern. After the intake of a high acute dose of alcohol by binge drinkers or a control refreshment by refrainers, subjects were distributed into three groups for each sex according to their BAC: BAC0-R (0 g/L, in refrainers), BAC1 (0.3–0.5 g/L, in binge drinkers) or BAC2 (0.54–1.1 g/L, in binge drinkers). The subjects' performance in the 1. Spatial span and 2. Letters and numbers subtests of WM were then measured using the Wechsler Memory Scale (WMS-III), as well as their WM-I.Q. The results showed impairments in the Spatial span subtest ($p < 0.001$) and Letters and numbers subtest ($p < 0.05$), and lower WM-I.Q. ($ps < 0.001$) in the BAC2 group vs Refrainers, while differences between the BAC1 and BAC2 groups were observed in the Letters and numbers subtest ($p < 0.01$) and WM-I.Q. ($p < 0.01$). These results suggest that WM is sensitive to the neurotoxic effects of alcohol in adolescent binge drinkers of both sexes, in which a BAC-dependent damage is observed

Observatorio Español sobre Drogas. (2016). *Encuesta Escolar sobre Uso de Drogas en Estudiantes de Enseñanzas Secundarias (ESTUDES) 2014-2015*. Madrid: Ministerio de Sanidad, Servicios Sociales e Igualdad.

SESSION 2 **POSTER 41**

POTENTIAL THERAPEUTIC EFFECT OF PSYCHOACTIVE DRUGS IN COMPULSIVITY

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Compulsivity is characterized by the performance of repetitive and dysfunctional actions without adaptive function and is present in many neuropsychiatric disorders. There are some patients that do not respond to pharmacologic treatments, what motivates the exploration of new drugs that may have a therapeutic potential to reduce compulsive behavior. Clinical studies have demonstrated that some psychoactive drugs at low doses have produced therapeutic effects. We conducted a preclinical study with male Wistar rats characterized as high (HD) or low (LD) drinkers according to their performance on schedule-induced polydipsia (SIP) and then, we evaluated the terapeutic potential in SIP of different doses of scopolamine (0.125,0.25, 0.5 mg/kg, i.p.), methamphetamine (0.25, 0.5, 1.25, 2.5 mg/kg, i.p.), ketamine (1.25, 2.5, 5, 10 mg/kg i.p.), cannabidiol (1, 3 mg/kg, i.p.), WIN21255-2 (0.5, 075, 1 mg/kg i.p.), and AM404 (0.25, 0.5 mg/kg, i.p.). Scopolamine reduced dose-dependent water intake in HD rats at all doses tested and did not affect water intake in LD rats. Methamphetamine produced a dose-dependent U-inverted curve effect: lower doses increased water intake in both group of rats, medium dose reduced water intake in HD rats and did not affect the LD group and the highest dose reduced water intake in both groups. Ketamine and cannabidiol induced a non selective reduction in water intake in both group of rats. Neither WIN21255-2 or AM404 had any effects. These data suggests that low doses of scopolamine and methamphetamine may prove effective for the treatment of compulsive disorders, underlying the important role of the dopaminergic and cholinergic system and discard the direct participation of cannabinoid and glutamatergic systems in individual differences on compulsivity behavior on SIP.

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DECISION MAKING AND MOTOR INHIBITION: THE ROLE OF THE ORBITOFRONTAL CORTEX THROUGH tDCS.

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Inhibitory control is a main executive function involved in functional and adaptive behavior. Decision making is a process that is closely related to inhibition and it depends on the integrity of the orbitofrontal cortex (OFC) (Ouellet et al., 2015). In this sense, transcraneal direct current stimulation (tDCS) is an usefull tool to investigate the funtional role of a neuroanatomical area and for neurorehabilitation (Kuhn et al., 2017). Our main aim was to investigate the role of OFC in inhibiton and decisión making. For that purpose we used a pre-post design with tDCS as intervention. Three groups of participants (N=55) performed three different task: Iowa Gambling Task (IGT), Go/No-Go Task and Stop Signal Task (SST). After that, they were exposed to tDCS during 20 minutes. Finally, they performed a parallel versión of the three task. Since the effect of tDCS depends in part on individual differences, the performance of women and men in each task will be evaluated. Statistical analysis shows that anodal tDCS in right OFC significantly improves IGT performance in women (p=0.004), while improvement in males does not depend on stimulation. In addition, participants exposed to anodal tDCS do not decrease the number of false alarms in Go/No-Go Task between sessions (p=0.69). There were no effects on SST. The results suggest that OFC is involved in decision-making process and not in motor inhibition, also the effect of tDCS is mediated by individual differences.

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SESSION 2 **POSTER 43**

SIMULTANEOUS COCAINE AND ALCOHOL INTRAVENOUS SELF-ADMINISTRATION IN YOUNG-ADULTS RATS

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Alcohol is widely consumed as a legal drug, whereas cocaine is the illicit psychostimulant most commonly used in western countries. The combined use of alcohol and cocaine is very prevalent and leads to further aggravation of health consequences compared to individual consumption. In addition, to extend the euphoria caused by cocaine, alcohol modulates the less desirable effects of cocaine and appears to be a trigger for compulsive cocaine consumption/craving behavior. The combined use of alcohol and cocaine leads to psychiatric problems, a higher risk of suicide, and an increased propensity for violent and antisocial behaviors.The presence of alcohol modulates the biotransformation of cocaine, leaving higher plasma levels of cocaine and modifying the phamacokinetic of cocaine derivatives. Additionally, a new molecule is produced: cocaethylene. This molecule increases motor activity and establishes instrumental behavior patterns. As assessed under the conditioning place preference paradigm cocaethylene's rewarding effects are stronger than those of cocaine or alcohol alone. This could explain why it is so common to find consumers of both substances. Exposure to alcohol or other drugs during the early stages of life affects the development of the central nervous system and it may predispose to a greater drug use. Based on the premise that drugs affect the early development and that these effects are different depending on the sex of the individual, we carried out a study of the effects of the simultaneous use of cocaine and alcohol on "young adult" male and female rats aged 55 ± 2 days. Intravenous administration allows a greater control of variables such as the abuse liability or motivational effects of the psychoactive substance, it also enables a better understanding of the behavioral and pharmacological factors affecting drug use. Although widely used for cocaine, ethanol self-administration has always been difficult to carry out in rats.A polyvinyl chloride catheter (0.064" internal diameter) was implanted in the right jugular vein. One day before initiating drug administration, the patency of the catheters was tested by the infusion of sodium thiopental (10 mg/kg). For 21 days and during 120-minute sessions, the drugs were made available to the rats in a fixed-1 ratio schedule. This regime was limited to a maximum of 15 effective responses. The rats that reached the 15 responses received: 15 mg / kg BW of cocaine and 2 g / kg BW of alcohol. Behavior was maintained for 21 days via intravenous delivery of a

cocaine/alcohol cocktail and was assessed using a FR-1 schedule of reinforcement. All rats that received the cocktail displayed the maximum number of responses. We observed a more consistent rate of response in females than in males. These preliminary results suggest that the self-administration behavior can be feasibly studied in rats at the dose used.

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SESSION 2 **POSTER 44**

ASSOCIATION BETWEEN FRAILTY SYNDROME AND MICRONUCLEUS FREQUENCY IN AN OLDER ADULT POPULATION. INFLUENCE ON COGNITIVE IMPAIRMENT

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Populations in nearly all countries are experiencing an important aging process as a consequence of both increase in mortality rate and decline in fertility, which is leading to an inversion of the normal demographic population pyramids and has relevant social and economic implications. In this new context, frailty has recently emerged as a more reliable way to measure biological age, more accurate than chronological age. Frailty is an important geriatric syndrome of decreased reserves and resistance to stressors, resulting from cumulative declines across multiple physiological systems, and causing vulnerability to adverse outcomes, including disability and mortality. Identifying people at risk of developing frailty is crucial since evidence from different studies suggests that frailty status, especially at its very earliest stages, might be reversible.

Increase in micronucleus (MN) frequency, a biomarker of genomic instability, has been previously associated with the aging process, as well as with cognitive impairment and neurodegenerative diseases. In the present work, the possible relationship between MN frequency, determined in peripheral lymphocytes and exfoliated buccal cells, and frailty status or cognitive status was evaluated in a population of 257 individuals (≥ 65 years) classified as frail, pre-frail and non-frail.

Results obtained showed an increase in MN frequency in lymphocytes and in binucleated buccal cells, as well as a decrease in the rate of pyknotic and condensed chromatin buccal cells, in frail individuals with respect to pre-frail and non-frail subjects. Moreover, individuals with cognitive impairment presented significantly higher values of MN rates in lymphocytes and of binucleated buccal cells, and significantly lower frequency of pyknotic buccal cells, than individuals with normal cognitive status. Further studies should be carried to confirm the usefulness of MN frequency as a potential biomarker of frailty.

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