SEPSICOBIO
Sociedad Española de Psicobiología

V International Congress of Psychobiology

Madrid, July 9th-12th, 2024

CONFERENCE BOOK

Universidad Autónoma de Madrid

Facultad de Psicología

SEPSICOBIO

Title:
V International Congress of Psychobiology (Madrid, July 2024): Conference Book

Scientific Editors:
Jaime Iglesias Dorado, Ela I. Olivares Carreño, Jorge Francisco Bosch Bayard

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Sociedad Española de Psicobiología

Collaborating entity:
Facultad de Psicología de la Universidad Autónoma de Madrid

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WELCOME MESSAGE

The V International Congress of Psychobiology welcomes you to the Faculty of Psychology of the Universidad Autónoma de Madrid, Spain, from July 9th to 12th, 2024.

The organizing committee is formed by a large group of researchers, guided by the Statutes of the Spanish Society of Psychobiology.

In its 5th edition, this congress follows in the wake of those organized by the **Spanish Society of Psychobiology** in previous editions (see below).

This year we will once again have the participation of excellent scientists: the opening lecture will be given by **Dr. Carmen Sandi** (Brain Mind Institute, Ecole Polytechnique Federal de Lausanne, Switzerland); a plenary session will be given by **Dr. Brad Duchaine** (Department of Psychological and Brain Sciences at Dartmouth, Hanover, NH, USA), another by **Dr. Carmen Cavada** (Department of Anatomy, Histology and Neuroscience at the Universidad Autónoma de Madrid) and the closing lecture will be given by **Dr. Rafael Yuste** (Neuro-Technology Center at Columbia University, NY, USA).

As in our previous meetings, the program includes pre-congress courses, outstanding symposia, standard and short oral communications, and poster sessions.

It is a great opportunity to give a good account of our interest in promoting research and teaching in psychobiology and knowledge transfer to society.

In the next pages we present you the logo we created for the congress using AI, but with human minds and feelings, titled "The Bear and the Brain".

Jaime Iglesias Dorado	Ela I. Olivares Carreño	Jorge F. Bosch-Bayard
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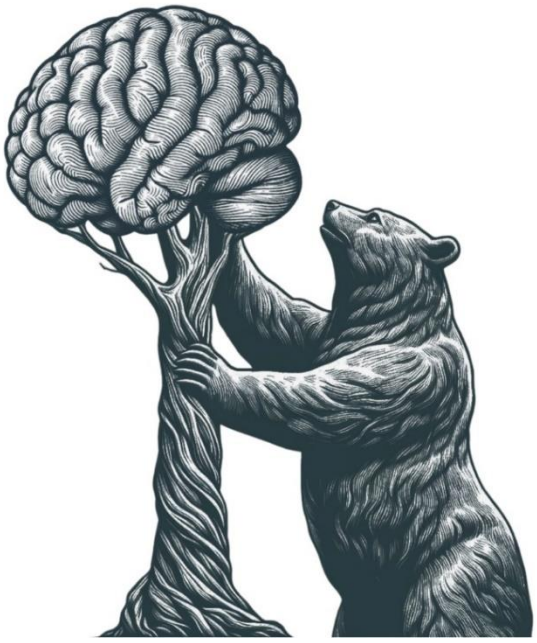
Previous congresses

IV. Valencia, 2022

III. Granada, 2019

II. Avila, 2017

I. Oviedo, 2015



El Oso y el Cerebro

En el corazón de Madrid, en la vibrante Puerta del Sol, se encuentra una escultura icónica que ha capturado la imaginación de locales y turistas por igual durante generaciones: el Oso y el Madroño. Esta vez, el símbolo se transforma en una imagen más intrigante y contemporánea: el Oso del Madroño que admira un cerebro que descansa sobre sus ramas.

La escultura presenta al familiar oso de pie, alcanzando con curiosidad las ramas de un madroño. Sin embargo, en lugar de las habituales bayas del árbol, descansa un cerebro, brillante y detallado, que añade una dimensión inesperada y provocativa a la escena. Esta fusión de naturaleza y simbolismo neurológico invita a una profunda reflexión sobre la relación entre la mente humana y el entorno que la rodea.

La Curiosidad y la Sabiduría: El oso, emblema de fuerza y perseverancia, parece fascinado por el cerebro, símbolo del conocimiento y la introspección. Esta interacción sugiere un viaje hacia la comprensión y la sabiduría, donde la naturaleza busca entender los misterios de la mente humana.

Equilibrio entre Naturaleza y Ciencia: El madroño, un elemento natural, sostiene el cerebro, una representación de la ciencia y el intelecto. Esto simboliza la necesaria armonía entre nuestro entorno natural y el avance científico. La imagen destaca cómo ambos deben coexistir y apoyarse mutuamente para el progreso humano.

Simbolismo Local y Universal: Mientras que el Oso y el Madroño son profundamente arraigados en la identidad madrileña, la inclusión del cerebro introduce un tema universal: el poder del conocimiento y la importancia del desarrollo intelectual en la sociedad. Esta combinación crea una obra de arte que resuena tanto a nivel local como global.

Conclusión:

El Oso del Madroño que admira un cerebro es una recreación artística que desafía al espectador a pensar más allá de lo evidente. Es una celebración de la curiosidad innata y del constante deseo de entender el mundo que nos rodea. Al combinar elementos de la identidad cultural de Madrid con símbolos universales de conocimiento, esta escultura se convierte en una meditación visual sobre la relación entre la naturaleza y la mente humana. Una obra que no solo decora, sino que también educa e inspira a todos los que la contemplan.

***Fuente**: Historia creada utilizando ChatGPT 3.5, versión gratis, para el V Congreso Internacional de Psicobiología, Madrid 2024.*

The Madroño Bear admires a Brain

In the heart of Madrid, in the vibrant Puerta del Sol, stands an iconic sculpture that has captured the imagination of locals and tourists alike for generations: the Bear and the Strawberry Tree. This time, the symbol is transformed into a more intriguing and contemporary image: the Bear of the Strawberry Tree admiring a brain resting on its branches.

The sculpture features the familiar bear standing, curiously reaching for the branches of a strawberry tree. However, in place of the tree's usual berries, rests a brain, shiny and detailed, adding an unexpected and provocative dimension to the scene. This fusion of nature and neurological symbolism invites deep reflection on the relationship between the human mind and the surrounding environment.

Curiosity and Wisdom: The bear, symbolizing strength, is fascinated by the brain, representing knowledge, and suggesting a journey toward understanding and wisdom.

Balance of Nature and Science: The brain, held by the madroño, symbolizes harmony between natural and scientific realms, essential for human progress.

Local and Universal Symbolism: Combining Madrid's cultural emblem with the universal symbol of intellect, the sculpture resonates locally and globally.

Conclusion:

This reimagined sculpture challenges viewers to think beyond the obvious, celebrating innate curiosity and the quest for knowledge. It's a visual meditation on the interplay between nature and human intellect, educating and inspiring all who see it.

***Source**: Story created using ChatGPT 3.5, free version, for the V International Congress of Psychobiology, Madrid, 2024.*

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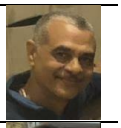
Secretary *Secretario*	Jorge F. Bosch-Bayard *Universidad Autónoma de Madrid*	
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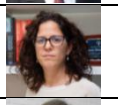
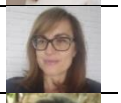
	Vanesa Hidalgo Calvo *Universidad de Zaragoza*	
	Mercè Correa Sanz *Universitat Jaume I*	
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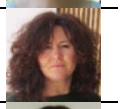
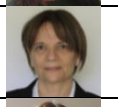
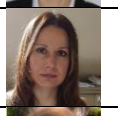
	María Ángeles Zafra Palma *Universidad de Granada*	
	Paloma Collado *Universidad Nacional de Educación a Distancia*	
	Nélida Mª Conejo Jiménez *Universidad de Oviedo*	
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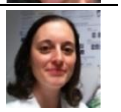
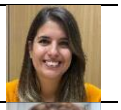
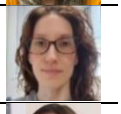
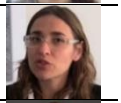
	Ana Sofía Urraca *Centro Universitario Cardenal Cisneros Alcalá de Henares*	
	Andrea Álvarez San Millán *Universidad Europea*	
	Patricia Sampedro Piquero *Universidad Autónoma de Madrid*	
	Cristina Massegú Serrà *Universidad Autónoma de Madrid*	
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ACCESS - CONGRESS VENUE

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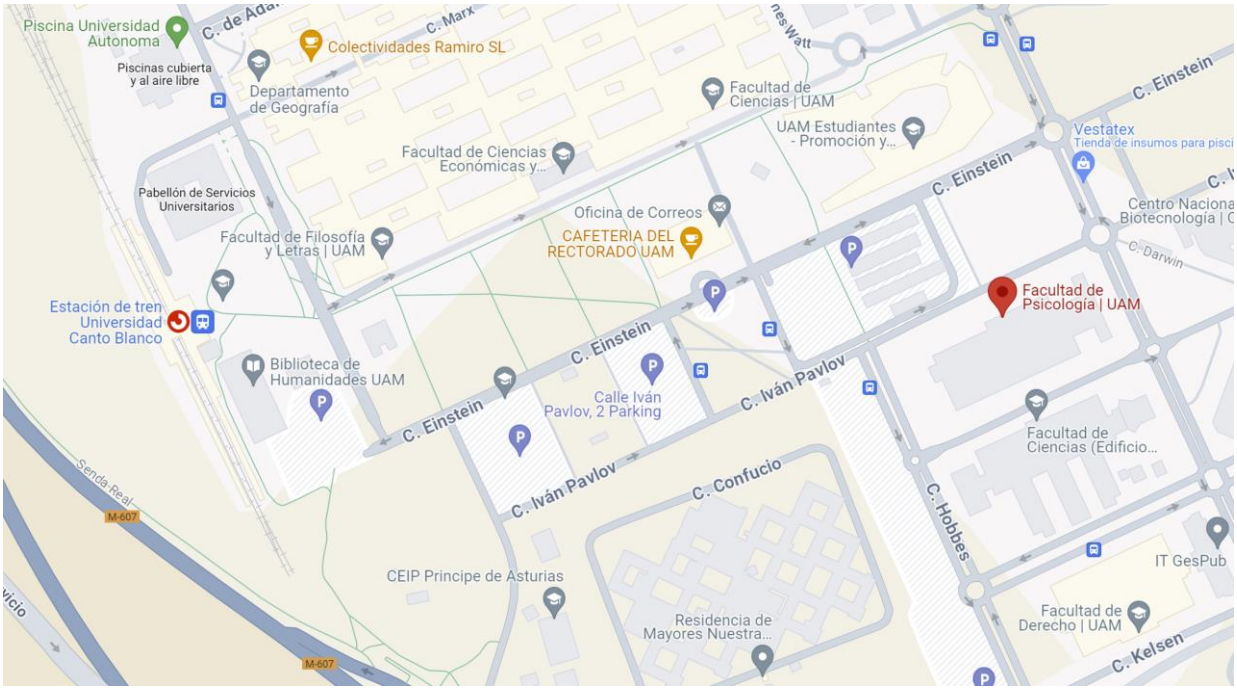
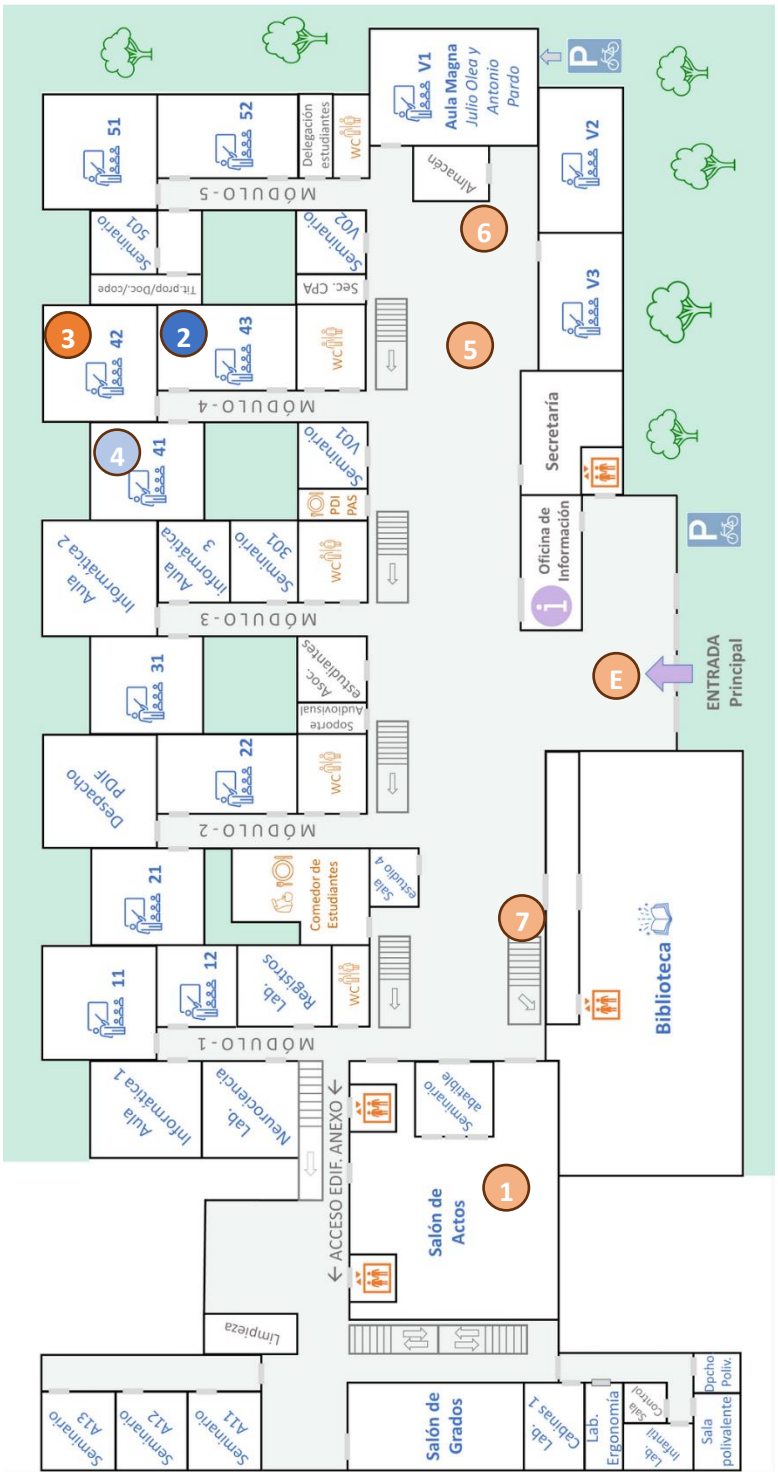


VENUE MAP – POINTS OF INTEREST



- E Entrance
- 1 Conference Room: Salón de Actos
- 2 ROOM 43: Symposia, Oral and Short Communications
- 3 ROOM 42: Symposia, Oral and Short Communications
- 4 ROOM 41: Symposia, Oral and Short Communications
- 5 Posters
- 6 Coffee Break
- 7 To the Cafeteria

V International Congress of Psychobiology
Madrid, July 9-12, 2024

SEPSICOBIO

PROGRAM AT A GLANCE

TUESDAY July 9th

15:30-16:00
Arrival at "La Corrala"

16:00-17:30
Pre Congress Course 1
MSc Cristina Masegú

17:30-18:00
COFFEE BREAK

18:00-19:30
Pre Congress Course 2
Dr Jorge Riera

WEDNESDAY, July 10th

Time	Activity
08:15-09:00	**Registration** Hall Faculty of Psychology
09:00-09:30	**Opening Ceremony** Conference Room ("Salón de Actos")
09:30-10:30	**Plenary session** *A neurometabolic nexus linking anxiety and low motivation* **Dr. Carmen Sandi** Conference Room
10:30-11:00	COFFEE BREAK
11:00-12:15	Symposium 1 Symposium 2 Symposium 3
12:15-13:30	Oral Communications 1 Oral Communications 2
13:30-15:00	Free time for lunch
15:00-16:15	Symposium 4 Symposium 5 Symposium 6
16:15-16:45	COFFEE BREAK
16:45-17:45	**Posters Session 1** **Posters 1 to 35** Hall Faculty of Psychology
17:45-18:30	Short Communications 1 Short Communications 2
20:30-22:30	**Guided Tour to Madrid Histórico** Starts at: Estatua Felipe IV, Plaza de Oriente (Palacio Real de Madrid Square) Metro station: Ópera, or Plaza de España

THURSDAY, July 11th

Time	Activity
08:30-09:15	**Registration** Hall Faculty of Psychology
09:15-10:15	**Plenary session** *Face distortions as a window into face perception* **Dr. Brad Duchaine** Conference Room
10:15-10:45	COFFEE BREAK
10:45-12:15	Symposium 7 Symposium 8 Symposium 9
12:15-13:30	Oral Communications 3 Oral Communications 4
13:30-15:00	Free time for lunch
15:00-16:15	Symposium 10 Symposium 11 Symposium 12
16:15-16:45	COFFEE BREAK
16:45-17:45	**Posters Session 2** **Posters 36 to 71** Hall Faculty of Psychology
17:45-18:30	Short Communications 3 Short Communications 4
18:30-19:30	SEPSICOBIO meeting
21:15-23:15	**GALA Cocktail** Hotel Riu Plaza de España floor 21

FRIDAY, July 12th

Time	Activity
08:30-09:15	**Registration** Hall Faculty of Psychology
09:15-10:15	**Plenary session** *What is singular in the human brain?* **Dr. Carmen Cavada** Conference Room
10:15-10:45	COFFEE BREAK
10:45-12:00	Symposium 13 Symposium 14 Symposium 15
12:00-13:30	Oral Communications 5 Oral Communications 6
13:30-15:00	Free time for lunch
15:00-16:00	**Closing Lecture** *The Novel NeuroTechnologies. Implications for science, medicine, and society* **Dr. Rafael Yuste** Conference Room
16:00-16:30	**Closing and Awards Ceremony** Conference Room
17:00-18:00	**Networking SEPSICOBIO** Centro Cultural "La Corrala"

ROOM 43
ROOM 42
ROOM 41

SOCIAL PROGRAM

- From **Tuesday 9th to Friday 12th July**, inclusive, a guided tour will be offered between **10:00** and **14:00** at the La Corrala Cultural Centre, located at 3-5 Carlos Arniches Street, in the urban area of Madrid's Rastro (flea market). The visit, which lasts one hour, with previous (free) booking (**by those who wish to attend**) includes a presentation on the history of the corralas in Madrid and the way of life in them, as well as a tour of the Museum of Popular Arts and Traditions of the Universidad Autónoma de Madrid. A minimum of 8 and a maximum of 20 people is required for each hour-long session.

  Bookings (free): visitas.atp@uam.es (telephone: 91 497 65 00 / 09).

- On **Wednesday 10th July,** there will be a guided tour from **20:30** to **22:30** with qualified guides from Tour Time. We will be introduced to historic Madrid with curiosities, starting at Plaza de Oriente and ending at Plaza Mayor. We will be divided into groups of around 20 people for the visit, with radio guides available.

- On T**hursday 11th July** the Gala Cocktail will be offered from **21:15** to **23:15** (the cocktail service starts at 21:30) on the 21st-floor, terrace of the Hotel Riu Plaza España, an emblematic building located in the heart of Madrid, with spectacular views from the terrace that we would like to enjoy with you on that day.

A Neurometabolic Nexus Linking Anxiety and Low Motivation

Dr Carmen Sandi

Brain Mind Institute, Ecole Polytechnique Federal de Lausanne, Switzerland

Short biography

Carmen Sandi is a professor at the Swiss Federal Institute of Technology Lausanne (EPFL). She has made seminal contributions to understanding how stress affects brain function and behavior. Currently, her lab investigates the factors and mechanisms that define individual differences in stress effects, focusing on how brain mitochondria and metabolism regulate behavior, and using integrative approaches in rodents and humans. This work has profound implications for understanding the vulnerability and etiology of certain psychiatric disorders, such as anxiety and depression. Carmen completed her PhD at the Cajal Institute - CSIC and Universidad Autónoma de Madrid, followed by postdoctoral work at the University of Bordeaux and the UK Open University, and held a tenured professor position at Universidad Nacional de Educación a Distancia en Madrid (1996-2023). She was recruited by EPFL in 2003, where she later served as the Director of the Brain Mind Institute (2012-2019). She has published over 260 articles and several books, and has received numerous awards and honors, including the Ron de Kloet Prize for Stress Research, the John Paul Scott Award for Research on Aggression, and the Agora Prize from the Swiss National Science Foundation. She has held honorary appointments at several universities, including the Valkhof Chair at Radboud University, Distinguished Visiting Scientist at the Hungarian Academy of Sciences, and sabbatical professor positions at Bern and Rockefeller Universities. She was the co-Director of the Swiss Center for Competence in Research Synapsy (2016-2022) and is the founder and co-President of the Swiss Stress Network and the Global Stress and Resilience Network. She serves on several editorial and institutional boards and has been the President of various organizations, including the European Brain and Behavior Society (EBBS; 2009-2012), the Federation of European Neuroscience Societies (FENS; 2018-2020), the Cajal Advanced Neuroscience Training Program (2020-2021), and is also the founder of the ALBA Network, for which she served as Chair (2018-2021) and currently chairs the Council of Partners.

ABSTRACT

There is important inter-individual variation in motivated behavior, and trait anxiety is revealing as a key moderator of this variation. Our work in animals and humans identifies the involvement of mitochondrial function and metabolism in various brain regions, including the nucleus accumbens – a brain's motivation hub – and the dorsomedial prefrontal cortex/dorsal anterior cingulate (dmPFC/dACC) in the links between anxiety and motivation. We have also identified key hormonal systems explaining anxiety-related differences in the functioning of nucleus accumbens and motivated behavior. Work in rodents and humans will be presented; the former involving models of natural variation in anxiety, stress, and cell-specific viral manipulation, along with molecular, cellular and circuit-related analyses, while the latter concerning experiments magnetic resonance spectroscopy (MRS) and functional magnetic resonance imaging (fMRI). Our findings have implications for the understanding of the mechanisms involved in individual differences in vulnerability to stress and comorbidity between anxiety and depression.

Face distortions as a window into face perception

Dr Brad Duchaine

Department of Psychological and Brain Sciences, Dartmouth, Hanover, NH, USA

Short biography

Dr. Brad Duchaine is a professor in Psychological and Brain Sciences at Dartmouth. His research concerns the cognitive, neural, and developmental underpinnings of face processing and other aspects of visual recognition. A significant portion of his work focuses on disorders affecting face processing such as prosopagnosia and prosopometamorphopsia.

ABSTRACT

Prosopometamorphopsia (PMO) is a striking disorder characterized by face perception distortions. People with PMO see facial features that appear to melt, stretch, and change size, color, and position. The current research on PMO will be presented that sheds light on the cognitive and neural organization of face perception and also report on manipulations that strongly modulate distortions in some PMO cases.

What is singular in the human brain?

Dr Carmen Cavada

Department of Anatomy, Histology and Neuroscience, Universidad Autónoma de Madrid, Spain

Short biography

Licentiate degree in Medicine and Surgery at the University of Bilbao and PhD at Universidad Autónoma de Madrid (UAM). She is professor of Human Anatomy and Neuroscience at UAM. Former President of the Spanish Society for Neuroscience, currently she is Director of the UAM-Fundación Tatiana Chair in Neuroscience. She has developed extensive teaching in universities and research centres in both Spain and Europe. Her research work, of notable impact in the field of Neuroscience, deals with the study of the connective and chemical architecture of the human and non-human primate brain. She is a current member of the editorial board of international neuroscience journals and of steering and expert committees of international neuroscience societies.

ABSTRACT

After presenting singular features of human activity, such as art, problem solving or culture's construction, unique features of the human brain will be presented that help understanding those human characteristics. Data on gene expression and neuronal types unique to the human brain will be presented. From a regional and circuit approach, the relevant territories of the human frontal lobe supporting idiosyncratic functions will be shown, including communication through language, planning over time, and context-sensitive social relationships.

Dr RafaelYuste

Neuro Technology Center, Columbia University, NY, USA

Short biography

Neurologist and inspirator of the BRAIN project. He is a professor of biological sciences at Columbia University, New York. His current work focuses on deciphering how awareness and memories work, experimentally altering memories in laboratory animals.

Fetal Alcohol Spectrum Disorder (FASD). Cognitive and behavioral features

MSc. Cristina Massegú Serrà

Department of Biological and Health Psychology at Universidad Autónoma de Madrid; Neuropsychologist at University Clinic of Universidad Rey Juan Carlos

Short biography

Cristina Massegú Serrà has a degree in Psychology and a master's degree in Cognitive Neuropsychology, with more than 15 years of experience in the assessment and neuropsychological rehabilitation of people with various brain conditions (acquired brain injury, neurodegenerative disorders, neurodevelopmental disorders, etc). Currently, she combines her clinical work at the neurorehabilitation service of the University Clinic of Universidad Rey Juan Carlos with her passion for teaching as an associate professor in the Department of Biological and Health Psychology at Universidad Autónoma de Madrid. She is also an active member of the Cognitive, Social, and Clinical Neuroscience research group at the same university.

ABSTRACT

Prenatal alcohol exposure is the leading preventable cause of cognitive deficits in developed countries and can lead to fetal alcohol spectrum disorder (FASD). This term encompasses a wide range of physical, cognitive, and behavioral effects resulting from the damage caused by alcohol exposure during intrauterine life. Alcohol use among the general population is common in Eastern European countries and especially among women at risk of social exclusion regardless of their country of origin. A high number of these children are adopted in Spain and many of them present neurocognitive and behavioral alterations, making FASD a public health problem in our country. FASD still goes unnoticed, although several studies indicate that its prevalence is already higher than that of other neurodevelopmental disorders, and it is underdiagnosed due to the overlapping of neuropsychological symptoms caused by the combination of brain damage combined with neglect and lack of attachment. So far, a specific neurocognitive and behavioral profile of this disorder has not been described, precisely because many of the symptoms are common to other etiologies. There is no specific FASD treatment, as each person shows a set of symptoms with a differential degree of involvement. For this reason, treatment is mainly psychological (cognitive-behavioral), logopedic, functional, educational, and very exceptionally, pharmacological, the latter always being symptomatic.

Objectives of the course: 1) to show which are the most frequent neurocognitive and behavioral alterations associated with FASD; 2) to acquire enough knowledge to understand which tests should be included in a neuropsychological assessment protocol for FASD; and 3) provide some intervention guidelines to help these children compensate for their difficulties. This course includes a description of the cognitive and behavioral characteristics that can help us in the differential diagnosis of this disorder. A guide will be provided to develop an appropriate assessment protocol: through the presentation of cases, tests that assess general cognitive functioning (WISC-V, WAIS-IV, NEPSY-II), tests that assess specific cognitive processes (Stroop, 5-Digit Test, TAVECI, AGL, Global-Local Attention, among others) and questionnaires and/or scales that assess behavioral and emotional aspects will be reviewed.

Resolving the mesoscopic missing link. Biophysical modeling of EEG and fMRI from cortical columns

Dr. Jorge J. Riera-Díaz

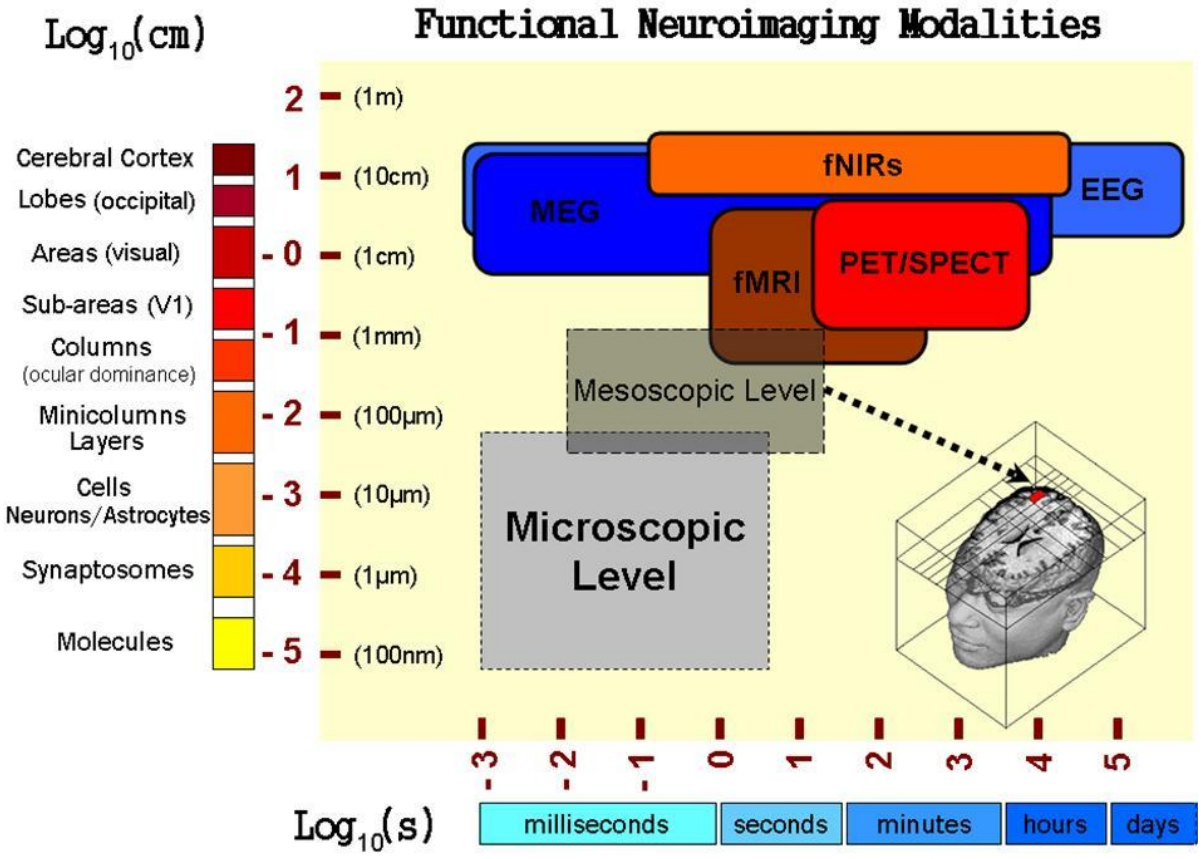
Department of Biomedical Engineering, Florida International University, Miami, FL, USA

Short biography

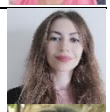
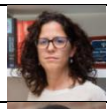
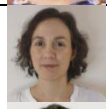
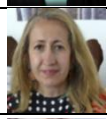
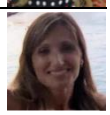
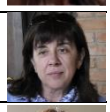
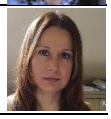
Educational background in physics and biomedical engineering, with specific training and expertise in MRI data acquisition/processing, biophysical models, fluorescent microscopy, Ca2+ imaging, and electrophysiology (e.g. EEG/MEG, intracranial electrical recording, ECoG). A long-term goal of his research is to understand the origin of mesoscopic phenomena in the neocortex of mammals. He has developed new inverse methods to estimate brain network activities from neuroimaging data and applied them to understand electrophysiological indicators of human cognition and to determine pathological signatures associated with migraine, epilepsy, and dementias. Postdoctoral training at RIKEN Brain Science Institute, Tokyo Institute of Statistical Mathematics, and Tohoku University Engineering School in electrophysiological data analysis/recording and neuroimaging modeling. In 2006, he created a multi-disciplinary group and a modern facility with avant-garde equipment for functional neuroimaging in small animals: the Brain Dynamics Center (BDC), and in 2007 he was appointed Associate Professor and Director of the BDC. In 2011, he was appointed Associate Professor of the Department of Biomedical Engineering at Florida International University. Research activity in his current lab, the Neuronal Mass Dynamics Lab, focuses on similar basic questions.

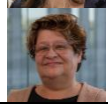
ABSTRACT

Forward-generative models are considered crucial to interpret and integrate data obtained with EEG and fMRI neuroimaging modalities. Typically, these models are formulated to represent biological principles at the mesoscopic scale, which basically stands for an average voxel (1 mm3) in these neuroimaging techniques. To this end, biophysical models for neuronal activity have been modified to incorporate general physiological mechanisms governing glial cell activity, vascular dynamics, and metabolism. For the cerebral cortex, the most relevant brain structure in functional neuroimaging, a variety of such extended biophysical models has been consolidating around two main research topics over the last decade: (a) the principles for neurovascular coupling and (b) the organization of cortical microcircuits. After modeling from mesoscopic variables to neuroimaging data, inversion of generative models provides insight into these underlying mechanisms of brain function and cognition. In this talk, I will revisit these concepts and present new promising results from my laboratory.


Functional Neuroimaging Modalities
Log10(cm)
2 (1m)
1 (10cm)
0 (1cm)
-1 (1mm)
-2 (100µm)
-3 (10µm)
-4 (1µm)
-5 (100nm)
Cerebral Cortex
Lobes (occipital)
Areas (visual)
Sub-areas (V1)
Columns
(ocular dominance)
Minicolumns
Layers
Cells
Neurons/Astrocytes
Synaptosomes
Molecules
MEG
fNIRs
EEG
fMRI
PET/SPECT
Mesoscopic Level
Microscopic Level
-3 -2 -1 0 1 2 3 4 5
Log10(s)
milliseconds
seconds
minutes
hours
days

SYMPOSIA LIST

No.	Symposium Name	Chairs
01	Neurobiology of reinforcement learning and its disorders: studies in animal models	Mercè Correa Sanz *Universitat Jaume I* 
02	Brain electrical tomography of superior cognitive processes	Ela I. Olivares Carreño *Universidad Autónoma de Madrid* 
03	Psychobiological markers in patients of clinical conditions	Irene Cano-López *Universitat de València*  Esperanza González-Bono *Universitat de València* 
04	Psychobiology of nutrition	Nuria del Olmo Izquierdo *Universidad Nacional de Educación a Distancia*  Helena Pinos *Universidad Nacional de Educación a Distancia* 
05	Stress and cognitive function	Vanesa Hidalgo Calvo *Universidad de Zaragoza* 
06	Energy as a cognitive recovery tool	Natalia Arias del Castillo *Universidad Nebrija* 
07	Corticolimbic networks for emotion and memory	Antonia Gómez García *Universidad de Sevilla*  Fernando Gámiz Ruiz *Universidad de Granada* 
08	Ethology, comparative psychology, and evolutionary psychology	Fernando Colmenares *Universidad Complutense de Madrid* 
09	Psychobiology of drug addiction and dual disorders in patients under treatment	Ana Adan Puig *Universidad de Barcelona* 
10	Motivational and emotional brain circuits involved in behavior: implications for psychopathology	María José Simón *Universidad de Granada* 
11	Immune system and neuroinflammation in alcohol abuse: translational studies addressing cognitive impairment	Laura Orío *Universidad Complutense de Madrid* 
12	Neuropsychology in different fields of action	Valentina Ladera Fernández *Universidad de Salamanca* 
13	Environmental determinants in neurodevelopmental and behavioral programming	Nélida María Conejo Jiménez *Universidad de Oviedo* 

14	Psychobiology of addictions	Marcos Ucha Tortuero *Universidad Nacional de Educación a Distancia*	
15	Use of biomarkers to explore gender diversity and physical and cognitive frailty: a view from psychobiology	Blanca Laffon Lage *Universidade da Coruña* Rosa Fernández García *Universidade da Coruña*	 

Symposium 01: Wednesday, July 10th, 11:00-12:15
Neurobiology of reinforcement learning and its disorders: studies in animal models

Chair: Mercè Correa Sanz

Universitat Jaume I

SUMMARY

Preclinical models based on the Research Domain Criteria (RDoC) approach to the study of the neural circuits that underlie specific behavioral processes and its specific pathological symptoms, are refocusing mental health research. In the present symposia four different rodent models are presented to study the vulnerability to express key symptoms that affect motivated behavior. Individual differences in willingness to work can help to understand the underlying factors of vulnerability for symptoms such as anergia, avolition or fatigue, which are important in some psychological and neurological pathologies such as depression, schizophrenia or drug withdrawal. Dopaminergic mechanisms in the nucleus accumbens such as the Cerebral Dopamine Neurotrophic Factor (CDNF) are presented as regulating effort expenditure and effort-based decision making. A preclinical model of compulsive behavior, the Schedule-Induced Polydipsia (SIP), reveals individual differences that allow the study of compulsive behavior, a transdiagnostic trait present in different neuropsychiatric disorders such as obsessive-compulsive disorder, autism, addiction, and eating disorders. Brain neuroanatomic and genetic alterations regarding 5-HT2A receptors in the frontal cortex underlie these differences. Drug-induced neuroplasticity changes are persistent over time, remodeling brain circuits and creating long-lasting memories that trigger drug seeking and taking. Perineuronal nets (PNNs) are a neuronal mechanism for synaptic stabilization. Drug-induced PNN expression around Golgi interneurons of the posterior cerebellar vermis modulate increases in PNN expression in infralimbic (IL) and prelimbic (PrL) regions. An important factor affecting behavior is the regulation of the circadian clock machinery. The impact of arrhythmicity is investigated by means of a genetic model (Bmal1-knockout mice), and of a protocol using environmental factors that reproduces a “social jet-lag model” in rodents. With the use of these models a behavioral phenotype related to cognitive and motivational responses, and the oscillatory profile of relevant genes related to circadian rhythms and neurotransmitters related to motivation and plasticity is established.

Individual differences in effort-based decision-making in rodents: dopaminergic correlates of vulnerability to anergia.

Mercè Correa[1], Andrea Martínez-Verdú[1], Régulo L. Olivares-García[1], Paula Matas-Navarro[1], Edgar Arias-Sandoval[1], Carla Carratalá-Ros[2] & John D. Salamone[3]

[1]*Universitat Jaume I, Psychology Unit, Castelló, Spain*

[2]*Universidad de Castilla la Mancha, Dpto. de Psicología, Albacete, Spain*

[3]*University of Connecticut, Behavioral Neuroscience Div. Storrs, Connecticut, USA*

Motivated behavior is characterized by a high degree of vigor, persistence, effort and activity. Nucleus Accumbens (NAcb) dopamine (DA) plays an important role in behavioral activation and effort-related decision-making. In the present work, we assessed individual differences in markers related to DA activity in the NAcb such as phosphorylation of pDARPP32-Thr34 and the Cerebral Dopamine Neurotrophic Factor (CDNF) and its relation to effort expenditure. We present data on individual differences for the tendency to work. In those experiments, rats and mice were assessed with a progressive ratio (PROG)/sucrose-drinking task, in which animals can either lever press to get access the high-sucrose solution, or alternatively, approach and consume a less preferred solution that is freely accessible. Additionally, in groups of mice selected for their individual differences on levels of voluntary running for long periods of time, we evaluate selection of active (running wheel) versus sedentary reinforcers (food rich in carbohydrates or fruit smell) in a 3-choice-T-maze task. In all these experiments we also perform behavioral phenotyping evaluation of novelty exploration, anxiety parameters and social contact seeking as potential behavioral correlates of those individual differences. In general, our data indicate that immunoreactivity for CDNF seems to be related to these individual differences, with number of positive cells higher in high responders. These results suggest that individual differences that lead to differences in effort-based choice can help to understand the underlying factors of vulnerability for symptoms such as anergia, avolition or fatigue, which are important in some psychological and neurological pathologies.

Funding: Grant to M. Correa from Ministerio de Ciencia e Innovación (PID2021-125977OB-I00).

Unraveling the neurobehavioral basis of the compulsive phenotype by preclinical rat models.

Elena Martín-González & M. Moreno-Montoya

Department of Psychology, Clinical and Experimental Neuroscience Research Group CTS280 and CIBIS, University of Almería, Almería, Spain

In 2030, Mental Illness might be the main cause of disability in the world. According to Research Domain Criteria (RDoC), compulsive behavior is considered a transdiagnostic trait present in many different neuropsychiatric disorders such as obsessive-compulsive disorder, autism, pathological gambling, addiction, and eating disorders. The research of our group has been focused on the assessment of behavioral and neurobiological differences in a preclinical model of compulsive behavior, Schedule-Induced Polydipsia (SIP). This is a behavioral procedure able to induce an adjunctive and compulsive drinking behavior in rats through fixed ratio food reinforcement. However, not all rats develop SIP, there are relevant individual differences that allow us to study a high drinker compulsive versus low drinker non compulsive rats. In this presentation, we will collate the main findings in compulsive rats selected by SIP, showing their behavioral deficits in cognitive flexibility, decision-making, and socioemotional behavior. Moreover, we will show the possible underlying mechanisms for compulsive vulnerability in high drinker rats, in terms of brain neuroanatomic and genetic alterations regarding 5-HT2A receptors in Frontal cortex. Finally, we will explain most of the effective treatments that have reduced compulsive behavior in our model. These results contribute to a better knowledge of the neuropsychopharmacological basis in a phenotype of compulsivity, that could help in the development of therapeutic and preventive strategies.

Funding: PID2022-139286NB-I00 PGC, MCIN/AEI/10.13039/ 501100011033; PND-2022I024 PNSD, MISAN; and SUBV23/00027, MIC, DGOJ, Gobierno de España and Fondos Feder.

Drug-induced memory trapped in a PNN.

Marta Miquel[1,2], Aitor Sánchez Hernández[1], Julián Guarque Chabrera[1,2] & Laura Font[1]

[1]*Universitat Jaume I, Psychobiology Unit, Castelló, Spain*

[2]*Dominick P. Purpura Department of Neuroscience. Albert Einstein College of Medicine, NY, USA*

Drug-induced neuroplasticity changes are persistent over time, remodeling brain circuits and creating long-lasting memories that trigger drug seeking and taking. Perineuronal nets (PNNs) are a neuronal mechanism for synaptic stabilization. PNNs are lattice cartilage-like structures formed by ECM molecules that wrap several neuronal populations, most of them fast-spiking, parvalbumin-positive (PV+) GABAergic interneurons. Drug-related plasticity and metaplasticity involve PNN regulation in different brain regions. In the cerebellum, Golgi GABAergic interneurons and glutamatergic and GABAergic output neurons of the deep cerebellar nuclei express PNNs. We have explored the role of cerebellar PNNs in drug-induced Pavlovian conditioning and cocaine self-administration. Our findings showed that both drug-induced conditioned memory and cocaine self-administration enhance PNN expression around Golgi interneurons of the posterior vermis. Moreover, the posterior vermis impairment that facilitates the establishment of cocaine-induced conditioned preference increases PNN expression around GABA/Parvalbumin+ interneurons in infralimbic (IL) and prelimbic (PrL) regions. Likewise, deactivating the infralimbic (IL) but not prelimbic cortex (PrL) encourages the expression of PNNs surrounding cerebellar Golgi interneurons and promotes conditioned preference. Our research also showed that PNN removal in the posterior vermis prevents short-term cocaine-induced conditioned memory and also prevents the stabilization of extinction memory, promoting reinstatement. Degradation of cerebellar PNNs during protracted abstinence does not prevent incubation of drug seeking but reduces the persistence of the response. Taken together, these findings indicate that PNNs around Golgi interneurons work as mechanisms for synaptic stabilization of drug-induced memory.

Funding: This research received funding for the R&D&I project PID2021-128852NB-I00 "ERDF A way to do Europe” from MCIN/AEIhttps://doi.org/10.13039/501100011033/.

Altered circadian rhythmicity leads to changes in cognition and motivation in mice.

Olga Valverde

Neurobiology of Behavior Research Group (Grenec-NeuroBio), Department of Medicine and Life Sciences, University Pompeu Fabra, Barcelona

The circadian clock controls the body's natural rhythms by synchronizing them to the environment over a 24-hour period. These molecular rhythms play a crucial role in regulating a variety of biological processes, including metabolic activities and behavior. Notably, disruption of rhythmicity has also been linked to changes in motivation and reward control. Disruption of circadian rhythms could be produced by genetic or molecular impairments, but alternatively, can also be induced by environmental factors, many of which have been observed in humans. In this context, the objective of this study is to investigate the behavioral and molecular consequences of arrhythmicity by means of two different models: i) a genetic model by using the Bmal1-knockout (KO) mice, that has been reported to induce altered activity patterns, and ii) a disruption protocol using environmental factors that contemplated long activity periods combined with a phase delay that experimentally reproduces a “social jet-lag model”. For this second procedure, we use adolescent mice to know the impact of changes in natural rhythms during this phase of the neurodevelopment. The study of both experimental models allows us to delineate the behavioral phenotype of the animals by means of a battery of well-established cognitive and motivational responses. Lastly, we aimed to assess the oscillatory profile of the expression of relevant genes related to circadian rhythms rhythmicity, and neurotransmitters related to motivation and plasticity to determine the influence of our experimental conditions at molecular level. This research sheds light on our understanding of how cognitive and motivation processing are under the regulation of circadian clock machinery.

Funding: This research is funded by the grant PID2022-136962OB-100 "ERDF A way to do Europe” from MCIN/AEI/https://doi.org/10.13039/501100011033/, and from Ministerio de Sanidad, PNSD (#2023/005) and Fondos de Recuperación, Transformación y Resiliencia (PRTR) Unión Europea (#Exp2022/008695). OV is recipient of an ICREA Academia Award (Institució Catalana de Recerca i Estudis Avançats, Generalitat de Catalunya).

Symposium 02: Wednesday, July 10th, 11:00-12:15
Brain electrical tomography of superior cognitive processes

Chair: Ela Isabel Olivares

Department of Biological and Health Psychology, Faculty of Psychology, Universidad Autónoma de Madrid, Spain

SUMMARY

The knowledge of the neural basis of mental processes is a constant goal of research in psychobiology. The present symposium presents four studies illustrating different approaches to explore the architecture and circuitry characterizing the human brain functions, especially those related to cognition. The first study, from the Florida International University, investigates the contribution of the different cortical neurons (apart from the pyramidal ones) to the activity recorded as local field potentials, current source density and EEG, reporting that certain GABAergic interneurons have a relevant contribution to such potentials. The second study, from Universidad Autónoma de Madrid, presents two ERP experiments addressing the global/local processing of faces as complex visual stimuli and showing how the typical global precedence in face perception can be modulated by the presence of incongruent local face components. The third study, from Universidad de Santiago de Compostela, addresses the preclinical indexes of decaying in episodic memory in individuals at risk of Alzheimer disease, showing that ERPs are an invaluable neuroscientific tool in the neurocognitive evaluation of special populations. Finally, the fourth study, with the contribution of several research institutes from Canada, Mexico, Italy, Cuba, and China, addresses an innovative EEG connectivity analysis in dyslexic participants based on Boder's model, suggesting important neurophysiological distinctions between dysphonetic dyslexia and non-specific reading delay, which can be found even in resting states.

Multiscale electrical signatures of interneuron in agranular frontal cortex of macaques during performance monitoring.

Jorge Riera[1], Beatriz Herrera[1] & Jeffrey Schall[2]

[1]*Florida International University, USA*

[2]*York University, Toronto, Ontario, Canada*

Introduction. Extracellular potentials have been assumed to originate mainly from the postsynaptic potentials and nonlinear dendritic dynamics of pyramidal cells (PCs). Thus, most biophysical modeling studies have focused on evaluating the local field potentials (LFPs), current source density (CSD), and EEG signatures of distinct PC populations in different cortical areas. Only a few studies have examined the contribution of GABAergic interneurons to these signals. Yet, they have mostly focused on basket cells and considered a limited number of interneurons and morphology reconstructions. Furthermore, they did not account for differences in the interneurons laminar across cortical areas nor considered external inputs associated with experimental paradigms. Method. Here, we evaluated the contribution of GABAergic interneurons in agranular frontal cortex to the extracellular potentials, considering their actual density throughout the cortical laminae and a total of 54 detailed biophysical models with distinct morphological reconstructions. Results. We found that calbindin (CB) and parvalbumin (PV) populations have a nonnegligible contribution to the LFP/CSD and EEG, while the calretinin (CR) interneurons only contribute to the signal as white noise. Furthermore, we examined the combined contribution of error PCs and supplementary eye field (SEF) interneurons to the ERN and Pe-component. Discussion and conclusions. Our results suggest that the combined activity of error PCs and interneurons more closely resembled the SEF CSD-derived EEG. Our work reports, for the first time to our knowledge, a nonnegligible contribution of interneuron populations to extracellular potentials.

Neurophysiological markers of the disruption of the "global precedence effect" when perceiving new faces.

Alba Jiménez-Bascuñán, Ela Isabel Olivares, Jorge F. Bosch-Bayard & Jaime Iglesias Dorado

Department of Biological and Health Psychology, Faculty of Psychology, Universidad Autónoma de Madrid, Spain

Introduction. Global/local processing is involved in the integration of parts into a whole for perceiving complex stimuli. Previous studies with large letters composed by the same or different small letters have described a global precedence effect (GPE) in young adults. We searched for neurocognitive markers of the global/local perception of new faces, one of the most relevant stimuli in human daily life. Methods. We conducted two high-density ERP experiments (N=32 young adults -16 women- each) using compound faces with different levels of incongruence, considering their global and local components. Experiment 1 included three oddball tasks with regular, congruent, and incongruent compound faces as frequent irrelevant stimuli, while Experiment 2 added a fourth task using common objects. Results. In Experiment 1, the amplitudes of face-sensitive N170/VPP ERPs decreased with compound faces, especially with the incongruent ones, suggesting a disruption of global processing. Interestingly, we observed a frontocentral negativity ~200-350ms whose amplitude increased progressively with stimulus incongruency. In Experiment 2, N170/VPP responses were similar between both types of compound faces and objects, whereas the frontocentral negativity had a similar amplitude between incongruent faces and objects. Moreover, a late positivity ~420-570ms, specific to objects, was observed. Neural sources reconstruction for the three ERPs of interest was analysed. Discussion. Results suggest that modifying the local elements of unfamiliar faces, especially if they are incongruent with the global configuration, leads to disruption of the typical GPE in young adults. Furthermore, the frontocentral negativity ~200-350ms suggests the engagement in attentional processes related to incongruences of the stimuli relative to the task context. Finally, the object-related late positivity might indicate subroutines concerning object recognition. Conclusion. The predominant global processing of faces can be modulated if the focus is directed to incongruent local elements. This experimental design can be useful to study face perception changes in neurodegenerative disorders.

Funding: FPI-UAM, Ministerio de Ciencia e Innovación (PID2022-139628NB-I00).

ERP indices of episodic memory decaying in participants with subjective cognitive decline in risk of Alzheimer's disease (SCD+).

Santiago Galdo Álvarez[1,2], Miguel Ángel Rivas Fernández[3], Montserrat Zurrón[1,2], Fernando Díaz[1,2] & Mónica Lindín[1,2]

[1]*Department of Clinical Psychology and Psychobiology, Universidade de Santiago de Compostela, Santiago de Compostela, Spain*

[2]*Cognitive Neuroscience Research Group, Health Research Institute of Santiago de Compostela (IDIS), Santiago de Compostela, Spain*

[3]*Imaging of Mood and Anxiety-Related Disorders (IMARD) Group, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona, Spain*

Introduction: Subjective Cognitive Decline (SCD) has garnered increasing attention in recent years, denoting the presence of self-reported cognitive concerns without objective evidence of impairment (Jessen et al., 2020). However, emerging evidence suggests that individuals with SCD exhibit neurostructural and neurophysiological changes (Rivas-Fernández et al., 2023), particularly those with biomarkers associated with Alzheimer's Disease (AD). This study aimed to investigate whether the diagnosis of SCD accompanied or not by a risk of AD (SCD+ vs SCD-) influences the psychophysiological (Event-related Potentials -ERPs-) correlates of episodic memory retrieval. Methodology: Three groups of participants (matched in age, sex and years of education) from the CompAS longitudinal study were included in this study: SCD+ individuals with AD-related biomarkers (N=11), SCD individuals without AD-related biomarkers (SCD-) (N=44), and a control group (N=53). Participants engaged in an old/new recognition memory task involving words, while their EEG activity was recorded. They were required to indicate whether presented words belonged or not to a list of 30 words learned 20 minutes earlier by pressing designated buttons. ERP components, including the Frontal Negativity (FN400) associated with familiarity and the Late Positive Component (LPC) linked to memory recollection, were quantified in terms of amplitude and latency. Results: Analyses of variance (ANOVAs) unveiled an old/new effect exclusively in the LPC amplitude as well as differences between conditions in its latency across all groups, consistent with prior findings from an analogous task. However, SCD+ participants exhibited diminished FN400 amplitudes in both conditions (old and new words) compared to the other two groups. Conclusions: This study supports the presence of ERP indices of decaying in episodic memory retrieval among SCD+ individuals at risk of AD, notwithstanding the absence of discernible memory deficits in the neuropsychological assessment. Furthermore, the findings underscore the importance of enhancing SCD diagnosis with AD-related psychobiological biomarkers.

Resting EEG effective connectivity at the sources in developmental Dysphonetic Dyslexia.

Jorge Bosch-Bayard[1,4,5], Rolando Jose Biscay[2], Katia Girini[3], Pedro Valdés-Sosa[4], Alan C. Evans[5] & Giuseppe Chiarenza[3]

[1]*Department of Biological and Health Psychology, Faculty of Psychology, Universidad Autónoma de Madrid, Spain*

[2] *Centre for Research in Mathematics, Guanajuato, Mexico*

[3]*Centro Internazionale dei Disturbi di Apprendimento, Attenzione e Iperattivita, Milano, Italy*

[4]*University of Electronic Science and Technology of China, Chengdu, Sichuan, China*

[5]*Montreal Neurological Institute, McGill University, Montreal, Quebec, Canada*

Introduction. Previous research on Dysphonetic Dyslexia (DD) suggests a lack of efficient coordination among different brain regions, termed neuronal dyschronia or timing deficiency. This study investigates brain connectivity in individuals with DD compared to those with Non-Specific Reading Delay (NSRD). We hypothesize that dyslexic individuals exhibit altered information flow due to timing defects. Method. We analyzed 184 subjects with DD (121 males and 63 females, mean age 9.3) and 43 children with NSRD (26 males, and 17 females, mean age 9.7). Dyslexia subtypes were identified using the Direct Test Reading and Spelling (DTRS) based on Boder's model (Boder, 1973). EEG recordings from 19 leads (1020 System) during eyes-closed were analyzed. To mitigate volume conduction, EEG signals were projected to the source space using sloreta and then unmixed following Biscay et al. (2018). Connectivity analysis involved 17 Regions of Interest (ROIs) identified via a data-driven approach. Effective connectivity was assessed using Isolated Effective Coherence (iCoh) (Pascual-Marqui et al., 2014), a measure of causal information flow in the frequency domain based on Akaike's Noise Contribution Ratio (NCR) (Akaike, 1968). Statistical analysis employed a linear mixed effect (LME) model (SURFSTAT, Worsley et al., 2009), with permutation techniques (Galan et al., 1994) to correct for multiple comparisons. Results were categorized by frequency bands. Results. In DD, increased activity was observed in the left calcarine sulcus, serving as a hub for information flow to various regions, particularly in slower frequency bands. Additionally, a network in the right hemisphere, predominantly in the Beta1 band, showed altered connectivity pathways. Conversely, NSRD exhibited predominant information flow in higher frequency bands, centered around the left rolandic operculum. Discussion and conclusion. This study pioneers EEG connectivity analysis in dyslexic subjects based on Boder's model, suggesting fundamental neurophysiological distinctions between DD and NSRD, evident even during resting states.

Symposium 03: Wednesday, July 10th, 11:00-12:15
Psychobiological markers in patients of clinical conditions

Chairs: Irene Cano-López & Esperanza González-Bono

Institut d'Investigació en Psicologia dels Recursos Humans, del Desenvolupament Organitzacional i de la Qualitat de Vida Laboral (IDOCAL)

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SUMMARY

The bio-psycho-social model of health supports that the interrelation between psychological and biological variables can relevantly contribute to explaining pathological conditions from a comprehensive view of the patients. This symposium focuses on psychobiological markers in clinical conditions through four presentations. The first presentation is entitled “Beyond the Surface: Understanding Suicidal Vulnerability Through Cardiovascular and Emotional Dynamics” and will be conducted by Dr. Adrián Alacreu. By analyzing cardiovascular and emotional responses to social stress in individuals with a history of depression and suicide attempts with high impulsivity, this study highlights potential biomarkers of suicidal behavior and contributes to the identification of high-risk patients. The second presentation, with the title “Clinical utility of EpiTrack and polytherapy as predictors of memory functioning and quality of life in patients with epilepsy”, will be carried out by Dr. Alejandro Lozano. This presentation focuses on the impact of polytherapy on attentional and executive functions, memory, and perceived quality of life in patients with drug-resistant epilepsy. The third presentation is entitled “The increase in blood ammonia and alterations in hand-eye coordination negatively affect the health-related quality of life of women with minimal hepatic encephalopathy” and will be conducted by Ms. Daniela Batallas. This study explores the associations between blood ammonia levels, minimal hepatic encephalopathy, and health-related quality of life in patients with liver cirrhosis, as well as the moderating influence of sex on these associations. Finally, the fourth talk, entitled “Neuropsychological profile and aging in Down syndrome”, will be conducted by Dr Camino Fernández, and copes with the cognitive aspects of this population in a critical period of their vital cycle. These presentations collectively emphasize the importance of integrating psychological, biological, and social factors in understanding and addressing clinical conditions.

Beyond the Surface: Understanding Suicidal Vulnerability Through Cardiovascular and Emotional Dynamics.

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Individuals with a history of suicide attempt (SA) exhibit a particular sensitivity to social stress. The literature suggests that stress response, which can be influenced by impulsivity, is at the core of suicidal vulnerability. Particularly suicidal patients with high impulsivity have greater cortisol response to social stress. However, emotional response remains understudied, and to our knowledge, there are no data analyzing the effect of impulsivity on Cardiovascular (CV) response to stress in suicidal patients. The objective of our study was to investigate CV and emotional responses to social stress in individuals with a history of SA with high impulsivity. We recruited 30 adult women with a history of depression and SA (SA group) and 34 with a history of depression without SA (affective controls, AC group). They were placed in a social stress situation using the virtual Trier Social Stress Test (v-TSST). CV response was measured using impedance cardiography throughout the v-TSST, and emotional response was assessed using questionnaires at different time points. Impulsivity traits were evaluated using the BIS-10. SA subjects showed a significant decrease in pre-ejection period (PEP) before the v-TSST, suggesting an anticipation to stress. Patients with low impulsivity and rapid recovery of High frequency and Low frequency heart rate variability were more at risk of being SA. Patients with high impulsivity and greater negative emotional reactivity were more at risk of being SA. Patients with low impulsivity and slower anxiety reduction after stress were more at risk of being SA. CV parameters may represent biomarkers of suicidal behavior. The role of impulsivity in stress vulnerability, resulting in altered CV and emotional responses in these subjects, could help identify at-risk individuals.

Clinical utility of EpiTrack and polytherapy as predictors of memory functioning and quality of life in patients with epilepsy.

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Introduction. In patients with drug-resistant epilepsy, the most common antiseizure medication (ASM) treatment regimen is polytherapy, which increases the possibility of unwanted effects, including cognitive effects (Mula & Trimble, 2009). Among the factors that modulate the quality of life of patients are polytherapy and memory performance (Alexander et al., 2018; Mosaku et al., 2006; Wang et al., 2022). However, existing studies on the subject usually address the effects of ASMs on quality of life or memory separately. Therefore, this work aims to investigate the relationships between the impact of polytherapy on attentional and executive functions, memory and perceived quality of life in the same sample of patients with drug-resistant epilepsy. Methods: Four studies have been carried out in patients with drug-resistant epilepsy who underwent a neuropsychological evaluation, to study, first, the impact of ASMs on memory in a context of manipulation of neural activity such as the Wada test (Study 1). Subsequently, we addressed the effect of pharmacological (number of ASM) and executive-attentional (EpiTrack) indicators of ASMs on memory and quality of life (Studies 2 and 3), before and after surgery. Finally, we examined whether there is a mediating effect of ASMs on the relationship between cognitive functioning (EpiTrack) and quality of life (Study 4). Results. The main results of the studies suggest that the impact of ASMs on quality of life is due, on the one hand, to a cognitive indicator effect (i.e., the impact of ASMs on attention and executive functions) and, on the other hand, to a direct effect measured through the impact of the number of drugs on memory. Conclusions. These results represent an advance in the knowledge of neuropsychology in drug-resistant epilepsy since they point to the relevance of polytherapy on the cognitive aspects and quality of life of these patients.

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The increase in blood ammonia and alterations in hand-eye coordination negatively affect the health-related quality of life of women with minimal hepatic encephalopathy.

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Minimal hepatic encephalopathy (MHE) affects 30-50% of liver cirrhosis patients, causing mild cognitive impairment and Hand-Eye Coordination (HEC) alterations. Hyperammonemia is key in MHE development, contributing to motor and cognitive deficits. Elevated blood ammonia and impaired HEC correlate with neuropsychiatric dysfunction in cirrhotic patients. However, their impact on subjective well-being remains unclear. This study aims to explore the potential associations between blood ammonia, HEC, and health-related quality of life (HRQoL) as well as the moderating influence of sex on these associations. Eighty-seven cirrhotic patients (65 men and 22 women) and 23 healthy volunteers (13 men and 10 women) aged between 44 and 80 years participated in this study. Participants underwent assessment using the psychometric hepatic encephalopathy score (PHES) for MHE diagnosis, performed tasks on the Vienna Test System to assess bimanual and visuomotor skills, and completed the SF-36 questionnaire to evaluate HRQoL. Blood samples were collected to measure ammonia. After controlling by age and education, results indicated significantly higher ammonia concentrations in individuals with MHE compared to those without MHE and controls. Moreover, MHE patients exhibited lower performance across all HEC tasks. Despite this, increased blood ammonia and HEC indices did not directly predict HRQoL. However, moderated-moderation analysis revealed an interaction between MHE presence and sex, in relation to ammonia levels or HEC and both physical and mental functional health. Thus, the increase in ammonia levels and the poorer performance of HEC negatively affect the HRQoL of women with MHE, a trend not observed in men with MHE, nor in non-MHE patients. These findings emphasize sex and MHE status in HEC impairments, affecting how cirrhotic patients perceive physical and mental health. Recognizing sex-specific differences in MHE expression could refine diagnostic and treatment approaches, enhancing outcomes and HRQoL for all patients. Keywords: MHE hyperammonemia, Hand-Eye Coordination, Quality of Life.

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Neuropsychological profile and aging in Down's syndrome.

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Background. Adults with Down syndrome (DS) have an elevated risk of early onset Alzheimer's disease (average age of onset in the mid-50s). Knowledge of the neuropsychological profile of adults with DS and its evolution with advancing age is essential to develop early diagnostic systems. However, studies in adults with DS are limited, and most of them are based on inter-group differences but not on intra-group differences. Aims. The study explores the neuropsychological profile and changes with advancing age in adults with DS, considering intergroup and intragroup differences. Method and procedures. The sample was composed of 40 adults with DS and 38 adults with moderate intellectual disability (ID) but without DS, matched for chronological age, sex, and intellectual level. The two groups were assessed twice with an interval of 4 years between assessments. Outcomes and results. In the first assessment, the participants with DS, unlike the other group, exhibited similar performance in their verbal and visual abilities, as well as in their verbal comprehension and production abilities (intra-group differences). In addition, they showed worse performance in verbal general measures and verbal comprehension abilities but similar performance in visual general measures and verbal production abilities (inter-group differences) compared with those without DS with similar intellectual levels on standardized measures. The outcomes of the second assessment are still preliminary. Analyses indicate that changes with advancing age are similar in both groups. The two groups show an improvement in verbal production abilities and a deterioration in visual abilities. Conclusions and implications. The outcomes highlight that a lack of dissociation between verbal and visual abilities, as well as between verbal comprehension and production abilities, seems to be a specific feature of adults with DS. However, changes with advancing age appear to be similar in adults with and without DS.

Symposium 04: Wednesday, July 10th, 15:00-16:15
Psychobiology of nutrition

Chairs: Nuria del Olmo & Helena Pinos

Department of Psychobiology, School of Psychology, National Distance Education University (UNED)

SUMMARY

This symposium will analyze current contents in the relationship between nutrition and brain functions based on the multidisciplinary experience of the authors. Delving into this topic, we will explore the ways in which nutritional alterations can impact various aspects of brain function. Key topics to be addressed include the consequences of early malnutrition and the development of obesity, inflammation, and peripheral abnormalities. Furthermore, we will investigate the effects of nutrition on neurobiological mechanisms across different stages of life, from the developing brain to adolescence and aging. Specifically, we will explore how prenatal nutrition shapes the development of the nervous system and cognitive processes, the impact of dietary choices on brain function during adolescence, and the role of nutrition in maintaining brain health in older adults. Moreover, the effect of tributyrin (TB), a butyric acid prodrug, in reversing the impairment of working memory and synaptic plasticity induced by enriched diets containing either saturated or unsaturated will be presented, proposing TB as a promising tool endowed with therapeutic potential in memory impairment conditions. Additionally, we will discuss how caloric restriction, characterized by reduced caloric intake without compromising essential nutrients, may enhance the effects of butyric acid on brain function. Through the presentation of empirical findings, this symposium aims to elucidate the multifaceted effects of dietary components on metabolic, inflammatory, and microbiotic responses, as well as the organization and physiology of brain circuits governing cognitive processes such as learning, memory, and reinforcement. While the influence of diet on brain function is widely accepted, the neurobiological mechanisms underlying these effects are only beginning to be understood. Our discussion seeks to provide insights into the impact of both harmful and beneficial dietary components on brain physiology and behavior, with implications for understanding normal brain function and addressing brain diseases.

A dietary shift from a maternal Western diet to a healthy diet after weaning restores impaired behavioral flexibility in spatial learning and brain oxidative metabolism in adult rats.

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The rising trend of obesity and overweight issues worldwide is attributed to the gradual adoption of the Western diet pattern brought about by globalization, urbanization, and socioeconomic changes. Consumption of a Western diet rich in saturated fats and sugar but low in fiber during gestation can have an impact on the offspring's neurodevelopment, leading to long-term consequences on adult brain function and behavior. To investigate the effects of gestational and early exposure to an obesogenic Western dietary pattern, pregnant Wistar dams were divided into three groups according to diet consumed: high-fat and high-sugar (HFS), standard (SD), and dietary reversal (R), the latter group with their offspring switched to a standard diet after weaning. In this study, spatial learning and behavioral flexibility in the male and female offspring of the three experimental groups were evaluated using the Morris water maze from postnatal day 60. Brain oxidative metabolism in the prefrontal cortex and hippocampus was also assessed. Remarkably, the HFS group performed similarly to the other groups in the spatial learning task but showed impaired cognitive flexibility. Additionally, the HFS group displayed higher brain metabolic capacity than the SD group. Reversing the HFS diet to an SD diet restored brain metabolic activity in both sexes to levels similar to those in the SD diet group. However, dietary reversal had only moderate, sex-dependent effects on body weight and fat distribution. These findings suggest that transitioning from an HFS diet to a balanced diet before early adolescence can improve behavioral flexibility and brain metabolism without significant sex differences.

Funding: This research was supported by MINECO grant PSI2017-83038-P (Ministry of Economy, Industry and Competitiveness, Spain).

Beyond basic needs: unveiling the link between prenatal diet and cognitive function.

Fernando Gámiz & Milagros Gallo

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Prenatal nutrition plays a pivotal role in the development of the nervous system and cognitive processes. The adequate intake of essential nutrients, such as folic acid and choline, during pregnancy contributes to the formation and maturation of the brain and nervous system in the fetus. Moreover, the uterine environment, rich in gustatory and olfactory sensory stimulation, can also have a lasting impact on the offspring. Consequently, nutrition during this stage may alter metabolic, inflammatory, or microbiotic responses, as well as the organization and physiology of brain circuits responsible for cognitive processes such as ingestion, reinforcement, taste preferences, decision making, among others. All these early experiences can "program" the organism for the rest of its adult life, as per the Barker Hypothesis. This presentation will review findings concerning various prenatal nutrition manipulations, ranging from malnutrition to supplementation. We will focus on the cognitive effects observed in preclinical studies in our lab and discuss how the concept of fetal programming can not only elucidate the predisposition to suffer from diseases or pathologies throughout life but also prepare us to better adapt to the extrauterine environment. Understanding the psychobiological mechanisms of prenatal nutrition can be a useful tool for understanding the development of the nervous system and for implementing public health policies.

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Restoring cognitive function: short-chain fatty acids as potential reversal agents for spatial memory impairment induced by saturated fatty acid-enriched diets.

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Introduction: Short-chain fatty acids, such as butyric acid, derived from the intestinal fermentation of dietary fiber, have been proposed as a treatment for certain pathologies of the central nervous system. Our research group has shown that tributyrin (TB), a butyric acid prodrug, reverses deficits in spatial memory and modulates hippocampal synaptic plasticity. Methods: Diets enriched in saturated (SOLF; Saturated OiL-enriched Food) or unsaturated (UOLF; Unsaturated OiL-enriched Food) fats were administered to 5-week-old male and female mice for either 2 hours or 8 weeks, and the effect of a TB-enriched diet administration was studied on spatial learning and memory (SLM) using both the Y-maze and the eight-arm radial maze (RAM). Additionally, hippocampal expression of genes involved in glutamatergic transmission as well as synaptic plasticity (long-term potentiation -LTP- and long-term depression -LTD-) were also analyzed. Results: Our results demonstrate that a TB-treatment regimen reversed the impairment of working memory and synaptic plasticity induced by enriched-fat diets and these effects are dependent on the diet, treatment duration, and sex. Specifically, 2 hours of SOLF intake impaired LTP as well as spatial memory measured in the Y-maze in juvenile male but not female mice. In contrast, 8-week treatment with SOLF/UOLF deteriorated SLM measured in the RAM in both sexes. Moreover, TB reversed the detrimental effects of SOLF in males and UOLF in females in SLM and synaptic plasticity, suggesting a potential beneficial influence of this molecule in learning and memory processes. These effects appear to be associated to the LTP-facilitation induced by TB through PPARγ and AMPK molecular pathways. Conclusions: Our study suggests that TB may offer therapeutic benefits for memory impairment by improving hippocampal synaptic plasticity and spatial memory.

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Diet and the Aging Brain: Relevance of Sex Differences.

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Advancements in the scientific, technological, and healthcare sectors have significantly increased life expectancy in our society over recent years. However, this increase has also led to a higher prevalence of age-related diseases. Ensuring not only a longer life expectancy but also years of healthy living requires research into strategies that can enhance the quality of life, such as delaying brain aging. This study aims to comprehensively explore the mechanisms influencing the aging process with a specific emphasis on environmental factors, particularly diet, and a nuanced analysis of sex-specific considerations. Specifically, we hypothesize that the beneficial effects of diet on the aging brain are associated to a decrease in pro-inflammatory parameters and an increase in the expression of synaptic proteins. These changes are believed to induce modifications in histone acetylation, thereby contributing to reversing age-associated transcriptional repression of regulatory genes linked to synaptic plasticity. Caloric restriction (CR), characterized by reduced caloric intake without compromising essential nutrients, may induce molecular changes associated with healthy aging, such as DNA methylation. Additionally, compounds like sodium butyrate (NaBu), a short-chain fatty acid and histone deacetylase inhibitor, show promise in mitigating neuroinflammation and enhancing cognition. In this context, we examined the lifelong effects of a 25-30% CR initiated from 4 months of age, along with i.p administration of NaBu (1,2gr/Kg) during the behavioral phase, on 24 -month-old male and female rats. We specifically assessed their performance in the Morris Water Maze task (MWM) and the outcomes showed sex-specific differences, with males exhibiting a greater susceptibility to age-related effects. Intriguingly, post-training infusions of NaBu, coupled with a CR diet, effectively counteracted the detrimental impacts of aging on hippocampal memory. These effects are related to modifications in metabolic and hormonal plasma biomarkers, and on hippocampal inflammation and synaptic plasticity proteins levels.

Funding: Ministerio de Ciencia e Innovación (PID2020-114243RB-I00 - AEI/10.13039/501100011033).

Symposium 05: Wednesday, July 10th, 15:00-16:15
Stress and cognitive function

Chair: Vanesa Hidalgo Calvo

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SUMMARY

It is well known that stress affects cognitive function. That is because the brain areas (e.g. hippocampus, amygdala and prefrontal cortex) underlaying the stress response are also involved in the control of cognitive function. Thus, it is expected that changes in these structures as consequence of exposition to different levels of stress will provoke changes in cognitive performance. Despite this evidence, it is unclear which direction these effects take given that several factors related to the type of stressor, the cognitive domain and/or the individuals studied, among others, are involved in the stress-cognition link. According to this, this symposium reviews, with four communications, the current knowledge on how acute and chronic stress (measured with different biomarkers) can impact on different cognitive domains (especially in different types of memory), attending to the age, sex, personality, isolation, loneliness and socioeconomic status of individuals. Addressing this issue with an integrative perspective will lead us to understand better the influence of stress on cognitive processes and, therefore, to design more accuracy treatments programs.

Openness to experience moderates the relationship between diurnal cortisol slope and verbal episodic memory in young adults.

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Diurnal cortisol slope (DCS) represents fluctuations in cortisol levels from morning to evening, and is pivotal for daily cognitive and behavioural functioning, being responsive to emotional and psychosocial stressors. Dysfunction in the hypothalamic-pituitary-adrenal (HPA) axis is associated with poor health outcomes and to aging, indeed, diurnal cortisol patterns and personality traits have been explored. Thus, openness to experience consistently correlates with improved cognitive functioning in older adults, yet this association remains underexplored in younger adults. The present study aimed to examine the relationship between DCS and cognitive function in young adults, considering the moderating role of personality factors. Participants (N=53) (Mean age ± SEM =21.32 ± 3.76) completed a neuropsychological battery to assess cognitive functions: the Trail Making Test (TMT), Verbal fluency, and the Free and Cued Selective Reminding Test (FCSRT) and the NEO Five-Factor Inventory (NEO-FFI). Saliva samples were obtained to analyse the DCS on three consecutive days. Moderation analyses only showed a significant moderation of openness to experience on the DCS and both immediate and delayed recall variables of the FCSRT. Specifically, the association between DCS and FCSRT variables was positive for people who scored highly in openness to experience. The additional NEO-FFI traits did not influence any other associations between DCS and FCSRT variables. No significant outcomes were observed among DCS in relation to TMT and verbal fluency. This study enhances the understanding of the link between HPA axis and cognitive processes, with a specific focus on the moderating effect of openness to experience in young adults.

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Negative association between hair cortisol concentrations and spatial memory in Long-COVID.

Sara Garcés Arilla[1], Magdalena Méndez López[1,2], Camino Fidalgo[1,2], M. Carmen Juan[3] & Vanesa Hidalgo[1,4]

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Long-COVID syndrome is characterized by a high prevalence of cognitive and emotional symptoms. These symptoms may lead to chronic stress. This study aimed to compare hair cortisol levels, perceived stress, symptoms of anxiety and depression, cognitive status, and object-location memory (OLM) between a Long-COVID group and a healthy group. Regressions were conducted, controlling for sex, age, socioeconomic status, and medication, to analyze the relationships among the aforementioned variables. The sample comprised 45 participants, including 37 with Long-COVID (94.59% women) and 8 healthy participants (100% women). Assessments included Perceived Stress Scale-10, Goldberg's Anxiety and Depression Scale, Montreal Cognitive Assessment, and an OLM task in immersive Virtual Reality. Results showed that individuals with Long-COVID exhibited higher perceived stress, more symptoms of anxiety and depression, and lower cognitive status compared to healthy individuals. There were no significant differences in hair cortisol levels. In the OLM task, the Long-COVID group made more attempts during the 24-hour recall and took longer to complete the task compared to the control group. Long-COVID group also required more attempts in the delayed recall in comparison to the immediate recall. Post hoc planned comparisons were made with Bonferroni adjustments for *p*-values. In the adjusted regression model, the Long-COVID group showed an association between heightened hair cortisol levels and reduced spatial memory in the OLM task for both immediate and 20-minute recall. The results suggest that the chronic hormonal response observed in individuals with long-COVID, but not their subjective emotional response, predicts a poorer performance on spatial tasks.

Funding: Conselleria d'Innovació, Universitats, Ciència i Societat Digital de la Generalitat Valenciana [GVA-COVID19/2021/025], Government of Aragon (Department of Science, University and Knowledge Society) under Grant (research group: S31_23R) and European Union-NextGeneration EU (ref. INVESTIGO 067-38).

Resting EEG, Hair Cortisol and Cognitive Performance in Healthy Older People with Different Perceived Socioeconomic Status.

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Introduction. Successful aging depends upon several internal and external factors that influence the overall aging process. Objective and subjective socioeconomic status emerge as potential psychosocial factors in the ethiopathophysiology of aging-related disorders. Presumably, low socioeconomic status can act as a psychosocial stressor that can affect humans' physiology via psychoneuroendocrine mechanisms, that may, in turn, affect the brain physiology. In resting-state electroencephalography (EEG), excess theta and delta activity has been related to cognitive decline and dementia. The main aim of this study was to analyze the effect of objective and subjective socioeconomic status (SES) on cognition and brain electrical activity through EEG measures. Methods. The present research constitutes a cross-sectional study with thirty healthy older adults (61–82 years old) separated into two clusters: high socioeconomic (HS) and low socioeconomic (LS) status; they were evaluated and compared in cognitive terms using the Wechsler Adult Intelligence Scale (WAIS-IV). An EEG at rest was recorded to measure brain activity and, as an indicator of long-term stress exposure, hair cortisol concentrations (HCC) were measured. Results. Our results show that lower SES is related to a worse performance in working memory tasks ($p = 0.009$), higher delta ($p = 0.002$) and theta power ($p = 0.039$), and lower alpha activity ($p = 0.028$). However, it seems that SES does not significantly affect HCC in this population of healthy older adults. Conclusions. The effects of SES on long-term cortisol exposure, brain electrical activity, and cognitive functions in healthy older people emphasize the role of psychosocial factors in aging from an integrative perspective that will allow us to implement better prevention programs to target cognitive decline in adults.

An exploration of possible biomarkers for subjective and objective isolation across older adults.

Shishir Baliyan[1], Leyre Castillejo[1], Juan Ignacio Grec[1], Maria Roman Moreno[1], Sara García Herranz[2], Cintia Díaz-Silveira[4], Raul Ballesta Barrera[1], Carmen Díaz Mardomingo[3] & César Venero[1,5]

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Loneliness and social isolation are prevalent, and malleable, concerns in the elderly population, impacting both physical and mental well-being. In this study, we report findings concerning the biosocial determinants linked to feelings of loneliness and social isolation among an elderly community-dwelling population. To this end we first explore the relationship between cortisol levels and their association with feelings of loneliness (emotional and social). Our analysis further delves into the association between plasma Brain-Derived Neurotrophic Factor (BDNF) levels and specific subtypes of emotional loneliness, such as familial and romantic loneliness, as well as BDNF and social isolation. Additionally, we examine the relationship between thyroid hormone levels and social isolation, along with memory function, while adjusting for key sociodemographic variables like age, education level, and depressive symptoms. These results will be discussed with an exploration of the nuances inherent in the differences between objective and subjective isolation, as well as those added by sex-related differences across the associations.

Funding: Ministerio de Ciencia e Innovación (PID2021-125945OB-I00) and “Beca Santander - Ayudas investigadores tempranos UNED - 2024”.

Symposium 06: Wednesday, July 10th, 15:00-16:15
The energy as a source of cognitive stimulation

Chair: Natalia Arias

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SUMMARY

One of the main social challenges in developed countries is the possibility of modulating neural circuits with different energy sources, which has changed the way in which brain neurodegenerative disorders and associated motor problems are treated and understood, as well as their impact on basic psychological processes. The importance of this issue is revealed by the main policy priorities across several countries, which includes topics about the potential of new tools, technologies and digital solutions for a healthy society. However, there is a need to address the limitations of applied techniques, registration models and clinical data accumulated in numerous neurodegenerative diseases with altered motor patterns, as well as basic cognitive processes at the multicenter level. This will improve the effective use of more data and new methods and tools which will allow researchers and psychologists to advance the understanding of risk factors, causes, development and optimal treatment in areas of cognitive damage or alterations through neuromodulation. In this symposium we will go deepen and disseminate knowledge about the current uses of neuromodulation and the main outcomes in human translation. We will also approach the need of analysis and interpretation of neuromodulation data, as well as its combination with data from brain records (EEG, fNIRS, MEG) that are especially useful to understand the impact of neuromodulation on cognitive function. This knowledge will allow the development of effective strategies, in order to avoid or reduce risk factors for the development of mental and behavioral disorders, as well as the associated comorbidities in adult life.

tSMS as a new member of the non-invasive brain stimulation family.

Antonio Oliviero

Hospital Nacional de Parapléjicos and Centre for Clinical Neuroscience – Hospital los Madroños

The advent of transcranial Static Magnetic Field Stimulation (tSMS) has broadened the spectrum of non-invasive brain stimulation (NIBS) techniques, offering a novel approach to modulate cortical excitability. Unlike its predecessors, such as transcranial Magnetic Stimulation (TMS) and transcranial Direct Current Stimulation (tDCS), tSMS utilizes static magnetic fields to induce changes in neuronal activity. This mechanism of action posits a unique niche for tSMS within the NIBS family, as it operates without inducing electrical currents in the brain. tSMS's principle relies on the application of a static magnetic field over targeted regions of the brain. Preliminary research suggests that tSMS can alter cortical excitability with effects lasting beyond the period of stimulation, indicating its potential for therapeutic applications in neuropsychiatric disorders and neurorehabilitation. The technique's simplicity, safety, and non-invasiveness are particularly appealing for clinical use, making it a promising tool for treating a variety of conditions, including for example ALS, drug-resistant epilepsy, and to boost stroke recovery. The simplicity and high safety profile suggest a potential us at home. As a new member of the NIBS family, tSMS represents an exciting frontier in neuroscience research, with the potential to significantly impact clinical practice and our understanding of brain modulation. The aim of this talk is to provide an overview of the basics and applications of tSMS.

Transcranial Direct Current Stimulation (tDCS): A Dual Approach for Neurorehabilitation and Elucidation of Brain Mechanisms.

Ana Sánchez-Kuhn[1], Pilar Fernández Martín[2], José Juan León-Domene[1], Rocío Rodríguez-Herrera[1], Pilar Flores[1,2] & Fernando Sánchez-Santed[1,2]

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Noninvasive brain stimulation techniques (NIBS) are a current tool for accompanying rehabilitation processes and discerning brain functioning mechanisms. Among these techniques transcranial direct current stimulation (tDCS) is one the most used ones. It delivers electric stimulation directly to cortical regions with the location of electrodes directly over the brain scalp. The location of the electrodes follows the 10-20 EEG international system, and the current is usually delivered at 1mA-2mA for 15 to 30 mins. This current is constant and generally produces a polarization or depolarization of the neuronal membrane of underlying cortical region, depending on the nature of the electrode, which is generally cathodal or anodal respectively. Firstly, in the present work we will briefly show some results of our laboratory in the feasibility of tDCS as a rehabilitation tool for (1) the co-rehabilitation of motor neurological diseases as stroke, (2) reduction of chronic pain in fibromyalgia and (3) the modulation of high order cognitive processes, such as risky decision making. And secondly, we will discuss its feasibility for exploring brain mechanisms, more specifically, the involvement of the cerebellum in cognitive processes. Finally, we will disclose the most relevant limitations and future directions of this technique. In conclusion, this work shows some insights into the potential of tDCS and its remaining clinical and research challenges.

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Photobiomodulation as a new technique for neuroscience.

Jorge L. Arias[1,2,3], Juan Ángel Martínez[2,3,4], Lucía Rodríguez[1,2,3], Juan Antonio Martín[2,3,4], Miguel Ángel José Prieto [2,3,4], Alba Gutiérrez[1,2,3] & Candela Zorzo[1,2,3]

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This talk will provide an opportunity to delve into the advancements in neuromodulation methods. While direct currents and magnetic fields have traditionally been utilized for treating psychiatric and psychological conditions, recent years have witnessed the emergence of light-based techniques for nervous system modulation. Transcranial photobiomodulation (tPBM), a non-invasive and painless intervention, has gained traction as a promising modality. By projecting low-power, high-fluence light from lasers or LEDs within the red to near-infrared spectrum onto the cerebral cortex, tPBM activates cytochrome c oxidase (CCO) in the mitochondrial electron transport chain. This activation enhances mitochondrial redox metabolism and augments adenosine triphosphate production, thereby bolstering brain functions. Nevertheless, the effective application of tPBM in therapeutic contexts necessitates meticulous consideration of various parameters including wavelength, power, irradiance, fluence, dose, beam area, and irradiation time, all of which warrant careful calibration prior to implementation.

Shedding Light on Cognitive Enhancement: Unraveling the Mechanisms of Photobiomodulation.

Natalia Arias[1,2,3], Juan Ángel Martínez[2,4], Juan Antonio Martín[4] & Miguel Ángel José Prieto[4]

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Currently, photobiomodulation therapy (PBMT) finds diverse applications and is increasingly recognized as a valuable therapeutic option. PBMT effectively promotes microcirculation, tissue repair, proliferation, and regeneration, along with alleviating pain, edema, oxidative stress, and inflammation across various traumatic, acute, and chronic diseases. Despite its widespread off-label use, controversy exists within the medical community due to incomplete elucidation of its underlying cellular and molecular mechanisms. Accumulating evidence implicates uncontrolled inflammatory responses in the pathophysiology of numerous brain conditions, with microglial alterations and subsequent release of pro-inflammatory mediators playing a key role. These mediators not only drive inflammation but also impact synaptic plasticity and memory formation, though the exact relationship remains under investigation. Moreover, apoptosis serves as a significant pathophysiological mechanism in brain aging and injury, highlighting PBMT's notable anti-neuroinflammatory activity. This activity, linked to PBMT's influence on the mitochondrial pathway, is triggered by intracellular signals during cellular stress, underscoring the need for further exploration of optimal treatment conditions. Additionally, PBMT shows promise in increasing neurotrophic factors that support neuronal growth and survival, suggesting its potential to induce neurogenesis and neuron migration in damaged brains. However, the lack of clarity regarding PBMT's optimized parameters for enhancing neurogenesis through developmental stages and neurodegenerative processes presents a challenge. This presentation will delve into the molecular mechanisms underlying PBMT's effects on neuroinflammation, neurogenesis, pro-oncogene expression, and brain mitochondrial activity, elucidating its role in cognitive enhancement across adulthood, aging, and neurodegeneration.

Symposium 07: Thursday, July 11th, 10:45-12:15
Corticolimbic networks for emotion and memory

Chairs: Antonia Gómez García[1] & Fernando Gámiz Ruiz[2]

[1]*University of Sevilla*

[2]*University of Granada*

SUMMARY

Corticolimbic networks play a fundamental role in emotion processing and memory formation. Understanding how these networks interact and adapt in response to experience and environmental stimuli is essential for deciphering the mechanisms underlying human and animal cognition. This symposium offers insight into various aspects of the organization and functions of the corticolimbic networks. Agüera, Arjol, Hagen, and Papini explore the implication of the amygdala in frustration induced by unexpected reward downshifts, a key phenomenon in motivation and learning. Using reward downshift models, they reveal specific neuronal activation patterns in the amygdala, identifying crucial areas for understanding this effect. Gallo and Gamiz investigate how the brain processes and becomes familiar with flavors across different life stages. Their findings suggest plastic adaptations in brain networks underlying taste familiarization, with implications for both memory and emotion. Zorzo, Arias, and Méndez examine spatial memory retrieval in rats, exploring how factors such as time passage and environmental stimuli affect this process. Their results reveal sex differences in brain activation associated with spatial memory retrieval, shedding light on how memory-supporting brain systems change over time. Miquel, Melchor-Eixea, Guarque-Chabrera, and Pastor unveil the cerebellum's influence on drug-related memory, highlighting its role in brain plasticity and addiction. Their findings suggest a complex interaction between the cerebellum and the medial prefrontal cortex in drug-induced reward memory formation. Gómez, del Águila, Rodríguez, and Salas investigate the limbic mechanisms of pain processing in teleost fish, challenging the conventional notion that fish lack pain experience capacity. Their findings suggest the existence of a neural network in the fish pallium that exhibits functional similarities with mammalian corticolimbic circuits. These findings could have a significant impact on the current hypotheses on cerebral cortex evolution. Together, these presentations showcase the multifaceted nature of corticolimbic networks and their crucial role in various aspects of cognition.

Detailed c-Fos expression patterns in the amygdala after frustrative nonreward.

Antonio David Rodríguez Agüera[1], David Arjol Echevarría[2], Christopher Hagen[3] & Mauricio R. Papini[3]

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[2]*University of Sevilla*

[3]*Texas Christian University*

Introduction: The amygdala has been implicated in frustrative nonreward induced by unexpected reward downshifts, using paradigms like consummatory successive negative contrast (cSNC) [1]. However, existing evidence comes from experiments involving the amygdala nuclei on a broad level [2]. Moreover, whether the amygdala's involvement in reward downshift requires a cSNC effect (i.e., greater suppression in downshifted animals than in unshifted controls) or just consummatory suppression without a cSNC effect, remains unclear. Methods: Three groups were exposed to (1) a large reward disparity leading to a cSNC effect (32-to-2% sucrose), (2) a small reward disparity involving consummatory suppression in the absence of a cSNC effect (8-to-2% sucrose), and (3) an unshifted control (2% sucrose). Brains obtained after the first reward downshift session were processed for expression of the neural activity marker c-Fos [3] in the anterior, medial, and posterior portions (A/P axis) of ten regions of the rat basolateral, central, and medial amygdala. Results: c-Fos expression was higher in 32-to-2% animals than in the other two groups in the anterior and the medial lateral basal, the medial capsular central, and the anterior antero-ventral medial amygdala. None of the areas exhibited differential c-Fos expression between the 8-to-2% and the unshifted condition. Discussion: Amygdala activation requires exposure to a substantial reward disparity. Conclusions: This approach has identified, for the first time, specific amygdala areas relevant to understanding the cSNC effect. References: [1] Flaherty, CUP, 1996. [2] Kawasaki et al., Neuroscience 2015, 303, 73-81. [3] Morgan & Curran, Neuroscience 1991, 14, 421-451.

Funding: Papini (Dean's Opportunity Fund, TCU Collage of Science and Engineering; grant # 66054, TCU/IS Fund, USA); Agüera (grant # PID2021-123338NB-100 -to Dr. C. Torres; Departamento de Psicología, UJA, Spain); Arjol (grants EST23/00069 and FPU19/00726, Ministerio de Ciencia, Innovación y Universidades, Spain).

Development of the brain networks involved in taste familiarization throughout the life.

Milagros GalloTorre & Fernando Gámiz Ruiz

Dept. Psicobiología. Instituto de Neurociencias (CIBM). Instituto Biosanitario de Granada (IBS). Universidad de Granada, España

The attenuation of taste neophobia is a behavioral model of recognition memory most suitable for a developmental approach because this sensory modality is functional throughout the entire life cycle. Immunohistochemical and pharmacogenetic studies in adult, adolescent and aged rats exposed to repeated exposures to a cider vinegar solution will be reviewed. Both adolescent and aged rats exhibit delayed attenuation of neophobia in comparison with adult rats. However, the underlying brain activity varies at different ages. In adult rats a complex brain network involving the perirhinal cortex (PRC), medial prefrontal cortex (mPFC), basolateral amygdala (BLA) and acumbens nucleus (NAcb) as well as hippocampal (HC) modulation has been identified. While the novel flavor increases activity in PRC, during the second exposure, as taste memory formation takes place, NAcb and mPFC activity increases. In addition, an inverse pattern of NAcb versus BLA activity was found at this stage with decreased BLA activity. This inverse pattern relies on a reciprocal inhibitory dopaminergic network mediated by D1DRs which pharmacological and pharmacogenetic interventions have identified. Developmental effects on this network are complex. While in mPFC adolescents do not exhibit changes related to taste processing, taste novelty but not taste familiarization increases ventral mPFC activity in aged rats. In general, aging induces altered activity patterns that cannot be explained exclusively in terms of decay. In all, the results indicate that the ability to recognize a taste as familiar and safe relays in the interplay of the brain circuits involved in memory, emotion and reward evolving as the result of plastic adaptations.

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Spatial memory retrieval under different conditions: a behavioral and brain activity study in male and female rats.

Candela Zorzo, Jorge L. Arias & Marta Méndez

University of Oviedo

Instituto de Neurociencias del Principado de Asturias (INEUROPA)

Instituto de Investigación Sanitaria del Principado de Asturias (ISPA)

Spatial learning and memory are critical for organism survival, relying on allocentric spatial strategy to navigate environments and establish spatial relationships. Remembering spatial information can be challenging due to various factors, including the interference caused by the passage of time. We conducted several experiments to explore allocentric spatial retrieval with different time intervals since learning acquisition, memory reactivation and modification of distal cues from the learning phase, all of them in male and female rats. We have observed that rodents retain memories of a location with a delay of up to a month, but not with longer delays. In cases of memory retrieval failure, there is a reduction in cytochrome c oxidase (CCO) activity in cortical structures and the hippocampus in both sexes, with females showing greater heterogeneity based on the elapsed time interval. Furthermore, failed allocentric spatial recall can be easily reactivated and facilitated after re-exposure to task contingencies, in both males and females. Under these conditions, males exhibit reduced CCO in the thalamus and septum, while females show such reduction in cortical regions, the hippocampus, thalamus, septum, and amygdala. Moreover, variations in environmental stimuli during the recall phase is easily performed when cues are removed, in both males and females, but only females can recall the location when new stimuli are added to those present during learning encoding. In males with preserved recall, CCO increases in most areas of the limbic system, whereas this does not occur when excessive information hinders recall. In females, changes in CCO activity are highly variable among groups successfully completing the task. Understanding how the brain retrieves memories based on spatial orientation can shed light on how our experiences are represented and help decipher how the brain systems enabling memories change as we age.

When the front fails the rear wins. Medial prefrontal cortex-cerebellum interactions in drug-induced memory.

Marta Miquel[1,2], Ignasi Melchor-Eixea[1], Julián Guarque-Chabrera[1,2] & Raúl Pastor Medall[1]

[1]*University of Jaume I, Castellón de la Plana*

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Addiction involves an aberrant engagement of brain plasticity processes that underlie reinforcement learning. Repeated drug use reorganizes prefrontal-striatal circuits. Nevertheless, there is also much evidence of drug effects on molecular, cellular, and structural plasticity in the cerebellum. Remarkably, most of the brain functions in which the cerebellum plays a role are impaired in drug addiction. Our research team has been working for years on the role of the cerebellum in drug-induced reward memory. Our findings identified the posterior vermis as the locus of drug-related learning hallmarks. The lesion of this cerebellar region facilitates learning of cocaine-induced conditioned memory and increases neuronal activity in the medial prefrontal cortex and other regions of the addiction circuitry. Chemogenetic inhibition of cerebellar output neurons may prevent the effect of the vermis lesion on drug reward learning, supporting a causal link. Chemogenetic activation of inhibitory interneurons in the same region also facilitates drug-induced reward learning, and their inhibition prevents it. Thus, cerebellar cortex dysfunction appears to be capable of promoting drug effects through the disinhibition of other regions in the addiction circuitry. Interestingly, the cerebellum acquires higher functional relevance when prefrontal function is compromised by other mental disorders or chronic drug use. Our recent studies have shown that deactivation of the infralimbic (IL) but not prelimbic cortex (PrL) mimics the effects of the posterior vermis impairment during cocaine-induced learning, dramatically increasing drug-induced conditioned preference and drug effects on cerebellar activity. Then, we wondered how IL might regulate cerebellar activity. Our results showed a never-described- before descending pathway through which IL sends monosynaptic projections to the Interposed DCN and the Inferior Olive, possibly through collateral projections, and then the Interposed and Inferior Olive reach LVIII; and an ascending pathway through which LVIII contacts IL trisynaptically via Interposed-to-VTA synapsis.

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Limbic networks for pain and emotion in the telencephalic pallium of teleost fish.

Antonia Gómez García,Tamara del Águila Puntas, Fernando Rodríguez Fernández & Cosme Salas García

University of Sevilla

While the ability of mammals to feel pain is generally recognized, the question of whether teleost fish can experience pain has sparked intense debate in the scientific community in recent years. Critics argue that fish lack the necessary brain structures, particularly comparable to the mammalian cerebral cortex, to process such experiences. Thus, our study aims to explore potential neural mechanisms for pain processing in goldfish. Using neuroimaging techniques, we scrutinized brain activity in the pallium of goldfish subjected to nociceptive and non-nociceptive stimuli. We observed specific activation of medial telencephalic pallium, specifically in the areas Dm2 and Dm4, in response to potentially painful stimuli, suggesting a neurosignature for pain perception. Moreover, activation intensity in these pallial regions correlated with stimulus intensity and emotional response. Mapping experiments revealed that Dm4 encodes both location and intensity information for both types of stimuli, suggesting a sensory function. In contrast, activation of Dm2 appears to correlate with the level of emotional activation. Additionally, these areas participate in viscerosensory and visceromotor functions, underscoring their significance in integrating sensory and visceral inputs and representing the body state. Conditioning experiments further demonstrated that Dm2 activation was as effective as natural nociceptive stimuli in eliciting negative hedonic associations, while Dm4 stimulation alone failed to induce conditioning. These findings suggest the presence of a pallial network in the teleost pallium that supports the integration of both the sensory and the affective dimensions of pain. This pain-related neural network in teleosts closely resembles the functional circuits found in the insular and anterior cingulate cortices in mammals. The present findings suggest that the pallial mechanisms involved in generating pain experience may have been present in the last common ancestor of teleost fishes and mammals, and they could be conserved across vertebrates.

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Symposium 08: Thursday, July 11th, 10:45-12:15
Ethology, comparative psychology, and evolutionary psychology

Chair: Fernando Colmenares Gil

Grupo UCM de Psicobiología Social, Evolutiva y Comparada Departamento de Psicobiología y Metodología en Ciencias del Comportamiento, Facultad de Psicología, Universidad Complutense de Madrid

SUMMARY

In the past decades evolutionarily minded biologists and psychologists have engaged in continuing interdisciplinary debates that have fostered both attempts at synthesis of existing disciplines (e.g., ethology and comparative psychology) as well as the emergence of brand-new disciplines (e.g., behavioural ecology and evolutionary psychology). The contributors to this symposium address several issues relevant to current research in ethology, comparative psychology, and evolutionary psychology. Turiégano and coworkers examine the relation between implicit and explicit measures of attentional bias toward human babies and the potentially mediating role of gender. Polo and coworkers test the strategic pluralism hypothesis on variation in mating strategies in human males, using data on physiological, morphological, psychological, and social environment variables. Belinchón and coworkers analyze the effect of previous competition on cooperative behaviour in intergroup conflicts. Azurmendi and coworkers assess the moderating impact of genetic, hormonal, and psychosocial factors as well as social context on the effects of parental control on reactive and proactive aggression in young humans. Albiach uses experimental data on nutcracking in orangutans to revisit the controversial hypothesis about the role of individual versus social learning in the acquisition of tool-use skills in non-human primates. Zamorano-Abramson and Hernández-Lloreda investigate vocal entrainment in the Orca as a model system to probe the evolution of cooperation and group coordination in nonhuman animals and the origin of music in humans. And Fidalgo de las Heras and coworkers describe the results of an animal assisted intervention study in which they evaluate the wellbeing of both young human subjects with intellectual disabilities and the animals themselves (sea bears). This collection of symposium presentations highlights the importance of evolutionary thinking, comparative data, the crossing and recrossing of levels of biological organization, and the identification of proximate and ultimate causes uniquely fostered by a broad-minded, integrative, non-reductionist, and evolutionary-comparative psychobiology.

Unveiling the effect of variables related to sex and gender on the relationship between explicit and implicit measures of interest in children.

Denisa Cristina Lupu[1], Ignacio Miguel Pardillo[2], José Manuel Caperos[3], Claudia Rodríguez-Ruiz[1], Beatriz Gil-Martí[1], Nereida Bueno[3], Ana Fidalgo[2], Susana Sánchez[2] & Enrique Turiégano[1]

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Introduction: Having tools to reliably assess the interest that children arouse would be of both social and scientific interest. However, as is often the case, there is not a good relationship between explicit and implicit measures of this interest. Our goal has been to unravel which variables can affect how these variables relate to each other, particularly some related to sex and gender. Methods: We studied in a large population (N=505 individuals) to what extent the relationship between explicit and implicit methods for measuring interest in babies is mediated by some variables related to sex and gender: two explicit measures of gender role, 2D:4D index, manual dexterity. For implicit methods, we used the dot-probe test to measure attentional bias towards babies, displaying photos for 200ms or 500ms, and the IAT to measure implicit associations. As explicit measures, we translated into Spanish different previously used tests: ABS (which in our sample is organized into different subscales than previously described), IWB, RB, ILWB, and BL. Results: Our first relevant result indicates that there are no differences between men and women in implicit measures, but there are in all explicit measures except RB, with differences in the direction previously described (women show more explicit interest). Implicit measures have a significant but weak relationship with some ABS scales (wanting, attending, costs) and with IWB. Of the different variables that could mediate the relationship between explicit and implicit measures, those measuring adherence to gender role and manual dexterity affect the relationship between explicit measures and IAT, those of adherence to gender role affect the relationship with Dot500ms, while none has much weight in the relationships with Dot200ms. Conclusion: It seems that gender-related variables most significantly affect, in the expected direction, the relationship between explicit and implicit measures in the interest shown towards children.

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Mating strategies in men: the role of morphological, psychological and physiological traits and the social environment.

Pablo Polo[1], José Antonio Muñoz-Reyes[1], Nohelia Valenzuela[1], Oriana Figueroa[1], Montserrat Belinchón[1], Nerea Aldunate[1], Miguel Pita[2] & Gabriela Fajardo[3]

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In humans, mating effort can be canalized through several pathways including the seeking of multiple mating partners (short-term mating strategy) or seeking and investing in a single mating partner (long-term mating strategy). According to the strategic pluralism hypothesis1, both strategies are expressed conditionally depending on the presence of certain morphological, physiological, and psychological traits and the features of the local social environment. In this presentation, first, we show some of our work aimed to test how certain evolutionarily relevant traits (i.e., traits related to intrasexual and intersexual selection) are associated with the deployment of mating strategies measured by the multidimensional sociosexual orientation inventory. Our studies performed on Chilean men indicate that high levels of androgenity, measured through muscularity, facial masculinity and strength are important for the expression of a short-term mating strategy while socioeconomic status, a trait related to resources, is relevant for a long-term mating strategy. Next, we ask about the role of the social environment on mating strategies showing that men increase their levels of short-term mating orientation in the presence of a woman while long-term mating orientation remained unaffected in a within-subject study. Finally, we investigate the role of circulating levels of testosterone as a causal mechanism that regulates mating effort through short-term mating strategy. However, our recent study employing a within-subject design and the administration of exogenous testosterone failed to find a relationship between testosterone and mating strategies. In sum, our line of research lend support to the strategic pluralism hypothesis showing that there are traits related to intrasexual competition that benefit short-term mating strategies while traits related to resources are important for long-term mating strategies. In addition, the expression of mating strategies is flexible, but social factors such as the presence of women seem more important than changes in testosterone levels.

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The Effect of Competition Outcome on Cooperation under Intergroup Contests.

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Laboratorio de Comportamiento Animal y Humano; Centro de Investigación en Complejidad Social; Universidad del Desarrollo, Santiago de Chile, Chile

The Male Warrior Hypothesis (MWH) establishes that men's psychology has been shaped by intergroup competition to acquire and protect resources and status. In this context, sex-specific selective pressures would have promoted cooperation with the in-group members while increasing hostility toward outsiders. However, intergroup conflicts do not occur in isolation and the outcomes of previous competitions may influence group cooperativeness to outcompete other groups. Since this phenomenon is not well understood, we aimed to shed light on the effect of previous competition on later cooperative behaviour under intergroup conflicts. In line with the MWH, we predicted that a repeated contest between groups may enhance in-group cooperation regardless of the outcome of the previous contest because status is at risk. We formed random groups of six men (N = 246), and we measured cooperation through the threshold repeated public goods game in two rounds, manipulating the outcome in the first round to create groups of winners and losers. Our results showed that intergroup conflict scenarios promoted cooperation in both victory and defeat conditions whereas, in the control scenario, only losers increased their cooperation. Winners under the presence of this external threat may enhance in-group cooperation in order to assure their status; whereas, losers may be attempting to regain it. In future studies it may be interesting to consider whether individual differences related to the MWH may modulate this relationship.

Genetic, hormonal and psychosocial factors of sensitivity to the effects of parental control on the development of reactive and proactive aggression from 9 to 12 years.

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This study examined the development of reactive and proactive aggression (both physical and relational) in prepubertal children. The aim is to explore the impact that parental control strategies (behavioural and psychological) have on the development of these subtypes of aggression; also contemplating the moderating role of (1) the hormonal profiles of testosterone and cortisol, (2) the genetic polymorphisms MAOA, 5-HTT, DRD4 and COMT, (3) the temperament variables "reactivity" and "emotional regulation" , and (4) the rejection and antisocial friends of the subject, have in that relationship. To achieve this objective, we rely on a longitudinal design with three data collection moments: T1 (4th grade of primary school, children aged 9-10), T2 (5th grade of primary school, children aged 10-11) and T3 (6th grade of primary school, children aged 11-12). The subjects in the study are 300 children, and at the beginning of data collection, time 1, they were 9-10 years old. Hormone levels and polymorphisms will be determined using saliva samples. Temperament will be evaluated through the Early Adolescent Temperament Questionnaire-Revised (EATQ-R). To evaluate peer rejection, we will use a sociometric questionnaire. The parental control exercised by fathers and mothers will be evaluated with the Parental Style Scale. We will evaluate aggression using three independent scales: a) Proactive Aggression Questionnaire (RPQ), b) Direct and Indirect Aggression Scale (DIAS) and b) Self-report of Aggression and Social Behaviour Measure (SRASBM). We think that the results of this study may will be relevant and contribute to current knowledge of aggression in a period of development in which important biological and contextual changes occur, derived from the changes associated with the arrival of puberty and the increasing importance of the peer group.

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Orangutans cracking nuts: a contribution to the zone of latent solutions debate.

Anna Albiach-Serrano[1], Elisa Bandini[2], Johannes Grossmann[3], Martina Funk[3], ClaudioTennie[4]

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Once, we thought that tool use and making was our defining character. Jane Goodall's pioneer observations on wild chimpanzees, however, shook this conception and led Louis Leakey to write his famous statement "Now we must redefine "tool", redefine "man" or accept chimpanzees as human". As field studies progressed and expanded across Africa, evidence accumulated of local variance in several chimpanzee behavior patterns -including tool usage- that could not be explained based on ecological factors. Culture could not be considered as uniquely human anymore. Nowadays, cumulative culture is regarded as a hallmark of human evolution, although not without debate. In our species, skills and technologies accumulate over generations and become more complex than what one individual could invent alone. The Zone of Latent Solutions (ZLS) hypothesis, by Claudio Tennie and colleagues, proposes that this is based on our capacity to copy the form of others' behaviors, whereas non-human great apes would mainly acquire behaviors individually, their social learning being limited to local and object enhancement, individual facilitation and copying behavior results. In a study designed to test this, we presented 12 orangutans from Leipzig and Zürich zoos with nuts and objects that could work as anvil and hammers*. Four subjects cracked nuts with tools, despite never having observed this behavior. This shows that even the complex nutcracking (that involves the manipulation of several objects in a sequence and requires both force and precision) can be individually learnt by non-human great apes, without the need to copy. I discuss these findings in the light of the extant controversy around the ZLS hypothesis and offer venues for future research.

Vocal entrainment in the Orca.

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Humans universally possess a proclivity to synchronize their movements with musical rhythms. This tendency known as "rhythmic entraintment" describes the synchronization of autonomous systems (such as internal rhythm generators like neuronal oscillations) or overt behaviors (like tapping or dancing) to external, periodic events (e.g., the beats in a rhythm). Some scholars suggest that the evolution of this ability is likely to have originated in human contexts of whole-body synchronization and coordination, such as dancing or marching. Following this argument, and similarly to what has been suggested for the gestural origin of language, in music, dancing would originate first, and later then vocal music co-opted this whole-body entrainment system to create the integration of both domains that characterized human singing and chorusing. However, the evidence on entrainment points to the interaction of independent rhythmic systems, which would not rule out the possibility of either inverse or simultaneous evolution of these musical manifestations. While comparative studies have demonstrated rhythmic entrainment in animals like parrots and sea lions, wherein they synchronize bodily movements with external auditory beats, the cross-modal nature of this ability suggests another possibility. Specifically, the potential for visual body movements to prompt periodic vocalizations implies an inverse or simultaneous origin for both manifestations. Any evidence supporting this in animals would further bolster this proposition. This study explores the rhythmic vocal synchronization abilities of orcas, a species known for its complex cooperative behavior and its capacity for multimodal imitative learning. We present evidence that they successfully synchronized their vocalizations with varying hand movement tempos, even when hand movements were concealed intermittently. This unveils a multimodal synchronization between visual body movement eliciting periodic vocalizations, all governed by a representation of a constant pulse. Results shed light on the evolution of rhythmic synchronization, cooperation and coordination in orcas and human music.

Preliminary study on the effect of sea bear-assisted interventions on the well-being of young people with intellectual disabilities and the bears that participate in them.

Ana M. Fidalgo de las Heras, Susana M. Sánchez Rodríguez, Sergio Díaz González, Ignacio Pardillo Gil & Ana Molina Yagües

Departamento de Psicología Biológica y de la Salud, Universidad Autónoma de Madrid, España

The main objective of Animal-Assisted Interventions (AAI) is to improve physical or psychological health and well-being of people. However, there are limitations to the generalization of the results, and they do not usually consider the well-being of the animals. This study aims to evaluate the subjective well-being of young people with intellectual disabilities related to AAI with sea-bears in Faunia, as well as the well-being of the animals that participate in them. The study was carried out on 7 sea-bears (1 male/6 females), analyzing their personality through questionnaires and behavioral analysis, for 6 months, before the beginning of the interventions. The effect of the interventions on young people with intellectual disabilities was carried out in 2022 and 2023 in 3 groups with heterogeneous functional diversity, but motor impairment in all cases (12 in 2022 with high disability and 6 in 2023 with low disability), measuring well-being through the SPANE-test, before and after AAI. The bears showed 2 personality traits: Neuroticism and Dominance. This allowed their categorization into animals with a high score in Neuroticism and animals with a high score in Dominance. Animals with high scores in Dominance, with a predisposition towards learning, are better than animals with high scores in Neuroticism, more likely to experience stress, for inclusion in the AAI. Young people with greater motor impairment (n=12) showed lower positive scores before than after the intervention ($p = 0.014$), which did not occur in young people with less motor impairment ($p = 0.248$), where an overlap of the participants' scores was noted. Despite the limited sample and its heterogeneity, these differences before the intervention in 2022 (mean 6.64) compared to 2023 (mean 15.33) could explain the greater effect of the intervention in 2022 which could indicate that the AAI would be more effective in participants with low well-being.

Symposium 09: Thursday, July 11th, 10:45-12:15
Psychobiology of drug addiction and dual disorders in patients under treatment

Chair: Ana Adan

Department of Clinical Psychology and Psychobiology, University of Barcelona, Spain
Institute of Neurosciences (UBNeuro), University of Barcelona

SUMMARY

In the last decades, several research have provided evidence of cognitive impairment in different cognitive domains and circadian rhythmicity in substance use disorders (SUD) patients. In the drug addiction clinic, patients with dual disorders, understood the coexistence or concurrence of at least one SUD and another mental disorder in the same person, are more the norm than the exception. This also happens in mental health care resources, where the prevalence of dual disorders is high and growing, especially with severe comorbid mental disorders. However, the study of neurocognitive characteristics and rhythmic functioning in both SUD and dual disorders patients under treatment, with emphasis on possible clinical aspects of vulnerability with undoubted interest in improving the care approach and therapeutic success, is an emerging area that must be developed in the immediate future. This symposium reviews the current knowledge on neurocognition and circadian rhythms in SUD and dual disorders patients, taking into consideration two comorbid severe mental illness with high prevalence and worse prognosis: schizophrenia and major depressive disorder. New empirical data are presented, emphasizing the cognitive domains and circadian rhythmicity, in patients in the early remission phase of SUD treatment. In addition, pioneering results of the differential profile of women in treatment for SUD and dual disorders are presented. In all cases, several clinical characteristics are considered as possible predictive variables of neurocognitive and rhythmic disturbance in patients during treatment. Our aim is to make a contribution to a more individualized therapeutic intervention, including the gender perspective. The data suggest the need to include cognitive rehabilitation therapy as well as the use of chronobiological approaches (handling hourly habits, light therapy and melatonin) for comprehensive treatment programs, especially in outpatient modality, for SUD and dual disorders.

Funding: The Spanish Ministry of Science and Innovation (MCIN/AEI/10.13039/501100011033); grant PID2020-117767GB-I00.

Neurocognition of male patients with a diagnosis of schizophrenia with and without comorbid substance use.

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Introduction. Comorbidity of schizophrenia (SZ) and substance use disorders (SUD) is observed at least in 50% of the patients with SZ and it is associated with greater disability and poorer treatment outcomes. However, little research on the neurocognitive profile of comorbid patients and the possible relationship with clinical variables has been done. Method. We conducted several studies to explore cognitive functioning through a neuropsychological test battery, in male patients with schizophrenia according to the presence (SZ+) or absence (SZ-) of a comorbid SUD in the early phase of remission. Comparisons are made with SUD-only patients and other comorbidities (major depression and bipolar disorders). In all cases, the influence of clinical variables related to consumption and comorbid mental disorder was explored. Results. Patients with SZ+ and SZ- performed worse than SUD in verbal learning/memory (encoding, storage and retrieval), processing speed, and global performance, while no differences were observed among the groups for premorbid IQ (vocabulary). Verbal learning/memory and global functioning were worse for SZ+ with an older age. On the contrary SZ- did not show any age-related changes on cognitive performance. Decision making is worse in SZ+ and related to previous suicide attempts. No influence of the type of drug consumed, months of abstinence or the course and symptoms of SZ was observed. SZ+ patients also performed worse than other dual disorders (dual depression and bipolar disorder) in tasks involving executive functioning. Conclusion. Cognitive functioning assessment in patients with SZ+ may lead to useful information about their differential vulnerability suggesting the need for neurocognitive assessment in all patients. Furthermore, it would help to consider cognitive rehabilitation when necessary. This would minimize patients' cognitive impairments from interfering with the therapeutic process. Future studies should delve into the role of such difficulties as indicators or endophenotypes for dual schizophrenia spectrum disorders.

Clinical and cognitive characteristics of patients with major depression comorbid with substance use disorder.

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Introduction. Major depressive disorder (MDD) is one of the most common comorbidities in substance use disorder (SUD). Patients with this condition (SUD+MDD) have shown specific sociodemographic, clinical and cognitive characteristics. Nevertheless, the studies that address this comorbidity compared to SUD-only patients are still scarce. Therefore, this study aimed to examine the possible differences in cognitive performance, as well as in sociodemographic and clinical data, between SUD+MDD and SUD-only patients in early remission phase. Method. The sample was composed of 271 male patients (SUD+MDD group: N=101; SUD-only group: N=170) who underwent a neuropsychological assessment in which visuospatial reasoning, verbal memory and learning, recognition, attention and executive functions were assessed. Furthermore, sociodemographic and clinical variables were explored through a structured interview as well as with some questionnaires, such as the Drug Abuse Screening Test or the Fagerström test. ANCOVA and MANCOVA main models were performed to explore differences between groups (SUD+MDD and SUD) in cognitive performance. Likewise, sociodemographic and clinical measures were analyzed by descriptive statistics using t-tests for continuous data and chi-square tests for contrasts in categorical and ordinal variables. Results. SUD+MDD patients showed worse cognitive performance than SUD-only patients in visuospatial reasoning, verbal memory and learning, recognition, and processing speed, also exhibiting more self-reported prefrontal symptoms. Furthermore, SUD+MDD group had worse social characteristics (i.e., older age and a higher percentage of patients who lived alone or were unemployed) as well as more severe clinical conditions (i.e., longer SUD duration, more substances consumed, and higher nicotine dependence). Conclusion. MDD could be considered a risk in SUD patients, since MDD+SUD patients present worse cognitive performance and social characteristics, as well as more severe clinical conditions. The results of this study may contribute to clinical practice by providing information that would allow for more appropriate treatment and facilitate the development of preventive strategies.

Circadian rhythms in drug addiction and dual disorders.

Ana Adan

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Institute of Neurosciences (UBNeuro), University of Barcelona, Spain

Introduction. Circadian rhythmicity in both substance use disorders (SUD) and several mental disorders play an important role in the severity and clinical curse. However, research on the assessment of possible impairment and recovery of rhythmicity is very limited to studying only sleep and patients without comorbidity. Method. This presentation provides data of circadian functioning in male patients with SUD and with dual diagnoses of schizophrenia, major depression and bipolar disorder. Clinical factors that have been related to the quality of circadian rhythmicity and whose consideration can improve the treatment of these patients are also studied. In addition, patients from two countries with different drug consumption cultures, Spain and Iran, have been evaluated. Results. Circadian rhythm impairment is evident in various parameters (amplitude, phase, stability, intraday variability) during the early remission phase of SUD. In functional terms, recovery of the duration and quality of sleep occurs in the first months of treatment (with or without medication), while the quality of wakefulness during the day shows more difficulty. This has a greater impact on dual patients, who show a rhythmic pattern considered immature. The age of onset of substance use, the time of abstinence and the type of treatment (inpatients/outpatients) are factors that influence the circadian indicators of these patients regardless of the main drug of consumption or the presence of symptoms of the comorbid disorder. Conclusion. Current evidence emphasizes that the circadian rhythmicity of SUD and dual disorders, evaluated at the beginning and during the treatment, can be a predictor of patients' adherence, recovery and quality of life. After the detoxification phase, it is advisable to focus on the quality of wakefulness, which is more resistant to being restored than that of sleep. Treatment programs should consider incorporating chronobiological strategies (handling hourly habits, exposure to light and melatonin) when needed.

Women with substance use disorder and comorbid major depression. Psychosocial, clinical and circadian characteristics.

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Introduction. Women are a minority in substance use disorder (SUD) treatment programs and both their adherence and response to treatment are lower compared to men. There is a high prevalence of major depressive disorder (MDD) in women with SUD, potentially reaching 80%. Regarding the SUD field, there is a long way to go to implement gender perspective to analyze data better and extrapolate conclusions to design more efficient drug treatment programs. Method. Data on psychosocial and clinical characteristics from two studies (N=50 and N=60) are presented. Differences between SUD (N= 30) and comorbid MDD (N= 30) women in circadian rhythmicity (distal skin temperature, motor activity, and light exposure) were explored and compared to SUD men and normative data. Results. Women are characterized by low rates of employability, financial struggles, maladaptive coping styles, and high gender-based violence rates in the couple context. The presence of depression leads to anxious symptoms, lower self-esteem, and a low subjective well-being perception. Women presented a worse temperature rhythm (higher minimum and lower mesor) than males, accompanied by differences in activity and light exposure habits exacerbated with comorbid MDD. Moreover, the age of SUD onset was associated with inter-daily stability and circadian functionality index (a general index of the circadian state of the subject) only in women. Conclusion. The psychosocial and clinical problems of women in treatment for SUD, highlighting MDD comorbidity, create specific barriers that impact treatment adherence and drug use relapses. Our study of integrated measurement of circadian rhythmicity is the first carried out in SUD women. It indicates a greater affectation than in men, despite being abstinent for more than three months. SUD treatments may consider sex differences and include specific approaches to help women recover their rhythmic organization and allow them to address difficulties after therapeutic discharge.

Symposium 10: Thursday, July 11th, 15:00-16:15
Motivational and emotional brain circuits involved in behavior: implications for psychopathology

Chair: María José Simón Ferre

Departamento de Psicobiología. Centro de Investigación Mente, Cerebro y Comportamiento (CIMCYC), Campus Cartuja, Granada, Spain

SUMMARY

Considerable progress has been made in the study and dissociation of specific components of the brain reward system that appear to underlie both adaptive behaviours and the development of psychopathological disorders. In this way, compulsive seeking behaviours, affective disorders, pathological learning (negative plasticity), and alterations in cognitive control mechanisms, among others, may be explained by functional and/or neurochemical changes in these circuits, by their interactions with each other or with external agents, and/or by the recruitment of additional systems in certain circumstances. The studies presented in this symposium entitled "Motivational and emotional brain circuits involved in the ", fall within this general framework. Thus, exposure during the foetal stage to external agents (bacteria or viruses) that activate the immune system or to stressful or traumatic situations can produce changes in these subsystems, favouring dysregulation and increasing the propensity to develop addictive behaviours, anxiety, depression, and alterations in social behaviour, among others. Neurobiological changes commonly implicated in addictive behaviours and stress responses include not only the hyperactivity of limbic circuits that regulate such aspects as emotional valence or motivation but also involvement of the hippocampus, among other structures. Researchers are currently studying the participation of the hippocampus in spatial processing, choice, response anticipation and cognitive flexibility. Studies are also underway on the role of neurochemical systems in modulating components of the reward system and on differences in the number and sensitivity of receptors between males and females (to elucidate the differential prevalence of certain disorders between the sexes) and as a function of other variables. Finally, researchers are also exploring the potential of corticosteroids to treat disorders related to the negative consequences of stress in preclinical models.

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Maternal immune activation and its relationship with reinforcement, schizophrenia and addiction.

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The phenomenon of prenatal immune activation and its potential impact on reinforcement and addiction constitutes a significant area of research within developmental psychobiology. Maternal exposure to pathogens during gestation can trigger an exaggerated immune response, disrupting the normal development of the fetal nervous system and potentially influencing future addictive behaviours. Over the past decade, our laboratory has been dedicated to investigating this relationship using animal models, with a particular focus on addiction and schizophrenia. We specifically examine the effects of maternal bacterial and viral infections on offspring, particularly in the context of cocaine self-administration experiments and, more recently, ethanol self-administration. Through a range of behavioural assays, including operant learning, Pavlovian-to-instrumental transfer, and Pavlovian conditioned approach tasks, alongside assessments of impulsivity and addiction-like behaviours, we aimed to elucidate the impact of prenatal immune activation on reinforcement mechanisms. To gain deeper insights into the underlying psychobiological mechanisms, we employ sophisticated methodologies such as positron-emission tomography and RNA sequencing. These tools have allowed us to examine the molecular and neurochemical changes associated with prenatal immune activation and subsequent addictive behaviours. Furthermore, our research highlights sex-specific differences in the manifestation of these effects. By documenting and analysing disparities between male and female offspring, we aim to unravel the complex interplay between biological sex and prenatal immune activation in shaping addictive propensities. In summary, our findings underscore the critical role of prenatal immune activation in shaping the neurobehavioural outcomes of offspring, with implications for addiction vulnerability and related psychiatric disorders.

Corticosterone treatment to prevent a mice PTSD-like phenotype and its influence on basolateral amygdala activity.

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Introduction: Exposure to stressful or traumatic life experiences increases the risk of developing posttraumatic stress disorder (PTSD). PTSD occurs in 5-10% of the population and is twice as common in women as in men. Despite the high prevalence rate, current treatments are only partially effective. Nevertheless, evidence suggests that exogenous glucocorticoid treatment shortly after trauma may prevent PTSD. The basolateral amygdala (BLA) is a key structure for processing positive and negative valence, and bidirectionally communicates with other regions to regulate the stress response. The present study evaluates the efficacy of corticosterone as a preventive treatment for a PTSD-like animal model and tests how corticosterone affects the neuronal activity of the BLA. Methods: Mice were exposed to 2 hours of stress immobilization (IMO) and, shortly afterwards, administered a single dose of vehicle or corticosterone. Subsequently, animals were assessed in a battery of behavioral tests. To discern the role of BLA neurons, we combined behavioral assessment with in vivo deep-brain calcium imaging (Miniscopes) in the BLA of freely moving mice. We also evaluate the effect of IMO and corticosterone administration on synaptic plasticity by recording ex vivo electrophysiology in the BLA. Results/Discussion: The results indicate that corticosterone can prevent the development of anxiety- and depressive-like behaviors and improve deficits in social motivation induced by IMO in males. However, corticosterone produces anxiety-like behavior in females, while it does not modify the PTSD-like phenotype. Additionally, our results reveal how neural signals in the BLA evolve during the stress paradigm and how corticosterone can alter synaptic plasticity. Conclusions: Our study extends our knowledge of corticosterone's potential as a preventative treatment for PTSD, highlighting likely sex differences in this therapeutic approach.

Understanding the role of the Sigma-1 receptor in addictive processes: A possible emotional modulation?

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Emotions modulate the development of substance use disorders; for example, it has been reported that exposure to negative emotions favors the development of alcohol use disorder (Kushner & Anker, 2019). The pharmacological study of this modulation is crucial given the high prevalence rates of this disorder. In this regard, the possible role of the Sigma-1 receptor is attracting special attention. The sigma 1 receptor is an intracellular chaperone located in brain areas that regulate learning and motivation (Cobos et al., 2008). Our laboratory has studied the role of this receptor in emotional processes such as frustration, induced in animal models through successive negative contrast. Based on this background, we will present different studies that attempt to clarify the role of Sigma-1 receptors in models of early alcohol exposure (Salguero et al, 2020). To this end, the results obtained with agonists such as Pre-084 or antagonists -such as S1RA- of the Sigma-1 receptor in the subsequent development of alcohol use disorder will be presented. Results will be interpreted in terms of possible modulation of alcohol's aversive effects.

Beyond Reward: How the Hippocampus Modulates Behavioral Responses to Reward Reduction.

Alejandro Navarro Expósito[1], Marta Sabariego Almazán[2], Megi Hoxha[2], Antonio David Rodríguez Agüera[1] & CarmenTorres Bares[1]

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Experiences of unexpected reward loss have been shown to trigger an aversive emotional state of frustrative nonreward (FNR). Failure to cope with these reward loss experiences has been strongly correlated with the onset of psychological disorders such as anxiety, depression, and substance abuse. The hippocampus, crucial for its role in facilitating memory updating of appetitive rewards is pivotal in this dynamic. However, the neural mechanisms that allow the organism to adapt optimally to reward changes and coping with FNR are not fully comprehended. To better understand the role of the hippocampus in adapting to changes in reward contingencies, we conducted a series of experiments targeting neural responses to reward devaluation in rats. In the first experiment, complete excitotoxic lesions of the hippocampus negatively affected choice performance in a figure-8 maze task after unexpectedly reducing reward quantity. Subsequent experiments revealed that both chemogenetic inhibition of the dorsal hippocampus and lipopolysaccharides IP (LPS) administration disrupted choice behavior following reward downshift in an autoshaping task, both manipulations being without effect in a consummatory task involving 32%-to-2% sucrose devaluation. The lack of effect of the HC manipulation on the consummatory task was consistent with the absence of increased neural activity in either the dorsal or ventral hippocampus, as measured by c-Fos expression. Overall, these experiments suggest the role of the dorsal hippocampus in reward loss situations involving choice, spatial information processing, memory update, anticipatory response and behavioural flexibility. Evidence showing whether one or more of these components are impaired by hippocampal manipulation will be presented, including recent studies differentiating FNR vs. behavioural flexibility.

Symposium 11: Thursday, July 11th, 15:00-16:15
Immune system and neuroinflammation in alcohol abuse: translational studies addressing cognitive impairment

Chair: Laura Orío Ortiz

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SUMMARY

Introduction: In this symposium we will cover an exciting line of research focused in the Psychoneuroimmunology of Alcohol Use Disorder (AUD) and its relationship with cognitive decline. Translational approaches using animal models with predictive validity for the human pathology and studies in alcohol abusers will be presented. Results: 1. The first talk will resume the hot topic of the activation of the microbiota-gut-brain axis during alcohol binge drinking and its behavioral consequences during abstinence. The translocation of bacterial products from the gut to the brain together with the overactivation of the innate immune system and neuroinflammation may have an impact in emotional and cognitive alterations in alcohol binge drinking. Traslational studies will be presented. 2. The second speaker will explain the role of apolipoproteins in AUD-induced inflammation and the associations between certain apolipoproteins and cognitive decline in AUD patients. The cross-talk between different plasma apolipoproteins may help in the categorization of patients according to cognitive impairment as well as the identification of AUD disorder. 3. Neurotrophic factors may also monitor the alcohol-induced neurocognitive disorder. In this third talk we will summarize results from a cross-sectional study in patients with AUD, evaluating the associations of neurotrophins/neurotropic factors and early cognitive decline. 4. The most severe neurocognitive manifestation of AUD is the Wernicke-Korsakoff syndrome. In this final talk different translational models of the pathology will be presented to demonstrate the role of the innate immune receptor TLR4 in the course of cognitive and motor symptomatology of the disorder, together with preliminary translational studies in human brains. Conclusion: These investigations point-out to an important role of the innate immune system and neuroinflammation in the emotional and cognitive manifestations of alcohol abuse, which could be a vulnerable factor for early dementia. Biomarkers as apolipoproteins and neurotrophic factors may help identify and/or monitor the disorder.

From the gut to the brain: translocation of bacterial products in alcohol abuse and its relationship with emotional/cognitive alterations.

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Introduction: Increasing evidence indicates an activation of the microbiota-gut-brain axis in certain neuropsychiatric conditions that curse with emotional and cognitive alterations. In this talk we resume findings indicating that alcohol abuse, specifically alcohol binge drinking (ABD), alters this axis and its possible consequences in behaviour. Methods: ABD was modelled in rats by forced administration of ethanol (3 g/Kg, i.g.), 3 times/day for 4 days. Behavioural tests were applied during abstinence: anhedonia (saccharine preference test), anxiety (EPM), depression-like behavior (Porsolt test) and memory function (WMT). Plasma, feces, colon and brain frontal cortex (FC) samples were collected to determine biomarkers (tight junction proteins, proinflammatory citokines…) by western blot, RT-PCR and Elisa kits. Specific neuropsychological tests in humans were applied and biomarkers measured similarly than in animals. Results: We show that ABD: (1) induces gut dysbiosis and disrupts the intestinal barrier; (2) induces the translocation of bacterial products from the gut to the blood, with activation of the immune system; (3) alters the bood-brain-barrier and induce neuroinflammation in the FC; (4) allows the presence of LPS in the brain by forming aggregates with sex-specific apolipoproteins. The inhibition of this axis (1-3) with oleoylethanolamide (OEA) prior to ethanol binges restores ABD-induced anhedonia, anxiety and depressive-like behavior during abstinence. The potentiation of (4) by using a 4F peptide (APL180) in females has negative consequences in anhedonia and memory and no effect in depressive-like behavior. Translational studies in humans indicate associations between inflammatory markers and neuropsychological performance. Conclusion: ABD induces a disruption of the gut barrier allowing the translocation of bacterial products from the gut to the blood; some bacterial components may reach the brain by joining sex-specific apolipoproteins. The activation of the innate immune system, induction of a peripheral proinflammatory state and neuroinflammation in the FC may have consequences in ABD-induced emotional and cognitive alterations.

Role of peripheral apolipoproteins in alcohol use disorder-induced inflammation and cognitive decline.

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Introduction. Identifying cognitive impairment in Alcohol Use Disorder (AUD) remains a significant scientific challenge, mainly relying on clinical and neuropsychological assessments. Apolipoproteins (APO) and related compounds are linked to inflammatory markers and may contribute to cognitive decline. Here, we explore: (1) plasma levels of different APOS in AUD patients and their relationship with inflammation (lipopolysaccharide, LPS) and cognitive decline; (2) the presence of APOE4 and Reelin plasma levels and their association with AUD-induced cognitive decline. Methods. 24-33 abstinent AUD patients (1 to 3 months of abstinence), recruited from an outpatient alcohol program (Hospital Universitario 12 de Octubre, Madrid, Spain) and 34 healthy control subjects were assessed with the cognitive screening test TEDCA ("Test of detection of cognitive impairment in alcoholism"). Plasma APOS and LPS were determined using Enzyme-Linked Immunosorbent Assay kits. APOE4 was determined using e4Quant technique. Results. (1) AUD patients showed elevations in plasma levels of APOAI, APOB, APOE, APOJ alongside reductions in APOM, together with higher LPS levels. Interestingly, APOAI and APOM showed divergent roles in AUD-induced inflammation and cognitive decline: APOAI correlated with a proinflammatory state (LPS) and cognitive impairment, while APOM showed the opposite trend. APOAI and APOM also identified the presence or absence of the disorder, respectively. (2) APOE correlated with worsened cognition in all the sample. Patients expressing the aberrant isoform APOE4 showed higher plasma levels of Reelin, a protein that shares receptor with APOE. Specifically, Reelin levels were upregulated in AUD patients carrying APOE4 and identified cognitive decline in the AUD group. Conclusions. The divergent roles of APOAI and APOM in relation to alcohol-induced inflammation and cognitive decline suggest their potential value as complementary biomarkers for assessing both AUD diagnosis and associated cognitive impairment, and Reelin plasma levels in early abstinence emerge as potential predictors of cognitive decline in the AUD group.

Alcohol Abuse and its relationship with early dementia: the role of neurotrophic factors.

Nerea Requena Ocaña[1], María Flóres-López[1], Nuria García Marchena[2], Javier Pavón[1,3], Pedro Araos[1], Antonia Serrano Criado[1,3] & Fernando Rodríguez de Fonseca[1,2,3]

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Detection and monitoring of cognitive impairment associated to neurodegenerative processes in Substance use disorder (SUD) patients remain a major clinical challenge, especially when early diagnosis is required. The present cross-sectional study aims to evaluate the association between cognitive impairment (assessed using MOCA and a frontal and memory loss assessment battery) and circulating levels of brain-derived neurotrophic factor (BDNF), neurotrophin-3 (NT-3) and the circulating concentrations of Neurofilament Light chain protein (NfL) in patients with alcohol use disorder (AUD). Our results indicated that lower educational levels were accompanied by earlier onset of alcohol consumption and earlier development of alcohol dependence, as well as impaired frontal cognitive function. They also suggest that NT-3 and BDNF may act as compensatory mechanisms for cognitive decline in the early stages When compared to healthy control subjects, AUD patients showed increases in plasma NfL concentrations and NfL/BDNF ratio, as well as reduced plasma BDNF levels. These changes were remarkable in SUD patients with moderate-severe cognitive impairment, being comparable to those observed in dementia patients. NfL concentrations correlated with executive function and memory cognition in SUD patients. The parameters "age", "NfL/BDNF ratio", "first time alcohol use", "age of onset of alcohol use disorder", and "length of alcohol use disorder diagnosis" were able to stratify our SUD sample into patients with cognitive impairment from those without cognitive dysfunction with great specificity and sensibility. In conclusion, we propose the combined use of NfL and BDNF (NfL/BDNF ratio) to monitor substance-induced neurocognitive disorder.

Role of the innate immune system in cognitive and motor alterations in Wernicke-Korsakoff syndrome.

Leticia López-Valencia[1,2], Marta Moya[1] & Laura Orío[1,2,3]

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Introduction: Chronic alcohol consumption (CAC) is often associated with malnutrition which could participate in cognitive deterioration. Wernicke-Korsakoff syndrome (WKS) is a neuropsychiatric disorder induced by thiamine/B1 vitamin deficiency (TD) whose main causal factor is CAC. WKS patients show devastating mood and executive functions alterations as well as significant memory problems. A dysfunction in the prefrontal cortex (PFC) has been associated with impulsivity and disinhibition in WKS patients. Here we studied the contribution of the innate immune system activation in the PFC and cerebellum to the WKS-induced behavioral alterations. Methods: Translational animal models of TD, CAC or mixed models were developed to study the specific contribution of these factors. The toll-like 4 (TLR4) receptor and neuroinflammatory markers were measured in PFC and cerebellum by Western blot and ELISA kits. Behavioral tests for emotional, cognitive and motor deficits were used. Results: TD activates the innate immune receptor TLR4 in PFC and cerebellum, inducing cortical disinhibition and motor deficits, respectively. Anti-inflammatory treatments (oleoylethanolamide. OEA) before symptoms prevented both the TLR4-mediated neuroinflammation in PFC and the disinhibitory behavior. CAC models activate the TLR4 signaling pathway and induced specific memory deficits. In the mixed model, combination of TD and alcohol consumption exacerbates TLR-4 dependent nitrosative stress, lipid peroxidation, apoptosis and cellular damage in the PFC and potentiated the behavioral disinhibition found in the TD model. As a translational approach, we observed that postmortem PFC samples of a WKS diagnosed patient showed an upregulation of TLR4 and its co-receptor MyD88 both in gray and white matter structures compared with a paired healthy control. Conclusions: TD and CAC may have independent or synergic actions in specific symptoms of the WKS pathology. Translational animal models of WKS showed a clear disinhibited-like behavior, which correlated with the upregulation of the immune TLR4 signaling pathway in the PFC.

Symposium 12: Thursday, July 11th, 15:00-16:15
Neuropsychology in different fields of action

Chair: Valentina Ladera Fernández

Faculty of Psychology, University of Salamanca

SUMMARY

Neuropsychology as a multidisciplinary discipline has a wide range of actions in health, education, legal, teaching and research, among others. The fields of action are mainly in neurological, neurosurgical, psychiatric, geriatric, surgical and general medical, pediatric and forensic populations. Four contributions are presented in this symposium. The first one is a study whose objective was to determine cognitive and functional risk markers of cognitive impairment (CI) using cognitive screening tests and functional scales, highlighting the importance of detecting subjects with CI in primary care and being able to carry out an appropriate diagnosis and therapeutic approach. The second one, presents normative data from the Hopkins Verbal Learning Test-Revised using a semantic facilitation task in subjects with mild CI and incipient Alzheimer's disease. The results indicate that the use of semantic facilitation in the short and long term is useful for the assessment of episodic memory, with adequate sensitivity and specificity. In the third contribution, the results obtained in a longitudinal study on executive functions, carried out in subjects with glioma in the anterior cranial fossa, will be presented. The importance of carrying out a cognitive assessment, specifically of executive functions before and after surgery, will be highlighted in order to be able to design neuropsychological interventions that allow subjects to carry out their activities independently. Finally, a topic of great interest in neuropsychology will be presented, such as the measurement of cognitive functions and their possible alterations. The need to use new and sophisticated psychometric models to quantify and interpret the cognitive changes that may appear because of a degenerative process or acquired brain damage will be highlighted.

Cognitive and functional risk markers of cognitive impairment.

Sara Mora Simón

Faculty of Psychology, University of Salamanca

Introduction. The identification of cognitive and functional risk markers of cognitive impairment (CI) would be very useful to detect those people who may be at risk of developing this syndrome, however, very few studies have been conducted to identify such markers based on cognitive and functional screening test. Objective. To determine cognitive and functional risk markers of CI based on cognitive screening test and functional scales that are usually applied in primary care. Methods. Prospective study. Baseline assessment: 313 participants over 65 years of age without dementia from Salamanca, with a mean age of 76.21±7.37 years. Of these, 263 had no CI and 50 mild CI. Final evaluation: after 4 years, the follow-up evaluation was developed on 127 participants, with a mean age of 78.61±7.09 years. Of these, 109 had no CI, 13 had mild CI and 5 dementia. MMSE, 7-Minute Screen Test (7MS), Barthel Index, Lawton and Brody Index, as well as sociodemographic and clinical data collection were applied. Logistic regression analyses were performed by components and test items to determine the markers. Results. Regarding to cognitive risk markers of CI, the attention and calculation component of the MMSE ($p < .01$) and, the Clock Drawing Test and categorical fluency of the 7MS ($p < .05$) are influential variables in CI risk. In relation to functional CI risk markers, the ability to transfer from the armchair and to wash clothes ($p < .01$) are also influential variables. Conclusions. The results show that higher scores on the attention and calculation components of the MMSE, Clock Drawing Test and categorical fluency of the 7MS, as well as independence in armchair transfer and laundry would indicate a lower risk of CI. Therefore, higher scores on these items would behave more as a protective factor against the development of CI than as risk markers.

Version of the Hopkins Verbal Learning Test-Revised with Semantic Facilitation in patients with Mild Cognitive Impairment and Incipient Alzheimer's Disease.

Rosalía García García

Faculty of Psychology, University of Salamanca

Introduction. The Hopkins Verbal Learning Test-Revised (HVLT-R), internationally validated and adapted for the Spanish population, is widely used in clinical neuropsychology for the assessment of episodic memory. The aim of this paper is to provide normative data of the HVLT-R using the semantic facilitation task in subjects with mild cognitive impairment, incipient Alzheimer's disease and without neurocognitive disorder. Methods. The sample is composed of 312 subjects participating in the NEDISA study, with mild cognitive impairment (n=43), incipient Alzheimer's disease (n=129) and without neurocognitive disorder (n=140) with similar sociodemographic characteristics in terms of age, gender and educational level. All subjects were administered a general neuropsychological battery. For this work we have selected the HVLT-R in which a semantic facilitation task has been introduced for the evocation of short- and long-term memory. Results. Statistically significant differences ($p < .05$) in short- and long-term semantic facilitation scores on the HVLT-R were found between groups with a high effect size. The area under the curve for the semantic facilitation index is 86% in the short term (sensitivity 82%, specificity 76%) and 90% in the long term (sensitivity 90%, specificity 74%) in the mild cognitive impairment group. The area under the curve for subjects with incipient Alzheimer's disease in the short term is 97% (sensitivity 91%; specificity 92%) and in the long term 99% (97%; specificity 93%). Conclusions. The use of the short- and long-term semantic facilitation task in the HVLT-R shows adequate sensitivity and specificity for the groups studied. It allows differentiation between subjects with mild cognitive impairment, incipient Alzheimer's disease and subjects without neurocognitive disorders.

Executive functions in subjects with glioma of the anterior cranial fossa.

Noelia Sánchez González

Faculty of Psychology, University of Salamanca

Introduction. Subjects diagnosed with glioma present deficits in cognitive functioning, particularly in executive functions, with significant repercussions on their activities of daily living. Objective. To study executive functions and their different components (planning, cognitive flexibility, attentional control, inhibition capacity, verbal fluency, reasoning, and abstraction) in patients with glioma of the anterior cranial fossa at different stages of the disease, comparing them with subjects without neurocognitive impairments. Method. A longitudinal observational design was used. The sample consisted of subjects with glioma (n=40) and subjects without neurocognitive impairments (n=83) with similar sociodemographic characteristics ($p > .05$). All participants were administered executive function assessment tests and were evaluated at four time points: pre-surgical stage, one month, three months, and six months post-surgery. Results. There are statistically significant differences ($p < .05$) between both groups in the scores obtained in all executive components analyzed at the four evaluated time periods. Conclusions. Patients with glioma of the anterior cranial fossa present alterations in planning capacity, cognitive flexibility, attentional control, inhibition, verbal fluency, reasoning, and abstraction. Improvements in overall executive performance (assessed through the FAB) and inhibition capacity (assessed through the Stroop) of glioma patients are observed from the first month after resection, and this improvement is maintained at the third and sixth post-surgical month.

Neuropsychological assessment from a psychometric perspective.

Jaime Unzueta Arce

Faculty of Psychology, University of Salamanca

Introduction. As a result of increased knowledge of the neuropsychological correlates of various neurological, neurosurgical, medical and psychiatric disorders, progress has been made in the development of new assessment techniques. Currently, there are hundreds of neuropsychological tests aimed at the evaluation of cognitive abilities and disorders used in different fields ranging from clinical practice, research to the psycho-legal field. Due to the implications that can be derived from their results, in-depth analysis of psychometric properties for these instruments has been an issue of great concern recently. Objective. To discuss some limitations and psychometric issues of neuropsychological tests and measurement procedures in this field. To this end, first, issues related to the adequacy of the normative samples used in the standardisation procedures of the scores of some tests will be analysed, as well as the shape of their distribution (considering normality and skewness). Furthermore, the comparability of scores from different tests will be discussed, taking into account the effect of measurement error, the levels of the scores to be compared and the presence of the sky and floor effect. Also, the presence of false positives and false negatives in test-based assessment and the reasons that might cause them will be reflected upon. Finally, the need to use new and sophisticated psychometric models to quantify and interpret cognitive change resulting from maturational processes such as in childhood, cognitive decline in adulthood or as a result of degenerative processes or acquired brain damage is presented.

Symposium 13: Friday, July 12th, 10:45-12:00
Environmental determinants in neurodevelopment and behavioral programming

Chair: Nélida M. Conejo

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Research Group in Behavioral Neuroscience, University of Oviedo, Oviedo, Spain
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SUMMARY

Environmental determinants play a key role in neurodevelopment and behavioral programming, as evidenced by a substantial body of research indicating that both prenatal and postnatal environmental factors can have lasting effects on brain structure and function. Early life exposure to environmental factors, including nutrients, chemicals, and air pollutants, is a strong determinant of vulnerability and resistance to stressors, influencing neurodevelopment through epigenetic modifications. These modifications can affect key brain regions that are critical for stress response and cognitive function. Additionally, sex differences have been observed in the risk and expression of mental disorders and epigenetic mechanisms play a role in sex-specific neurodevelopment and disease susceptibility. The role of the immune system in brain development also highlights the complex interplay between the brain, endocrine, and immune systems, with implications for later-life cognitive and mood outcomes. In summary, from experimental animal studies to human studies, this symposium will address the impact of exposure to chemicals such as the pesticide chlorpyrifos or air pollution in neurodevelopmental disorders such as Autism Spectrum Disorder, as well as the consumption of substances such as plant-derived phytoestrogens or alcohol, during the prenatal and postnatal stages, which could affect and reprogram different aspects of behavior. Similarly, the possible biological mechanisms associated with the impact of these adverse factors on behavior and brain function will be addressed. These factors are influenced by epigenetic mechanisms, genetic differences, and sex-related factors. These investigations underscore the need to evaluate the impact of these environmental determinants in developing policies and interventions that could mitigate adverse effects and the relevance of addressing environmental risks to protect and promote healthy neurodevelopment in children and adolescents.

Exploring the impact of developmental chlorpyrifos exposure on social behavior and excitatory-inhibitory balance in mice.

Judit Biosca-Brull[1,2,3], Laia Guardia-Escote[1], Pia Basaure[1], María Cabré[1,4], Jordi Blanco[1,3,5], Cristian Pérez-Fernández[6], Fernando Sánchez-Santed[6] & MaríaTeresa Colomina[1,2,3]

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In recent decades, chlorpyrifos (CPF) has been one of the most widely used pesticide worldwide. Despite its use has been regulated, its use is still maintained in some developing countries. Exposure to environmental toxics has been suggested to increase the risk for autism spectrum disorder. Moreover, we have demonstrated that human ε3 and ε4 alleles and sex confer different vulnerabilities to CPF. In this study we assess social autistic-like behaviors and determine its relation with the timing at CPF exposure and APOE genotype in both sexes. Therefore, C57BL/6J and human apoE3- and apoE4-target replacement homozygous mice were used. To evaluate the effects of prenatal CPF exposure, a group of females were exposed to 0 or 1 mg/kg/day of CPF through the diet, from gestational day (GD) 12 to 18. Besides, another group of C57BL/6J females were exposed to 300 mg/kg/day of VPA on GD 12 and 13 by a subcutaneous injection to include a positive control of autism. To evaluate the effects of postnatal CPF exposure, pups were exposed to the vehicle (corn oil) or CPF by oral gavage from postnatal day 10 to 15. In both exposure periods, social behavior was evaluated using the three-chamber test at adolescence. After that, mice were sacrificed and hippocampal samples were collected to study gene expression. Results from prenatal exposure showed a deficit in social memory, especially in C57BL/6J treated males and apoE3 and apoE4 treated females, while postnatal exposure showed alterations in sociability, specifically in control apoE4 males, apoE3 and apoE4 treated females and control apoE4 females. Regarding gene expression, we observed a disequilibrium between glutamatergic and GABAergic neurotransmitters after prenatal exposure. Thus, the period of exposure to CPF affects social behavior differently. Our results highlighted the importance of the developmental period of CPF exposure on social behavior outcomes.

Neurodevelopmental Consequences of Gestational Exposure to Particulate Matter <10: Evidence from Neurodevelopmental Milestones and Autism-Like Behaviors.

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Air pollution is a key component that should be controlled. The effects of different air pollutants, like Particulate Matter (PM), have been related specifically with health outcomes like cardiovascular or pulmonary health. However, recent evidence is showing a putative link between prenatal exposure to PM and neurodevelopmental disorders like the Autism Spectrum Disorder (ASD), which is characterized by reduced social behavior and abnormal motor and cognitive performance. To clarify this relationship, we exposed pregnant rats in our laboratory to PM<10 to a specific dosage of 200 µg/kg/day, and assessed different behaviors related to ASD in different developmental stages (ultrasonic vocalization in pups [PND7] and social behavior in adolescence [PND31-33] and adulthood [PND370-PND377], and inhibitory control in adulthood [PND102-PND150]). In addition to these behaviors, we also assessed different neurodevelopmental milestones that should be accomplished in a specific developmental stage. We detected that gestational PM<10 exposure seems to not impact neither birth-weight nor weight evolution. However, other developmental milestones like ocular opening, neurofunctional performance, and testicular development are affected by gestational exposure to PM<10. Regarding the behavioral variables, we noticed that prenatal PM<10 exposure impacts social behavior differently depending on the developmental stage that is analyzed. In terms of inhibitory control, no effect of gestational exposure was evidenced, but further research is needed to clarify some data that may show effects of PM<10 gestational exposure on compulsive behaviors. Brain samples were dissected in pups and adolescence related to social behavior. In the whole hemisphere (in pups), a down-regulated gene expression was detected for some GABA and Glutamate receptors. In the adolescence, a down-regulated gene expression was present in the Frontal Cortex and in the Cerebellum for some serotonin receptors, oxidative stress and GABA-Glutamate enzymes. On the contrary, an up-regulated pattern was evidenced in the hypothalamus for Glutamate, neuroinflammation, and some dopamine receptors.

Effects of phytoestrogen exposure during development on hypothalamus organization in rats.

José Manuel Fernández-García[1,2,3], Beatriz Carrillo[1,2], Paloma Collado[1,2] & Helena Pinos[1,2]

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Compounds classified as endocrine disruptors are considered toxic substances and are presumed to have harmful effects on mammalian physiology. However, while most endocrine disruptors are associated with detrimental effects, such as increased cancer risk, one group of these compounds, phytoestrogens, is linked to several beneficial effects, including preventive or therapeutic actions in carcinogenesis, atherosclerosis, and osteoporosis. Although the potentially beneficial effects of consuming soy, the main phytoestrogen compound consumed in Western society, have been highlighted many times, the potentially adverse effects have not received the same scrutiny, and virtually nothing is known about how phytoestrogens affect brain function, hormone regulation, and behavior in humans, especially children, with the effects of phytoestrogen-rich soy infant formulas on children remaining totally unknown. Although no overt adverse effects have been detected to date, this may simply be because no comprehensive large-scale studies have been conducted to address the problem and may change in the near future. Aiming to shed light on this subject, we evaluated the long-term effects of postnatal exposure to genistein, the main active compound in soy, on the morphology and neuropeptide expression in the hypothalamic structures that regulate food intake and metabolism in male and female Wistar rats. We analyzed how food shapes our brain, regulates different aspects of behavior, and modifies neuroendocrine function differentially in male and female rats throughout their lives. A significant number of studies have shown that alterations in the system controlling energy metabolism in adulthood are due to a poor diet during the early pre and postnatal periods, be it quantity or quality, and the study of compounds with estrogenic properties can help to clarify the factors through which these circuits are programmed and the role they play in these early periods of development.

Binge drinking undermines neurocognitive development during adolescence and young adulthood.

Concepción Vinader-Caerols & Santiago Monleón

Universitat de València, Valencia, Spain

The binge drinking (BD) pattern of alcohol consumption is currently prevalent during adolescence and young adulthood, a period characterized by critical changes in the structural and functional development of brain areas associated with memory. Furthermore, BD is associated with impaired neuropsychological abilities, such as memory. In our research, the timing, dose and chronicity of the pattern of use are the main factors studied, with results from cross-sectional and longitudinal experimental studies showing different cognitive effects in males and females. When this type of research cannot be carried out on humans for ethical reasons, animal research is used (results from our animal studies are also presented). Among the findings are that BD has different effects depending on the type of memory and biological sex in humans: immediate visual memory is one of the most affected; women are more susceptible than men to some of the detrimental effects of BD on memory; a cognitive tolerance effect is observed in women but not in men. Our longitudinal experimental study shows that the long-term effects of BD on memory persist and increase over time. On the other hand, our animal studies show that the chronic-intermittent pattern of use is also more detrimental at the cognitive level than other patterns of use (acute and subchronic patterns). Furthermore, this BD-induced memory impairment appears to be mediated, at least in part, by neuroinflammatory processes. In conclusion, BD undermines neurocognitive processes such as memory during adolescence and young adulthood, some of which may persist into adulthood.

Symposium 14: Friday, July 12th, 10:45-12:00
Psychobiology of addictions

Chair: Marcos UchaTortuero

UNED – Department of Psychobiology

SUMMARY

Addictions are psychiatric disorders which can arise after repetitive use of natural or artificial reinforcers or reinforcing behaviors. Addicted people crave and seek the desired substance or activity even at the risk of damaging their health, jobs, friendships, and families. These destructive behaviors are a result of several neurobiological phenomena involving the systems related to learning, decision making, stress responses and behavioral drive and inhibition. In this symposium, we will have the opportunity to listen to leading researchers in the field as they discuss their findings on the neurobiological mechanisms underlying addiction, the identification of risk factors biomarkers and endophenotypes linked to addiction and the relationship between drug use and other psychiatric conditions.

Effects of ketogenic diet on ethanol consumption in male and female mice.

M. Rodríguez-Arias & L.Torres-Rubio

Universitat de Valencia, Faculty of Psychology, Department of Psychobiology, Unit of Research on Psychobiology of Drug Dependence

The ketogenic diet (KD) is a high-fat, low-carbohydrate, and protein-balanced diet that induces a metabolic shift towards utilizing ketone bodies as the primary energy source, replacing glucose. Due to this special metabolic status that the KD induces, in recent years, this diet has been employed as a complementary treatment in several neurological disorders, such as epilepsy or neurodegenerative diseases. This protective efficacy is attributed to the diet's antioxidant and anti-inflammatory effects. However, research on the role of the KD in relation to substance abuse is limited. Preclinical studies have demonstrated that the administration of this diet significantly reduces withdrawal symptoms of ethanol withdrawal, without altering the behavioral profile. We have recently shown that male mice fed a ketogenic diet displayed an overall decrease in ethanol consumption without changes in their motivation to drink. However, all these studies were performed only on male animals. Ongoing studies in our laboratory have tested if KD induces the same effects in female mice. The effect of the ketogenic diet on increased ethanol consumption after social stress and biochemical changes in selected brain areas will also be discussed in this talk. References: Blanco-Gandía, et al., Rodríguez-Arias, M. (2021). Ketogenic diet decreases alcohol intake in adult male mice. Nutrients, 13(7), 2167. Ródenas-González, et al., Rodríguez-Arias, M. (2022). Cognitive profile of male mice exposed to a Ketogenic Diet. Physiology & Behavior, 254, 113883.

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The role of the Akt/mTOR/S6 pathway dysregulation in cannabis-induced risk for schizophrenia.

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Schizophrenia is a chronic, disabling and early-onset disease with a lifetime prevalence of up to 1% of the population worldwide. Several hypotheses regarding aetiopathogenesis of schizophrenia have been suggested but none has been consistently confirmed. Although symptomatic onset of schizophrenia occurs normally during late adolescence and early adulthood, the disorder arises from genetic and/or environmental factors (i.e. maternal infection during pregnancy) that are present prior to disease onset. In this context, the injuries to the brain during the neurodevelopment could be considered a key aetiopathogenical mechanism that would lead to the morphofunctional dysfunctions observed in schizophrenia. In this context, in the aetiopathogenesis of schizophrenia, a double-hit phenomenon has been suggested: a prenatal priming event (i.e. maternal infection during pregnancy) that would induce vulnerability, followed by a second hit in peripuberty (i.e. drug abuse, stress...). Cannabis consumption in early adolescence, a period of increased vulnerability to its effects, increases the risk of developing schizophrenia in vulnerable subjects. However, the neuronal mechanisms underlying vulnerability to develop schizophrenia after cannabis abuse during adolescence remain unknown. In this context, our hypothesis is that Akt/mTOR/S6 signaling pathway dysfunction may lead to a dendritic and synaptic disorganization that confers vulnerability to cannabis- induced risk for schizophrenia. In this work, we evaluated the psychosis-related behaviors and the status of the Akt/mTOR/S6 signaling pathway in a 'double-hit' rodent model induced by a maternal immune activation and THC administration at the peri-puberal age as well as in neurons obtained from the olfactory epithelium of subjects with schizophrenia and cannabis use and their matched controls. Results show a strong dysregulation of the Akt/mTOR/S6 pathway in both rodent and human samples, allowing us to identify a putative biomarker of vulnerability to schizophrenia in cannabis users.

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Noradrenergic modulation of cocaine-associated memory extinction.

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Addictive drugs induce long-lasting changes in brain circuits responsible for learning and memory. Maladaptive conditioned memories between contexts and drug effects are a hallmark of addiction. This form of aberrant learning is linked to unmanageable drug use and relapse, even after long periods of abstinence. A potential clinical tool to reduce craving and relapse may be to facilitate the extinction of drug-associated memories. Extensive evidence shows that noradrenergic signaling plays a pivotal role in memory plasticity. The activation of β2-adrenergic receptors (β2-AR) has been proposed as a necessary mechanism to facilitate and consolidate memories, including those that mediate extinction. Additionally, the infralimbic division of the medial prefrontal cortex (IL) is thought to play an important role in the extinction of conditioned memories. The studies presented in this symposium examine whether the activation of β2-ARs could facilitate extinction of cocaine-induced conditioned place preference (CPP). Male C57Bl/6J mice followed a CPP procedure with cocaine. During extinction mice received systemic or intracranial administrations of clenbuterol (CLEN), a selective β2-ARs agonist. Systemic activation of the β2-ARs had no consequences on extinction in any of the cases, although under certain conditions (short extinction sessions) CLEN administration during extinction facilitated reinstatement of cocaine CPP induced by a priming cocaine injection. Animals that showed a facilitation of reinstatement, also exhibited an increased c-Fos expression in the Paraventricular Nucleus of the Hypothalamus and in the Nucleus Accumbens core, that significantly correlates with preference. Intra-IL administrations of CLEN during extinction prevented extinction of cocaine-CPP making animals persistent in their response. Altogether, our data suggest that, under certain circumstances, non-contingent exposure to the stimulus previously paired with cocaine may be facilitating memory reconsolidation, instead of extinction. This process would be facilitated with the administration of β2-ARs agonists following short exposure to the conditioned stimuli.

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Biopsychological markers in gambling addiction: neurobiological, endocrine and clinical factors.

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Background: Gambling has been an entertainment and leisure activity since ancient times, but for some people this activity becomes a disorder with multiple adverse consequences. Gambling Disorder (GD) has a complex multifactorial etiology with the interaction between biological (genetic, neuroendocrine, neuropsychological...), psychological (personality traits, self-esteem, coping stress strategies…) and environmental (educational, cultural...) factors. The identification of the endo-phenotypes of the disorder allows a better understanding of its specific nosology, and enables the development of reliable diagnostic, prevention and treatment tools based on potential therapeutic targets, with the premise of promoting precision medicine. Objectives: To identify differentiated endophenotypes and phenotypes in a clinical sample of patients with a diagnosis of GD, who asked for treatment due to their gambling problem in a specialized unit of a tertiary public hospital. Methods: A cross-sectional cohort design was applied. The total sample included n=237 subjects with a diagnosis of GD and n=36 controls. Results: Compared to the control group, GD patients showed worse neurocognitive performance and lower mean levels in some hormones (such as LEAP2 and leptin). It was also possible to identify differentiated subtypes of patients, depending on these risk factors and the type of game preferred (strategic vs. non-strategic). Conclusions: GD is a heterogeneous condition, in which different subtypes can be identified, depending on a number of endophenotypes, phenotypes and type of gambling chosen for addiction. The search for biomarkers is crucial for the development of personalized treatment programs.

Symposium 15: Friday, July 12th, 10:45-12:00
Use of biomarkers to explore gender diversity and physical and cognitive frailty: a view from psychobiology

Chairs: Blanca Laffon Lage & Rosa Fernández García

Universidade da Coruña, Grupo DICOMOSA, CICA – Centro Interdisciplinar de Química e Bioloxía, Departamento de Psicología, A Coruña, Spain

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SUMMARY

This symposium will address the use of genetic, epigenetic, immunological, endocrine, neuropsychological and neuroimaging biomarkers for the identification and study of gender diversity and cognitive frailty. Evidence pointing to a complex etiology of gender incongruence (ICD-11) is increasing, with environmental, hormonal, genetic, and epigenetic components, which give rise to a specific neuropsychological profile. One of the current hypotheses suggests that gender identity is established during fetal/early post-natal development via sex hormones influences. In this way, gender incongruence might be related to a different sexual differentiation of the brain as a result of modifications in the DNA sequence of the estrogen (α-β) and androgen receptor genes. On the other hand, the extensive interindividual heterogeneity in the main outcomes of aging has fostered the emergence of the concept of "frailty" as a more accurate measure of biological age. Frailty is defined as a geriatric clinical syndrome that encompasses multisystem age-associated physiological decline, reduced homeostatic reserves, and increased individual vulnerability to stressors. Thus, the identification of frail elderly subjects is currently far more suitable to determine aging and the risk of development of age-related diseases. In an attempt to integrate physical frailty and brain aging, cognitive frailty was defined as a heterogeneous clinical manifestation characterized by the simultaneous presence of both physical frailty and cognitive impairment. Cognitive frailty is characterized by reduced cognitive reserve but differs from physiological brain aging. A potential for reversibility has been demonstrated for cognitive and physical frailty in the initial stages; hence, developing diagnostic tools, such as biomarkers, for its early identification is crucial. Acting on frailty through effective interventions may change the aging trajectories of many individuals from the possible "pathological aging" pattern to the more personally and economically desirable "successful aging".

Genetic and epigenetic markers of gender incongruence.

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Gender dysphoria by DSM-5 and gender incongruence by ICD-11 are characterized by a marked incongruence between one´s experienced gender and biological sex. The etiology of gender incongruence is complex, making the identification of one single cause impossible. Thus, evidence pointing to a complex etiology is increasing, with environmental, hormonal, genetic, and epigenetic components, which give rise to a specific neuropsychological profile. One of the current hypotheses suggests that gender identity is established during foetal/early post-natal development via sex hormones influences. This hypothesis supposes that, in transgender people, the process by which sex hormones influence the development of gender identity is altered. This idea has its basis in the organisational/activational dogma of hormonal impacts on the sexual differentiation of the brain. Under this framework, sex hormones prenatally organise brain tissues through receptor interactions, which later manifests in sex-specific behaviours. In this way, gender incongruence might be related to a different sexual differentiation of the brain as a result of modifications in the DNA sequence of the estrogen (α-β) and androgen receptor genes. On the other hand, epigenetics provides a relationship between genes and the environment. Epigenetic modifications determine which genes are expressed at each moment, in response to specific environmental stimuli. In our latest investigation we investigated the cross interaction between cortical thickness and DNA methylation in a transgender population, founding differences in methylation in the gene *CBLL1* that correlated with global and left hemisphere cortical thickness. *CBLL1* gene encodes the HAKAI protein, a conserved component of the N6-methyladenosine (m6A) transferase complex for messenger RNA methylation, essential for several biological processes such as myelination, cell differentiation, neurogenesis, and sex determination. Furthermore, the functioning of the m6A machinery in the nervous system is essential since it marks the "tempo" of corticogenesis and is also implicated in oligodendrocyte plasticity during adulthood.

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Physiopathology of frailty in older adults: biomarkers for early identification.

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Introduction: Frailty is a multidimensional geriatric syndrome characterized by loss of function and physiologic reserves and manifested by a progressive physiological decline in multiple body systems, which leads to increased vulnerability to disease and death. Frailty status can be delayed, or even reverted, if detected in initial stages. Hence, the development of biomarkers for its early detection, before the onset of clinical manifestations, is crucial for implementing preventive actions and specialized geriatric care that may improve health and well-being of older adults, as well as to reduce associated social and public health costs. The objective of this work was to investigate a set of biological parameters related to aging and age-related disorders, to determine their suitability as biomarkers of frailty and deepen our understanding of the physiopathological mechanisms involved in frailty syndrome. Methods: A cross-sectional study was conducted in a population of Spanish older adults (aged 65 and over, N=240) classified according to their frailty status (phenotype criteria). Whole blood samples were collected and biomarkers related to the immune and endocrine systems and to genomic instability were measured by standard methods. Linear regression analysis adjusting for age, gender, smoking habit and comorbidity was applied to estimate the effect of frailty status on the different biomarkers. Results: Significant differences were obtained between frail and non-frail subjects for most parameters analysed. Conclusions: Results obtained support involvement of Th1 immune activation, inflammaging, genomic instability, and hypothalamic-pituitary-adrenal axis deregulation in the physiopathology of frailty, as important driving forces of this syndrome. Moreover, a number of parameters are suggested as promising biomarkers of frailty and may be useful for its early identification.

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Neuroimaging correlates of physical and cognitive frailty: a comprehensive literature review.

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Frailty, a multifactorial age-associated biological syndrome characterized by a decreased physiological reserve and resistance to stressors, poses significant challenges to the healthcare system due to its association with adverse health outcomes. While frailty has traditionally been assessed through physical performance measures, recent research has emphasized the importance of incorporating cognitive frailty, which encompasses cognitive impairment in addition to physical decline, into comprehensive frailty assessment. Neuroimaging techniques offer valuable insights into the underlying neural substrates of frailty. This narrative review explores the neuroimaging correlates of physical and cognitive frailty, synthesizing structural and physiological brain changes associated with the syndrome. Structural Magnetic Resonance imaging (MRI) studies have revealed a reduced gray matter volume in regions involved in motor function, such as the prefrontal cortex, supplementary motor area, and cerebellum. Alterations in white matter integrity and white matter lesions, as evidenced by diffusion tensor imaging (DTI), have also been linked to gait speed reduction and cognitive impairment. Functional neuroimaging studies have revealed abnormal patterns of brain activity in frail individuals during motor and cognitive tasks, revealing compensatory recruitment of additional brain regions to maintain task performance. Furthermore, resting-state functional MRI studies have highlighted disruptions in functional connectivity networks involved in sensorimotor integration and executive function. Thus, recent neuroimaging research has identified neurobiological markers associated with both cognitive impairment and physical frailty, suggesting overlapping physiopathological mechanisms. The review highlights the importance of adopting a multidimensional approach to frailty assessment and management, integrating physical and cognitive domains. Knowledge of the neural correlates of frailty may help to identify potential biomarkers for early detection, prognosis, and targeted interventions aimed at preserving functional independence and mitigating adverse health outcomes in frail individuals.

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Neuropsychological markers of frailty state.

Nuria Cibeira[1], Rocío López-López[1], Carlota Lema-Arranz[2,3], Ali Hemadeh[2,3], Natalia Fernández-Bertólez[3,4], Isabel González-Abraldes[1], José Carlos Millán-Calenti[1], Ana Maseda[1], José Luis Rodríguez-Villamil[1], Eduardo Pásaro[2,3], Vanessa Valdiglesias[3,4], Blanca Laffon[2,3] & Laura Lorenzo-López[1]

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Introduction: There is extensive evidence in the literature showing that older people who meet the criteria for physical frailty have poorer cognitive performance and a higher risk of developing cognitive impairment and/or dementia with advancing age, and that older people with cognitive impairment or dementia are, in turn, at increased risk for physical frailty. This close and bidirectional relationship between physical frailty and cognitive impairment suggests that both conditions interact during the aging process and has been explained mainly by the pathophysiological and phenotypic mechanisms they share. Physical frailty has been linked to dysfunction in several neurocognitive domains, such as general cognitive status, memory, processing speed, and verbal fluency. Few previous studies have focused on the relationship between prefrailty, the subclinical state of frailty, and cognitive function. Method: In this work, we explored the neuropsychological profile of 60 dementia-free community-dwelling adults, aged 65 years or older (60.0% women), classified as prefrail and non-frail according to physical criteria. Participants completed a comprehensive standardized neuropsychological evaluation. We explored neurocognitive differences between the groups and examined the association between specific criteria of frailty phenotype and clinical and neuropsychological outcomes with bivariate tests and multivariate models. Results: Prefrail participants showed poorer cognitive performance than non-frail participants in both memory and non-memory cognitive domains. Conclusions: The fact that specific cognitive domains may be susceptible to subclinical states of physical frailty may have important clinical implications.

Funding: This work was supported by the Spanish Ministry of Science and Innovation: MCIN/AEI/10.13039/501100011033 [Grant PID2020-113788RB-I00] and Xunta de Galicia (ED431B 2022/16).

Oral Communications 1: Wednesday, July 10th, 12:15-13:30
Shaping the behavior: genes and environment

Chair: María Teresa Colomina Fosch

Universitat Rovira i Virgili, Tarrragona

Addressing sexual dimorphism in compulsive rats: impact on vulnerability to alcohol drinking and its relationship with the development of pathological gambling and social dominance.

Manuela Olmedo-Córdoba, Álvaro López-Villegas, José Juan León, Ángeles Prados-Pardo, Elena Martín-González & Margarita Moreno-Montoya

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Compulsivity refers to the inability to cease an ongoing behavior that has become unsuitable for the given circumstances. Clinical research indicates that obsessive-compulsive symptomatology is related to alcohol consumption leading to a pattern of compulsive alcohol drinking. Thus, compulsivity may be a vulnerability factor contributing to loss of control and alcohol abuse. The aim of the current study was to delineate the susceptibility of compulsive alcohol drinking as a determinant for the development of pathological gambling and social violence in both sexes. To accomplish this, we exposed male and female Wistar rats to a preclinical model of compulsivity known as Schedule-Induced Polydipsia (SIP). Initially, the rats underwent 20 sessions of SIP using water, followed by a 6% alcohol solution until they reached stability in their drinking. Various groups were formed based on their levels of water and alcohol intake. Blood samples were collected during the last day of SIP-alcohol to analyze alcohol concentration using the Analox AM1. Following group formation, a series of behavioral tasks were conducted, including the probabilistic spatial reversal learning task (evaluating cognitive flexibility), the rodent gambling task (assessing decision-making), the dominance tube test (measuring social dominance), and Crawley's sociability test (examining social interaction). The outcomes will be discussed in terms of identifying behavioral characteristics such as cognitive inflexibility, risky decision-making, and social dominance and interaction within a susceptible vulnerable population to alcohol drinking. In conclusion, the assessment of this factor underscores compulsivity as a transdiagnostic attribute that is present in the vulnerability to the development of alcohol use disorder.

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Biological vulnerability for depression and poor sleep quality: insights from a genetically informative design.

Juan J. Madrid Valero[1], Josep Pol Fuster[2], José M. Martínez Selva[1], Federico J. Blanco Garcia[1], José J. Morosoli[3] & Juan R. Ordoñana[1]

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Introduction: Depression is one of the most common conditions in clinical practice. The onset and course of depression is multi-causal and previous research has highlighted the aetiological role of both genetic and environmental factors and their possible interactions. In this regard, the diathesis-stress model posits that environmental stressors may have a different impact on depression depending on individual vulnerability (e.g. genetic predisposition). Sleep quality is closely related to depression; yet the origin and architecture of this relationship are not completely understood. In this study we hypothesized that there is a significant interaction between sleep quality and genetic vulnerability for depression that can explain depressive symptomatology. Methods: The sample was composed of 1,206 participants from the Murcia Twin Registry (mean age: 55.4; SD:7.4). Sleep quality was measured using the Pittsburgh Sleep Quality Index and symptoms of depression were measured using the Patient Health Questionnaire depression scale. Polygenic scores (PGS) for depression were calculated using LDpred2. In order to test for the main hypothesis of this study (a significant interaction between sleep quality and genetic vulnerability for depression), we fitted a series of mixed-effects regression models. Results: The best fit was provided by a model including sleep quality, PGS for depression, sex, and their interactions (AIC=5759.1) as compared to the model without the interaction between sleep quality and PGS for depression (AIC=5763.8) (P=0.009). Conclusions: Our results indicate that poor sleep quality is more strongly associated with depressive symptoms when there is a genetic vulnerability for depression. Key words: Depression, polygenic scores, sleep quality.

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The interplay between genetics and social policies: Heritability and polygenic index for years of education in Spain.

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Introduction: There is growing interest on the possible interplay between genetics and social environmental factors. Time-trends in the heritability of educational attainment were studied previously in Spain (Colodro-Conde et al, 2015), showing an increase for the role of genetics on inter-individual variability, following an educational policy reform which increased equality and accessibility to the educational system. In this study we aimed to replicate and expand those results by adding molecular genetic information. Methods: A polygenic index (PGI) for years of education was calculated in 1798 participants from the Murcia Twin Registry (655 pre-reform and 1143 post-reform), by computing the sum of the number of trait-associated allelic genetic variants, weighted by their association effect size, based on summary statistics from the largest available GWAS. PGI was calculated using LDpred2. Results: Average years of education were 12.27 (SD=4.4) for males [9.52 (SD=4.3) pre-reform vs 13.12 (SD=4.2) post-reform] and 11.2 (SD=4.7) for females [8.24 (SD=4.3) pre-reform vs 13.03 (SD=4.0) post-reform]. PGI for years of education explained a lower proportion of the variance in the pre-reform group (2.58%) as compared to the post-reform group (5.77%). This increase was more marked in males (pre-reform=0.41% vs post-reform= 4.93%) than in women (pre-reform=3.06% vs post-reform= 6.25%). Conclusions: The predictive value of PGI for educational attainment is larger after the educational reform This result matches well with our previous study, where a heritability increase was found after the reform, especially for males. Our conclusions highlight the interplay between genetics and educational policies and reinforce the idea of heritability as an index of equality in social environments.

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The relationship between parenting style and aggression is moderated by genetic polymorphisms.

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Although there is evidence supporting the influence of social circumstances, such as parenting styles, on individual aggressive behavior, it has been noted that individuals vary in the sensitivity and responsiveness to the environment. This discrepancy could be due to individual variables, such as genetic polymorphisms, which may confer a greater sensitivity to the context. Thus, the aim of the study was to analyze if different genetic polymorphisms involved in the dopaminergic and serotonergic systems confer vulnerability (diathesis-stress), susceptibility (differential susceptibility), or vantage (vantage sensitivity) to adverse and favorable parenting styles from both parents, concerning children's reactive and proactive aggressive behavior. For that, the sample consisted of 279 eight-year-old children (125 girls and 154 boys) from Spain. Reactive and proactive aggressive behavior was assessed through the Reactive and Proactive Questionnaire (RPQ; Andreu et al., 2009), while parenting styles were measured using the Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson et al., 2001). Saliva samples were collected to genotype for the genetic polymorphism via real-time PCR and PCR followed by agarose gel electrophoresis. To analyze the moderating role of the genetic polymorphisms in the relationship between aggressive behavior and parenting styles sex-based regression analyses were conducted. Afterwards, to determine which theoretical model best explains the significant interactions, the techniques described by Roisman et al. (2012) were performed. Our findings revealed that genetic polymorphisms are a biological variable that confers greater sensitivity to the environment. Moreover, our results also emphasize the necessity of analyzing the parenting styles of both mothers and fathers, as both predict aggressive behavior. Finally, it also highlights the importance of conducting separate analyses for boys' and girls' aggressive behavior.

Oral Communications 2: Wednesday, July 10th, 12:15-13:30
Cognitive decline

Chair: Alicia Salvador

Universitat de València

Functional connectivity of DMN in subjective cognitive decline at risk of Alzheimer's disease.

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Introduction: Subjective Cognitive Decline (SCD) refers to self-reported cognitive deterioration without objective neuropsychological evidence and is usually considered a preclinical state in the Alzheimer's disease (AD) continuum. The aim of this study was to determine whether participants with SCD, particularly those with atrophy in the hippocampus as a neurostructural marker of risk for AD (SCD+), exhibit changes in the functional connectivity of the default mode network (DMN) compared to controls, since this network is known to be altered in the AD continuum. Method: The sample comprised 133 participants: 69 controls, 51 SCD, and 13 SCD+. SCD participants with age, sex, and total intracranial volume adjusted Z scores of the left and/or right hippocampal volume below one standard deviation were diagnosed as SCD+. Seed-to-voxel analysis using four DMN ROIs was conducted. Additionally, dynamic independent component analysis of the DMN was performed. Results: The SCD and SCD+ groups showed DMN hyperconnectivity, which was more extensive in SCD+. Increased anticorrelations between DMN and task-positive network regions were observed in the SCD+ group, relative to both controls and SCD groups, and were linked to poorer executive scores in parietal regions in the SCD+ group. Finally, a trend for higher DMN recurrence was observed in the SCD+ participants. Conclusions: Hippocampal atrophy as SCD+ biomarker is associated with extensive DMN hyperconnectivity and increased anticorrelation between DMN and task-positive network regions. This study supports the use of hippocampal atrophy as an objective criterion to better characterize SCD as a preclinical stage of the AD continuum.

Neurophysiological Biomarkers and Cognitive Reserve in Older Adults with Subjective Memory Complaints.

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Identifying individuals in the early stages of neurodegenerative disorders allows for the implementation of potential preventive interventions. Thus, subjective memory complaints (SMCs) hold significant importance as they may provide insights into the neurological underpinnings of prodromal mild cognitive impairment (MCI) or Alzheimer's disease (AD). In this study, we examined whether resting state EEG (rsEEG) rhythms, which are typically altered in MCI and AD, exhibit similar changes in individuals with SMCs compared to control group. Additionally, we investigated the potential association between rsEEG rhythms and cognitive reserve (CR). Seventy-one older adults aged 55 to 74 years participated, undergoing a 3-minute recording in both rsEEG conditions with eyes open and eyes closed. The rsEEG measures considered included power spectral analysis of delta (0.5–4 Hz), theta (4–8 Hz), alpha (8–12 Hz), and beta (13–30 Hz) bands, as well as the alpha/theta transition frequency (TF) and individual alpha frequency peak (IAFp). In comparison to the control group, older SMCs exhibited higher theta power, while no significant differences were observed in the TF nor IAFp. Furthermore, in SMCs group, greater CR correlated with slower TF and IAFp. Our findings suggest that neurophysiological markers of brain dysfunction could serve as indicators of cognitive changes. Additionally, it seems that compensatory mechanisms related to CR interact with the neurophysiological processes underlying cortical alpha rhythms. Overall, rsEEG's could serve as a valuable complement to currently established dementia biomarkers since it is non-invasive, and extensively applied beyond academic context.

Perceived stress and subjective memory complaints during the post-pandemic period: the moderating role of hypothalamic-pituitary-adrenal axis.

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Introduction: The implementation of measures to avoid the spread of the COVID-19 pandemic (e.g., social distancing) was a source of prolonged stress. It has been acknowledged that its consequences were detrimental to mental health and cognitive functions such as memory. The present study aimed to study whether the perceived stress would predict subjective memory complaints (SMCs), a measure of subjective memory performance, during the post-pandemic period. In addition, we sought to investigate whether this relationship was moderated by hypothalamic-pituitary-adrenal (HPA) axis hormones (Hair Cortisol, HC and Hair DHEA, HDHEA). Methods: The final sample was composed of 69 healthy volunteers (63 women; mean age=23.45, SD=3.53). Participants were recruited between March and December 2021, from different bachelor's degrees at the University of Valencia (Spain). Perceived stress was assessed through the Spanish version of the Perceived Stress Scale (PSS), while to evaluate the SMCs, the Spanish version of the Everyday Life Memory Failure (MFE-30) questionnaire was employed. To study the HPA axis hormones, three strands of hair samples were extracted from the posterior vertex region. Results: Results indicated a positive association between perceived stress and SMCs, whereas HC and HDHEA acted as moderators in this relationship. Specifically, higher levels of both hormones intensified the effect of perceived stress on SMCs. Conclusions: The findings highlight the importance of considering both psychological and biological markers to understand the impact of stress on cognitive health during challenging times, specifically in youths. In addition, results revealed that higher levels of both hormones intensify the impact of stress on SMCs, which reflects that increased activation of the HPA axis in response to perceived stress negatively affects memory.

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Resilience, cognitive decline and its relationship with 5-HTTLPR polymorphism.

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The escalating prevalence of Alzheimer's disease underscores the urgent need to identify modifiable factors for prevention. Among these factors, resilience has emerged as a promising predictor of cognitive decline. However, longitudinal studies investigating resilience are sparse, impeding a comprehensive understanding of its temporal dynamics. Resilience is supposed to be influenced by a complex interplay of environmental, psychological, and genetic factors, although this relationship remains incompletely understood. One candidate gene implicated in both resilience and cognitive impairment is the serotonin transporter promoter region (5-HTTLPR), which influences serotonin production. Our main objective was to examine whether resilience could predict the maintenance of cognitive performance. Additionally, we aimed to investigate the time trajectories of resilience and cognitive function, exploring potential associations with the 5-HTTLPR polymorphism. We hypothesized that resilience would protect against cognitive decline by negatively predicting it. Furthermore, we propose that reductions in resilience and cognitive performance will primarily manifest in short allele carriers (S-carriers), who are supposed to exhibit lower serotonin levels. To achieve this, we assessed resilience and cognitive performance in 49 voluntary participants administering several psychological and cognitive tests. Four years later, participants returned for re-evaluation. Genetic analyses were conducted to identify different 5-HTTLPR genotypes: homozygous long allele (LL; N=11) and short allele carriers (S-carriers; N=39). Our results indicate a less resilience and a decline in episodic memory and semantic fluency in the complete sample and in the S-carriers, but not in the group of LL. Additionally, resilience was found to predict this decline only in the semantic fluency test in the whole sample. In conclusion, our findings suggest that resilience may play an important role in predicting cognitive impairment. Furthermore, we demonstrated greater vulnerability to cognitive decline associated with a particular form of the 5-HTTLPR polymorphism (S-carriers).

Funding: Project PID2020-199406-GB-100) and FPI 2021 funded by MCIN/AEI /10.13039/501100011033 and by FSE+.

Oral Communications 3: Thursday, July 11th, 12:15-13:30
Psychophysiological biomarkers

Chair: Santiago Galdo Álvarez

Universidade de Santiago de Compostela

Neuropsychological rehabilitation of face learning in a case of acquired prosopagnosia: Event-Related Potentials (ERPs) as electrophysiological efficacy markers for a rehabilitation programme.

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Introduction: The aim of this study was to improve face learning in a prosopagnosic woman with face perception and recognition problems, through a behavioural training programme. Methods: E.C. (30), visual agnosic due to right occipital brain damage, and 15 controls participated. Two sets of artificial face images were used. For set 1 ("pure" facial condition), faces had to be learnt, associating general structure to eyes. For set 2 (visuo-verbal), additionally, name and occupation should be learnt. E.C. underwent 70 learning sessions, each comprising a study phase, with controlled exposure to the faces, and a test phase, with several visuo-verbal forced-choice matching tasks. After training period, final testing was conducted, where an incomplete face (context) was presented, followed by a set of matching or mismatching eyes (target), and with simultaneous EEG recording at 20 sites (10-20 International System + Oz). ERPs were subsequently analyzed off-line, with ERPs locked to the target event, and computing mean amplitude of the difference (mismatch minus match) N400-like component. Results: E.C. required a longer learning period than controls. Her learning curve adjusted to a logarithmic function, but with significantly better behavioural performance in the visuo-verbal than in the structural condition. Her N400 ERP was most conspicuous in a verbal task, followed by a mixed visual-verbal, and least in a pure visual condition. Discussion: Presence of verbal-semantic information associated to faces and the use of analytic processing strategies facilitated learning of face-eyes associations in E.C., as proven by behavioural and ERP results. Conclusion: Recreating natural conditions including semantic information associated to faces may be a useful strategy within the neuropsychological rehabilitation of face processing abilities in prosopagnosia. Notwithstanding limitations of single case studies, results suggest that ERPs might constitute powerful electrophysiological markers of the impact of behavioural rehabilitation programmes.

Funding: Ministerio de Ciencia e Innovación (PID2022-139628NB-I00).

The role of openness to experience in the relationship between HRV and Prospective Memory.

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The relationship between different physiological states and several cognitive functions including prospective memory (PM) could vary depending on individual differences, such as personality traits. Specifically, increased heart rate variability (HRV) has been associated with improved cognitive performance. Furthermore, a positive relationship has been suggested between PM performance and personality traits like openness and extraversion. This study investigates the relationship between HRV and PM performance, as well as the potential mediating role of personality traits. HRV was recorded at rest in participants (N=53) (Mean age= 41,26) using time-domain measures of parasympathetic activity (the square root of the mean, RMSSD), and they were administered the "NEO Five-Factor Inventory" (NEO-FFI). Then, all participants completed the Cambridge Prospective Memory Test (CAMPROMPT) as an objective measure of PM. Results indicated the higher rest-state HRV, the better performance on PM tasks ($B = 6.24$, $p<0.05$). The mediation analysis revealed a positive regression between openness trait and PM, meaning that participants who scored higher in openness showed better MP performance. Furthermore, the mediation analysis also revealed a positive indirect effect of the openness trait on the relationship between HRV and PM, meaning that high openness scores could affect the relationship between resting HRV and PM. This suggests that the openness trait not only independently showed relationship with performance in PM, but it could also be influencing the relationship between physiological markers at rest and cognitive performance outcomes. However, the other personality traits did not mediate this relationship. These findings highlight the importance of examining the influence of specific personality traits on the relationship between physiological states and cognitive performance.

Funding: Proyecto PID2020-119406-GB-I00 financiado por MCIN/ AEI /10.13039/501100011033.

Sex hormones and global/local visual perception.

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Introduction. The processing of complex visual stimuli involves the integration of global and local information that make up the entire visual scene. The experimental study of this phenomenon has revealed an effect of precedence of global vs. local analysis in young adults. Since this effect is not constant and sex differences in global/local visual processing have been observed, in the present study we analysed whether such differences can be explained by hormonal changes in women according to the phase of the menstrual cycle. Methods. We administered large letters formed by small letters as stimuli (matching or mismatching), under both direct and divided attention conditions, to 78 men and 168 women, 69 of them in the follicular phase of the menstrual cycle, 52 in the luteal phase, and 47 using hormonal contraceptives. Results. The direct attention task revealed: faster reaction times in men than in women, a global unidirectional interference in men, and differential global/local interference effects in the different groups of women. The divided attention task revealed a global advantage in men and a local advantage in women when comparing between sexes, with this local advantage observed exclusively in women in the luteal phase of the menstrual cycle. Discussion. The global precedence effect was modulated by ovarian hormones, evidencing a more analytical visual processing style in women than in men, specifically when they are in the luteal phase of the menstrual cycle (with higher concentration of progesterone). The divided attention task yields more conclusive results, highlighting that tasks with higher cognitive demand sharpen global or local processing biases. Conclusion. This study demonstrates the importance of evaluating the hormonal status of women to understand sexual differences in cognitive processes, as well as the need for neuroimaging studies to define neural changes during the menstrual cycle in relation to information processing.

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Oral Communications 4: Thursday, July 11th, 12:15-13:30
Neuropsychology

Chair: Israel Contador

Universidad de Salamanca

Semantic verbal fluency across life in Mexican population.

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Introduction. Semantic verbal fluency task (SVFT) is extensively used but despite its usefulness, a notable lack of normative data (ND) for Spanish-speaking population exist, especially, for clustering and switching strategies. The aim of this study was to generate ND for total score (TS), clustering and switching in SVFT for the Mexican population between 6-90 years old. Method. The sample consisted in 778 participants from Mexico City and Guadalajara. The majority were women (60.5%), with a mean age and education of 29.72 and 6.73 years respectively. Participants completed the SVFT (animals and fruits) and four scores were calculated: TS, number of cluster (NC), cluster size (CS), mean cluster size (MCS), and number of switches (NS). Ten Poisson regression models were run including age, age2, log education, sex, vocabulary, and all two-way interactions between these variables as predictors. Over-dispersion was assessed. To generate ND: the expected test score (μi) was computed based on the parameters estimates from the regression model βp, the probability based on the Poisson Cumulative Distribution function was estimated and multiplied by 100 to interpret it as a percentile. Results. For animals, age by vocabulary (for TS and CS), and sex by education (for TS, and NC) interactions were found. Vocabulary was associated with NC, and NS; while age was related to CS and MCS. For fruits, age by vocabulary interaction was found for CS. Age, sex, and vocabulary were related to NC, while age and education to NS. The models that explained a greater percentage of variance were fruits TS (49,57%), and CS (30,70%), and animals TS (43,14%), and NS (30,67%). Discussion. The present study provides innovative SVFT (animals, and fruits) TS and qualitative strategies norms for Mexicans, as it used the Poisson Distribution model. We believed the norms will help clinicians in their regular clinical activities.

The Impairment of Empathy and Emotion Recognition in Parkinson's Disease: A Comprehensive Analysis.

África Pérez Santiago, Liz Mendoza Hernández, Pilar Martín Plasencia & Laura Alonso Recio

Department of Biological and Health Psychology, Faculty of Psychology, Universidad Autónoma de Madrid, Spain

Introduction: The capacity of empathy and the recognition of emotions seems to be impaired in Parkinson's Disease (PD). Yet there is an ongoing debate on its theoretical background, the relationship between them, and their clinical implications. The objective of this study is to deeply analyze these two social cognition abilities and its relation in PD, as well as the association between them and cognitive impairment, clinical symptomatology and daily life. Method: For this aim, 47 controls and 68 patients completed several computerized tasks to assess both emotion recognition and empathy at different levels. These measures included auditory stimuli, static and dynamic facial expressions, along with a situational task and a self-report measure of empathy (IRI test). The MoCA test was used to determine cognitive impairment. Clinical data, as the UPDRS scale and a Quality-of-Life test (PDQ-39), were retrieved from 28 and 16 patients, respectively. Results: PD patients exhibited a significantly poorer performance in all tasks, except in self-report empathy (IRI). Results also showed that those who revealed more difficulties in the emotion recognition tasks displayed poorer empathy capacities. Regarding cognitive impairment, when excluding the dementia cases (MoCA scores<23) the significant differences between groups remained, as well as the relation between recognition and the situational task of empathy. No significant correlations were observed in recognition and empathy with UPDRS, among patients. Although, generally, less severe cases (UPDRS lower scores) performed better on the tasks. Nevertheless, there was a significant negative correlation between PDQ-39, especially in the communication sub-dimension, and empathy (IRI). Conclusions: These results provide empirical evidence to the emotion recognition and empathy deficit in PD, which appears to be, at least, not directly affected by severity factors. The apparent relation with quality of life points out the convenience of assessing social cognition variables to improve the adjustment of behavioral interventions.

The Role of BDNF and Olfactory Function in Memory Impairment in Minimal Hepatic Encephalopathy moderated by Age.

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Liver cirrhosis patients may exhibit minimal hepatic encephalopathy (MHE), with cognitive alterations. MHE presence correlates with blood levels of Brain-Derived Neurotrophic Factor (BDNF), a neurotrophin linked to neuron survival and plasticity. Impaired olfactory function is noted in various neurological disorders, correlating with hepatic encephalopathy severity. Identification of MHE could converge with age-related mild cognitive impairment (MCI), especially regarding memory deficits, as age and survival rates rise. Thise study aimed to explore the relationship between MHE and memory, focusing on the role of BDNF and olfactory function, particularly due to their significance in neuronal survival and plasticity within memory mechanisms, as well as their status as potential indicators of brain health. For this, 109 cirrhotic patients (85 men and 24 women) and 31 healthy volunteers (16 men and 15 women) aged 35 to 80 years underwent CANTAB visual memory tests, digit span (working memory), olfactory function assessed by the Sniffin' Test, and Weschler IV memory scale (verbal memory). Plasma BDNF levels were also analyzed. Results revealed a significant positive link between BDNF levels and short-term verbal memory across the MHE patients. However, no significant correlations were observed with visual-spatial and working memory domains. Notably, olfactory function also exhibited a significant positive association with visual-spatial memory in MHE patients, underscoring the potential significance of olfaction in cognitive assessments within this cohort. Further analyses incorporating age as a moderator in both associations indicated that these relationships become more pronounced after the age of 54. These results suggest the importance of BDNF and olfactory function in the cognition of MHE patients, highlighting the need to consider these factors in the clinical assessment and management of cognitive dysfunction in liver cirrhosis. In addition, the age is a key factor to better understand these mechanisms.

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Understanding the impairment of processing speed in Parkinson's disease: A comprehensive analysis.

Liz Mendoza Hernández, África Pérez Santiago, Juan Manuel Serrano Rodríguez & Fernando Carvajal Molina

Department of Biological and Health Psychology, Faculty of Psychology, Universidad Autónoma de Madrid, Spain

Introduction: Slowness is a core cognitive feature of Parkinson's disease (PD). However, there is no conclusive evidence that determines whether such impairment is a consequence of motor difficulties or related to a more central processing speed alteration. Processing speed studies have designed several tasks to establish the nature of slowness, such as simple and choice reaction time (RT) or response inhibition and inspection time. However, these tasks are not typically assessed together in studies. This study aims to comprehensively analyze the different components of speed response, and their relation to motor symptoms and quality of life. Method: 43 non-demented PD (MoCa score > 23) and 43 healthy controls were assessed using various computerized tasks (simple RT, choice RT, response inhibition and inspection time). Moreover, 24 of the PD participants completed the Unified Parkinson's Disease Rating Scale (UPDRS III) and Parkinson Disease Questionnaire (PDQ-39), to assess motor symptoms and quality of life, respectively. Results: While non-demented PD showed a similar accuracy (number of correct answers) in simple and choice RT tasks compared to healthy controls, their RT in these tasks were significantly slower. Moreover, the PD group had less correct answers in response inhibition task, and no differences were found in inspection time task performance. Regarding the complete sample, RT did not significantly correlate with task performance, except for those between response inhibition-RT and inspection time (0.40 $p<0.05$). There were also significant correlations between response inhibition-RT and choice-RT (0.60 $p<0.01$). No significant correlations were observed between any of the tasks and UPDRS III or PDQ-39. Conclusions: Deficits in information processing in PD seem to have a complex nature, where motor slowness and deficits in some cognitive processes, such response inhibition ability, contribute to explain their performance.

Oral Communications 5: Friday, July 12th, 12:00-13:30
Stress, Diet and Drugs

Chair: Alejandro Higuera Matas

Universidad Nacional de Educación a Distancia, Madrid

Acute Social Defeat Stress in male and female prepubertal CD1 mice.

Alina Díez Solinska, Oscar Vegas Moreno, Maider Muñoz Culla, Garikoitz Azkona Mendoza

Department of Basic Psychological Processes and their Development, Faculty of Psychology, University of the Basque Country (UPV/EHU)

Introduction: Social stress has shown to have physiological and behavioral implications and to be related to the development of psychological disorders such as anxiety and depression. However, although women are more prone to suffer these diseases, a considerable amount of published studies have mostly been centered in men or, alternatively, in male animal models. As a result, many studies of stress vulnerability and resilience have focused on males, and therefore, one of the most used paradigms is the Social Defeat Stress (SDS) model. This model involves a confrontation between two males, a resident and an intruder, resulting in stress induction in the intruder male. This is the model usually employed to study stress and its negative health consequences in male mice due to their idiosyncrasy. However, as males do not typically exhibit aggression towards females, other models are often used when studying stress effects on females, and as a result, studying males and females comparatively is challenging. Methods: In order to study sex differences, we used SDS, in both, males and females. Nevertheless, to prevent the resident male from perceiving the intruder mouse as a female, urine from adult male mice was used to mask the scent of the females. Results: This method resulted in no differences in attack latencies towards males or females, thus, the SDS model worked for both sexes. Regarding physiological measures, plasma cortisol levels were higher in stressed animals compared to non-stressed ones. Stressed female mice showed lower testosterone and progesterone levels, and no differences in estradiol levels compared to non-stressed female mice. No differences were observed in male mice. Differences were also observed in mRNA expression levels in some pro and anti-inflammatory cytokines. Conclusions: Overall, our results indicate that this model can be used to compare the effect of SDS in both sexes.

Exploring the Impact of Prenatal Interventions on Neurodevelopmental Outcomes: Insights from Probiotic and Vitamin D Supplementation.

Mario Ruiz Coca, Cristian Pérez-Fernández, Diego Ruiz-Sobremazas, Miguel Morales-Navas & Fernando Sánchez-Santed

Department of Psychology and CIBIS, University of Almeria, Almeria, Spain

Autism Spectrum Disorder (ASD) is a diverse neurodevelopmental condition with a multifaceted origin, marked by early-onset social communication difficulties, social impairments, and repetitive sensory-motor behaviors, activities, or interests. While genetics play a crucial role in autism, environmental factors also influence its development. Prenatal exposure to Chlorpyrifos (CPF) has been shown to produce behavioral and molecular effects like those seen in individuals with autism. Additionally, prenatal vitamin D deficits and dysbiosis are common comorbidities associated with ASD and CPF prenatal exposure. Based on this, we hypothesize that ASD-like behaviors resulting from gestational CPF exposure could be mitigated by administering a probiotic and vitamin D supplementation during pregnancy. Our study also aimed to investigate the expression levels of key genes involved in major neurotransmitter systems and neural epigenetic processes. We observed the performance of Wistar rats in the 3-Chambered Test, the Open Field Test, Plus Maze Test and the emission of ultrasonic vocalizations by pups. Surprisingly, most of the neurodevelopmental effects in control subjects found were due to prenatal dietary supplementation. Probiotic and vitamin D supplementation influenced several behaviors (development, motricity, sociability, vocalizations) in short and medium term, as well as ASD related genes in cerebral cortex. Future research should examine the offspring safety considerations of using such supplements during pregnancy and should reconsider the use of greater regulation of such products.

Maternal immune activation by the viral analogue Poly I:C decreases goal-tracking, biases decision-making towards disadvantageous choices and increases preference for saccharine over ethanol in a discrete-trial choice procedure.

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Introduction: Maternal immune activation (MIA) by viruses or bacteria has long-lasting influence on offspring behaviour and the brain neurochemical systems governing reward processing and drug use. However, the question still remains whether MIA could affect several traits associated to compulsive ethanol use or choice of ethanol over an alternative reward. Methods: Pregnant Sprague-Dawley rats were administered Poly I:C (4 mg/kg i.p.) on gestational day 15. Several behavioural traits were evaluated in the adult (beginning on PND 60) male and female offspring that are predictive of compulsive drug use. Results: MIA induced an increase in goal-tracking in a Pavlovian-conditioned approach assay. In addition, it was also associated with more disadvantageous choices in a modified rat gambling task. While no effects were observed in motivation for ethanol self-administration or compulsive self-administration, MIA-exposed rats (especially the females) were more prone to choose saccharine over ethanol in a discrete-trial choice task. Conclusions: These results suggest that MIA affects reward-related behaviour and alcohol choice in a divergent and, in some cases, sex-specific way and warrants further research into the psychobiological mechanisms involved.

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Consequences of early alcohol exposure influenced by maternal consumption and an antioxidant diet.

Teresa Aparicio Mescua[1], Ignacio Molero Beato[2], Leandro Ruiz Leyva[2], Agustín Salguero[3], Olga López Guarnido[4], Ricardo Pautassi[3,1], Ignacio Morón Henche[1] & Cruz M. Cendán Martínez[2]

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Early exposure to alcohol, especially during gestation and adolescence, can lead to abusive consumption and harmful alterations. In Spain, it is estimated that 40% of women consume alcohol during the first trimester of pregnancy, and 70% of adolescents have consumed alcohol in the last year. These consumption patterns can alter the metabolism of oxidative stress and cause behavioral effects such as anxiety and memory alterations. These effects have been studied in animal models exposed to alcohol during gestation or to episodic excessive alcohol consumption (EEAC). Attempts have been made to mitigate these effects with dietary supplements such as folic acid (FA) and selenium (Se), which can help restore oxidative balance. In our research, we seek to expand our knowledge about the treatment with diets enriched with FA and Se in situations of early exposure to alcohol. Mothers are exposed to different forms of alcohol consumption during gestation and to different forms of supplementation, and then their antioxidant capacity is analyzed. The offspring are exposed to a supplemented diet and their voluntary alcohol consumption in adolescence, their anxious/depressive phenotype, and their hippocampus-dependent recognition memory are analyzed. Preliminary data show a decrease in weight and food consumption in rats whose mothers were exposed to alcohol. Additionally, these offspring consume more alcohol compared to those whose mothers did not consume alcohol. This design allows us to analyze possible interactive effects between the different treatments to pregnant mothers and adolescents. This approach is novel both for the design and for the variables to evaluate, as the behavioral consequences associated with the treatment with diets to restore the antioxidant capacity altered by early exposure to alcohol remain largely unexplored.

The impact of acute stress and alcohol Consumption perception in Decision-Making in young adults.

Maragda Puigcerver Pérez[1], Francisco Molins Correa[1], LucíaTeresa Hipólito Cubedo[2] & Miguel Ángel Serrano Rosa[1]

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The misuse of alcohol results in 3 million deaths annually worldwide, highlighting addiction as a complex health challenge influenced by a variety of factors. Indeed, stress is a significant factor contributing to the development and maintenance of alcohol compulsive intake, through the impairment of information processing, risk assessment, and impulse control. Thus, this study focuses on the impact of acute stress and alcohol consumption perception on decision-making. 53 healthy young adults (mean age = 23.34, SD = 5.72; 49 women) participated in this laboratory study, being asked about their alcohol consumption pattern. Participants were divided in two groups: stress (TSST-VR) and control (distractor). The Iowa Gambling Task (IGT) was performed twice, before and after the stressor/distractor. The second IGT was modified including alcoholic beverage images. Heart rate (HR), negative affect, and self-reported stress were assessed during all the protocol. Participants exposed to TSST-VR exhibited higher physiological stress indicators and negative mood, confirming effective stress induction. ANOVA analysis revealed a negative association (β = -71.301) between participation in the stress group and learning outcomes, indicating diminished learning in this group as evidenced by the differences in IGT2-IGT1 total scores. This suggests a detrimental impact of stress on decision-making processes. However, psychophysiological stress indicators were not related to changes in IGT. On the other hand, when incorporating the frequency of alcohol consumption as a moderating variable, disclosed differential effects on learning across groups. Specifically, in the control group, a higher intake of alcohol was associated with decreased learning, as demonstrated by lesser improvements in IGT scores. In contrast, such a pattern was not observed in the experimental group. This divergence may be attributable to the overshadowing effect of stress on alcohol's impact on decision-making. Conversely, in the absence of acute stress, alcohol consumption frequency perception reduces learning in decision making. This study reveals a complex relationship between stress, alcohol consumption, and decision-making, emphasizing the importance of understanding these dynamics to develop preventive strategies for alcohol misuse in non-clinical settings.

Oral Communications 6: Friday, July 12th, 12:00-13:30
Functional studies from an ethological perspective

Chair: Pablo Polo

Universidad del Desarrollo, Chile

Are there sexual differences in the tunning of aggression and cooperation under an intergroup conflict scenario?

José Antonio Muñoz-Reyes, Pablo Polo, Nohelia Valenzuela, Oriana Figueroa, Nerea Aldunate & Simón Ramírez

Centro de Investigación en Complejidad social, Facultad de Gobierno, Universidad del Desarrollo

Intergroup conflict has a ubiquitous presence in human societies. In this sense, various researchers have proposed that competition between groups has acted as a key selective force throughout human evolutionary history. Such intergroup competition for limited resources exacerbated the expression of intergroup aggression and intragroup cooperation. Furthermore, from an evolutionary approach, classic models predict that it would have sexual dimorphism, with men demonstrating increased sensitivity to conflict threats—to maximize reproductive opportunities—while women generally reject active engagement in intergroup conflict. The present presentation will explain the main results of this line of research that tried to find and explain sexual differences in the modulation of cooperation and aggression in intergroup conflict scenarios. We have conducted behavioural experiments under controlled laboratory conditions to measure cooperation and aggression using virtual games (modelled from game theory), specifically the Public Good Games and the Point Subtraction Aggression Paradigm, in several studies compromising 787 participants of both sexes. Our results indicate that both sexes are tunning aggression and cooperation to increase it in the presence of intergroup conflict. However, in the case of collaboration, it only occurs in unisexual groups. These results, obtained in the last eight years of studies, prompt the need to discuss another functional theoretical framework to explain how men and women display aggressive and cooperative behaviour under intergroup conflict scenarios.

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Competitive altruism as a signal of status and the role of reproductive strategies in its expression in men and women.

Oriana Figueroa Valdebenito[1], José Antonio Muñoz-Reyes[1], Eugenio José Guzman[1], Gabriela Fajardo[2], Simón Ramírez[1], Francisco Villarroel[1], Josefina Larraín[1], Montserrat Belinchón[1], Nerea Aldunate[1], Jaquelin Morillo, José Antonio Muñoz-Reyes, Pablo Polo[1], Nicolás González[1], Francisco Reyne[1], Daniel Torrico-Bazoberry[1], Pablo Polo[1]

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Social status, understood as one of the dimensions of social capital, is a desired characteristic since it provides multiple health benefits and advantages in intrasexual competition scenarios (Fournier, 2020; Gangestad & Simpson, 2000). Behaviors such as competitive altruism are described as those in which individuals will compete in terms of generosity to gain social status through prestige, signaling themselves as a good reproductive partner (e.g., charity donations) (Hardy & van Vugt, 2006). The objective of this research was to understand how competitive altruism is affected by individual characteristics such as sociosexuality (measured by SOI-M) considering two contexts: one where participants know each other and show their social capital (status) (N=193) and another in controlled laboratory conditions where the subjects do not know each other, so hierarchies (status) must be established (N= 191). A total sample of 384 individuals (206 women and 175 men) between 18 and 58 years old (M=24.44; SD= 6.73) was recruited. Participants answered a series of psychometric instruments (sociodemographic questionnaire, sociosexual orientation multidimensional inventory (SOI-M), and BIG FIVE). They then played an economic game to measure the social standing of the individuals and were finally allowed to donate part of their profits to the NGO (Non-Governmental Organization) publicly. We found no relationship between short-term reproductive strategies (measured by SOI-M) and competitive altruism (donation to NGOs) regardless of context. Furthermore, we found no sex differences in the expression of altruism, showing that competition to achieve status through prestige is important for both men and women. We conclude that exploring the relationship between competitive altruism and reproductive strategies is necessary by including new variables (e.g., physical attractiveness) and testing new metrics to estimate individuals' social capital from network analysis.

Funding: This work was possible thanks to Fondecyt postdoctoral project (3220233) National Research and Development Agency, Government of Chile (Oriana Figueroa).

Facial physical traits and their relation to competitive ability and attractiveness in men. An armament-ornament approach.

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Introduction: Dual function in the context of sexual selection refers to physical traits that convey information about multiple qualities of an individual to potential competitors and mates despite of being initially selected through intrasexual competition (armaments) or mate choice (ornaments). These signals can communicate both the ability to compete in challenging situations and genetic quality. In this sense, the facial width-to-height ratio (fWHR) is a sexual dimorphic trait positively associated with fighting ability in men and is suggested to have evolved via intrasexual competition. However, fWHR may also provide information about protective abilities to potential mates and, then, play a secondary role in mate choice especially jointly with other attractive traits. On the other hand, the fluctuating facial asymmetry (FFA) is a measure of developmental instability that is negatively associated with physical attractiveness and plays a significant role in mate choice. However, since FFA is considered a proxy of genetic quality, it may also signal competitive abilities to potential rivals. Methods: The aim of this study was to investigate the potential dual function of previous mentioned morphological traits. In order to accomplish that, we obtained standardized facial photographs of 834 men aged 18-53 years to measure fWHR and FFA. Then, twelve evaluators of both sexes rated the competitive ability and attractiveness of the participants faces. Results: The results indicated that fWHR was positively related to competitive ability, on the one side, and to attractiveness in interaction with FFA, on the other. The FFA was negatively related to both perceived competitive ability and attractiveness. Discussion: These results support our predictions and indicate that certain facial features may act as dual functions that convey information about both competitive ability and physical attractiveness contributing to the understanding of mechanisms underlying mate choice and intrasexual competition.

Harshness and Unpredictability During Childhood: An Approach from Life History Theory to Understanding Risk Behaviors.

Eugenio José Guzmán-Lavín, Oriana Figueroa Valdebenito, José Antonio Muñoz-Reyes, Nerea Aldunate & Pablo Polo

Laboratorio de Comportamiento Animal y Humano (LABCAH), Centro de investigación en Complejidad Social, Facultad de Gobierno, Universidad del Desarrollo, Santiago de Chile

Risk behaviors involve a degree of danger, yet they also offer the chance of gaining rewards. Several studies have highlighted the influence of childhood environment, particularly in terms of its harshness and unpredictability, on several aspects of individual life history strategies, including risk-taking during adulthood. Although significant advances have been made in understanding risk behaviors, controversies persist regarding the relationship between childhood environment and risk behaviors, as well as the moderating role of reproductive strategy-related trade-offs and the current social environment. In this context, considering a sample of 368 participants (age 18 to 58 years, mean = 24.52, SD = 6.71, of whom 195 were female), collected in person at two different settings (field [university class rooms] and laboratory), the present study aimed to examine, from a framework based on life history theory, how adverse childhood experiences —characterized by perceived harshness and unpredictability (self-report questionnaire)— influence risk propensity measured with the balloon analogue risk task (dependent variable). Through robust regression models, we explore how this association may have been moderated by factors related to reproductive strategies and by current social environmental conditions (self-reported questionnaires). Overall, we did not find a clear relationship between childhood environment and risk behavior as predicted. Conversely, we found a positive relationship (we expected a negative relationship) between childhood harshness and risk propensity in women that delay they first sexual intercourse (moderator variable). Furthermore, we found that an adverse childhood was associated with the onset of menarche, age at first sexual intercourse, family support, and participant neighborhood. Additionally, in an exploratory basis, we divided our sample according to the setting of data collection; however, we failed to find a coherent pattern of results. This study underscores the importance of considering additional factors that may influence the relationship between childhood experiences and risk-taking.

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Influence of Aggressive Context in Neutral Information Processing: An ERPs study.

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Introduction: Threatening stimuli, such as angry faces, have electro-physiological correlates in their early processing. One of the Event-Related Potentials (ERPs) elicited following the presentation of threat stimuli is the Early Posterior Negativity (EPN), whose amplitude reflects the amount of attentional resources allocated to the stimulus due to its emotional salience in early perceptual processing. In the present study, we investigated the influence of aggressive context on the processing of angry and neutral faces, aiming to analyze neutral information processing in terms of emotional salience depending on its context through the EPN. Methods: 30 participants were asked to indicate if faces were aggressive or not in a congruency paradigm, while electroencephalogram (EEG) was recorded. Half of these faces were neutral, while the other half were angry. Prior to the presentation of each face, a screen displaying a sentence describing an action that could be emotionally congruent or incongruent with the facial expression was presented. Half of them described aggressive actions towards another person, while the other half described neutral actions towards another person. Results: Behavioral results show an effect of context on the attribution of aggressiveness to neutral faces, observing that when they were presented in contexts of aggressive actions, they were perceived as more aggressive. ERP analyses showed that the EPN exhibited greater amplitude for angry faces compared to neutral faces, especially in the right hemisphere. Additionally, we observed a modulation of this component by congruency depending on the hemisphere. Conclusions: The results indicate that not only does the emotional expression of the face influence the modulation of the EPN component, but also the context influences it and is mainly reflected in the right hemisphere. We will discuss the results from a functional perspective to understand the processing of neutral stimuli in aggression contexts.

Funding: This research was mainly funded by the FONDECYT-Chile Grant (11190245) from the Agencia Nacional de Investigación y Desarrollo de Chile (ANID) to Nerea Aldunate.

Short Communications 1: Wednesday, July 10th, 17:45-18:30
Studies with clinical implications

Chair: Margalida Coll Andreu

Universitat Autònoma de Barcelona

Biological substrate of cognitive functions in adolescent population with early onset psychosis: N-acetyl aspartate levels during the first 5 years of illness.

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Introduction: Subjects with Early Onset Psychosis (EOP) present alterations in early cognitive development, which are lower than in their healthy counterparts [1][2]. The most impaired cognitive functions are related to the dorsolateral prefrontal cortex (DLPFC), namely executive functions, global attention and working memory [2]. Some studies point to biochemical alterations as underlying causes of cognitive dysfunction, N-acetyl-aspartate (NAA) being one of the altered markers in the DLPFC region of EOP [3]. The aim is to analyse the relationship between NAA levels and cognitive functions during the first 5 years of illness in EOP adolescents [4], compared to their controls. Methodology: There were 65 EOP subjects and 67 controls (15.59 ± 1.82 years). The study of the cognition index was conducted by neuropsychological assessment of global attention, working memory and executive functioning. In vivo NAA levels were obtained by single-voxel MR spectroscopy. Data were obtained at baseline, 2 and 5 years. Statistical analysis: Mixed Model and Pearson correlation study. Results: When introducing NAA as a covariate, the difference between EOP subjects and their counterparts reached significance in global cognition (difference:0.458, p=0.007); and attention (difference:0.722, p=0.002), at 5 years follow-up. In controls, the cognition index increased significantly when considering NAA, (Basal- 5: difference:0.406, p<0.01; 2-5years: difference:0.327, p=0.002). The same occurred with working memory (Basal-5: difference:0.437, p=0.010). In EOP subjects, variation in basal-5 executive functions was associated with variation in NAA (coefficient: 0.24, p=0.05). Conclusions: The decrease in NAA levels in DLPFC in EOP is related to a deficit in cognitive development. This metabolite would be a specific marker of neurodevelopmental deficit or cellular alteration contributing to cognitive impairment.

Transcranial direct current stimulation over the dorsolateral prefrontal cortex induces inhibition of blood pressure-related hypoalgesia.

Pilar Ruiz Medina, Gustavo Adolfo Reyes del Paso, Nicolás Gutiérrez Palma & Casandra Isabel Montoro Aguilar

Universidad de Jaén

Background: Over the years, the efficacy of tDCS to modulate pain perception has been the subject of many studies, offering inconclusive results, while the role of associated cardiovascular changes has gone largely unexplored. Objective: This study broached the impact of transcranial direct current stimulation (tDCS) on pain perception and blood pressure (BP)-related hypoalgesia mechanisms. Method: Fifty-eight right-handed participants were randomized to receive: 1) bilateral tDCS over the Dorsolateral Prefrontal Cortex (DLPFC) at 2mA for 20 min or 2) non-stimulation (Sham). Pain measurements (threshold, tolerance, perceived pain intensity and unpleasantness) and cardiovascular parameters (BP and heart period) were recorded before, during, and after stimulation. Baroreflex sensitivity (BRS) was calculated by the sequence method. Results: tDCS was associated with an increase in perceived pain intensity and unpleasantness, as well as to an increase in BRS, which remained after the stimulation had ceased. While BP was positively associated with pain threshold and tolerance throughout the entire procedure in the Sham group, these correlations disappeared during and after stimulation in the group that received tDCS. After stimulation, only a positive correlation remained in this group, specifically between diastolic BP and pain threshold. Similarly, the negative correlations observed between BP and BRS indexes before stimulation vanished in the tDCS group but remained in the sham group. Furthermore, a negative association was found between BRS and tolerance only during tDCS, which was not present either after the stimulation or in the sham group. Conclusion: These results suggest that tDCS applied over the DLPFC modulates both pain perception and blood pressure-related pain mechanisms. Concretely, a left anodal and right cathodal DLPFC tDCS montage heightens pain perception by inhibiting BP-related hypoalgesia.

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Early chronic administration of delta-9-tetrahydrocannabinol (THC) does not mainly influence the subsequent development of activity-based anorexia.

Deysi Adriana Escobar Borja, Ana de Paz Regidor, Miguel Miguéns Vázquez & Ricardo Pellón Suárez de Puga

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Introduction: While there may be indirect effects of delta-9-tetrahydrocannabinol (THC) on feeding behavior and activity levels, specific research investigating the impact of THC administration on activity-based anorexia is limited. In this study, the effects of chronic THC administration during the early developmental period on subsequent ABA establishment were analyzed. Methods: Thirty-six female Wistar Han rats were used. A dose of 5 mg/kg/day of THC -or the corresponding vehicle (VH)- was administered intraperitoneally for 14 days. After a 7-day washout period, the rats in the ABA groups (ABATHC and ABAVH) had access to an activity wheel for 22 h per day. Food intake was restricted to 1 h per day for both the ABA and the food control groups (FCTHC and FCVH). Results: Initially, the FCTHC group lost more weight than the other groups. However, during the last days the ABA groups lost the most weight, regardless of whether they received THC or VH, and did not differ from the FCTHC rats. The ABAVH rats ate less compared to the FCVH and FCTHC groups, while the amount of food consumed by the ABATHC group was not significantly different from the control groups. Activity levels among the ABA groups showed no significant differences, although ABATHC rats tended to engage in more wheel running. THC treatment did not affect the time to withdraw the animals from the experiment or their recovery time after the procedure. Conclusions: Early THC administration increased food intake of ABA groups, but did not result into attenuated weight loss, delayed ABA development, or earlier recovery. However, the observed tendency for increased wheel running in the ABATHC group suggests a potential vulnerability.

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Exploring Plasma Apolipoproteins and Memory Function in Alcohol Use Disorder: Insights from Mice and Humans.

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Introduction. Memory impairment due to alcohol abuse prompts exploration of biomarkers associated with cognitive decline in patients with Alcohol Use Disorder (AUD). The apolipoproteins APOAI, APOB, and APOE have been linked to neurodegeneration and cognitive function, with recent findings suggesting that AUD patients carrying the APOE4 gene exhibit worse memory performance. This study primarily seeks to determine memory deficits in both mice and humans with alcohol dependence and the relationship between plasma APOAI, APOB, and APOE and cognitive outcomes. Method. In a validated model of AUD, 19 adult male mice underwent the two-bottle choice (2BC) paradigm and chronic intermittent ethanol vapor (CIE) exposure. Mice were divided into: 2BC-air group (n=11) and 2BC-CIE group (n=8). Additionally, 29 participants were divided into: AUD group (n=12) and control group (n=16). The AUD group consisted of abstinent patients in an outpatient program at Hospital Universitario 12 de Octubre (Madrid). Memory was assessed in both animals and humans using cognitive tests: Object Location Test (OLT)/Nobel Object Recognition Test (NORT) in mice, and Wechsler Memory Scale-IV (WMS-IV) in humans. Blood plasma was collected for determination of APOAI, APOB, and APOE levels using ELISA kits and immunoassay technology (Luminex Corporation). Results. Higher levels of APOAI were detected in 2BC-CIE mice and AUD patients, with no differences in APOB and APOE in animals and humans. 2BC-CIE mice exhibited impairments in spatial (OLT) and recognition memory (NORT), while AUD patients showed deficits in verbal and visual memory (WMS-IV). Significant negative correlations were found between APOAI, APOB, and APOE levels and various memory functions, with APOAI showing consistent results in both animals and humans. Conclusions. Both AUD mice and AUD patients presented elevated levels of plasma APOAI that correlated with worse memory function, suggesting a potential role of this apolipoprotein in alcohol-related cognitive impairment.

Study of Early Biomarkers of Neuroinflammation in Amyotrophic Lateral Sclerosis.

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Introduction: Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease characterized by the loss of motor neurons. The majority of those affected are aged between 60 and 70 years, and 5% to 10% of patients harbor a mutation in the C9orf72seq gene, characterized by a hexanucleotide repeat expansion of GGGGCC. This study aims to investigate the potential relationship between ALS-induced neurodegeneration and inflammation, and whether the latter can serve as a predictor of disease development. Methods: A group of 30 transgenic mice for the human C9orf72seq gene and another group of 30 C57BL/6 mice as controls were utilized. Animals were divided into groups of 5 for each condition, and astroglia and microglia were measured over time (1, 3, 6, 12, 18, and 24 months) using immunohistochemistry and stereology-based quantification of their associated proteins, GFAP and IBA-1, in the following brain regions: prefrontal cortex (cingulate, prelimbic, and infralimbic cortices), dorsal and ventral hippocampus (CA1, CA3, dentate gyrus), and spinal cord (dorsal and ventral). Additionally, levels of inflammation markers IL1β and TNFα were quantified using western blot technique and subsequent image analysis. Results: The data revealed changes in GFAP associated with ALS in regions such as the prefrontal cortex, ventral hippocampus, and dorsal spinal cord. However, Iba-1 data appeared to be associated with the natural aging process rather than disease development. Furthermore, variations in IL1β and TNFα levels were observed during aging and in ALS processes. Conclusions: The differences observed in the various groups over time indicate a variation in the expression of inflammation markers in neurodegeneration compared to aging processes, enabling the identification of early disease biomarkers.

Short Communications 2: Wednesday, July 10th, 17:45-18:30
Psychophysiology and Neuropsychology

Chair: Magdalena Méndez López

Universidad de Zaragoza

Is Fear Generalization influenced by the unknown?

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Social anxiety disorder (SAD) is a severe condition characterized by intense fear in social situations, usually increased during unpredictable events. Fear overgeneralization (FO) can lead to maladaptive responses and avoidance, and consequently intensify SAD symptoms. However, the relationship between unpredictability and fear overgeneralization remains unclear. We aimed to investigate the association between unpredictability and fear overgeneralization and if this relationship constitutes a biomarker of SAD. In this study, 56 participants answered to depression, anxiety, social anxiety, and intolerance of uncertainty questionnaires. EEG and SCR ratings were recorded during a single-cue fear conditioning paradigm. In habituation, participants were exposed repeatedly to a neutral female face (CS+). In acquisition, a loud scream (US) followed the CS+ at its offset in the Predictable Group, whereas in the Unpredictable Group the scream could happen at anytime. Finally, generalization involved presentations of the CS+ and six stimuli (GSs), which differed in similarity to the CS+. All stimuli were presented flickering at 15Hz for 3000ms to evoke steady-state visual evoked potentials (ssVEPs). Ratings of valence, arousal, and US-expectancy were collected. Contrary to our hypothesis, we did not find a significant relationship between ssVEPs and social anxiety and also between ssVEPs and unpredictability, suggesting that fear responses may not be overgeneralized in SAD individuals neither during unpredicted situations. However, the emotional impact of the CS+ (valence and arousal) remains consistent across different scenarios of unpredictability. The study highlights the complexity of fear-related processes and the difficulty in finging a direct correlation with unpredictable threat. Hence, we highlight the need for further research regarding unpredictable threat and SAD.

Musical expertise and brain structure: A study with musicians and 'musical sleepers'.

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Introduction: Music training has been studied as an important part of human development and is often presumed to change brain structure. Nevertheless, this assumption is primarily based on cross-sectional comparisons between musicians and musically untrained individuals (non-musicians)[1]. While music training could explain differences in such comparisons, causality could be reversed: preexisting differences in brain structure could influence musical ability and the likelihood of taking music lessons. Studying 'musical sleepers', i.e. musically untrained individuals with naturally high musical abilities, can help to clarify this question[2]. If musical sleepers' brain structure is similar to that of trained musicians, this would imply that training is nonessential to explain musicianship effects – preexisting differences would be an explanation. Methods: We examined associations between musical expertise and brain structure, considering music training and natural musicality in musical sleepers. Participants were 93 adults (m_{age}=28.85, SD=6.70), including 29 musicians (>5 years of training) and 64 nonmusicians. Nonmusicians were divided into musical sleepers (n=32) and non-musical sleepers (n=32) based on their performance on a battery of tests of musical abilities. All participants completed a high-resolution structural brain scan on a 3T MRI scanner. Results: Based on voxel-based morphometry analyses, implemented in SPM12 with the CAT12 toolbox, we are currently identifying differences in grey matter volume between (1) musicians and nonmusicians, (2) musicians and musical sleepers, and (3) musical sleepers and non-musical sleepers. Conclusion: These results will help clarify the brain basis of musical expertise and inform debates on the roles of experience and predispositions in musicality.

References: 1. Criscuolo, A., Pando-Naude, V., Bonetti, L., Vuust, P. & Brattico, E. An ALE meta-analytic review of musical expertise. Sci. Rep. 12, 11726 (2022). 2. Law, L. N. C. & Zentner, M. Assessing Musical Abilities Objectively: Construction and Validation of the Profile of Music Perception Skills. PLOS ONE 7, e52508 (2012).

The role of testosterone in reactive relational and reactive physical aggression in 9-year-old children.

Ania Daguerre Picabea[1], Eider Pascual Sagastizabal[1], Nora Del Puerto-Golzarri[1], Rosario Carreras De Alba[2], José Manuel Muñoz Sánchez[2], Rosa María Ruiz Ortiz[2] & Aitziber Azurmendi Imaz[1]

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Introduction: Biology, and particularly hormones, have been shown to play a crucial role in the formation and expression of childhood aggressive behavior, being testosterone and cortisol the most closely associated hormones with this behavior. There are several classifications for aggressive behavior; one of them, focused on the mode of response, divides aggression into direct and relational. Another classification is based in the function of aggression, resulting in reactive and proactive aggression. These typologies of aggression complement each other, producing four types of aggression: reactive relational, proactive relational, reactive physical, and proactive physical, although these combined forms have been poorly studied, especially regarding their endocrine correlates. Methods: The aim of this study was to investigate whether testosterone levels, cortisol levels, sex and their interactions explained these types of aggression. Data were obtained from 90 9-year-old boys and girls. Testosterone and cortisol were measured through saliva samples, and aggressive behavior was assessed using the Self-Report of Aggression and Social Behavior Measure (SRASBM) questionnaire by Morales and Crick (1998). Results: The results showed that higher levels of testosterone were associated with a greater propensity to exhibit reactive aggression, both, relational ($F=5,637$; $p<0.001$) and physical ($F=2,649$; $p=0.016$), in the boys in the sample, but not in girls. Conclusions: The findings suggest that testosterone plays a significant role in the emergence of reactive, relational and physical aggression in children of this age. The implication that these hormones may have in the development of reactive and proactive aggression during late childhood and preadolescence is discussed.

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Short- and long-term memory for object location in a healthy young sample as assessed by an immersive virtual reality tool.

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Introduction: The ability to remember objects and their characteristics is essential in everyday life. Object-location memory (OLM) is a subtype of spatial memory that refers to the memory of object locations in the environment, independent of the memorization's routes. Immersive Virtual Reality (iVR) is a current technology that enables users to interact with simulated environments, replicating real-life experiences, and improving neuropsychological assessment. Methods: We analyze the short and long-term OLM in a young healthy sample (n=79) using an iVR task requiring OLM and recall of nine everyday objects. An analysis was conducted to investigate potential sex differences and correlations between performance in the OLM-iVR task and the following tests: Perspective Taking and Spatial Orientation Test (PTSOT), Visuospatial working memory (VSWM-eCorsi), as well as the Wayfinding Questionnaire (WQ) navigation scale, State-Trait anxiety Inventory (STAI) and the reverse digits from the Wechsler Adult Intelligence Scale (WAIS). Results/Discussion: The principal results have shown that there're no differences between sexes neither in OLM-iVR task at any delay nor WQ navigation nor STAI nor reverse digits. However, we could establish a relation between delayed 20 minutes OLM assessed by iVR and working memory tasks (VSWM-eCorsi and Reverse digits), and the consolidation of OLM (even a day or a week) and navigation tasks (WQ navigation). The differences between sexes have a significative relevance in PTSOT, in which the results showed a better male performance. Conclusions: Results provide new evidence for the absence of sex differences in delay and consolidation tasks (OLM-iVR) and working memory skills (VSWM-eCorsi and Reverse digits) and determine which components of spatial ability are required for short- and long-term OLM using iVR.

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Human virtual EPM for studying the psychophysiological effects of alcohol and cannabis consumption in youth.

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Introduction: Stressful events appear to be risky situations that can precipitate the consumption of drugs. One way to recreate stressful contexts, in an ecological and controlled method, is through immersive virtual reality (VR). Methods: In our study, we designed the scenario of an elevated plus-maze (EPM) using VR, which is widely used in animal models to assess unconditioned anxiety. This task allowed us to analyze the behavioral, psychophysiological (heart rate and electrodermal activity), and hormonal response (salivary cortisol and Alpha-amylase) to this stressful situation before VR task, at the end of the task and 10 minutes later in young people with problematic alcohol use (AU, n=27), alcohol combined with cannabis consumption (AU+C, n=10), as well as in a control group (CO, n=33). Results: Behavioral analysis revealed that the AU group displayed fewer entries into open arms than the CO group, whereas both experimental groups spent less time at the end of the open arms, as well as lower time-by-look down index compared to the CO group. Moreover, our VR-EPM induced different psychophysiological responses in the different moments measured. In general, electrodermal activity seemed to be a good biomarker of recovery from a stressful situation, as once the exposure to the stressful situation ended, the AU+C group took longer to recover compared to the CO group. Regarding hormonal analyses, we observed a similar response pattern in all groups suggesting that our VR task was able to activate both stress systems. The alpha-amylase to cortisol ratio, proposed as a biomarker of stress dysregulation, was higher in the group of young participants with alcohol abuse. Interestingly, our VR-EPM was able to induce alcohol craving in experimental groups. Conclusion: Our results suggest behavioral and physiological differences that could be used to detect young individuals at risk of future severe addictions or other stress-related comorbidities.

Funding: This study was funded by the Spanish Ministry of Health (Government Delegation for the National Plan on Drugs, code 2022I004 to P.S.-P.) and Spanish Ministry of Science and Innovation (code PID2022-137601OA-I00 to P.S.-P.).

Short Communications 3: Thursday, July 11th, 17:45-18:30
Cognitive impairment

Chair: César Venero

Universidad Nacional de Educación a Distancia, Madrid

Association between Social Isolation, Cognitive Function, and Circulating Levels of Thyroid Hormones in Older Adults.

Leyre Castillejo Sanz, Juan Ignacio Grec, María Roman Moreno, Raul Ballesta Barrera, Sara García Herranz, Cynthia Diaz-Silveira, María del Carmen Díaz Mardomingo, Shishir Baliyan & César Venero Núñez

Psychology deparment, UNED

Social isolation is the objective lack of frequent social interactions. Although there is evidence indicating that social isolation can negatively impact cognitive functions, there is limited understanding of the psychobiological factors that may mediate this relationship. Thyroid hormones play a crucial role in regulating various systems in our bodies and brain function, thus influencing cognitive functions. Therefore, we conducted an exploratory study to investigate whether there is a relationship between social isolation, cognitive functions, and circulating levels of thyroid hormones, such as thyroxine (T4) and triiodothyronine (T3). Exclusion criteria included having overt thyroid disease. This study was conducted on 207 individuals, aged between 60 and 92 years (153 women and 54 men). Social isolation was assessed using the Lubben Social Network Scale. We conducted regression models controlled for sex, age, and education level. We observed that the social network was positively associated with executive function and long-term episodic verbal memory. Moreover, we observed a significant relationship between the degree of isolation and thyroid hormone levels; specifically, free T4 levels were negatively associated with the degree of social isolation, particularly concerning friendships. We conducted separate mediation models, including executive function as the dependent variable, social network as the independent variable, and free T4 levels as the mediator variable, controlling for the covariates (age, educational level, and sex). Results showed a positive indirect effect of the social network on executive function via free T4 levels. In summary, our findings suggest an inverse relationship between decreased friendships and T4 levels. These findings highlight the importance of further investigating how T4 levels may influence the social network on cognitive function and thyroid hormones.

Genetic Mutations in Amyotrophic Lateral Sclerosis and Frontotemporal Dementia could predict Cognitive Deficits: A Meta-Analysis.

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Introduction: The shared clinical spectrum between amyotrophic lateral sclerosis (ALS) and frontotemporal dementia (FTD) has suggested an underlying genetic interconnection. However, the diversity of cognitive, behavioral and mood symptoms associated with these mutations still presents challenges in defining specific profiles. The present meta-analysis focused on comprehensively investigating cognitive profiles related to specific genetic mutations in ALS/ FTD patients. Method: A systematic search was conducted in four databases: PubMed, Web of Science, ScienceDirect and Scopus. Inclusion criteria resulted in the selection of 26 studies from a total of 55390 articles. Cognitive tests used in relation to specific genetic mutations, such as C9ORF, GRN, MAPT and TDP-43, were analysed in human ALS/FTD patients. R software was used to conduct meta-analyses based on the effect sizes between the experimental and control groups. Results: They revealed significant differences in multiple cognitive domains in relation to the genetic mutations studied. Differences were observed in cognitive tests such as the Mini Mental State Examination (MMSE), the Montreal Cognitive Assessment (MoCA) and the Clinical Dementia Rating (CDR) in relation to mutations in genes such as C9ORF, GRN, MAPT and TDP-43. While significant differences were found for MAPT overall in the MoCA, no significant differences were found in MAPT when assessed separately in the same test ($p = .415$). Furthermore, tests assessing visual memory such as the Benson Recall, did find significant differences in the global analysis in the patients with CORF gene, whereas no differences were found in MAPT patients ($p = .375$). Conclusions: The current study reveals the heterogeneity in cognitive profiles associated with specific mutations, underlining the need for careful and detailed assessment in ALS/FTD patients. The clinical heterogeneity and overlapping features between mutations underscore the need for individualised assessment and a deeper understanding of the associated cognitive phenotypes.

Neurodegenerative symptoms in the elderly: APOE genotype and sex influence on memory loss upon chronic inflammation.

Séfora Barberà-Parada[1,2,3,6], Judit Biosca-Brull[1,2,3,6], Rocío Rodulfo-Cárdenas[1,2,3,6], Raquel Gabaldón-Díaz[1,5], Jordi Blanco[1,3,4], María Cabré[1,5] & MaríaTeresa Colomina[1,2,3,6]

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Aging and the APOE4 genotype in humans have been identified as significant risk factors for developing neurodegenerative disorders like Alzheimer's in the elderly. Those pathologies are strongly characterised by a progressive loss of memory and cognitive deterioration, as well as other behavioural alterations. However, there is currently a lack of clear guidance on prevention strategies for APOEε4 variant carriers. Recent research suggests that chronic neuroinflammation plays a pivotal role in neural diseases, contributing to neurodegeneration. Interestingly, APOE acts as an immunomodulatory agent, creating a link between these observations. Nonetheless, the precise mechanisms underlying this connection are yet to be clarified. Our objective was to determine the most susceptible APOE genotype and sex in aged transgenic mice following a chronic inflammatory challenge. We evaluated bahavioural aspects involving learning and memory and depression-like states with adapted Water Morris Maze and Forced Swim test. To achieve this, male and female mice homozygous for humanized apoE3 and apoE4 between 15 and 16 months of age were administered intraperitoneal doses of either 0 or 0.25mg/kg of lipopolysaccharide three times a week on alternate days for a total of 17 doses (over 6 weeks). Behavioural assessment started on the 15th injection until the end of the study. Our findings revealed differences in learning and short- and long-term memory. These effects were influenced by the APOE genotype, with distinct responses observed between E3 and E4 variants. We also found effects of treatment influenced in a sex-dependent manner. Overall, our results underscore a multifaceted vulnerability scheme, emphasizing APOE genotype and sex as critical risk factors and encouraging new paths for future interventions.

Exploring Gene-Environment Interactions: Postnatal Exposure to PM10 Disrupts Development and Cognition in Transgenic APOE Mice.

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Exposure to air pollutants during early development has enduring effects on the retardation of nervous system growth and is associated with central nervous system (CNS) diseases in children. Specifically, traffic-related air pollution (TRAP) has been demonstrated to have negative impacts on cognitive and behavioral development in children. Particulate matter (PM) has emerged as the primary pollutant associated with these adverse effects. Conversely, the APOE gene is a human polymorphic gene which has three different alleles (e2, e3, e4), with e3 being the most prevalent in the general population. The e4 allele has been linked to an increased risk of Alzheimer's disease (especially in females) and cognitive impairment. Interestingly, it has also recently been associated with poorer neurodevelopmental outcomes in children exposed to TRAP. In this regard, our study aimed to investigate how the inhalation of PM10 (SRM 2787; NIST), delivered in exposure chambers, impacts humanized ApoE3 and ApoE4 mice during the crucial early postnatal period (from postnatal day 4 to 14), coinciding with a pivotal stage of CNS development. PM10 was collected using an air intake filtration system located at a prominent exhibition center in Prague, Czech Republic. Exposure levels were approximated to match those experienced by humans in urban populations, a daily dose of 200 µg/kg of PM. In terms of developmental milestones, our results showed a lower gain weight and an advancement on eye and vaginal opening in ApoE3 treated mice. Moreover, PM treatment impacts negatively on neuromotor development. In terms of behavior, at 3 months of age, differences between genotypes were noticed in anxiety, sucrose preference, learning and flexibility cognition. In summary, significant changes in physical parameters due to PM exposure were observed primarily in ApoE3 mice, whereas notable distinctions in cognitive and behavioral parameters were noted between genotypes.

Short Communications 4: Thursday, July 11th, 17:45-18:30
Development and Diet

Chair: Jorge L. Arias

Universidad de Oviedo

Exploring the Impact of Maternal Immune Activation on Brain Metabolism and adult emotional behavior.

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INTRODUCTION: The increasing incidence of neurodevelopmental disorders and mental illnesses in contemporary society underscores the critical need to investigate the environmental factors contributing to their emergence. Acknowledging the significance of environmental and epigenetic determinants on behavior and neurodevelopment from early life stages, this study examines how immune activation during pregnancy, a potential risk factor, affect brain and behavioral development in Wistar rats. METHODS: It focuses on the impact of intraperitoneal administration of the E. coli endotoxin Lipopolysaccharide serotype O111:B4 (LPS) during gestation (days 15-16) and its sex-specific effects on the offspring, analyzing depression-like (Forced Swimming Test) and anxiety-like (Elevated Zero Maze) behavior and related brain regions. RESULTS: The findings revealed significant differences in behavior patterns related to anxiety and depression between sexes, as well as in brain energy metabolism and functional connectivity (functional brain networks), depending on the brain region examined. These behavioral and metabolic changes highlight the modulating effect of sex in response to maternal immune activation induced by LPS. This research provides crucial evidence on how adverse events during pregnancy, such as infections, can have lasting and sex-differentiated effects on neurodevelopment and behavior.

Funding: This research was supported by the Ministry of Science and Innovation (PID2022-140980NB-I00) and the "Severo Ochoa" Program for Predoctoral Grants from the Department of Culture and Sports of the Principality of Asturias (PA-22-BP21-020).

Photobiomodulation as a Strategy to Stimulate Neurogenesis.

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Introduction: The hippocampus houses neural stem cells (NSCs) that contribute to adult hippocampal neurogenesis (AHN), essential for hippocampal structural and functional plasticity, which likely persists throughout life but declines with aging. Enhancing adult neurogenesis in the brain has been proposed as a potential therapeutic strategy. Photobiomodulation therapy (PBMT) is a non-invasive treatment based on the application of low-intensity light, which, due to its influence on mitochondrial activity and intracellular signaling, has shown promise in regenerative medicine. However, whether PBMT can modulate the proliferation and differentiation of NSCs remains uncertain. Methods: Two independent studies were conducted: (i) to explore the differential effect of 5 Hz versus 40 Hz on AHN in adult rats and (ii) to investigate the critical time window (48 hours versus 96 hours) during which AHN is stimulated in adult rat brains. The protein expression levels of Ki67, DCX, Tuj-1, and Nestin in different brain regions such as the prefrontal cortex, hippocampus, cerebellum, and hippocampus were assessed by Western blotting after PBMT in both conditions. Results: Among the most significant changes observed, there was clear evidence of increased Ki67 expression, a marker of neuronal proliferation, in the experimental group subjected to 40 Hz treatment. Additionally, an increase in doublecortin (DCX) expression, a marker of neuronal migration, was noted in the 96-hour group in the hippocampus and cerebral cortex. Furthermore, there was significant evidence of decreased Nestin expression, an intermediate filament involved in the structural maintenance of neurons, in both experimental groups (5 Hz, 40 Hz). Finally, Tuj-1 expression, a marker of neuronal migration, did not show a significant difference compared to the control group. Conclusion: PBMT appears to be a promising tool for modulating neurogenesis at specific frequencies within a defined time window. Further research should focus on the integration of newborn neurons into preexisting neural network.

Photobiomodulation-Mediated Apoptosis Regulation: Influence on NF-κB, p53, and p38 Signaling Cascades.

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Introduction: Photobiomodulation therapy (PBMT) has emerged as a promising treatment for neurological disorders, demonstrating improvements in neuroinflammatory processes. The aging process is closely associated with neuroinflammation, wherein NF-κB, p53, and p38 signaling cascades play crucial roles, influencing various aspects of cellular function and contributing to age-related neurodegenerative disorders. However, the impact of PBMT as a therapeutic tool to improve the molecular mechanisms underlying aging remains unclear. Methods: Eighteen-month-old Wistar male rats were randomly divided into ageing control group and 40 Hz pulsed wave PBM with an 810 nm wavelength on frontal cortex over five consecutive days (46.50 J/cm2 for 12 minutes). The study focuses on the molecular changes in the apoptosis and neuroinflammation cascades linked to ageing processes. Results: Moreover, PBM remarkably decreased IFNA2, TNF-α and Iba-1 production were observed in hippocampus, prefrontal cortex and other cortices. PBM significantly attenuated apoptosis. Such changes were accompanied by downregulation of P53 in cerebellum and cortices, Bcl-2 in cortices and hippocampus. In addition, PBM remarkably inhibited p38 signalling in hippocampus. Conclusion: The findings indicate that PBMT differentially modulate apoptotic and neuroinflammatory pathways, particularly enhancing hippocampal function and related limbic system brain areas such as prefrontal cortex, cerebellum and other cortices which could be underlying improvements in cognitive performance, especially in response to 40 Hz treatment under ageing conditions.

Chronic consumption of high-fat diets since the juvenile period decreases saturated fat seeking behavior in an animal model of operant self-administration.

María Roca, Ana Belén Sanz-Martos,Tamel Salinas-Blasco, Emilio Ambrosio & Nuria del Olmo

Psychobiology Department, School of Psychology, UNED, Madrid, Spain

Introduction: Nowadays obesity constitutes a prominent public health concern worldwide, a phenomenon often attributed to the overconsumption of highly palatable, calorie-rich foods laden with sugar and fat. These diets can modulate certain neural pathways and present potential addictive properties. In this sense, our previous results show a potent seeking behavior for SOLF (Saturated oil-enriched food) and UOLF (Unsaturated oil-enriched food)-two high-fat diets with no added sugar- in juvenile male and female mice. Nevertheless, it has been observed that chronic exposure to high-fat diets impairs the reinforcing properties of food and other addictive substances, such as cocaine. Methods: Considering this, we conducted a study using SOLF and UOLF in a model of operant self-administration with Skinner boxes following a three criteria protocol: 1) reward seeking behavior, 2) motivation to obtain the reward and 3) compulsivity. Adult C57BL/6J mice, both male and female, were subjected to an increasing reinforcement program followed by a progressive ratio session aimed at finding the breaking point and finally, a cue-induced reinstatement session following an extinction phase. Experiments were carried out in adult animals that had consumed either SOLF, UOLF or a standard diet ad libitum for 8 weeks since adolescence. Results: After the 8-week dietary treatment, we observed that substance seeking in mice from both high-fat groups decreased compared to control animals. Moreover, animals that consumed SOLF, exhibited reduced seeking and compulsive behaviors towards reinforcers compared to animals that had access to UOLF. Conclusions: Chronic high-fat diet intake starting at the juvenile period seems to influence the brain reward circuitry, weakening the reinforcing properties of both saturated and unsaturated high-fats.

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Genistein impact during development on the ventromedial nucleus of the hypothalamus in adult male and female rats.

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Background: Genistein consumption has increased during first months of life through the intake of soy formulas as a substitute for breastfeeding. This compound may act as an endocrine disruptor due to its similarity to estradiol, which plays a key role in organization of the hypothalamic circuits that regulate metabolism and intake. Furthermore, exposure during the second week of life to genistein alters the number of Nissl-stained neurons in the arcuate nucleus over the long-term depending on sex, dose and subdivision in rats. Objective: To investigate the long-term effects of the exposure to genistein during second week of life on the number of neurons of the ventromedial nucleus of the hypothalamus (VMH) and its subdivisions, other crucial structure on the regulation of metabolism and feeding behavior. Methods: All female and male rats were daily injected subcutaneously from postnatal day 6 (P6) to P13. Depending on the experimental condition, were injected with: I) sesame oil (control groups); II) a low-dose of genistein 10 µg/g (G10 groups); and III) a high-dose genistein 50 µg/g (G50 groups). On P90, sacrifice was performed, and the number of neurons was estimated with coronal Nissl-stained sections using ImageJ software. Results: Control males showed higher number of Nissl-stained neurons in the posterior subdivision than control females. Moreover, higher Nissl-stained neurons were detected in G50 males in VMH, medial division and dorsomedial, central and ventrolateral subdivisions compared to G50 females. Additionally, control females showed higher Nissl-stained neurons in medial division and ventrolateral subdivision than G50 females. Conclusions: Early exposure to genistein may alter on the long-term the number of Nissl-stained neurons on the VMH differently according to sex, dose and subdivisions.

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POSTER 1

A mouse model to study the intergenerational consequences of parental exposure to alcohol.

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Nowadays, Binge Drinking (BD) has become a major health problem and there is a critical need to understand the effects of this alcohol consumption pattern and its inheritance. BD is characterized by chronic-intermittent consumption of large quantities of alcohol in short periods of time. Although clinical research has provided information regarding the risks and consequences of this consumption pattern, human studies cannot thoroughly examine all the effects of BD due to ethical limitations. As a result, animal models can be useful to understand all the consequences of BD. The main goal of the present study is to generate an animal model of alcohol "binge drinking" and therefore being able to study reproductive and neurobehavioral consequences of this consumption pattern in male mice. In addition, it also focuses on analyzing the transmitted phenotypes by the paternal germline to the offspring, as most studies that examine intergenerational effects of alcohol have focused on maternal alcohol abuse during pregnancy. The most outstanding results of the investigation show that male mice subjected to a chronic and intermittent alcohol protocol, characteristic of BD, have lower short-term memory than control mice. In addition, this phenotype is inherited by offsprings and therefore could be considered a multigenerational phenotype. It also causes differences in mice depressive behavior. On the other hand, embryos obtained from alcohol-treated male sperm have a reduced Gapdh (glyceraldehyde-3-phosphate dehydrogenase) gene expression in the blastocyst state. These findings suggest that the animal model of BD used in this work may be a great paradigm to study intergenerational effects of alcohol consumption.

POSTER 2

Atomoxetine enhances declarative memory using the Novel Object Recognition test in female swiss mice.

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The noradrenergic (NA) system mediates consolidation of emotionally arousing events. However, the role of NA in declarative memory remains unclear. In the present study we investigated the role of Atomoxetine (ATO), a NA reuptake inhibitor, in a mice model of declarative memory: The Novel Object Recognition task (NOR). This task is based on innate preference for novelty and the discrimination between familiar and novel objects. Previous data indicate that post-training yohimbine administration, an α2-adrenoceptor antagonist, enhances object location memory in mice, suggesting that increases in NA signaling are associated to an enhancement in memory consolidation. Despite this evidence using post-training manipulations, the involvement of the NA system in the acquisition of NOR is unknown. The aim of the present study was to evaluate the modulation of the NA system in the acquisition of NOR in male and female Swiss mice. Our hypothesis is that ATO will improve memory recognition in male and female mice. To achieve this aim, mice were trained as follows: 1) Training (1 minute): two identical objects were presented. 30 min before training mice were treated with saline or ATO. Test was performed 48 hours after training 2) Test (5 minutes): two different objects (familiar and novel) were presented. Previous data suggest that the perirhinal cortex is crucial for object recognition in rodents and that catecholamine release in the dorsal hippocampal CA1 region from the locus coeruleus is required to update spatial contextual recognition memory. Thus, c-Fos expression was also analyzed in the hippocampus (CA3-CA1) and perirhinal cortex. Brains were collected 1 hour after test for c-fos analysis. We found that ATO facilitated NOR in female but not in male mice. Female mice treated witn ATO also showed an increase of c-Fos expression in the perirhinal cortex. Our findings suggest that the NA system may play a role in the acquisition of recognition memory.

Funding: Pla de Promoció de la Investigació UJI- B2021-28 and Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital Grant Generalitat Valenciana-AICO (2021/215).

POSTER 3

Behavioral and neural correlates of individual differences in effort-based decision making for sucrose in rats.

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Nucleus Accumbens (NAcb) dopamine (DA), plays an important role in effort-related decision-making processes. Previous results showed that individual differences in selection of high effort activities for food are modulated by neural markers related to NAcb DA activity such as phosphorylation of pDARPP32-Thr34. In this study, we assessed individual differences in the selection of effortful responding for a preferred sucrose concentration and markers of DA activity in the NAcb such as the Cerebral Dopamine Neurotrophic Factor (CDNF). Non-water deprived Sprague-Dawley male rats were assessed with a progressive ratio (PROG)/sucrose-drinking task, in which they can either lever press on a PROG schedule to get access the 5% solution, or approach and consume a less preferred 0.3% solution that is freely accessible. Animals were divided into three groups of responders: high, intermediate, and low. Lever pressing was significantly different for these three groups, and their performance in the PROG/choice task was correlated with responses in the PROG under no free choice conditions. In addition, before and after the operant task, animals were tested for spontaneous two-bottle sucrose preference (0.3% vs 5%), voluntary locomotion in a Running Wheel (RW), and novel exploration of an Open Field (OF). Preference for 5% sucrose or RW activity pre or post operant evaluation were not correlated with number of lever presses in the PROG/Choice operant task. However, rearing in the OF evaluated before the operant task showed a significant positive correlation with lever pressing. CDNF immunoreactivity seems to be related to these individual differences, with the number of positive cells higher in high responders. These results suggest that neural and behavioral characterization of individual differences that lead to differences in effort-based choice can help to understand the underlying factors of vulnerability for symptoms such as anergia, which are important in some psychological and neurological pathologies.

POSTER 5

Characterization of the Cerebral Dopamine Neurotrophic Factor (CDNF) in Nucleus Accumbens as a marker of functional neuroprotection.

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The Cerebral Dopamine Neurotrophic Factor (CDNF) is an atypical neurotrophine discovered recently which has demonstrated to have a protective effect on the dopaminergic neurons of the nigrostriatal pathway. CDNF has then been suggested as a potential treatment for neurodegenerative disorders such as Parkinson disease. However, little is known about the expression of this neurotrophic factor in the mesocorticolimbic system, and more specifically in Nucleus Accumbens (Nacb), the main structure involved in the regulation of behavioral activation and exertion of effort in motivated behaviors. The aim of the present work is to analyze in mice if factors such as age and sex or experience with exercise modulate baseline levels of CDNF immunoreactivity in Nacb. Additionally, we explored the type of Nacb neurons in which CDNF is found using immunofluorescence techniques and co-labeling CDNF with other cytological markers like Dapi, NeuN, or dopamine markers such as DAT or TH or markers to determine the type of GABAergic projection neurons with Substance P (D1 receptor containing), Enkephalin (D2 receptor containing), or GABAergic interneurons with Parvalbumin. Our results show that in Nacb, CDNF was colocalized in the postsynaptic somas of neurons also immunoreactive to Substance P, Enkephalin and Parvalbumin, but not in dopaminergic terminals immunoreactive to TH or DAT. As for the different factors that could regulate CDNF levels, we found that CDNF is reduced with age in a similar way, both in males and in females. Moreover, different types of exercise conditions and training in active operant tasks that required physical effort, increased it. Thus, these data could be relevant in the increasing knowledge of the use of neurotrophic factors as a potential and novel treatment for neuropsychiatric disorders as well as the important of maintaining an active lifestyle to promote brain function.

POSTER 6

Effects of indomethacin and binge drinking on recognition, emotional and spatial memory in mice.

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Objective: The main objective of this work was to evaluate if the anti-inflammatory indomethacin counteracts the effects of chronic-intermittent ethanol administration, model of binge drinking (BD) alcohol consumption pattern, on recognition, emotional and spatial memory in adolescent mice of both sexes. Methodology: Animals were randomly assigned to four groups in each sex: SS (saline+saline), SA (saline+alcohol), SI (saline+indomethacin), and AI (alcohol+indomethacin). They were injected (i.p.) with saline, ethanol (3 g/kg) and indomethacin (10 mg/kg) in chronic-intermittent administration (the first three days of each week, throughout three weeks). After treatment, recognition memory was assessed by the Novel Object Recognition (NOR) test; emotional memory was assessed by an inhibitory avoidance task; and spatial memory was assessed by a Morris Water Maze (MWM) task. Results: In the NOR test, the SA group spent less exploration time for the novel object than the SS and the SI groups. In the inhibitory avoidance test, emotional memory impairment was observed in the SA group, while the AI group showed similar inhibitory avoidance to controls. In the MWM test, no significant differences between groups of treatment were observed in spatial memory. No significant sex differences were observed. Conclusions: BD alcohol impairs recognition and emotional memory, but not spatial memory, in mice of both sexes. Indomethacin did not counteract the recognition memory impairment, but it counteracted the emotional memory impairment. This work represents new evidence about the involvement of neuroinflammation in the cognitive consequences of BD alcohol.

POSTER 7

Effects of transcranial photobiomodulation therapy on memory and regional brain metabolism in middle- aged female rats.

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INTRODUCTION: Limited evidence suggests that noninvasive transcranial photobiomodulation (tPBM) may improve cognitive function in aging individuals. Additionally, TPBM has shown promising results in enhancing cognitive function in both human and rodent models without cognitive impairment. However, most studies on tPBM have been conducted in male rodents, so the present study used female subjects to investigate potential sex differences. METHOD: The tPBM method used here involves applying 810 nm laser light for 12 days on the anterior third of the rat head targeting the frontal region, including the period during which animals performed behavioral tests. Spatial learning and memory were assessed using the Morris water maze, while regional brain oxidative metabolism was assessed using cytochrome c oxidase quantitative histochemistry. To evaluate the effectiveness of tPBM in improving cognition (spatial learning and memory, cognitive flexibility in a reversal learning task) in middle-aged female Sprague-Dawley rats, we used two groups of 10-month-old animals. One group was exposed to laser light (n=16), while the other group underwent the same handling without laser exposure (n=16) for 12 days. RESULTS: Rats showed significantly lower escape latencies in the PBM group in the spatial reference memory task. Similarly, the group receiving tPBM showed greater activation and connectivity of the brain regions linked to spatial learning. CONCLUSION: non-invasive tPBM therapy could also improve cognitive function in middle-aged female rats and could be used as a promising non-invasive neural enhancement therapy for age-related cognitive decline.

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POSTER 8

Exploring the effects of photobiomodulation frequency on cognitive flexibility and brain activity in healthy rats.

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Introduction: Photobiomodulation (PBM), has emerged as a promising intervention in the treatment of various pathologies [1]. It involves the use of red or near-infrared light to stimulate tissue, repair, and protection. The mechanism of action primarily targets cytochrome c oxidase (CCO), enhancing ATP production. The aim of this study was to investigate the impact of PBM on spatial learning and cognitive flexibility, and the effect on the brain related areas. Methods: PBM was applied at frequencies of 5 Hz and 40 Hz, utilizing a wavelength of 810 nm, over a period of 5 consecutive days on healthy rats. The study examined the effects on CCO activity and evaluates proto-oncogene expression, and it was assessed the influence of PBM on spatial memory and flexibility performed in the Morris Water Maze. Results: Both PBM groups and control group exhibited significant learning ability from day 1, however, there was a slight better performance in the flexibility task in both treatment groups. Regarding brain activity, no differences were found in CCO activity among the three groups in the areas studied. However, we observed a c-Fos expression enhancement in cingulate area on the 40 Hz group, in comparison with 5 Hz and controls, suggesting a higher neuronal activity in this area, which is closely related to cognitive flexibility. Conclusions: PBM holds promise as a non-invasive therapy for various neurological conditions, with the potential to modulate neuronal activity. Overall, more research is needed to determine the optimal parameters for PBM therapy, to maximize its therapeutic potential.

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POSTER 9

Exploring the Role of the Cerebellum in Drug-induced Associative Learning.

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Recent advancements in neuroscience have underscored the pivotal involvement of the cerebellum in drug-induced associative learning, particularly in relation to contextual cues (Miquel et al., 2009, 2016, 2020; Moulton et al., 2014). Building upon this understanding, our research has delved into the intricate interplay between the cerebellum, drug-induced memories, and associative learning mechanisms (Carbo-Gas et al., 2014; Carbo-Gas et al., 2017; Gil-Miravet et al., 2021; Guarque-Chabrera et al., 2022). Here, we investigate the associative learning role of the cerebellum in a biased cocaine-induced place preference (CPP) paradigm. The first correlational experiment extends prior research, demonstrating significant neural activity changes the posterior cerebellum's vermis during the expression of drug-context memories. As expected, enhanced neural activity in the granule cell layer of the dorsal posterior cerebellar vermis is observed in rats exhibiting preference for cocaine-associated cues, reinforcing the cerebellar cortex's involvement in shaping Pavlovian memories. In the second experiment, we used a chemogenetic strategy to activate or inhibit the posterior vermis during learning of cocaine-induced CPP. Activation of inhibitory interneurons of lobule VIII facilitated the acquisition of CPP, while their inhibition prevented it. In a last experiment, we wondered whether Lobule VIII activation of inhibitory interneurons paired with the CS+ is sufficient to induce rewarding effects or the concurrence of drug effects is required. A non-clear preference for the CS+ could be demonstrated without the drug. Our findings strongly suggest a key role of the posterior cerebellar vermis in regulating cocaine-induced Pavlovian learning. Moreover, they suggest that by increasing the inhibitory control over Purkinje cells, behavioral drug effects may be regulated, shedding light on its potential as a therapeutic target.

POSTER 10

Exposure to cannabinoid vapour during adolescence alters the relationship between behavioural predictor of addiction and alcohol self-administration in rats.

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Introduction: The question remains whether cannabis consumption during adolescence could predispose to drug use disorders, such as alcohol, during adulthood and if this exposure may disrupt the relationship between behavioural traits predictive of addiction and different features of pathological alcohol consumption. Thus, our aim was to investigate whether adolescent cannabinoid exposure (ACE), in vapor form, could facilitate the emergence of alcohol use disorder in adulthood, affect behavioural predictors of addiction or change the relationship between both. Methods: Male and female rats were exposed to different THC and CBD concentrations (THC alone, THC/CBD 33:1, THC/CBD 1:33) or vehicle on alternate days from postnatal day (PND) 28 to 44 using an in-house designed vapour chamber. We evaluated the effects of these treatments on body temperature and plasma THC and CBD concentrations 30 minutes after exposure. Adult behaviour assessments (PND70-95) included locomotor activity, novelty and saccharine preference, sign/goal-tracking behaviours, and anxiety (or disinhibition) in an elevated plus maze. Ethanol self-administration was studied under different conditions, including acquisition, progressive ratio, and punished seeking. Results and discussion: THC induced hypothermia in both sexes, but CBD mitigated this effect, even at lower doses. Adolescent cannabinoid exposure (ACE) did not alter novelty or sweet solution preferences, sign/goal-tracking behaviours, or anxiety levels, and did not impact alcohol self-administration. However, sex differences emerged, with females displaying a stronger compulsive-type alcohol seeking behaviour. In addition, exposure to THC vapour in the females changed the direction of the relationship between novelty preference and alcohol self-administration. These results suggest that even if ACE may have a limited effect on subsequent alcohol use disorder risk it could change the psychological relationships between specific behaviours predictive of addiction and alcohol intake. Moreover, females may have a higher predisposition to developing compulsive alcohol intake than males.

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POSTER 12

Food restriction impairs long-term potentiation in activity-based anorexia.

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Introduction: The activity-based anorexia (ABA) animal model has been shown to produce alterations in various brain regions. In this study, we examined the effects of ABA on hippocampal synaptic plasticity and gene expression-related proteins. Methods: Female Wistar rats were subjected to an ABA procedure (n=10) consisting of free access to a running wheel for a period of 22 h and access to food for 1 h each day. Additionally, a food control group (FC; n=10) subjected to the same food restriction but without access to the running wheel, and a naïve control group (NV; n=4), were used. After ABA recovery, in vitro electrophysiological recordings were conducted to study synaptic plasticity as long-term potentiation (LTP) induced by three high frequency stimulation (100 Hz, 1 s) and LTP-depotentiation induced by low frequency stimulation (900 pulses, 1 Hz) in the hippocampus. Contralateral hippocampi and prefrontal cortex were dissected for gene expression analysis. Results: ABA and FC rats showed deterioration in LTP maintenance and impaired depotentiation compared to NV control rats, with the effect being more pronounced in the ABA group. Moreover, ABA rats exhibited inhibited LTP induction, a result that was not observed in FC rats. Furthermore, ABA and FC rats showed gene expression inhibition of ephrin receptor (EphB2) and Gsk3b, genes associated with cognitive deficits, in both hippocampus and prefrontal cortex compared to NV rats. Conclusions: Irrespective of physical activity, both food-restricted groups (ABA and FC) shown a decline in hippocampal synaptic plasticity, with a more pronounced effect observed in the ABA group. Furthermore, the downregulation of Gsk3β and EphB2 gene expression in both groups may partially account for the impairment of the underlying LTP mechanism involved in learning and memory processes.

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POSTER 13

From gestation through adolescence: reversing high-fat, high-sucrose diet effects on brain metabolism and behavioral flexibility in rats.

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Introduction: There is growing concern about the effects of prolonged consumption of diets high in saturated fats and sugars, which have been linked to obesity and overweight. These conditions not only affect physical health but also have a negative impact on cognitive function, both in humans and in animal models. Methods: To assess the impact of obesogenic diets from gestation through early development, three diets were used: one high in fats and sugars (HFS), a control receiving a standard diet (SD), and a reversal group (R) that switched from HFS to SD at weaning. The study evaluated spatial learning and cognitive flexibility in adult Wistar rats of both sexes, employing the Morris Water Maze. It also analyzed oxidative metabolism in key brain areas, such as the prefrontal cortex and hippocampus. Results/Discussion: The findings indicated that, although rats on the HFS diet performed similarly in spatial learning tasks compared to their counterparts, their cognitive flexibility was compromised. These groups also showed increased cerebral metabolic capacity compared to animals fed the standard diet. Reversing diet restored cerebral metabolic activity in both sexes to levels similar to those observed in the SD diet. Moreover, in the Morris Water Maze task, the reversal group matched the performance of those on the standard diet in every aspect of the task. However, the dietary transition's effects on body weight and fat distribution were found to be relatively mild and varied by sex. Conclusions: Early dietary intervention from an HFS to a SD seems to offer positive outcomes for cognitive flexibility and brain metabolic health, though it does not preclude the possibility of enduring secondary issues.

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POSTER 14

Functional mapping of teleost fish telencephalic pallium: Implications for the evolution of the cerebral cortex.

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The telencephalic pallium of teleost fish is widely considered homologous to the mammalian cerebral cortex. However, the specific homologies within its subdivisions remain contentious. One hypothesis posits that the teleost pallium comprises regions exclusively comparable to the limbic cortex of mammals, while an alternative view suggests the presence of a sector akin to the dorsal pallium of other vertebrates (neocortex in mammals). A distinctive characteristic of the neocortex is the existence of discrete unimodal sensory areas alongside somatomotor areas specialized for fine motor control. This study investigates the presence of somatosensory and somatomotor areas within the teleost pallium. Using voltage-sensitive dye imaging, we identified sensory areas dedicated to various modalities, including a somatosensory region situated in the caudal part of the Dm area. Notably, lesioning this somatosensory area did not impair performance in a complex motor task requiring fine postural adjustments and precise coordination of axial musculature and paired appendages. Furthermore, employing electrical microstimulation mapping, we demonstrated that the goldfish pallium is not directly involved in motor response generation. Instead, pallium activation elicited emotional responses characterized by both visceral and long latency behavioral responses. The results suggest that the sensory areas identified in the teleost fish pallium are more similar to those of the limbic cortex than the neocortex. These functional findings highlight the resemblance between the teleost fish pallium and the limbic cortex of mammals while indicating the absence of sectors equivalent to the dorsal pallium. Thus, present results support the view that the presence of a limbic pallium could be a primitive feature in vertebrates, while the existence of neocortical sector could be a recent evolutionary acquisition within the lineage leading to amniotes or even mammals.

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POSTER 15

A correlation analysis of epigenetics with cortical thickness in a population of transgender men.

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Gender identity is the consciousness of being male, female, or another gender identity. This inner sense may or may not align with a person's sex as assigned at birth or to a person's primary or secondary sex characteristics. If this incongruity is distressing, it is defined as gender dysphoria in the DSM-5. Here, we measured whole-genome DNA methylation by the Illumina © Infinium Human Methylation 850k array and reported its correlation with cortical thickness in 22 transgender men (TM) experiencing gender dysphoria versus 25 cisgender men (CM) and 28 cisgender women (CW). With respect to the methylation analysis, TM vs. CW showed significant differences in 35 CpGs, while 2155 CpGs were found when TM vs. CM were compared. With respect to correlation analysis, TM showed differences in methylation of *CBLL1* and *DLG1* genes that correlated with global and left hemisphere cortical thickness. Both genes were hypomethylated in TM compared to the cisgender groups. Furthermore, early onset TM showed a positive correlation between *CBLL1* and several cortical regions in the frontal (left caudal middle frontal), temporal (right inferior temporal, left fusiform) and parietal cortices (left supramarginal and right paracentral). Conclusions: Our findings suggest that *CBLL1* and *DLG1* genes may participate in the modulation of cortical thickness in humans, and they distinguish three cortical endophenotypes related to gender identity (i.e., CM, CW, TM). Moreover, they also suggest epigenetic differences related to the cortex between early and late GD onset TM. All these results support a cortical hypothesis that suggests that different rates of development, in specific cortical regions, could underlie gender identity and its variants. All these findings support a neurodevelopmental hypothesis to explain the development of the binary male and female gender identities and point out they have a biological counterpart.

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POSTER 16

Alcohol effect on EEG activity: a systematic review focused on sex related differences in young people.

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Background: Most EEG investigations on alcohol have focused on adults with a long history of alcohol consumption, or on individuals with a family history of alcoholism. By contrast, scarce data are available on the potential of EEG measurements to detect young people at high-risk, as well as to understand possible sex differences on alcohol impact on the brain. Objective: This systematic review aimed to explore EEG related differences in young people with problematic alcohol use (AU), while considering the relevance of sex as a mediating variable for the effects of alcohol. Methods: We conducted a systematic review of the literature in major scientific databases following PRISMA guidelines. The review protocol has been registered in Prospero (ID: CRD42024511471). Results: It seems that in contrast to girls with alcohol use disorder (AUD), beta amplitude was generally higher in young AUD boys. Furthermore, AUD boys usually exhibited greater interhemispheric connectivity (interHC), whereas AUD girls tended towards enhanced intraHC. In addition, P3 appears to be particularly sensitive to AU, with boys typically exhibiting a lower amplitude than young girls. Other ERPs such as N415, P640, and ERN lacked sufficient methodological support to draw conclusions regarding sex differences. N340 and P540 suggested avenues for expanding research on memory processing, indicating differences in amplitude between men and women. Conclusion: Considering sex as a variable in clinical research will supposedly enhance our understanding of sex-dependent alterations in brain function and structure, which might contribute to tailoring pharmacotherapeutic treatment strategies for AUD, particularly for young women.

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POSTER 18

Biopsychosocial intervention program based on virtual reality for youth in conflict.

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Introduction: Adolescence and young adulthood represent a crucial phase in an individual's life with important physical, cognitive and emotional changes. Often the normal development of this stage is interrupted triggering behaviors such as aggression, anger, impulsivity and hostility. Among the approaches aimed at reducing this conflict, Virtual Reality (VR) has recently been included as a complement to enhance the impact of social intervention. Our main goal is to design and apply a new multicomponent intervention with VR for the treatment of aggression in young people in social conflict, determining its effectiveness in psychological and biological variables versus traditional intervention without VR. The application of the intervention program will follow the principles regulated for randomized controlled trials (RCT). The aim is to cover a significant number of young people between 13 and 21 years of age in a situation of social conflict from among the different centers and programs implemented by Asociación para Gestión de la Integración Social (GINSO), which collaborates with the company Innovae VR for the development of VR software. Methods: After selecting those young people with high scores in aggression, anger, impulsivity, hostility or difficulties in emotional regulation, they will be randomly assigned to groups (VR group and active control group), where they will receive intervention from general health psychologists. The RCT protocol together with the preliminary results are presented in this communication. Discussion: Given the potential therapeutic effects of immersive VR situations, we consider that it can be a positive strategy for this population and with important short- and long-term benefits, such as the prevention of psychological disorders and emotional regulation problems.

Funding: This study was funded by GINSO (Plan de Recuperación, Transformación y Resiliencia, Gobierno de España, Fondos Europeos) and Universidad Francisco de Vitoria (project reference: UFV2024-16).

POSTER 19

Effect of a dog-assisted intervention on physiological parameters, mood, and social relationships of a group of elderly residents, a pilot study.

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Animal Assisted Interventions (AAI) are becoming more frequent, despite the lack of research regarding its effects on users. In this pilot study (CEI-133-2787) we assessed the effect of an AAI with dogs on different parameters of physiological and psychological health in a group of 8 elderly people in a nursing home. Participants attended 8 workshop sessions, which were randomized between dog-assisted sessions and control sessions. Before and after each session they were video recorded in a social context for 5 minutes; later 2 observers (ICC = 0.82) recorded desirable social interaction behaviors and emotional expressions of positive valence. We measured blood pressure and blood oxygen before and after each session, and participants used an emoticon scale to assess their mood. Using the Wilcoxon test we have compared 1) "before and after the control workshop", 2) "before and after the experimental workshop", and 3) "after the control workshop and after the experimental workshop". Results show significant differences in mood between before and after in the sessions without dog, as well as in the sessions with dog, improving in both cases after both types of workshops. However, desirable social behaviors and emotional expressions increase after workshops with dogs, but not after workshops without dogs, and are more frequent after workshops with dogs than after workshops without dogs. Systolic blood pressure and blood oxygen levels do not change after workshops with dogs or without dogs. Despite the small sample size, our results support the importance of AAI in improving psychological health parameters in the elderly.

POSTER 20

From MEG to EEG: Transferring the natural frequencies of the human brain.

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Our brain is constantly generating oscillatory activity of electromagnetic nature. This is considered essential for brain function and its alteration is related to several neuropsychiatric disorders. Therefore, the study of oscillatory signatures has become a key concern in modern medicine. A recent publication has presented a normative map of the brain's natural or typical oscillatory frequencies obtained from magnetoencephalography (MEG) data, which holds potential for detecting alterations in brain activity in individuals suffering from neuropsychiatric conditions. However, a main constraint in translating this approach to healthcare is the high amount of costs derived from the use of MEG, besides the very limited number of MEG scanners worldwide. Electroencephalography (EEG) provides a good alternative for recording brain activity and is commonly employed in hospitals and health centers, thus overcoming the aforementioned limitations. The aim of the present study is to transfer the methodology for brain mapping of natural frequencies to EEG, both high and low-density. EEG recordings were collected from 43 healthy volunteers (20.1 ± 3.3 years) for 10 minutes at rest, with a 128-channel device, and preprocessed with an automatic pipeline adapted from Gil et al., including the selection of channels equivalent to 64 and 32 low-density systems. As in the original computation, we trained a k-means clustering algorithm to classify source-space (1cm3-voxels) power spectra (150 per subject and voxel). After that, all power spectra (> 2000) of each subject were introduced for classification into the clusters previously obtained. Finaly, the peak of the most prevalent spectrum shared by most of the subjects was obtained, z-normalized, and smoothed based on the neighboring voxels to define the natural frequency of each voxel. Our results show that the brain map of natural frequencies can be reliably obtained with either high-density or low-density EEG, enhancing its potential as a promising tool for clinical practice.

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POSTER 21

Neuromodulation and multicomponent exercise in women over 65: preliminary effects on shifting attention.

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Introduction: Intervention with physical exercise has been shown to be beneficial in preserving cognitive abilities in individuals over 65 years old, as it can induce individual cognitive reserve, maintain activation of the cingulate prefrontal cortex, and reduce brain tissue loss during aging. Likewise, transcranial direct current stimulation (tDCS) delays the decline in cognitive and motor functions associated with aging. This communication presents the preliminary results of a study suggesting that the combination of tDCS and multicomponent physical training enhances shifting attention in women over 65 years old. Methods: The design included double-blind randomization of 30 women into three groups: active-tDCS, placebo-tDCS, and control. Over 10 weeks, they engaged in a 45-minute multicomponent exercise program followed by 20 minutes of tDCS, twice a week. The anode electrode was placed on F3 and the cathode on the opposite supraorbital region (Fp2). Neuropsychological assessment was conducted before and after the program. This work presents the results obtained in: Five Digit Test, Trail Making Test, and Digit Span (WAIS-IV). Results/ Discussion: It is hypothesized that the multicomponent exercise program combined with active tDCS will enhance the cognitive reserve of participants, resulting in improved performance on neuropsychological tests compared to the placebo and control groups. This increase could be attributed to the synergistic effects of both interventions, contrasting with the control group. It is expected that the placebo tDCS group will maintain stable performance compared to the control group. Conclusions: Programs integrating multicomponent exercise and brain neuromodulation may represent an alternative to promote quality of life in women over 65 years old.

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POSTER 22

A society for multidisciplinary research in neuroscience and beyond.

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Introduction: Multidisciplinarity is crucial for contemporary neurosciences. Nowadays, excessive specialization, and a relative lack of integration efforts of the vast amounts of data, pose a risk to neuroscientific progress. Given the diverse and complex challenges, we need not only collaborations but also intellectual cross-pollination, and rethinking how we develop, review, and publish scientific endeavors. SEMF (in Spanish, Society for Multidisciplinary and Fundamental Research, https://semf.org.es) is a non-profit organization with the ambition to create social spaces and events where deep theoretical and practical blending of ideas and tools happen. We aim at bridging the gap between STEM, humanities, and artistic disciplines, through an open, inclusive community. Methods: For 13 years, we have designed and organized successful online and hybrid events (see https://www.youtube.com/@SEMF), covering topics from psychobiology to physics and music. Our speakers have come from many renowned research institutions. These events have also helped us build an online community on Discord, with multiple channels by topic for extensive discussion and freely organizing new events and collaborations. Moreover, we have established many partnerships with academic and non-academic institutions (such as national science academies, companies…). Importantly, SEMF is designed upon key principles: open science, minimal bureaucracy, strict open-mindedness, and integration of diversity. We now intend to extend our network in several neuroscience-related congresses. Results: We have achieved active participation of people from many countries and fields. For instance, the 2023 Summer School (https://semf.org.es/school2023/; report here: https://semf.org.es/school2023/school23report.pdf) gathered 300 people, coming from >100 institutions across all continents. On the Discord server, an active group of 330 people daily shares diverse content and perspectives, engaging in biweekly, online events that intertwine diverse subjects. Moreover, several collaborative projects have been founded. Conclusions: Our organization is successfully bringing together people from scientific and artistic disciplines, catalyzing the reconception of theoretical backgrounds, tool applications, and academic structures.

POSTER 23

Adaptation of the Luria's Neuropsychological Diagnostic Battery: A Pilot Study in Spanish Older Adults.

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Introduction: The Luria Neuropsychological Diagnostic Battery (DNA) is an original tool for cognitive assessment of Spanish Adults[1]. Previous literature has identified several concerns (i.e., time consuming, complexity of tasks) that compromise the utility of the battery in older adults[2]. Thus, we aimed to develop an adapted version (Luria DNA-2) for the assessment of Spanish older adult. Methods: A pilot study was conducted in 29 cognitively healthy subjects aged 55 years and older to identify potential difficulties in administering the Luria DNA-2. The battery was adapted in three stages by experts in the assessment of older adults. First, items inappropriate for older adults (i.e., culturally invalid, or extremely complex) and those requiring literacy were removed. At this stage, an inter-rater analysis was used to guide item selection. Second, the level of complexity of the items was assessed. Items were then grouped into different cognitive domains, favoring medium difficulty. Finally, task administration was adapted for older adults and scoring revised to facilitate correction. Results/Discussion: The Kappa index [3] showed high inter-expert agreement in the identification of literacy-related items (91.6%), and substantial agreement in material complexity (70.5%). The final adaptation of the Luria DNA-2 battery consisted of 25 items divided into four cognitive domains (i.e., memory, language, visuospatial skills, and executive functions) with a maximum score of 264. The administration time was reduced in comparison with the previous version (i.e., 35' vs. 50'). In the pilot study, several administration difficulties were identified (i.e., confusing instructions, missing ceiling score) and additional specifications were included for the application. Conclusions: This study presents a novel battery (Luria DNA-2) for the cognitive assessment of Spanish older adults. Forthcoming studies are in progress to investigate its psychometric properties and neurofunctional validity.

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References: 1.Manga & Ramos (2000); 2.Rueda Revé et al. (2017); 3.Cohen, J. (1960).

POSTER 24

Psychobiology in the digital age: Peer assessment and learning through Instagram.

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Introduction: The integration of new technologies and digitalization has revolutionized education, addressing the diverse needs of modern learners. Acknowledging this shift, maximizing digital resources has become imperative rather than optional. Active and collaborative learning strategies, particularly in disciplines like psychobiology, not only engage students but also provide them with essential skills. In response, an educational innovation project was launched from 2019 to 2024, encouraging students to create educational content of Psychobiology as teaching pills on Instagram. Methods: In the final year of implementation, peer assessment was introduced to enhance the educational experience by encouraging students to actively engage in the evaluation process, thus further developing their critical skills and understanding of the psychobiological concepts. Results: With 1,500 student participants and 446 posts on the @Psicobionews Instagram account, the project has reached a wide audience. A subsample of 200 psychology students engaged in peer assessment, evaluating content based on four dimensions: objective, content, topic knowledge, and originality. Logistic regression analysis examined how students' emphasis on these dimensions varied by academic year. The overall accuracy of the model was 69.0%, with moderate accuracy. Coefficient analysis indicated that "Quality of content" was a significant predictor of course ($p = 0.029$), with a very strong effect (Exp(B) = 16538.69). Results indicated that second-year students placed greater importance on content, suggesting evolving priorities as students' progress. While not significant, negative coefficients on "Objective" and "Originality" hinted at potential differences in evaluation between first and second-year pills. Conclusions: The project has yielded valuable insights into the potential of social media and collaborative learning for enhancing education in Psychobiology. The initiative has fostered a culture of critical evaluation and reflection, contributing to the ongoing evolution of educational practices in the digital age.

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POSTER 25

Biological substrate of cognitive functions in adolescent population with early onset psychosis: N-acetyl aspartate levels during the first 5 years of illness by sex.

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Cognitive functions in subjects with Early Onset Psychosis (EOP) have shown to continue to develop at a lower rate than their control counterparts. Especially, functions related to the dorsolateral prefrontal cortex (DLPFC). Previous studies have shown reduced NAA in the DLPFC in EOP compared to controls. Differences by sex have been poorly studied, but there are studies that showed differences in DLPFC. The main aim is to analyse the relationship between the variation in NAA and cognitive functions over the first five years after the onset of the disease by sex. The study sample was: 65 EOP and 67 controls (15.59±1.82,34%women). Cognitive function was performed by neuropsychological assessment. NAA levels by single-voxel MRS in the left DLPFC. The statistical analysis was performed using mixed model and Pearson's correlation. Global cognitive functions: significant rise with NAA as covariate, from baseline to 5-years (difference:0.406,p<0.01) in controls.The difference between EOP and controls, became statistically significant taking into account NAA (difference:0.458,p=0.007). In controls women, the model reached statistical significance from 2-5years with NAA (difference:-0.706,p=.018). In EOP women there was a correlation between NAA levels and cognitive functions development (r=0.434,p=.004). Global attention: the difference between groups at 5-years became significant with NAA (difference:0.722,p=0.002). In addition, EOP women showed a significant correlation between NAA levels change and global attention development (r=.439,p=.003). Working memory: in controls the difference baseline-5years reached significancy when we considered NAA (difference:0.437,p=0.010). Executive functions variation in EOP subjects was correlated with NAA (coefficient:0.24,p=0.05). When we stratified these correlations were observed in both sexes. The low NAA levels in the DLPFC in EOP is related to a deficit in the development of cognitive functions over follow-up, especially for women. This brain metabolite would be a specific marker of neurodevelopmental deficit or continued cellular disruption that may contribute to the impairment of cognitive functions.

POSTER 26

Child Mental Health: a reading from neuropsychoanalysis on the consultation and treatment of a case.

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For this work we recognize that due to the increase in the population of multiple psychological disorders, as well as social problems linked to the field of mental health, neuroscientists and psychoanalysts such as Kandel, Gauchet, Panksepp, Chessick, among others, relate the theoretical precepts of both approaches to propose a new method that allows a complete intervention, through the use of technological tools, to identify the functioning of the central nervous system and psychoanalytic techniques that allow us to know the subjective processes and the emotional reality of the human being, in order to satisfy their psychological needs. Therefore, we begin to emphasize that the last decade has seen significant advances both in neurobiological research of the brain and in psychoanalytic studies of the mind. The emerging discipline of developmental neuropsychoanalysis has been a fertile repository for incorporating interdisciplinary data from psychology, developmental biology, and neurochemistry. This new subdiscipline of psychoanalysis has returned to the fundamental problem of the mechanisms of developmental changes, but mainly in the change of psychic functions and structures. The result is the generation of more complex psycho-neuro-biological models of brain-mind-body change, not only at the beginning but also at all subsequent stages of development. Therefore, this work will present the analysis of a clinical case and the necessary intervention strategies from neuropsychoanalysis and theoretical and clinical reading from the same approach. We venture to explore how an integrated understanding of psychological and neurobiological processes can shed light on the emotional and behavioral challenges children face, with a particular focus on the practical application of clinical consultation.

POSTER 27

Chronic Pain and Its Association with Cognitive Decline and Brain Function Abnormalities in Older Adults: Insights from EEG and Cognitive Assessments.

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Understanding the impact of chronic pain on cognitive function and its role in causing functional changes in the brains of older adults can provide valuable insights for clinical investigation and future therapeutic approaches. As of now, there have been no studies specifically examining the interplay between chronic pain, cognitive function, and functional brain abnormalities in older adults. To address this gap, we conducted a study involving 26 older adults with chronic pain (CPOA), 30 pain-free older adults (OA), and 31 healthy younger adults (YA). We administered a series of neuropsychological tests and recorded electroencephalography (EEG) data during resting-state to analyze frequency band oscillations. Consistent with our expectations, individuals with CPOA demonstrated significantly poorer performance compared to OA counterparts on the Stroop test, several variables of the Wisconsin Card Sorting Test (WCST) including correct answers and errors, as well as Digit Span. Furthermore, our analysis of EEG power spectra revealed notable differences between the groups. Both groups of older adults exhibited significantly higher beta activity compared to younger adults, with CPOA participants displaying particularly elevated beta-2 activity compared to OA individuals. Correlation analyses indicated that in CPOA participants, heightened beta activity was linked to decreased performance on the WCST, characterized by fewer correct responses and increased errors and perseverative responses. Conversely, in OA individuals, we observed a positive correlation between increased beta activity and improved performance on the WCST. Overall, our findings highlight the association between chronic pain in older adults, executive function deficits, and aberrant brain activity, suggesting that prolonged pain experiences may accelerate the aging process in the brain.

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POSTER 28

Cognitive reserve dimensions and frailty: insights from UK biobank data.

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In recent studies, there has been a growing interest in the potential protective effects of cognitive reserve dimensions against frailty among older adults. To explore this relationship, we analyzed cross-sectional data from the UK Biobank. Our analysis included 31,975 participants aged 60 years and older (mean age 65.58 ± 4.42 years, range 60-82 years, 50.7% females, 2.2% frail) who underwent web-based cognitive testing assessing fluid intelligence, working memory, visuospatial attention and processing speed, and executive functioning. Frailty was defined according to Fried's phenotype criteria. We compared cognitive performance between nonfrail and frail groups and used regression models to investigate the associations between cognitive reserve dimensions (education, occupational skill level, social support, and multiple deprivation index; MDI) and frailty likelihood. Our analysis revealed significant differences in cognitive function between frail and nonfrail groups, with frail individuals showing poorer performance on all cognitive domains (all $p < .05$) except fluid intelligence. Regression analysis, adjusting for age, revealed that lower educational attainment (OR .792, 95% CI .669-.938, $p = .007$), engagement in low cognitive demand occupations (OR .767, 95% CI .649-.907, $p = .002$), inadequate social support (OR .776, 95% CI .650-.927, $p = .005$), and residing in regions with high levels of multiple deprivation (OR 1.025, 95% CI 1.019-1.030, $p < .001$) significantly increased the likelihood of frailty. These findings highlight the association between declined cognitive functions and frailty, emphasizing the importance of implementing public health interventions aimed at enhancing cognitive reserve.

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POSTER 30

Effects of Neuropsychological Treatment on the Recovery of Cognitive Functions in Patients with Substance Use Disorders.

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Background: Various studies place the prevalence of cognitive impairment (CI) at 30-80% of the population with SUD. Although prolonged abstinence could totally or partially reverse cognitive functions, cases of irreversible deterioration have also been described. However, this scientific knowledge has not yet been transferred to health practice since current programs for the treatment of addictions do not implement neuropsychology, the branch of psychology specialized in evaluating and intervening on the behavioral consequences of brain alterations. Methods: The present longitudinal study investigates the effects of prolonged abstinence (6 months) and a 3-month (one hour two days a week) neuropsychological intervention (Fundación Héroes) on cognitive functions. We recruited 18 abstinent subjects with substance use disorders (SUD) in outpatients' services (Proyecto Hombre Málaga). The participants were divided into SUD patients who received neuropsychological treatment (intervention group, N=9) and SUD patients who only received their conventional treatment (control group, N=9), who were matched by sex, age, BMI and CI. SUDs were diagnosed by Psychiatric Research Interview for Substance and Mental Diseases (PRISM) and CI was assessed by Montreal Cognitive Assessment (MoCA). Results: Our results suggested that, after 6 months of abstinence, the intervention group improved the scores in total MoCA (p<0.001) as well as in the visuospatial/executive subtest (p=0.009). Conclusions: 3-month neuropsychological treatment could improve cognitive function in SUD patients. This could have big implications since CI is an important predictor of therapeutic success, being related to a greater probability of abandoning addiction treatment or relapse.

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POSTER 31

Functional Connectivity Disruptions in Williams Syndrome: Insights from MEG resting-state analysis.

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Williams syndrome (WS) is associated with unique cognitive and behavioral profiles, but the underlying brain connectivity patterns remain largely unexplored. This study aimed to assess functional connectivity differences in individuals with WS using Phase Locking Value (PLV) analysis derived from magnetoencephalography (MEG) recordings. A total of 24 individuals with WS and 17 controls participated in this study. Brain activity was recorded during a 5-minute resting-state session with eyes closed using MEG, employing the Automated Anatomical Labeling (AAL) atlas for regional brain analysis. Functional connectivity was analyzed using PLV across classic frequency bands, comparing each pair of brain regions, followed by a t-test and correction for multiple comparisons using the False Discovery Rate (FDR) method at 0.01. Our results indicated notable connectivity differences across three frequency bands. In the alpha band, there was reduced connectivity in WS individuals between medial prefrontal regions, hippocampal regions, and the precuneus, which are typically involved in the default mode network (DMN). Additionally, increased alpha band connectivity was observed between left temporo-occipital regions, coinciding with ventral processing pathways. In the theta band, an extended pattern of hyperconnectivity was found in posterior regions (occipital, temporal, and parietal), along with reduced connectivity between medial and right prefrontal regions and the cingulate areas. In the beta band, a profile of hyperconnectivity was noted in both posterior and anterior regions of the bilateral prefrontal cortex. These findings suggest a significant disruption in DMN connectivity and alterations in posterior brain connectivity in WS, highlighting the complex nature of neural communication in this syndrome. Understanding these connectivity patterns may provide insights into the neurobiological basis of the cognitive and sensory peculiarities associated with Williams syndrome and potentially guide therapeutic interventions.

POSTER 32

Heart Rate Variability, Self-Reported Measures and Somatosensory Sensitivity in Patients with Chronic Low Back Pain: A Preliminary Study.

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Introduction: Chronic low back pain (CLBP) results from a dynamic interplay between peripheral inputs and central nociceptive changes. Limited evidence suggests that low heart rate variability (HRV) and decreased parasympathetic activation may serve as biomarkers for physical and psychological disorders, including CLBP. Hence, we explored differences in HRV in CLBP versus healthy controls (HC). Methods: We recorded electrocardiographic (ECG) signals using a QuickAmp amplifier at 1000 Hz on N=31 adults with CLBP (44.8±9 years, 13 males) and N=29 HC (37.1±15.1 years, 12 males). ECG data were segmented in epochs of 300s, digitally filtered (high-pass at 5 Hz, low-pass at 30 Hz, and Notch at 50 Hz) by using BrainVision Analyzer, and hand-corrected for artifacts by using the QRSTool. Inter-beat interval values were extracted. HRV metrics of time (mean heart rate, standard deviation of the normal-to-normal intervals, and the root mean square of the successive differences) and frequency domains (the power in ms2 of the very low (0-0.04 Hz), the low (0.04-0.15 Hz) and the high (0.15-0.4 Hz) frequency) were computed by using Kubios HRV Standard. Self-reported questionnaires and the two-point discrimination (TPD) test, pressure-pain thresholds (PPT), and pressure-pain intensity ratings (PPIR) on the lower back and the index were also used. Results/Discussion: No between-group differences emerged for any of the HRV parameters, TPD, PPT, or for the level of anxiety. However, differences arose in the subscales not-distracting, not-worrying, and trusting of the Multidimensional Assessment of Interoceptive Awareness (all ps<.05), and levels of disability (Oswestry Disability Index), catastrophizing (Pain Catastrophizing Scale), central sensitization (Central Sensitization Inventory), prognosis (STarT Back Screening Tool), kinesiophobia (Tampa Scale), mood (Depression-Anxiety-Stress Scale), fear-avoidance (Fear-Avoidance Beliefs Questionnaire), and PPIR in both body locations (all ps<.01). Conclusions: The between-group differences found only in self-reported variables and PPIRs suggest an alteration in subjective psychological and pain-related variables in CLBP.

POSTER 33

Impact of Mindfulness on Resting State Networks in Adults with Mood Disorders: A Systematic Review.

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Introduction: Functional dysregulation within the default mode network (DMN) has been associated with mood disorders. However, other networks can be discerned in the resting state, such as the salience (SN) and executive central (CN) networks, both of which may be relevant to mood disorders. Mindfulness-based interventions (MBI) have been shown to be a new promising adjunctive treatment for mood disorders; however, the neural mechanisms that lead to psychiatric improvements of MBI remain poorly understood. The objective of this study was to systematically review the current scientific literature that reports evidence on the effects of mindfulness on RSN in adults with mood disorders and/or depressive symptoms. Methods: Based on the PRISMA guidelines, a literature search on Web of Science, SCOPUS, and PsycINFO was performed to identify relevant studies published between 2018 and 2023 aimed to investigate the effects of mindfulness interventions on RSNs in adults diagnosed with mood disorders and/or with depressive symptoms. Results/Discussion: Of the initial 364 studies identified, 14 met the inclusion criteria. The findings revealed consistent evidence of mindfulness-induced modulations in DMN, SN, and ECN. Specifically, MBI were associated with decreased DMN activity which correlated with reduced self-referential processing and rumination and increased connectivity within the DMN and ECN. Furthermore, a restoration of the anticorrelation activity pattern typically observed between these two RSNs in healthy subjects was also found. The results regarding SN were not clear, with some studies reporting increased connectivity between SN and DMN, and others reporting questionable evidence on changes in the SN and therefore its interaction with changes in depressive symptomatology. Conclusions: Our research reveals compelling evidence about the effects of mindfulness on RSNs in adults with mood disorders and elucidates the neurobiological underpinnings of mindfulness-based interventions, contributing to our understanding of their beneficial therapeutic mechanisms.

POSTER 34

Cardiac Interoceptive Processing Across Psychopathy Dimensions: Evidence from the Heartbeat Tapping Task and the Attentional Modulation of Heartbeat-Evoked Potentials.

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Introduction: Psychopathy is a multidimensional personality structure encompassing interpersonal, affective, and behavioral traits. Interoception (ability to perceive and subjectively experience inner bodily states) may be a putative mechanism underlying the etiological pathways of psychopathy. Individual differences in interoceptive processing across psychopathy dimensions may interfere with the ability to perceive somatic sensations that signal the emotional valence of everyday events. Goal: To examine the association between psychopathy dimensions (triarchic phenotypes - boldness, meanness, and disinhibition; classical 4-facets - interpersonal, affective, impulsive, antisocial) and cardiac interoceptive processing, namely objectively measured cardiac interoceptive attention and accuracy. Methods: Fifty community-dwelling participants (25 women) were recruited and completed: (a) self-report measures indexing psychopathy, trait-based interoceptive attention and accuracy, and alexithymia; (b) modified Heartbeat Tapping Task to index cardiac interoceptive accuracy, where subjects were required to tap after each heartbeat under rest and breath hold conditions (the latter enhanced the magnitude of cardiac signals); (c) modified Heartbeat Attention Task for producing an attentional modulation of heartbeat-evoked potentials (HEP) - neuronal markers of cardiac interoceptive processing - where subjects were required to allocate their attention on their heart vs. an exteroceptive stimulus (objective measure of interoceptive attention). Results: Cardiac interoception was only significantly related to boldness traits. Boldness was positively associated with cardiac interoceptive accuracy after the breath hold manipulation (non-significant after controlling for heart rate), despite no significant effects being observed at rest. Boldness was also negatively correlated with the attentional modulation of HEP due to atypical neuronal responses when allocating attentional resources to the heart. Conclusion: The current findings implicate cardiac interoception in the boldness phenotype, as this psychopathy dimension was associated with enhanced interoceptive-specific perceptual sensitivity and atypical neuronal responses to cardiac afferent inputs when attending to heart-related sensations. Future studies should examine how other interoceptive modalities (e.g., respiratory, gastric) are implicated in psychopathy.

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POSTER 35

Inhibitory and decisional mechanisms in sex and pornography addictions.

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Introduction Sex and pornography addictions fall within what we commonly call behavioral addictions. The present work aims to verify the presence of a deficit in executive functions -specifically, impulsivity, decision-making, risk-taking and inhibitory control - in a population of individuals with sex or pornography dependence. This kind of alteration might explain the mechanism underlying these non-substance addictions. Method Cognitive variables were compared between patients with sex or pornography addiction (n= 22) and a group of controls without such addiction (n= 8) at the Gregorio Marañón Hospital (AdCOM). Cognitive function was assessed with the MOCA and impulsivity with the UPPS-P. In addition, three computerized tasks were used to measure executive abilities in the 3 domains: BART, which measures risk-taking, a Stop signal task with erotic images to assess inhibitory control, and an erotic delay discounting task to measure decision making. Results and discussion There were no significant differences in impulsivity (UPPS-P). In the erotic stop signal, there were no significant differences between patients and controls, however, both groups presented a longer stop signal reaction time for images preceded by an erotic stimulus, which would indicate greater interference from erotic stimuli. In the erotic delay discounting there were no differences between conditions. Both groups accepted more trials when they had a low delay cost and had a longer reaction time upon accepting or rejecting trials with a high delay cost. In BART, patients had a longer reaction time (time taken to pump again after completing a trial) and performed a greater number of pumpings after an explosion, which could indicate worse behavioral adjustment towards risky decisions. Conclusion Sex and pornography addictions appear to impact an increase in risk-associated decisions, without impacting impulsivity and inhibition.

POSTER 36

Hedonic valence processing in the goldfish telencephalic pallium during discriminative classical conditioning.

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Considerable progress has been made in understanding the anatomy and function of the cerebral cortex, yet tracing its evolutionary development across vertebrates remains challenging. Comparisons among living vertebrate species are essential for reconstructing the phylogenetic history of the cerebral cortex. Studying the organization of the pallium in ray-finned fishes (actinopterygians) is crucial to identify the ancestral features of the cerebral cortex, as they are the sister group of land vertebrates and other lobe-finned fishes (sarcopterygians). The actinopterygian pallium consists of two primary sectors: dorsolateral (Dl) and dorsomedial (Dm). While one hypothesis suggests that Dl and Dm correspond to the hippocampus and pallial amygdala, respectively, another proposes additional pallial areas akin to the dorsal pallium (neocortex) in other vertebrates. To contribute to understanding the functional organization of the actinopterygian pallium, we firstly studied the neural activity of the main regions of the goldfish pallium using in vivo optical imaging while performing discriminative aversive classical conditioning procedures; secondly, we investigated the effects of lesioning key areas of this network on aversive classical conditioning performance. Results suggest the presence of specialized neural networks involving Dm and Dl areas in assessing stimulus salience and processing the hedonic value of stimuli. The results suggest that the Dm area of the teleost fish pallium contains an emotional-centered neural network comparable to the emotional limbic circuits of mammals (posterior insula - anterior cingulate cortex - prefrontal ventromedial cortex). Additionally, the Dl area of the teleost fish pallium seems to be comparable to the hippocampus-limbic cortex network of mammals (hippocampus - entorhinal cortex - retrosplenial cortex - posterior cingulate cortex). These results have significant implications for current theories of cerebral cortex evolution.

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POSTER 37

Influence of the androgenic system during development in the energy metabolism and the hypothalamic circuits that regulate feeding.

Rocío García Úbeda

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Introduction: Different factors are involved in the programming of energy metabolism and hypothalamic circuits that regulate food intake, but not much is known about the role of androgens during these early. In the present study, the effects of the inhibition of androgen activity early after birth on the estrogens and androgens receptors and hormonal levels have been studied. Methods: Androgen receptors (AR) and the main metabolic pathways of testosterone were inhibited during the first five days of postnatal life in male and female Wistar rats. Pups received a daily s.c. injection from the postnatal day (P) 1, to P5 of Flutamide (competitive inhibitor of AR), Letrozole (aromatase inhibitor), Finasteride (5-alpha-reductase inhibitor) or vehicle. Hypothalamic hormonal receptors (AR, ERα and ERβ) were analyzed by qPCR and circulating hormones levels (testosterone, DHT and estradiol) were measured using ELISA assay at P90. Results: The inhibition of the androgenic pathways did not alter the hypothalamic levels of hormone receptors in males. However, in females the inhibition of the enzyme aromatase increased the levels of AR and ERβ, the blocking of the androgen receptor increased the levels of ERβ, and the inhibition of 5α-reductase decreased the levels of ERα. Sexual dimorphism in circulating levels of testosterone was not altered by any treatment. Aromatase inhibition reduced circulating testosterone levels in males and females. In females, these levels were also reduced by flutamide and finasteride. Circulating levels of DHT were higher in males than in females and this dimorphism was only affected when the aromatase was inhibited. Circulating levels of estradiol did not show sexual dimorphism between male and female controls but it did with all treatments. Discussion: Our results show that early postnatal inhibition of the androgenic activity alters the expression of hormonal receptors in the hypothalamus as well as the hormonal circulating levels in adulthood.

POSTER 38

Ketogenic diet reduces ethanol consumption in female mice.

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Introduction: The ketogenic diet (KD) has demonstrated efficacy in reducing ethanol consumption in male mice; however, its impact on ethanol consumption in females remains unexplored. Given the growing recognition of the importance of gender perspective in research, driven by observed behavioral disparities between males and females, our objective was to evaluate the influence of the KD on ethanol consumption in female mice. Methods: Thirty female OF1 mice were divided into two groups based on their dietary regimen: Standard (n = 15) and KD (n = 15). The KD group maintained this dietary protocol from postnatal day 39 until the conclusion of the experiment. Twenty-four hours following the initiation of the experimental feeding conditions, all mice underwent the Drinking in the Dark test (DID) for ethanol habituation. Subsequently, two days after completing the DID, the oral ethanol self-administration (SA) paradigm was initiated. Results/Discussion: The results revealed that female mice fed the KD diet displayed notably reduced ethanol intake and fewer effective responses compared to those on a standard diet throughout the SA procedure. Additionally, the trend towards decreased consumption in the KD-fed groups was observed during the DID test too. These findings suggest that the KD might attenuate the reinforcing effects of ethanol. Conclusion: Overall, these results demonstrate the effectiveness of the KD in reducing ethanol consumption in females, underscoring its potential therapeutic utility for treating AUD.

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POSTER 39

Limbic networks for conditioned place aversion in the goldfish telencephalon.

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Actinopterygian fish, the sister group of sarcopterygians that includes amniotes and mammals, plays a crucial role in understanding the evolutionary history of the pallium and cerebral cortex. Increasing evidence shows that the dorsomedial part (Dm) of the teleost fish pallium is implicated in emotional processing. In fact, in recent years, the hypothesis that Dm is the homologue of the mammalian pallial amygdala. However, in mammals, the amygdala is just one component of a larger limbic cortical network involved in emotional processing, encompassing structures like the insula, anterior cingulate, and prefrontal cortices. This study investigates the presence of a similar network in the Dm of teleost fish. Using in vivo optical imaging and electrical microstimulation mapping, we demonstrated that Dm comprises at least four distinct subdivisions, each exhibiting unique functional characteristics such as sensory modality representations, viscerosensory encoding, and involvement in emotional arousal. Additionally, we evaluated the aversive effects of electrical microstimulation in different Dm subregions using place avoidance procedures. Activation of the area Dm2 induced emotional arousal and behavioral activation, acting as a potent aversive reinforcer. Overall, these findings suggest that goldfish Dm may contain areas homologous to the pallial amygdala, as well as regions resembling the insula, anterior cingulate, and ventromedial prefrontal cortex. This emotional network potentially represents an ancestral organization of the limbic system in vertebrates.

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POSTER 40

No effects of Photobiomodulation therapy on 18-month-old aging rats.

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Introduction: Aging is a multifactorial process associated with cognitive decline and an increase in vulnerability to suffer a neurodegenerative disease [1]. Photobiomodulation (PBM) is a non-invasive therapy that involves the use of red or near-infrared light to stimulate, preserve and regenerate tissue and cells and has been seen to be a promising tool to treat neurological illnesses linked to age [2]. This study aims to research the effect of PBM on elderly healthy rats. Methods: 38 animals with 18 months of age were used. Animals were divided in three groups: a control group (n=12), a control apparatus group (n=13) and a PBM group (n=13). PBM application started with a habituation day on mode off, and then, the therapy was applied for 11 days. It was applied with a pulse waved diode at 810 nm, 40 Hz, for 12 minutes per animal in three cycles of 4 minutes each. All animals underwent an assessment of their neurological status, and then, a battery of behavioural assessment was performed. Anxiety-like behaviour was explored with the Zero elevated Maze, a motor evaluation with the Rotarod and a reference memory evaluation with the Morris Water Maze along with the PBM therapy. Brain samples were processed using two cytochrome c oxidase histochemistry (CCO) and c-Fos immunohistochemistry. Results: No major changes were found throughout the groups on either the behavioural testing or the brain activity. Conclusions: Some literature shows improvements after PBM therapy application, especially on animals with a neurodegenerative pathology, and others do not observe the desirable effect. This underscores the need for further investigation into the application of PBM in the elderly.

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POSTER 41

Physical exercise after traumatic brain injury in late middle-aged rats: interaction with sex and effects on anxiety-like and compulsive-like behaviors.

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Introduction: Traumatic brain injury (TBI) may elicit chronic alterations in emotional reactivity, that could be attenuated by physical exercise. However, existing animal research on this topic predominantly focuses on adolescent or young adult rodents, with limited exploration of potential sex-based differences. Methods: Late middle-aged (14 months old) male and female rats were either submitted to TBI or were sham-operated. One week after surgery, the animals were submitted to either a sedentary or an exercise (voluntary wheel running) condition. Seven weeks after the surgery, the animals were tested in the elevated plus maze (EPM) and the marble burying test (MBT). Results/discussion: TBI increased the time spent in the open arms and reduced the time in the closed arms of the EPM in both male and female rats. Irrespective of injury, female rats exhibited higher locomotor activity, spent more time in open arms and less time in the central platform of the EPM, and buried more marbles in the MBT, compared to male rats. Moreover, female rats ran significantly longer distances and times daily compared to males, with TBI exacerbating these sex differences. Notably, exercise reduced time in open arms and the number of buried marbles, regardless of sex or injury (indicating attenuation of compulsive-like behavior). While the alterations observed in the EPM post-TBI could suggest reduced anxiety, they may also reflect diminished risk assessment capacity. Conclusions: In late middle-aged rats TBI altered anxiety-like behaviors in both sexes, while exercise attenuated these changes. In addition, TBI induced sex-dependent changes in the amount of voluntary wheel running.

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POSTER 42

Preference for active versus sedentary sources of reinforcement: the role of different types of previous exercise and their impacts on the dopaminergic system.

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The mesolimbic dopamine (DA) system intricately governs behavioral activation and the exertion of effort. Pharmacological manipulation targeting DA, such as antagonism or depletion, can lead to anergia, particularly evident in effort-based decision-making paradigms. However, little is known about the neural mechanisms underlying decision-making processes that establish preferences for sedentary versus activity-based reinforcers. This study aims to elucidate the impact of prior exposure to distinct exercise regimes on reinforcer preference and to ascertain the influence of DA depletion using tetrabenazine (TBZ), a catecholamine depleting agent and vesicular monoamine transporter-2 (VMAT-2) inhibitor, on choice behavior. Additionally, we investigate the modulation of cerebral dopamine neurotrophic factor (CDNF) immunoreactivity by these exercise paradigms. Male CD1 mice underwent daily training either on a programmed-automatic running wheel (RW) mandating physical activity or in cages equipped with voluntary activity wheels. Control groups were provided locked RWs. After a 9-week regimen, animals underwent testing in a T-maze-3-choice task, designed to gauge preference between physical activity (RW) and more sedentary reinforcers (sucrose pellets or a non-social odor). Notably, all groups exhibited a pronounced preference for engaging in running activities. TBZ administration elicited a shift in preference within the control group, reducing the time spent running while increasing feeding time. Intriguingly, both the forced and voluntary exercise groups displayed resistance to the effects of TBZ, indicating potential resilience to DA manipulation. Furthermore, analysis of CDNF immunoreactivity suggests no discernible differences attributable to varying exercise regimes. In summary, this investigation sheds light on the intricate interplay between exercise experience, dopaminergic modulation, and preference for activity-based reinforcers, with implications for understanding the neurobiological underpinnings of decision-making processes related to physical activity engagement.

POSTER 43

Same-sex sexual behaviour in the Saharan Dorcas Gazelle (Gazella Dorcas neglecta) are not linked with aggression and affiliation.

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Same-sex sexual behaviour (SSB) has been observed in many ungulate species and it has frequently been described as more common between younger males without access to females. One common explanation for the existence of SSB between males in ungulates is that they help establish social positions within a group, either by acting as dominance behaviours, establishing the actor of SSB as a dominant individual; or as affiliative behaviour, establishing positive bonds between two animals. The present study has two objectives 1) to explore if the SSB correlates with agonistic behaviours and 2) to explore if SSB correlates with affiliative behaviours. We observed five captive groups of Gazella dorcas neglecta with a total of 23 individuals. We used scan sampling to record agonistic, affiliative, and sexual behaviours for a total of 295 hours. We constructed social networks and performed QAP correlations using R (v 4.3.2). Using social network analysis, we found no relationship between the sex behaviour network of the group and the agonistic structure ($p > 0.05$ for all groups), which indicates that SSB do not seem to be related to the dominance structure. Likewise, we found no relationship between the sexual network and the affiliative network ($p > 0.05$ for all groups), which does not support that SSB helps maintain affiliative bonds in this species. In conclusion, our data does not support that SSB shows a relationship with neither aggression not affiliation, which contrasts with previous hypotheses regarding its possible functions. More research is needed to investigate ungulate SSB and social networks, expanding the investigation to associations based on special proximity.

POSTER 44

Sex differences in discrimination learning.

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The aim of the present study was to test sex differences in discrimination learning and whether or not such differences might be related to inhibitory learning. To do this, two groups of adult Sprague Dawley rats (females n=8; males n=8) were trained in discrimination learning within a conditioned taste aversion preparation. All the rats received four reinforced trials with a single flavor A followed by an intraperitoneal injection of LiCl 0.15 M at 10% of their body weight (A+ trials) and four unreinforced trials with an AB flavor compound in an intermixed schedule (AB-trials). After this training, rats received a conditioning trial with flavor C before a summation test in which this stimulus was presented in a compound with flavor B. According to the associative theory of learning, B will be expected to be an inhibitor after discrimination training, decreasing the conditioned response evoked by C during the summation test. Finally, all the rats received a two-bottle choice test with the conditioned flavor C and the BC compound. The experiment found stronger discrimination between A and AB during training for males but no differences in BC consumption during the summation test. However, in the two-bottle choice test, discrimination between C and BC was evident only for males. These findings suggest that discrimination might be improved more strongly in males. The results obtained in subsequent tests are compatible with the idea that inhibitory learning might be disrupted in females. However, it might also be possible that generalization between stimuli was stronger for females. Because the issue might be relevant for better understanding relevant clinical phenomena, such as learning about security cues, this incipient line of research deserves to be extended in the future to confront these possibilities.

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POSTER 45

Social defeated in adolescent male and female mice: effects on depressive- and anxiety-like behaviors.

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Social defeat (SD) experience in adulthood is known to induce depressive-like behaviors and increase anxiety in both male and female mice. However, limited evidence exists regarding the effects of SD during adolescence, especially in female mice. This study aimed to investigate the impact of SD experience during adolescence on depressive- and anxiety-like behaviors in both male and female mice. Adolescent OF1 male mice were subjected to repeated SD, while females underwent repeated vicarious SD. Twenty-four hours after the final encounter, the social interaction test (SIT) was conducted to assess depressive-like behaviors. Anxiety-like behavior was evaluated either four days (short-term, adolescent mice) or three weeks (long-term, adult mice) after the last SD encounter using the elevated plus maze (EPM) paradigm in both groups of mice. Adolescent female mice exhibited a higher percentage of resilience to depressive-like behavior compared to their male counterparts following the respective SD exposures. In contrast to stressed adult mice, resilient mice defeated during adolescence spent less time in the open arms of the EPM than controls. Additionally, all adult mice showed increased anxiety-like behavior compared to adolescents, spending more time in the closed arms of the maze. Interestingly, female mice were more likely to enter the open arms during adolescence, whereas male mice exhibited the opposite pattern. These results confirm that SD experience during adolescence induces two populations of male and female mice, some resilient and others susceptible to depressive-like behaviors, similar to observations in defeated adult mice. However, resilient adolescent mice showed a distinct anxiogenic response. These findings highlight the importance of studying the unique adolescent response to social stress. Key words: female mice, male mice, adolescence, social defeat.

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POSTER 46

Taste familiarity does not alter the reward system activity in adolescent rats.

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Taste neophobia is crucial for adolescents needing to explore potentially dangerous novel food. This is related to the developmental changes in the brain reward system that take place in this late maturational phase. Repeated exposure to a novel flavor without negative consequences leads to increased ingestion termed attenuation of neophobia (AN). This phenomenon has been explored in adolescent male Wistar rats (PND28-PND42) to assess the activity of the reward system. The rats received six daily exposures to a 3% cider vinegar solution. In addition, the sample was divided into Novel (n=6), Familiar-2 (n=6) and Familiar-6 (n=6) groups based on the number of flavor exposures. Ninety minutes after the drinking session, immunohistochemistry of the c-Fos protein was applied as an index of neural activity in the medial prefrontal cortex (mPFC) and nucleus accumbens (NAcb). The results indicate higher activity in the prelimbic cortex (PrL) than the rest of mPFC and in the NAcb Sell than the NAcb Core. However, no differences have been found regarding flavor neophobia and AN formation, in spite of the fact that familiarity after six exposures is associated with higher activity in the ventral than the dorsal region of the mPFC. These results can be interpreted in terms of the reward system immaturity.

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POSTER 47

The behavioral profile of female mice during intermittent social defeat episodes in a between-female aggression paradigm predicts vulnerability or resilience to the rewarding effects of cocaine.

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Introduction. Intermittent social defeat is a useful paradigm of social stress in male mice and allows researchers to discriminate between vulnerable and resilient individuals (Calpe-López et al., 2020). However, it is difficult to implement a social defeat protocol in female mice, since they express low levels of aggression. In the present study we developed an intermittent defeat protocol for female mice and evaluated its long-term effects on the rewarding properties of cocaine in the conditioned place preference (CPP) paradigm. Methods. Experimental C57BL/6J female mice (n=30) were confronted with a Swiss female opponent mouse that had cohabitated with castrated male mice to enhance their aggression levels. The mice's behavior was videotaped for subsequent behavioral analysis. Control female mice (n=12) were not exposed to stress and explored an empty cage. After exposure to four episodes of defeat or exploration (on postnatal day (PND) 47, 50, 53 and 56) defeated and control female mice were evaluated in the CPP paradigm (PND 77-91) after being administered cocaine (1.5 mg/kg). Results/Discussion. It was possible to implement a protocol of intermittent social defeat in female mice, though 5 of our experimental mice did not experience aggression from their opponent. Moreover, aggressive behaviours were reduced as the episodes of defeat took place. Only defeated female mice spent more time in cocaine-paired compartment in Post-C2 and Post-C3 in comparison to Pre-C. In addition, the CPP score was higher in defeated than in control mice. These effects were more evident in female mice that exhibited more submissive behavior during the episodes of defeat. Conclusions. Exposure to social defeat induces increased sensitivity to the rewarding effects of cocaine, particularly in vulnerable female mice.

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POSTER 48

Transitive inference in goldfish: The role of the hippocampal pallium.

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Transitive inference, that involves drawing logical conclusions based on preliminary information, is a clear instance of representational flexibility as it implies the novel expression of learned information. In mammals and birds, transitive inference critically depends on the integrity of the hippocampus. Comparative neurobiological evidence indicates that a hippocampus homologue can also be found in the telencephalic pallium of teleost fish. Here, we investigated whether goldfish demonstrate inferential behavior in a standard transitive inference task, and whether the hippocampal pallium of goldfish, akin to the hippocampus in mammals and birds, plays a role in transitive responding. We trained goldfish on a series of overlapping two-item visual premise pairs: A+B-, B+C-, C+D-, D+E-, and observed that they readily learned the premise pair discriminations and respond transitively during the crucial test involving a novel pair of non-adjacent elements (B vs D). On the contrary, hippocampal pallium lesioned goldfish were impaired in the critical transitive inference test, although they successfully learned to discriminate the premise pairs. Thus, results suggest that a relational memory function of the hippocampus, serving as a neural substrate for novel expression of learned information, could be a primitive feature of the vertebrate hippocampus. The findings presented here challenge the prevailing hypothesis suggesting that the hippocampus initially evolved solely for spatial navigation in ancestral vertebrates, later expanding its function to encompass a broader role in episodic memory with the emergence of mammals. Instead, the results lend support to the alternative view that the hippocampus initially encoded both spatial and non-spatial dimensions of relational memories since its evolutionary inception. Furthermore, this feature may have been conserved throughout the evolution of distinct vertebrate lineages.

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POSTER 49

Consequences of early exposure to alcohol: influence of supplementation with folic acid to restore the oxidative balance.

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Early alcohol exposure poses a significant risk for harmful changes, especially in oxidative stress metabolism, with gestation and adolescence being crucial periods. Both early alcohol exposure (EPA) and excessive episodic alcohol consumption (EEAC) have been replicated in animal models. EPA's adverse effects stem from alcohol's pro-oxidant properties, increasing oxidative stress by promoting reactive oxygen species (ROS) and inhibiting cofactors required for their breakdown. Pharmacological interventions like antioxidant administration (e.g., N-acetylcysteine) have been proposed to counteract EPA's effects. EPA boosts free radical production and alters glutathione production, contributing to oxidative stress and related pathogenesis. Paraoxonase (PON1), an enzyme found in plasma bound to high-density lipoproteins (HDL), degrades oxidized phospholipids, playing a vital role in antioxidant defense. Reduced PON1 activity is observed in various oxidative stress-related diseases, and its plasma levels correlate with alcohol consumption and dietary antioxidants. However, the relationship between EPA, EEAC, and dietary supplementation with FA and/or Se regarding PON1 activity against different substrates remains unexplored. Assessing PON1 activity against these substrates provides comprehensive insight into its function. Moreover, these adverse effects are associated with malnutrition due to changes in the absorption and metabolism of micronutrients like FA and Se, crucial for oxidative balance. This study aims to enhance understanding of dietary FA or FA+Se supplementation's impact on antioxidant defenses against alcohol exposure during gestation and adolescence. Dams will undergo various alcohol consumption regimens during gestation, while offspring will be exposed to different supplemented diets (FA, FA+Se, or standard). Antioxidant capacity will be assessed through enzyme activity assays including glutathione reductase (GR), glutathione peroxidase (GPx), catalase (CAT), and paraoxonase (PON1). It is expected that FA and FA+Se supplemented diets will influence PON1 activity in both offspring and alcohol-exposed dams. This finding could have significant implications for future antioxidant interventions if differences in PON1 activity against various substrates are identified.

POSTER 4

Behavioral cross-sensitization between cocaine and ethanol in mice: role of Oleoylethanolamide.

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Drug addiction is a recurring mental disorder that results in both biological and psychological dependence without effective treatments. Brain changes resulting from repeated consumption of certain abused drugs can increase the vulnerability to addictive effects in early developmental stages and lead to neuronal alterations into adulthood. Drug cross-sensitization refers to behavioural and neurochemical events in which addictive responses become sensitized to different drugs than those to which the responses are already sensitized. Some N-acylethanolamides (NAEs), such as oleoylethanolamide (OEA), contribute to modulating dopaminergic transmission and their effect is studied in relation to motivated behaviours and reinforcement, such as substance use disorders. Evidence demonstrates the OEA's ability to intervene in the addictive process to psychostimulant drugs like cocaine and depressants like alcohol, although studies have not yet described OEA's capacity to counteract the combined sequential effects of both substances. Our primary objective was to characterize the phenomenon of cross-sensitization between alcohol and cocaine during adolescence and adulthood in mice, analysing the potential effect of OEA (10 mg/kg, i.p.) to modify its development and expression. Animals were treated with/without OEA (10 mg/kg, i.p.) and repeated doses of alcohol (2 or 2.5 mg/kg) in an open field (sensitization development). After 5 days without treatment, animals were tested with/without OEA after receiving an acute dose of cocaine priming (challenge: 10 mg/kg, i.p.). Results showed differential effects of OEA in counteracting the acquisition and expression of cross-sensitization to alcohol and cocaine depending on age and doses tested. Understanding OEA's effects on the neurobiological mechanisms underlying cross-sensitization processes due to alcohol and cocaine consumption could contribute to the development of effective therapies for treating sequential drug abuse during vulnerable stages such as adolescence and adulthood.

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POSTER 50

Neurophysiological Markers of Cardiac Interoceptive Processing in Expectant Parents: A Study with Heartbeat-Evoked Potentials.

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Introduction: Pregnancy and parenthood are associated with functional and morphological brain changes. Specifically, the parental caregiving network encompasses key structures implicated in interoception, that is, the ability to perceive and subjectively experience inner bodily states. Interoceptive processing may be critical for successful caregiving, allowing parents to integrate perceived changes in their own bodily states with information stemming from their child. Thus, it is feasible to hypothesize that pregnancy-related neurophysiological changes can modify interoception in expectant parents. Objective: To compare neural markers of cortical interoceptive processing (heartbeat-evoked potentials; HEP) between first-time expectant parents (mothers and fathers) and matched non-parents. Methods: First-time expectant heterosexual couples at 26-34 weeks gestational age (n = 70) and matched non-parents (n = 140, 70 female) will complete a multilevel interoception assessment protocol. Neural markers of interoception will be indexed by HEP, that is, neurophysiological responses to cardiac afferent inputs which are obtained through electroencephalography recordings (EEG) time-locked to electrocardiography events (ECG). HEP will be recorded while participants complete the Baby Face Repetition Suppression Paradigm in which sad or neutral infant facial expressions are either repeated or alternated in a 500 ms interstimulus interval. This manipulation induces an emotion-specific repetition modulation on HEP amplitude (differential effects for sad vs. neutral facial expressions). A condition with adult facial expressions will be employed to examine domain-general vs. infant-specific effects. Expected Results: Expectant parents will display increased allocation of neural resources to interoceptive inputs (larger repetition-induced HEP modulation) in contrast to non-parents, particularly when considering infant facial expressions. Effect sizes will be larger when contrasting sad vs. neutral infant facial expressions. Implications: Findings from this pioneering study will provide further understanding of the parental brain and the role of interoception during pregnancy, contributing to the comprehension of complex processes involved in caregiving and the development of the parent-infant bond.

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POSTER 51

Promoting brain health in healthy older people: An analysis of their cognitive state.

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Background: The ongoing demographic shifts and the ageing of the population have prompted the development of a novel preventive framework designed to promote successful ageing strategies. In this context, The ReVirBrain Project aims to maintain brain health and wellbeing in older adults using virtual reality-based interventions. Objective: Our first aim was to assess and describe the cognitive status of healthy older people in order to identify their needs and characteristics, with a view to designing the most appropriate strategies. Methods: The sample consisted of 51 people over 55 years of age, who were recruited through convenience sampling in the 'Nau Gran' university program (M=65.48±5.68 years; 74.5% women). Once recruited, they underwent a neuropsychological assessment session that included several tests aimed at assessing the cognitive state of the sample (Mini-Mental state, Phototest, Minicog, and Trail Making Test). Results: Significant differences were obtained regarding demographic variables as sex, age, tobacco consumption or sport practice. The data indicated that women exhibited higher scores than men on the Phototest (p=0.006). Additionally, it was observed that individuals in the younger age group (55-65 years) demonstrated superior performance on the MMSE relative to those in the older age group (66-75 years) (p=0.023). Regarding smoking, it was observed that smokers exhibited lower scores on the TMT-B than non-smokers (p=0.018). Conclusions: These results are consistent with those of previous studies that have demonstrated the influence of factors such as gender, age and substance use on the cognitive status of older people. In the subsequent phase of the project, these results will be employed to inform the design of effective technology strategies that are tailored to the needs of older people based on their cognitive status.

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POSTER 52

Relative prefrontal asymmetry activity in resting state predicts alexithymia in general population: a near infrared spectroscopy study.

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Introduction: Alexithymia is a dimensional personality trait that is characterized by problems in emotional processing. Prefrontal cortex has been identified as an area involved in alexithymia. Furthermore, since the right hemisphere is the main responsible for emotional processing, the so-called "right hemisphere dysfunction hypothesis" has been proposed to explain alexithymia. However, this hypothesis is based mainly on indirect findings. A direct technique that may allow to test this hypothesis is functional near-infrared spectroscopy (fNIRS). The aim of this work is determining the relationship between alexithymia with relative prefrontal asymmetry. Methods: Relative prefrontal asymmetry and alexithymia were evaluated in 35 undergraduates using a fNIRS and Toronto Alexithymia Scale, respectively. Results/Discussion: The results showed that, controlling age and sex, relative prefrontal asymmetry accounted for 15% of alexithymia. Otherwise, lower right prefrontal activity is related to alexithymia. This result supports the "hypothesis of right hemisphere dysfunction" and confirms and confirms previous work based on indirect findings. Conclusions: this study provides direct evidence that relative prefrontal asymmetry contributes to alexithymia. These findings support the hypothesis of a neurobiological correlate in alexithymia related to dysfunction of the right hemisphere at least in the prefrontal cortex.

POSTER 53

Shared responses to affective images: a near-infrared spectroscopy study.

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Introduction: In this work, we investigated whether emotions triggered by affective pictures evoke shared responses across viewers that can be captured in Functional near-infrared spectroscopy (fNIRS) signals recorded on the forehead. Here, we present an experimental design that combines: (1) fixed blocks of affective pictures for emotion induction; (2) Multiresolution analysis methods to locate the temporal scales (i.e. frequency-bands) showing higher Inter-subject correlations (ISC) and (3) a newly developed NIRS device that allows multi-distance measurements to disentangle cerebral from extra-cerebral components. Methods: Twenty healthy participants observed blocks of neutral, violence and sexual pictures while recording the systemic response (heart and respiratory activity) and the hemodynamic activity of the frontopolar cortex. Results/Discussion: The results revealed that ISC is dependent on the frequency-bands, pictures' valence, and the source of the hemodynamic activity. Only at low frequencies, the sexual and violence pictures produced shared extracerebral and cortical responses across views, respectively. Conclusions: our results demonstrate that certain types of images can induce synchronization between the superficial hemodynamic activity of the participants, which emphasizes that the ISC approach is not free from the potential confounding effect of extra-cerebral activity.

POSTER 54

Source-level identification of oscillatory episodes in the human brain.

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Neural oscillations in the human brain are believed to support communication across regions, which enables cognitive functions. While observing how the amplitude of a brain signal on a given frequency fluctuates during a particular experiment has been considerably valuable, it should still be demonstrated that such oscillation is actually present. Because of this, we have developed a new method to isolate rhythmic episodes contained in brain signals at the source-reconstructed level. By evaluating only maximum local peaks in the power spectra, we can successfully represent the signal as a combination of rhythmic episodes of different frequencies and background activity. We also detect local peaks through brain volume to minimize the effect of volume conduction. Then we define a power threshold drawn from its own aperiodic component where no oscillations are present, and a duration threshold of at least one cycle. In this work, we evaluate the accuracy and tolerance of this method on a series of simulated signals generated at the source level with increasing levels of noise. Results show that, with an adequate signal to noise ratio, it is possible to identify the sources and the properties of the simulated oscillatory activity. Beyond the traditional analysis of frequency amplitudes, examining episodes of oscillatory activity can contribute to the understanding of how different brain regions communicate. Future work should aim to detect simulated signals with more realistic features.

POSTER 55

The impact of mindful relaxation on implicit associations with sexual images: An event-related potentials study preregistration.

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Sexual experiences, especially distressful ones, can significantly affect mental well-being and sexual responses. Emotional processing of such events can increase activity in brain regions like the amygdala and the hypothalamic-pituitary-adrenal axis, leading to heightened sympathetic nervous system (SNS) activity. Mindfulness interventions, including relaxation exercises, might help modulate this system, potentially aiding those who have experienced sexual trauma. Our study aims to investigate whether a brief mindfulness session impacts automatic associations towards visual sexual stimuli (VSS) in individuals with non-traumatic sexual events. We will also examine neuroelectric activity associated with emotional processing of VSS using event-related potentials (ERPs) and assess the potential influence of mindful relaxation. This pilot study will be conducted in parallel with a larger-scale investigation, employing the same methods, allowing comparisons between individuals with and without sexual trauma. Thirty participants will complete self-report questionnaires, including trauma screening tools. Those without trauma will engage in an experimental laboratory task using two versions of the Single Target Implicit Association Test (ST-IAT) to assess implicit associations toward "liking" and "wanting" sex. Half of them will be randomly assigned to 6-minute mindful relaxation session before the ST-IAT. Neuroelectric activity will be recorded during relaxation session and VSS presentation. Brainwave patterns and emotion-related ERPs will be compared across conditions (with and without relaxation). We expect that the mindfulness session will improve automatic associations with sexual stimuli, decrease the SNS activity, and positively influence emotional processing of VSS. Specifically, we expect to observe increased alpha waves during relaxation session and lower amplitudes of P2, N2, P3, and PSW among participants in the relaxation group. This study extends previous research on mindfulness interventions in sexual contexts, examining the effects of short mindful relaxation on cognitive processing of sexual stimuli. The findings will provide valuable insights into the clinical potential of mindfulness in addressing sexual trauma.

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POSTER 56

The relation of social isolation and loneliness with blood pressure changes during a neuropsychological evaluation in older adults.

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Introduction: Social isolation and loneliness have been postulated to affect physical and mental health through various mechanisms, one of which has been postulated to be via high blood pressure (House et al., 1988). Additionally, loneliness and isolation have a wide range of detrimental effects, cardiovascular disorders being one of them. In the present study, we investigate whether there is an interaction between loneliness (romantic, familial and social), social isolation and blood pressure changes following a neurocognitive evaluation. Furthermore, we explore potential differences between sexes and the impact antihypertensive treatment may have on the results. Methods: Loneliness, social isolation and blood pressure levels were assessed in a sample of 126 older adults (76,4% woman) aged between 60 and 85 years. Social isolation was measured using the Spanish version of Lubben Social Network Scale (LSNS-R), loneliness was assessed using the Spanish version of the SESLA-S (Social and Emotional Loneliness Scale for Adults) and we measured blood pressure was at five key moments during one and a half hour long neuropsychological evaluation. Results: A relationship was identified between systolic blood pressure and feelings of familial loneliness, social loneliness, and social isolation in men not undergoing antihypertensive treatment. Conversely, in women undergoing antihypertensive treatment, a positive correlation was observed between systolic blood pressure and the neurocognitive Direct Digit-Span Test (a subtest of Barcelona's test). Conclusions: It's seems that there are differences between sexes regarding blood pressure and feelings of loneliness, social isolation and certain cognitive functions. Further research with a larger sample size is needed to investigate this more comprehensively.

POSTER 57

Transcranial Alternating Current Stimulation (tACS) at gamma frequency may interfere with episodic memory in healthy individuals: behavioral and psychophysiological evidence.

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Introduction: Transcranial alternating current stimulation (tACS) provides a valuable tool for investigating the causal role of neural oscillations in cognition. Specifically, promising improvements in episodic memory have been observed when tACS is applied, particularly at frequencies between 30-80 Hz (gamma band) [1] over the dorsolateral prefrontal cortex (DLPFC) [2,3] during the memory encoding phase. However, the previous findings on the effects of gamma tACS on modulating episodic memory in healthy adults are limited and contradictory. Methods: In this study, gamma-tACS (60Hz), theta-tACS (6 Hz, control1) and placebo (control2) were applied to 19 healthy individuals (18-37 years old; 10 women) during the encoding phase of a visual episodic memory task in three different sessions separated by 7 days. During the retrieval phase (old/new recognition task), execution (d') and response speed (RTs) were measured in each stimulation condition, and evaluated using ANOVAs (stimulation type), comparing theta-tACS vs placebo and gamma-tACS vs placebo. Additionally, electroencephalography was recorded during the task, from which the mean amplitudes of the N400, P600, and LPC ERP components were extracted on electrodes Fp1, Fp2, F3, F4, P3, P4. These parameters were analyzed using ANOVAs (stimulation type x location) for each condition (new or old) separately. Results/Discussion: The value of d' was higher in the placebo condition compared to the gamma-tACS condition, with no differences between placebo and theta-tACS. Additionally, P600 in the "old" condition and LPC in both the "old" and "new" conditions showed lower average amplitudes when stimulated with gamma-tACS compared to placebo, with no differences between theta-tACS and placebo. These results suggest that gamma-tACS interferes with the memory encoding or consolidation processes, affecting the retrieval of previously stored material and impairing late monitoring processes during task execution.

POSTER 58

Where personality, memory and decision-making meet: a cognitive-behavioral neuroscience study.

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Introduction: The idea that evidence accumulation is the only crucial factor for decision making has been recently challenged (Ferrucci et al., 2021). Even during simple visual tasks, both impulsivity/prudence and working memory (WM) may also play a crucial role in its dynamics. We wanted to investigate how a wide range of sequences of visual evidence and the presence of a time gap (located in between such sequences) would interact with participants' trait impulsivity (measured with a personality scale) to bias WM and/or the prioritization of speed over accuracy. Methods: 34 human adults (65% females, aged 18-48) performed a version of the tokens task (Cisek et al., 2009), played on a computer: 15 dots (tokens) sequentially jumped (each 200 ms) from a central circle to a left or a right one, with variable probability, and then disappeared. Half of the trials had a time gap (of 300 ms), with no jumps, before the fourth token jumped (TG trials). Participants were asked to decide, before the end of the trial, which circle would receive the majority of the tokens. After the task, participants answered the Spanish Version of the UPPS–P Impulsive Behavior Scale (Verdejo-García et al., 2010). Results: In TG trials, despite not being aware of the presence of the gap, participants decided after fewer jumped tokens (less information). Analyses suggested the size of this effect was positively correlated to a remarkably adaptive speed prioritization and to higher trait premeditation scores. Besides, the gap did not seem to cause WM losses. Conclusions: The cognitive-behavioral biases we found were robust and highly similar to previous tasks (Keung et al., 2019) with different pace, amount and modality of evidence. Moreover, our results suggest ways to constrain how to implement speed-accuracy tradeoffs, memory capacity and impulsivity in computational models of decision-making.

POSTER 59

Socio-demographic variables and perception of stress in binge drinkers and polydrinkers of alcohol and cannabis.

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Alcohol and cannabis use is associated with numerous serious social and public health problems. There is a high prevalence of binge drinking (BD) and poly-drinking (BD + cannabis) among adolescents 14-18 years old (OEDA, 2022). Nowadays, there are few studies that investigate the perception of stress (PS) in adolescents establishing the relationship of PS with socio-demographic variables, considering the gender variable. Objective: To study PS in male and female adolescents with different drinking history (abstainers, BD drinking history and BD+THC poly-drinking history) and to establish the relationship with different socio-demographic variables (sleep hours, stimulant drinks consumption, age at onset of alcohol consumption, number of alcoholic drinks per BD episode, AUDIT score and CAST score). Method: Female (n = 100) and male (n = 71) adolescents were grouped according to their history of consumption (History: abstainers, BD drinkers and BD+THC poly-drinkers) under strict inclusion criteria. All participants were assessed for PS using the Perceived Stress Scale (PSS-14) and the mentioned socio-demographic variables were recorded. Results: The Anova showed that variable History was not significant; however, the variable Gender showed PS higher in females than in males. In females, correlations and regression analyses showed a significant negative relationship of PS with sleep hours and positive relationship with stimulant drinks consumption and AUDIT score. In males, only a significant negative relationship of PS with age at onset of alcohol consumption was observed. Conclusions: The socio-demographic variables examined have a stronger association with and prediction of PS in women than in men.

POSTER 60

Understanding dosimetry and cranial characteristics of photobiomodulation therapy.

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Introduction: Non-invasive brain stimulation methods are demonstrating their therapeutic effectiveness, with their scope of application expanding to address a wide array of neurological, psychiatric, and psychological disorders [1]. This research investigates the impact of human skull bone thickness and density on light penetration in Photobiomodulation (PBM) therapy, particularly focusing on efficacy prediction. Methods: Precise measurements of bone thickness and density were obtained, and their influence on light penetration at 405, 532, 665, 785, 810, 830, 980 and 1064 nm wavelengths were analyzed. Results: The study found no significant correlation between skull bone density and thickness and light penetration capability in PBM therapy. However, certain wavelengths, such as 405 nm and 665 nm, exhibited stronger correlations with bone density. Conversely, wavelengths including 532 nm, 785 nm, 810 nm, 830 nm, 980 nm, and 1064 nm showed low correlations, suggesting minimal impact from bone density variations. Nonetheless, data variability suggests that bone thickness may play a more significant role in predicting light power traversing the bone, especially at certain wavelengths. Conclusions: The effectiveness of PBM therapy with bone involvement is not solely determined by bone density and thickness but is influenced by various factors including bone composition, light characteristics, and treatment parameters. These findings contribute to a better understanding of the complex dynamics involved in optimizing PBM therapy outcomes.

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POSTER 61

Negative affective states mediation in opioid misuse among chronic pain patients.

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Chronic pain is a burden of disease that reaches in some cases 30% prevalence in developed countries. Recent research has demonstrated the relationship between chronic pain, opioid use disorders, and negative affective states (such as anxiety and depression) mainly in preclinical samples. The goal of the present study was to examine pain severity in relation to opioid misuse patterns, and the role of anxiety and depression in this relationship in a Spanish clinical sample. 101 chronic pain patients were recruited from the pain unit of the Hospital General Universitario of Valencia (age: M = 57.44, SD = 13.88; women: 69.4%). First, the average perceived pain from the last month was obtained through a Visual Analogue Scale (VAS). Moreover, the Current Opioid Misuse Measure (COMM) was administered to assess the consumption of opioid medication. Finally, to measure anxiety and depression, Beck Anxiety Inventory (BAI) and Beck Depression Inventory (BDI) were administered. The descriptive analysis showed an average of 13.4 score in the COMM revealing a risk of opioid misuse. Additionally, the pain perception average denoted a severe level of pain. Moreover, a moderate to strong positive correlation was found between BAI, BDI, COMM and VAS scores. However, when analyzing per gender only women maintained the correlation of the four variables whereas in the case of men, the correlations of pain perception with the other variables were dissipated. Finally, mediation models with the total sample revealed that anxiety and depression scores mediated between pain perception and COMM score. In conclusion, these results suggest that the pain perception is not the only critical variable to increase the risk of opioid misuse, indeed the negative affective state (i.e. anxiety and depression) could be key variables to promote opioid misuse especially in female pain patients.

POSTER 62

Neural Correlates of Internet Gaming Disorder and Pathological Gambling: A Meta-Analysis of Functional Neuroimaging Studies.

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Introduction: Internet gaming addiction (IGD) is not formally recognised as a specific disorder in the Diagnostic and Statistical Manual of Mental Disorders, fifth edition (DSM-5), being considered under other existing disorders. However, there is a greater depth of understanding for a similar disorder: pathological gambling (PG). To bridge this gap, we conducted a systematic review and activation likelihood estimation (ALE) meta-analysis of functional neuroimaging studies to identify neural correlates of IGD under cognitive control tasks, comparing them to those of PG. Methods: We systematically searched the databases PubMed, Scopus, and PsychArticles up to April 2024, and included nineteen studies comprising a total of 307 subjects for PG and fourteen studies comprising a total of 212 subjects for IGD. The software Ginger-ALE 3.0.2 was utilized for coordinate unification and meta-analysis. The meta-analysis contrasted (1) patients with controls, and (2) IGD with PG, revealing insights into the neural substrates implicated in the disorders. Results: The main effects (addiction-oriented) showed greater limbic (insula) activation, whilst gambling showed enhanced nucleus accumbens activations. The group effects (pathology-oriented) showed greater presence of prefrontal (inferior frontal gyrus) areas. No joint activation of both pathologies was found.

POSTER 63

Effects of acute exercise on craving, anxiety, cognition and neurophysiological variables in young people with risky alcohol use: a pilot study.

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Background: Risky alcohol use (RAU) during youth is known to induce several cognitive deficits and neurophysiological changes. Objective: We aimed to examine the short-term effects of acute exercise on EEG resting state, alcohol craving, anxiety state and cognitive functions in physically inactive young people with RAU compared with a control (CO) group. Methods: RAU was determined by AUDIT score. The intervention was a 12-minute test performed on a cycle ergometer. Participants self-rated their desire for alcohol and state anxiety and performed different tests focused on attention, speed processing and executive functions (d2; TESEN 3 and 4; Letters and Numbers test and Five Digit Test (FDT)). An EEG resting state was carried out before and after exercise. Effects of exercise were assessed using RM-ANOVA (between-factor: GROUPS (CO and RAU)) and dependent sample t-tests with effect sizes. Results: Before exercise, RAU group displayed a higher score in the alcohol craving, a poorer performance in the Letters and Numbers test, in the 4 section of TESEN and in the Flexibility index of FDT compared with the CO group. Exercise protocol was able to equalize the performance between the RAU and the CO in the TESEN and in the Letters and Numbers tests, whereas craving score continued being higher in the RAU group. Comparisons between groups in resting state revealed that beta and theta activity was higher in the RAU group than in the CO before performing exercise and these differences were not significant after exercise protocol. Poor performance in the FDT and Letters and Number test correlated negatively with beta and theta measurements in the RAU group, but not in the CO. Differences between groups were not found in HRV variables. Conclusion: An acute protocol of exercise could be a promising avenue to promote brain and cognitive changes in young people with RAU.

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POSTER 64

Object-location memory impairment in Long-COVID patients assessed by an immersive Virtual Reality tool.

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Introduction: Object-location memory (OLM) refers to the ability to accurately associate objects with their spatial locations [1]. The Medial Temporal Lobe (MTL), particularly the hippocampus, is primarily responsible for OLM [2]. Long-COVID is a multisystemic syndrome characterised by a wide range of symptoms, including memory alterations [3]. MTL dysfunction has been observed in Long-COVID patients [4]. Immersive Virtual Reality (iVR) systems can provide high ecological validity for OLM assessment. The aim of this study was to assess OLM in Long-COVID using an iVR task. Methods: 66 Long-COVID patients (LC) and 21 Healthy Adults (HA) participated in the study. The iVR task recreated an office with nine everyday objects located in specific positions. Following a memorization trial, participants completed three recall trials: immediately (Imm-Rec), 20 minutes (20m-Rec), and the day after memorization (1d-Rec). Results/Discussion: In the iVR-based OLM task, the LC group had a lower number of correct responses and a higher number of task attempts compared to the HA group. Furthermore, the LC group exhibited a higher number of errors and required more attempts in the 20m-Rec and 1d-Rec trials compared to the Imm-Rec trial. Conclusions: The study presents new evidence on OLM and its consolidation in Long-COVID syndrome, supporting previous findings of memory alterations in this syndrome. The use of iVR tasks in clinical research has the potential to improve the understanding of object-place association memory.

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POSTER 65

Oxidation of lipoproteins in a cohort of alcohol-use disorder patients: studies on the relationship with sex and cognition.

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Introduction: Chronic alcohol consumption (CAC) induces a proinflammatory state and oxidative stress that is related to neuroinflammation and emotional/cognitive alterations during abstinence. It is known that lipoproteins HDL and LDL are key components to counteract inflammation, since they bind lipopolysaccharide (LPS) for its hepatic elimination. This clearing mechanism may be altered in proinflammatory scenarios, such as CAC, where high levels of oxidative stress may lead to dysfunctional (oxidized) HDL (OxHDL) and LDL (OxLDL). Here, we explored: (1) the oxidation of lipoproteins in men and women with Alcohol Use Disorder (AUD) during early abstinence (1-3 months) by measuring plasma levels of OxHDL and OxLDL; (2) the relationship of OxHDL and OxLDL with cognitive impairment. Methods: 32 AUD patients of an ongoing alcohol programme at the Hospital Universitario 12 de Octubre (Madrid, Spain) enrolled the study and 32 control subjects randomly recruited from the general population (with AUDIT score below threshold). Plasma levels of OxLDL and OxHDL were measured by Enzyme-Linked Immunosorbent Assay (ELISA). Cognitive function was assessed with the General Cognitive Function scale of the validated screening tool `Test of detection of cognitive impairment in alcoholism` (TEDCA). Results: We found higher OxHDL levels linked to AUD condition ($p<0,05$) and an interaction between sex and group, which indicates that the higher levels of OxHDL take place in AUD women versus their controls ($p<0,05$). No differences were observed in OxLDL levels. Correlation analysis did not find associations between OxHDL or OxLDL and cognitive status. Conclusions: AUD is associated with oxidation of the plasma lipoprotein HDL but not LDL. Results suggest that the protective HDL may be dysfunctional under CAC specially in women, although no associations with cognitive function were found. The study on the implication of oxidative lipoproteins in the clearance of alcohol-induced inflammation and association to cognitive function requires further investigation.

POSTER 66

Perceived stress in drug-resistant epilepsy: its relationship with cortisol levels and clinical variables.

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Introduction. Stress is a trigger factor for seizures, being strongly related to clinical and emotional variables. However, the stressors and stress response in people with epilepsy (PWE) appear to be differential to the general population, due to chronic exposure to seizures and difficulties in their daily lives. Therefore, this study aimed to study the relationships between perceived stress, cortisol levels, and clinical variables in patients with drug-resistant epilepsy. Method. 125 patients (59 men and 66 women; mean age = 38.70 years, SD = 11.18) underwent a neuropsychological assessment. Perceived stress was explored through the Epilepsy Perceived Stress Inventory for Adults (EPSI-A), composed of four scales: social consequences, epilepsy severity, impact on daily performance, and epilepsy concerns. Furthermore, nine measures of salivary cortisol were gathered during the evaluation. Clinical variables (i.e., number of previous failed antiseizure medications (ASMs), current ASMs, and seizure frequency) were collected through a structured interview. Results. Social consequences was negatively related to the first four cortisol measures (for all, $p < 0.049$), and epilepsy severity was correlated to the last three cortisol measures and the area under the curve with respect to the ground (for all, $p < 0.039$). Moreover, impact on daily performance, social consequences, and the EPSI-A total scores were positively related to the number of previous failed ASMs and the number of current ASMs ($p < 0.001$). Epilepsy concerns was only positively related to the number of current ASMs ($p = 0.016$) and epilepsy severity was positively associated to the number of previous ASMs ($p = 0.016$). Conclusions. Although PWE showed higher mean cortisol levels than the general population, those who showed lower cortisol had higher perceived stress, suggesting a higher vulnerability. When hypocortisolemic, epilepsy may share enhanced stress sensitivity, which could lead to experiencing the negative effects of stress on the disease.

POSTER 67

Plasma amino acid profile in abstinent patients with Alcohol Use Disorder.

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Alcohol use disorder (AUD) is an important public health issue due to its negative impact and its high prevalence. Recognized as a chronic relapsing condition, AUD represents a significant challenge in clinical practice, particularly concerning relapse in individuals undergoing alcohol dependence treatment. Hence, our focus has been to investigate potential changes occurring during alcohol withdrawal. Given that AUD represents a systemic metabolic disturbance, metabolomic strategies have been employed to discern the molecular pathways underlying alcohol exposure and addiction. Furthermore, interventions targeting metabolic regulation offer promising avenues for treatment and prevention. In the light of these considerations, the aim of this study was to determine potential alterations in plasma amino acid levels among alcoholic individuals who have been abstinent for 1 to 3 months. Blood samples were collected from 42 men and 31 women alcoholics and controls aged 18 to 65 free from comorbidities. These samples were analyzed by capillary electrophoresis laser-induced fluorescence (CE-LIF). The measured amino acids included L-isoleucine, L-leucine, L-glutamine, L-alanine, L-threonine, glycine, L-serine, taurine, L-glutamate, L-tyrosine, L-phenylalanine, L-valine, and L-aspartic acid, and different ratios such as Branched-chain amino acid/aromatic amino acid (BCAA/AAA), BCAA/L-Tyr, L-Gln/L-Glu, L-Tyr/L-Phe, L-Ser/Gly, and L-Ser/L-Ala. The analysis revealed significantly lower levels of BCAA/AAA and BCAA/L-Tyr in patient compared to controls. Conversely, higher levels of Gly and L-Asp were evident in the patient group. Sex-specific disparities were observed; women in abstinence exhibited elevated concentrations of L-Glu, L-Tyr, and L-Tyr/L-Phe relative to the control group. Moreover, male patients demonstrated reduced concentrations of L-Val, L-Iso, and L-Leu compared to controls while lower concentrations of L-Gln/L-Glu were observed in female patients relative to controls. These findings elucidate alterations in the plasma amino acid profile during alcohol withdrawal, which diverge between genders and offer potential for discerning diagnostic biomarkers and shed light on the underlying pathophysiological mechanisms of AUD.

POSTER 68

Power-spectra Alterations in Williams Syndrome: A Resting-State MEG Study.

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Williams syndrome (WS) is a rare genetic disorder characterized by distinctive cognitive and behavioral traits, yet the underlying neurophysiological bases remain poorly understood. To elucidate the cerebral electrophysiological characteristics associated with WS, we employed magnetoencephalography (MEG) to record brain activity during a 5-minute resting state session with eyes closed from 24 participants diagnosed with WS and 17 controls, similar in age, sex, and hand laterality. Spectral power analysis in classic frequency bands was performed using Cluster-Based Permutation Testing (CBPT). Our results revealed significant alterations particularly in the alpha and beta frequency bands. Individuals with WS exhibited reduced spectral power in two prominent clusters: the medial prefrontal regions and the left temporo-occipital cortex in the alpha band ($p = 0.0028$; $p = 0.015$), suggesting potential disruptions in networks involved in attention and sensory processing. Similarly, in the beta band, decreased power was observed in the left angular gyrus, left supramarginal regions, and bilateral temporo-occipital areas ($p = 0.008$; $p = 0.033$*). These findings indicate impairments in regions critical to cognitive functions such as language processing and visuospatial integration. These electrophysiological patterns underscore substantial functional alterations in both prefrontal and posterior brain regions linked to the ventral and dorsal processing streams. The observed disruptions in neural activity patterns in WS contribute to our understanding of the neurophysiological underpinnings of the syndrome and could inform future therapeutic strategies aimed at mitigating cognitive and sensory deficits.

POSTER 69

Preclinical study of the therapeutic potential of psychedelic drugs in transdiagnostic clinical symptoms.

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Psychedelics have emerged as a new hope in the treatment of mental disorders, thanks to their plasmatogenic properties that promote structural and functional neuronal plasticity in brain circuits crucial for optimal brain functioning. In this study, we focused on three serotonergic psychedelics: ibogaine (IBO), tabernanthalog (TBG), and a stimulant, methamphetamine (MA). Unlike IBO and TBG, methamphetamine does not directly target the 5HT2a receptor. Instead, it induces the release of serotonin, dopamine, and norepinephrine, which can indirectly activate the 5HT2a receptor. Our aim was to evaluate the therapeutic potential of these psychedelic compounds to treat transdiagnostic clinical symptoms, such as compulsivity, anhedonia and anxiety. To this end, we investigated the behavioral effects of a single dose of ibogaine (40 mg/kg), TBG (10 mg/kg) and methamphetamine (1 mg/kg) in Wistar rats by dividing them into two groups: an experimental group receiving the compounds and a control group receiving vehicle. Following administration, all rats were subjected to various behavioral tests, including the marble burying test (MBT), sucrose preference test (SPT), elevated plus maze (EPM) and open field test (OFT) as a control measure for locomotion. It should be noted that, so far, no results have been obtained and the research is being actively pursued. The results will be analyzed in terms of 5HT2a receptor functionality.

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POSTER 70

Study of drug abuse and academic performance in late adolescence as a consequence of late preterm birth: pilot study.

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Introduction: Late preterm infants (LP) are defined as those newborns born at a gestational age ranging from 34 weeks to 36+6+6/7 days. Although until a few years ago the fragility and neurodevelopmental alterations of this population were little known, recently some studies have revealed that these children are at risk of suffering sequelae during infancy that seem to extend into adolescence. The aim of this study was to analyze the frequency of substance abuse in LP and its possible association with academic achievement. Methodology: A pilot study was conducted using an online survey among students aged 18 and 20 years. The online survey consists of Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), as well as a sociodemographic questionnaire. The average grade in the last academic year was also recorded. Results: A total of 45 participants were analyzed, of whom 26 were PT (years: 18.65 ± 0.79; 18 females) and 19 term newborns (years: 18.49 ± 0.61; 16 females). A higher alcohol consumption subscale score was observed in the PT group (p=0.039), as well as a lower academic performance (p=0.033). Furthermore, an association has been found between higher scores on the alcohol consumption subscale and a lower academic performance (rho=-0.358; p=0.01). Conclusion: Neurodevelopmental alterations in LPs could lead to an increased risk of drug abuse associated with poorer academic performance. These findings could help professionals and families to conduct more comprehensive risk assessment and better monitoring of this population during critical developmental stages. Additionally, the development of preventive strategies targeting substance abuse, specifically alcohol, as well as improving academic performance.

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POSTER 71

The effects of diet-Induced ketosis on neurodegenerative diseases: a systematic review.

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Currently, neurodegenerative diseases are the main cause of disability worldwide, and this prevalence continues to increase, with no treatments offering a definitive cure available. Scientific literature suggests that this increase is related to the aging of the population and the influence of environmental and metabolic factors, as well as unhealthy lifestyles that act as risk factors, with excessive sugar consumption playing an important role in the development of these diseases. Various studies indicate that the ketogenic diet, characterized by its low carbohydrate (sugar) content, can positively influence the pathological processes of neurodegenerative diseases by promoting the use of ketone bodies as the main energy source. The objective of this systematic review is to analyze diet-induced ketosis and its impact on brain function, considering its potential as a palliative, even preventive, strategy in neurodegenerative diseases, specifically Alzheimer's, Parkinson's and Multiple Sclerosis. To this end, the review begins with an analysis of the fundamental biochemical and physiological bases of ketogenic diets in the nervous system, based on preclinical studies. The scope of the research is subsequently expanded to include clinical studies in neurodegenerative diseases, allowing for more direct evaluation of the diet's effectiveness and practical effects in human contexts. The data collected indicates the therapeutic potential of ketogenic diets in the treatment of Alzheimer's, Parkinson's and Multiple Sclerosis, supported by physiological research. However, the characteristics of the studies limit the possibility of establishing definitive conclusions. Finally, clinical implications, limitations, and possible directions for future research in this field are discussed.

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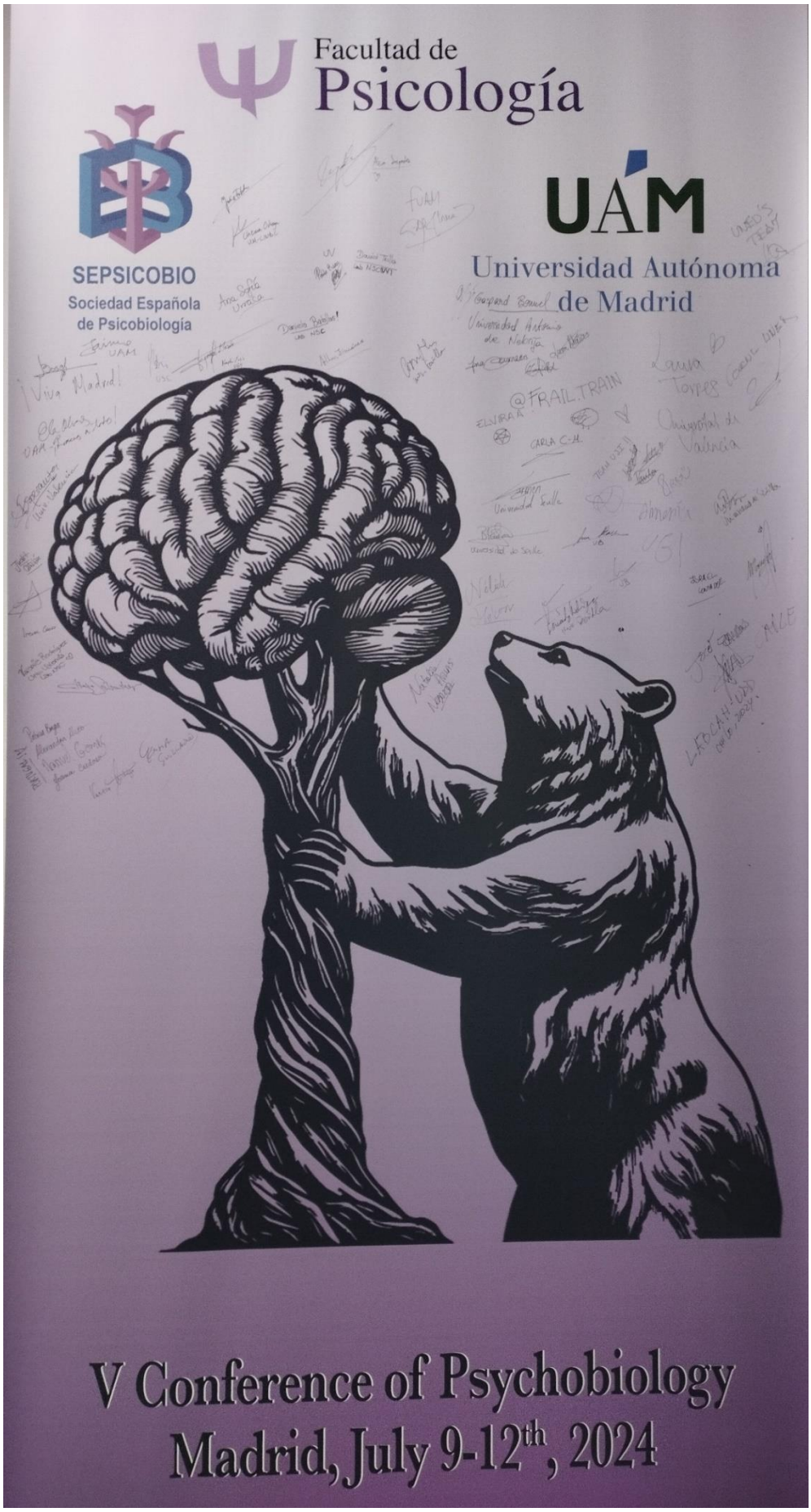

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