1st INTERNATIONAL CONGRESS OF PSYCHOBIOLOGY

I International Congress of Psychobiology

OVIEDO, SPAIN

JULY, 2015

INDEX

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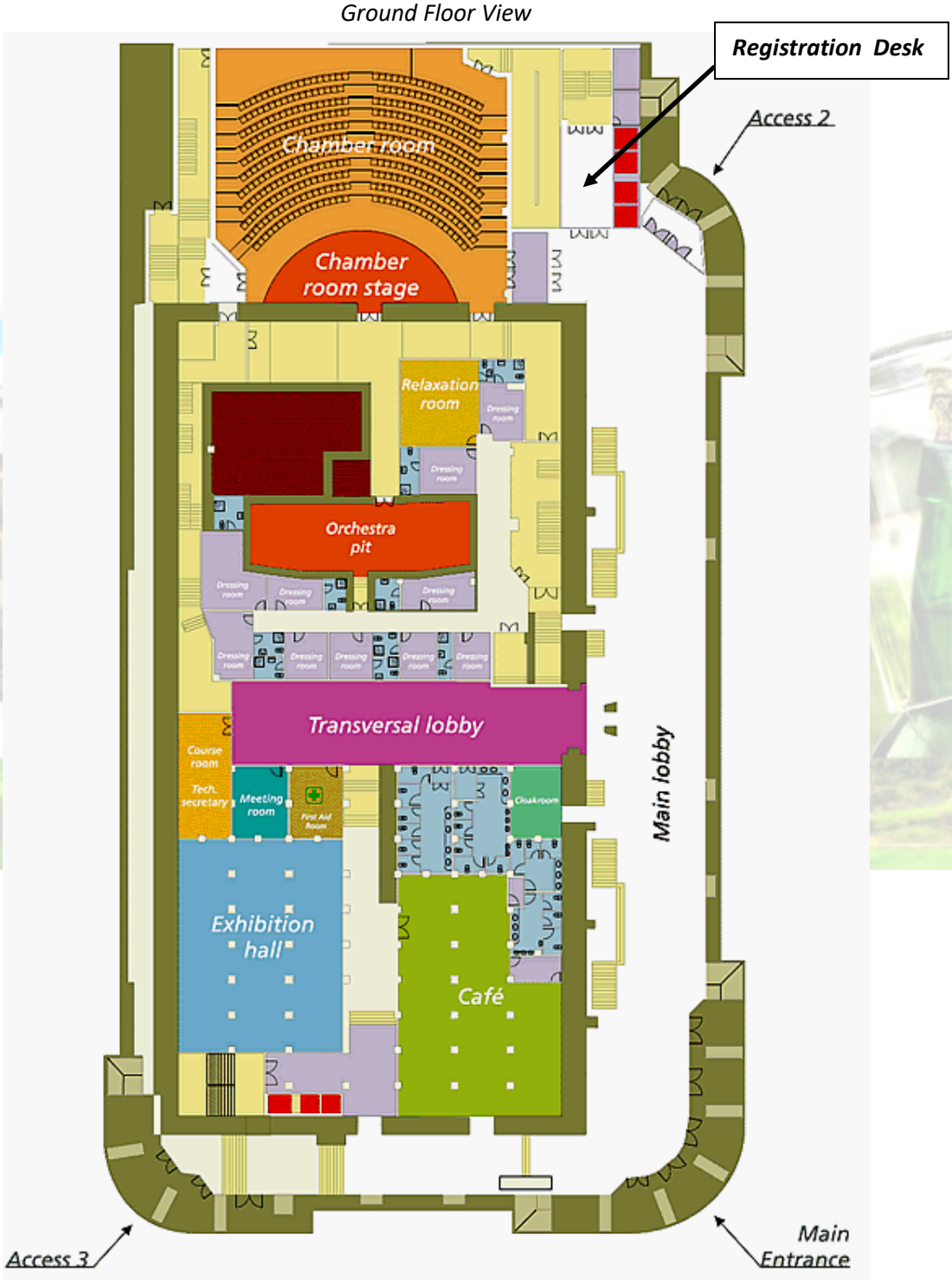
Ten years after celebrating the last Spanish Psychobiology congress, researchers in this scientific field from different European and American Universities are organizing the 1st. International Congress of Psychobiology in Oviedo (Principality of Asturias, Spain) endorsed by an international Programme Committee.

It will be held at the *Príncipe Felipe Auditorium and Conference Center* in Oviedo (Spain) on July 15-17, 2015.

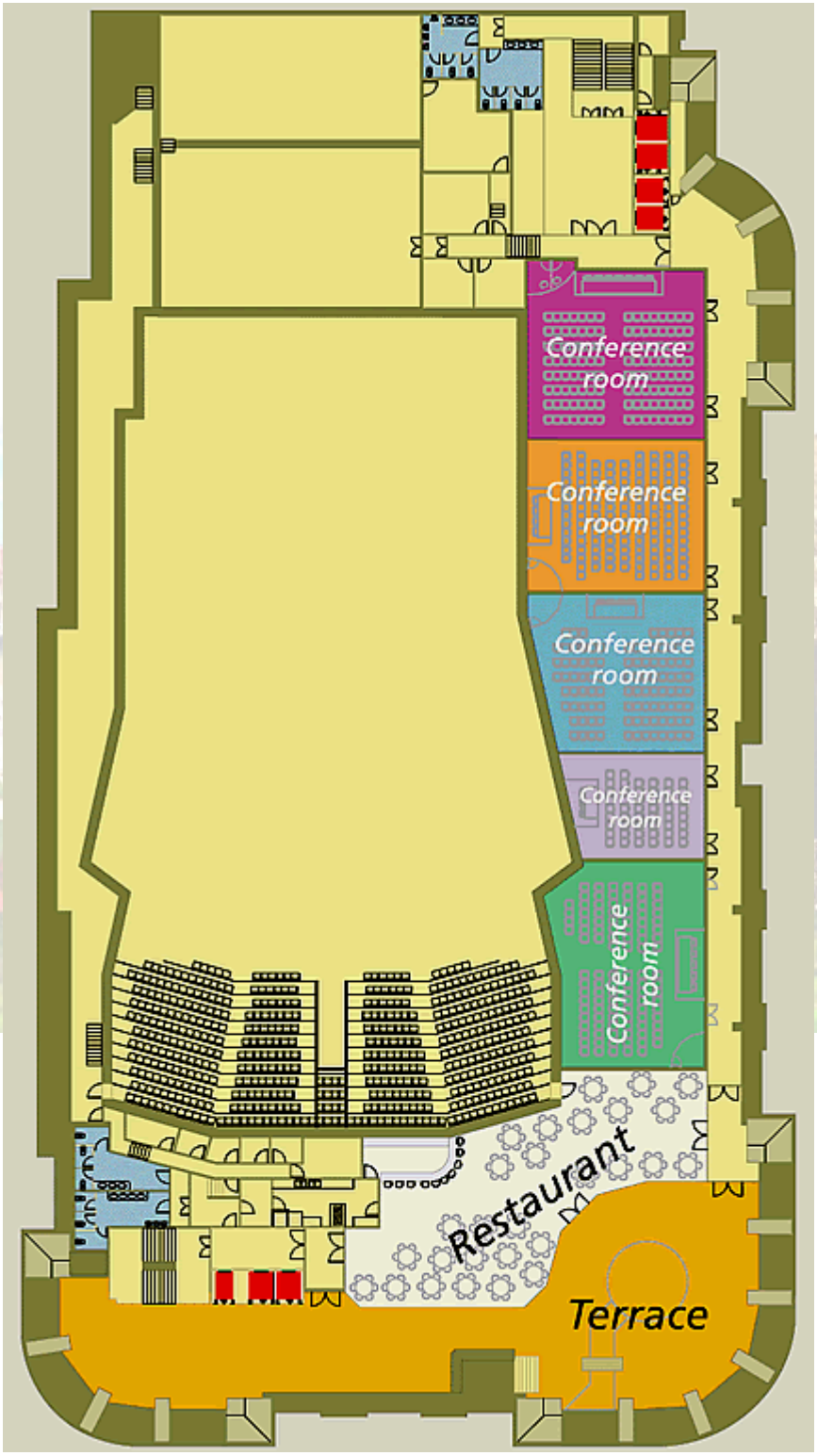
Exhibition area will be located in the Main Lobby. Poster sessions and coffee breaks will also be held at the *Main Lobby*. Mandatory registration and identification of all attendees will be required at the *Registration Desk*. Plenary Lectures will be delivered at the *Chamber Room*.

Ground Floor View



Conferences and Symposia will be held at *Conference Rooms* (1-5) on the Third Floor.

Third Floor View



HOW TO GET THERE

By city bus (TUA): many bus lines (**2, 3, 5, 8, 9, 10, and 12)** stop at walking distance (2 min) from the *Príncipe Felipe* Auditorium. The nearest bus stops are: **Calvo Sotelo Gesta, Calvo Sotelo Instituto, Santa Susana Instituto.**

By train: if you prefer to use the train, the Llamaquique Train Station (*Renfe Cercanías*) is also at walking distance (5 min) from to the Auditorium.

By taxi: there is a taxi rank at Calvo Sotelo Street. It is located near the Auditorium, just crossing Plaza de la Gesta square. Useful phone numbers: Radio Taxi Principado (+34 985 25 25 00) / Radio Taxi Oviedo (+34 985 25 00 00).

CONGRESS ORGANISATION

CONFERENCES

The congress will feature four plenary lectures. The opening lecture will be given by Prof. Francisco Gonzalez-Lima (Department of Psychology and Institute for Neuroscience at Austin, Austin, Texas, USA), and the closing lecture by Prof. Carmen Sandi (Brain Mind Institute, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland).

Additional plenary lectures will be given by Dr. Gertrudis Perea (Instituto Cajal, Centro de Investigaciones Biológicas CIB-CSIC, Madrid, Spain) and Dr. Gina L. Quirarte (Instituto de Neurobiología, Universidad Nacional Autónoma de México, Campus Querétaro, Mexico).

SYMPOSIA AND *ORAL COMMUNICATIONS*

8 scientific symposia and 10 oral communications will take place and will be chaired by experts in each research topic.

POSTER EXHIBITION

2 Poster Sessions will be held during coffee breaks. Appropriate materials to fix the posters will be available for authors on panels located at the main lobby. The size of poster panels (i.e. maximum poster size) is 95 cm (3.1 feet) wide and 238 cm (7.8 feet) high.

PROGRAMME AT A GLANCE

Wednesday 15th July

Registration (Main Lobby)

09:30-11:00 **Poster Hanging Time** (Main Lobby)

Arrangement of Prints for *Art and Neuroscience* Exhibition (Exposition Hall)

11:30 – 12:00 **Opening Ceremony** (Chamber Room)

Plenary Lecture (1) (Chamber Room)

12:00 – 13:30 *"Augmentation of cytochrome oxidase and neurocognitive functions with transcranial near-infrared lasers and LEDs"*

Prof. Francisco Gonzalez-Lima (Department of Psychology and Institute for Neuroscience, University of Texas at Austin, USA)

13:30 **Welcome Cocktail** (Restaurant-Terrace, Third Floor)

16:00 – 17:30 **Symposium (1): Advances in Psychophysiological Research** (Conference Room 1)

Symposium Chair and Opening Lecture:

- Prof. Alicia Salvador
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- Fernández-Montejo. "Psychophysiological response to social stress from an integrative approach". *University of Valencia.*

Speakers and Lectures:

- Prof. José María Martínez Selva. "From psychophysiology to behavioural neurosciences". *University of Murcia*.
- Prof. Jaime Iglesias Dorado. "Brain dynamics of the identity processing as revealed by the access to and retrieval of both "pure" faces and verbal/semantic face-associated information: an ERP and neural source reconstruction study". *Universidad Autónoma de Madrid*.
- Prof. Fernando del Valle-Inclán Alsina. "Low resolution storage in visual short-term memory". *University of A Coruña*.

16:00 – 17:30 **Symposium (2): Neuroplasticity and Brain Networks** (Conference Room 5)

Symposium Chair and Opening Lecture:

- Prof. Paloma Collado Güirao. "Vulnerability of brain circuits to undernourishment in male and female rats". *Universidad Nacional de Educación a Distancia*.

Speakers and Lectures:

- Prof. Fernando Rodríguez Fernández. "The organization of the teleost fish telencephalic pallium: searching for the Bauplan of the cerebral cortex". *University of Sevilla*.
- Prof. Marta Asunta Miquel Salgado-Araujo. "Cerebellar hallmarks of cocaine-induced conditioned memories of preference". *Jaume I University* .
- Dr. Juan C. Alvarez Carriles. "Natural and Induced Neuroplasticity in Human Brain Damage: a Neuropsychological and Neuroimaging View". *Clinical Neuropsychology Unit – Liaison Psychiatry Service. Central University Hospital of Asturias and Department of Psychology. University of Oviedo*.

Coffee Break and Poster Session 1 (Main Lobby)

17:30 – 18:30 **Neuroscience and Art Exhibition:** *Cognitive Geography Atlas* (Exposition Hall). María López Quiroga and Chris Lloyd. *Neuroscience Department. University of Edinburgh (United Kingdom)*.

18:30 – 20:30 **Oral Communications (1): Neuropsychology** (Conference Room 1)

Chair: Prof. Cosme Salas García. *University of Seville.*

Oral Communications (2): Nervous System Disorders and Behavioural Disorders (Conference Room 5)

Chair: Prof. Ricardo García. *University of Salamanca.*

Thursday 16th July

Plenary Lecture (2) (Chamber Room)

9:00 – 10:00 *"Astrocyte role in sensory information processing in vivo"*

Dr. Gertrudis Perea (Functional and System Neurobiology, Instituto Cajal, Consejo Superior de Investigaciones Científicas, Madrid, Spain)

10:00 – 12:00 **Symposium (3): Neuropsychology** (Conference Room 1)

Symposium Chair and Opening Lecture:

- Prof. Mª Victoria Perea Bartolomé. "Neurological evaluation in the study of cognitive performance". *University of Salamanca.*

Speakers and Lectures:

- Prof. José Manuel Cimadevilla Redondo. "Neuropsychological assessment of spatial cognition using virtual-reality based tasks". *University of Almería*.
- Prof. Pedro José Montoya Jiménez. "Pain and the Brain: insights from Biological Psychology. *University of the Balearic Islands.*
- Prof. Mª Antonieta Nieto Barco. "Cognitive functioning in Friedreich's Ataxia. *University of La Laguna*.
- Prof. Blanca Laftón Lage. "Frailty in the elderly: biomarkers for early detection". *University of A Coruña*.

Symposium (4): Psychobiology of Emotion (Conference Room 5)

Symposium Chair and Opening Lecture:

- Prof. José Ramón Sánchez Martín. "Hormones and aggression". *University of the Basque Country*.

Speakers and Lectures:

- Prof. Carmen Pedraza Benitez. "What role does the LPA1 receptor play in regulating emotional-like behaviours?" *University of Málaga*.
- Prof. Marc Pallarés Añó. "Neonatal allopregnanolone levels alteration: effects on emotional behaviour and vulnerability to alcohol abuse in male rats". *Autonomous University of Barcelona.*
- Prof. Rosa Redolat Iborra. "Enriched environments: Which factors may modulate its effects as an intervention strategy against stress and cognitive aging?". *University of Valencia*.
- Prof. Larraitz Garmendia Rezola. "Social stress, behavior and the immune system". *University of the Basque Country*.

Coffee Break (Main Lobby)

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12:00 – 12:30 **Neuroscience and Art Exhibition:** *Cognitive Geography Atlas* (Exposition Hall). María López Quiroga and Chris Lloyd. *Neuroscience Department. University of Edinburgh (UK)*.

12:30 – 14:00 **Oral Communications (3): Endocrine System, Immune System and Psychoneuroimmunology** (Conference Room 1)

Chair: Prof. José Ramón Sánchez Martín. *University of the Basque Country.*

Oral Communications (4): Psychobiology of Cognition and Emotion (Conference Room 2)

Chair: Prof. Rosa Redolat Iborra. *University of Valencia.*

Oral Communications (5): Addiction & Psychopharmacology (Conference Room 3)

Chair: Prof. Héctor González Pardo. *University of Oviedo.*

Oral Communications (6): Biological Development and Behaviour (Conference Room 5)

Chair: Prof. Eduardo Pásaro. *University of A Coruña.*

14:00 – 16:00 **LUNCH**

16:00 – 17:00 **Plenary Lecture (3)** (Chamber Room)

"New insights into memory, stress and striatum"

Prof. Gina L Quirarte. (Department of Behavioural and Cognitive Neurobiology. Institute of Neurobiology, The National Autonomous University of Mexico –UNAM-, Querétaro, Mexico)

Coffee Break and Poster Session 2 (Main Lobby)

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17:00 – 18:00 **Neuroscience and Art Exhibition:** *Cognitive Geography Atlas* (Exposition Hall). María López Quiroga & Chris Lloyd. *Neuroscience Department. University of Edinburgh (UK)*.

18:00 – 19:30 **Symposium (5): Experimental Approaches to Pathology** (Conference Room 1)

Symposium Chair and Opening Lecture:

- Prof. Luis Fernando Sánchez Santed. "Development of an animal model for amblyopia and its treatment". *University of Almería*.

Speakers and Lectures:

- Prof. Milagros Gallo Torre. "Recognition memory in rats: a model for understanding aging and related neurodegenerative diseases". *University of Grenade*.

- Prof. Mª Teresa Colomina. “Mouse models of vulnerability to neurodegeneration: gene-environment interactions”. *Rovira i Virgili University .*
- Prof. Rosa María Fernández García. “Genetic vulnerability of transsexualism”. *University of A Coruña*.
- Prof. Mercé Correa. “Animal models of effort related decision making for the study of motivated behavior: Involvement of the mesolimbic dopaminergic system”. *Jaume I University.*

18:00 – 19:30 **Symposium (6): Experiences in Neuroscience and Education**
(Conference Room 5)

Symposium Chair and Opening Lecture:

- Prof. Luis Miguel García Moreno. “Neuroeducational research and teacher training in Cognitive Neuroscience”. *Complutense University of Madrid*.

Speakers and Lectures:

- Prof. Pilar Martín Lobo. “The effects of application of Programs of neuropsychological abilities in the school”. *International University of La Rioja*.
- Dr. José Ramón Gamo. “Neuroscience and Education”. *Centro CADE- Centro de Atención a la Diversidad Educativa*.
- Prof. Patricia Mateos Gordo. “Importance of proper evaluation neuropsychological diagnosis of ADHD”. *Complutense University of Madrid*.

19:30 – 20:30 **Social Networks:** *Psychobiology 2017* (Conference Room 1)

20:00 – 21:00 **Guided Walking Tour to the Historic Quarter of Oviedo**

21:30 **Traditional Asturian Dinner (*Espicha*)**

Friday 17th July

09:00 – 10:30

Oral Communications (7): Methods and Techniques in Psychobiology (Conference Room 1)

Chair: Prof. José Manuel Cimadevilla Redondo. *University of Almería.*

Oral Communications (8): Neuropsychology (Conference Room 2)

Chair: Prof. Valentina Ladera. *University of Salamanca.*

Oral Communications (9): Psychobiology of Cognition and Emotion (Conference Room 5)

Chair: Prof. Ana Adán Puig. *University of Barcelona.*

Oral Communications (10): Ethology (Conference Room 3)

Chair: Prof. Fernando Rodríguez Fernández. *University of Seville.*

10:30 – 11:00

Coffee Break (Main Lobby)

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Neuroscience and Art Exhibition: *Cognitive Geography Atlas* (Exposition Hall). María López Quiroga and Chris Lloyd. *Neuroscience Department. University of Edinburgh (UK)*.

11:00 – 12:30 **Symposium (7): Psychopharmacology** (Conference Room 1)

Symposium Chair and Opening Lecture:

- Prof. Carlos Manuel González Aragón. "Role of intracellular calcium on ethanol-induced activation of protein kinase a and its behavioral consequences. *Jaume I University*

Speakers and Lectures:

- Prof. Ana Adán Puig. "Circadian rhythmicity, neurocognition and personality in dual diagnosis patients. Correlates and clinical predictive value". *University of Barcelona.*
- Prof. Elisabetta Tronci. "Increased susceptibility to dyskinesia in BDNF-overexpressing rats". *University of Cagliari, Italy*
- Prof. David Roura Martínez. "Differential modulation of glutamatergic, GABAergic and endocannabinoid systems in the basolateral complex of amygdala during the incubation of cocaine, heroin and sucrose craving". *Universidad Nacional de Educación a Distancia*.

11:00 – 12:30 **Symposium (8): Master and Doctorate Degrees in Psychobiology** (Conference Room 5)

Symposium Chair and Opening Lecture:

- Prof. Cosme Salas García. "The Area of Psychobiology in the Official Master and Doctorate degrees of the University of Sevilla". *University of Seville*.

Speakers and Lectures:

- Prof.Alicia Salvador Fernández-Montejo. "Participation of the area of Psychobiology in the Postgraduate Programs at the University of Valencia". *University of Valencia*.
- Prof. Milagros Gallo Torre. "Current status of Psychobiology in the postgraduate programs at the University of Granada". *University of Grenade*.
- Prof. M. Gabriela Chotro. "The strategy of the University of the Basque Country UPV/EHU". *University of the Basque Country*.

12:30 – 13:30 **Plenary Lecture (4)** (Chamber Room)

"The stressed social brain"

Prof. Carmen Sandi (Brain Mind Institute, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland).

13:30 – 13:45 **Awards ceremony for Best Poster and Best Oral Presentation**
Sponsored by *Leica Systems* and *Colegio Oficial de Psicólogos de Asturias* (Chamber Room)

13:45 – 14:00 **CLOSING CEREMONY**(Chamber Room)

14:30 **LUNCH**

EVENT SCHEDULE

Wednesday 15th July

TIME	EVENT	LOCATION
9:30-11:00	Registration and Poster hanging	Main Lobby
	Neuroscience and Art Exhibition. Arrangement of Prints.	Exposition Hall
11:30-12:00	OPENING CEREMONY	Chamber Room
12:00-13:30	**Plenary Lecture by Prof. Francisco Gonzalez-Lima** "Augmentation of cytochrome oxidase and neurocognitive functions with transcranial near-infrared lasers and LEDs"	Chamber Room
13:30	**WELCOME COCKTAIL**	Restaurant-Terrace
16:00-17:30	**Symposium** (1). Advances in Psychophysiological research	Conference Room 1
	Symposium (2). Neuroplasticity and Brain networks	Conference Room 5
17:30-18:30	Coffee Break and **Poster Session 1**	Main Lobby
	Neuroscience and Art Exhibition: *Cognitive Geography Atlas*	Exposition Hall
18:30-20:30	**Oral Communication** (1). Neuropsychology	Conference Room 1
	Oral Communication (2). Nervous System Disorders and Behavioural Disorders	Conference Room 5

Thursday 16th July

TIME	EVENT	LOCATION
9:00-10:00	**Plenary Lecture by Dr. Gertrudis Perea** "Astrocyte role in sensory information processing in vivo"	Chamber Room
10:00-12:00	**Symposium** (3). Neuropsychology	Conference
	Symposium (4). Psychobiology of Emotion	Conference Room 5
12:00-12:30	Coffee Break	Main Lobby
	Neuroscience and Art Exhibition: *Cognitive Geography Atlas*	Exposition
12:30-14:00	**Oral Communication** (3). Endocrine System, Immune System and Psychoneuroimmunology	Conference Room 1
	Oral Communication (4). Psychobiology of Cognition and Emotion	Conference Room 2
	Oral Communication (5). Addiction & Psychopharmachology	Conference Room 3
	Oral Communication (6). Biological Development and Behaviour	Conference Room 5
14:00-16:00	**LUNCH**	
16:00-17:00	**Plenary Lecture by Prof. Gina L. Quirarte** "New insights into memory, stress and striatum"	Chamber Room
17:00-18:00	Coffee Break and **Poster Session 2**	Main Lobby
	Neuroscience and Art Exhibit: *Cognitive Geography Atlas*	Exposition
18:00-19:30	**Symposium** (5). Experimental Contributions to Pathology	Conference Room 1
	Symposium (6). Experiences in Neuroscience and Education	Conference Room 5
19:30-20:30	**Social Networks**: *Psychobiology 2017*	Conference Room 1
20:00-21:00	**Guided Walking Tour to the historic quarter of Oviedo**	
21:30	**TRADITIONAL ASTURIAN DINNER** ('*ESPICHA*')	

Friday 17th July

TIME	EVENT	LOCATION
9:00-10:30	**Oral Communication** (7). Methods and Techniques in Psychobiology	Conference Room 1
	Oral Communication (8). Neuropsychology	Conference Room 2
	Oral Communication (9). Psychobiology of Cognition and Emotion	Conference Room 5
	Oral Comunication (10). Ethology	Conference Room 3
10:30-11:00	Coffee Break	Main Lobby
	Neuroscience and Art Exhibition: *Cognitive Geography Atlas*	Exposition Hall
11:00-12:30	**Symposium** (7). Psychopharmacology	Conference Room 1
	Symposium (8). Master and Doctorate Degrees in Psychobiology	Conference Room 5
12:30-13.30	**Plenary Lecture by Prof. Carmen Sandi** "The stressed social brain"	Chamber Room
13:30-13:45	**Awards Ceremony for Best Poster and Best Oral Presentation** Sponsored by *Leica Systems* and *Colegio Oficial de Psicólogos de Asturias*	Chamber Room
13:45-14:00	**CLOSING CEREMONY**	Chamber Room
14:30	**LUNCH**	

ABSTRACTS

PLENARY LECTURES, SYMPOSIA, ORAL COMMUNICATIONS, AND POSTER SESSIONS

PLENARY LECTURES

AUGMENTATION OF CYTOCHROME OXIDASE AND NEUROCOGNITIVE FUNCTIONS WITH TRANSCRANIAL NEAR-INFRARED LASERS AND LEDS

Prof. Francisco Gonzalez-Lima

Department of Psychology and Institute for Neuroscience.University of Texas at Austin, Austin, TX 78712. E-mail:gonzalezlima@utexas.edu

OPENING CONFERENCE

Near-infrared lasers and LEDs modulate mitochondrial respiration by donating photons to cytochrome oxidase, the main acceptor of photons from red-to-near-infrared light in neurons. Augmentation of cytochrome oxidase activity improves brain functions. Light that intersects with the absorption spectrum of cytochrome oxidase enhanced in vivo oxygen consumption (measured with fluorescence-quenching oxygen probe and near-infrared spectroscopy) and ex vivo cytochrome oxidase (measured with enzyme spectrophotometry and histochemistry) in both rat and human cerebral cortex. In rats, red-to-near-infrared light stimulation after fear extinction learning prevented fear renewal as compared to controls. In humans, transcranial infrared laser stimulation to the forehead improved prefrontal cortex-related cognitive and emotional functions, such as sustained attention and working memory. These studies suggest that transcranial brain stimulation with red-to-near-infrared light may be used as an efficacious approach to increase neuronal mitochondrial respiration and improve cognitive functions. This fascinating approach provides a new non-invasive, neurocognitive-enhancing intervention in animals and humans.

ASTROCYTE ROLE IN SENSORY INFORMATION PROCESSING IN VIVO

Gertrudis Perea, Ph.D.

Functional and System Neurobiology, Instituto Cajal, Consejo Superior de Investigaciones Científicas, Madrid, Spain.E-mail: gperea@cajal.csic.es

Astrocytes play important roles in synaptic transmission and plasticity. Despite in vitro evidence, their contribution to cortical network activity and sensory information processing in vivo remains unresolved. Here, we use optogenetic tools to selectively stimulate astrocytes and investigate their consequences on neuronal activity in primary visual cortex (V1). Astrocytes were selectively targeted with adeno-associated viral vector with light-sensitive channelrhodopsin-2 (ChR2) under GFAP promoter and neuronal activity was recorded from layer 2/3 neurons of V1. Photostimulation of astrocytes in vivo increases the spontaneous firing rate of parvalbumin-positive (PV+) inhibitory neurons and excitatory neurons, but does not modify the spontaneous firing rate of somatostatine-positive (SOM+) inhibitory interneurons. Moreover, PV+ neurons show increased baseline visual responses and reduced orientation selectivity to visual stimuli, whereas excitatory neurons show either increased or decreased baseline visual responses together with complementary changes in orientation selectivity. On the other hand, unlike PV+ neurons, SOM+ interneurons show either increased or decreased baseline visual responses, with changes in orientation selectivity, similar to excitatory neurons. Excitatory and inhibitory drive was measured in V1 slices by recording whole-cell currents in excitatory neurons, PV+ and SOM+ interneurons. Optogenetic activation of astrocytes evoked a transient potentiation of spontaneous excitatory postsynaptic currents (sEPSCs) and miniature excitatory postsynaptic currents (mEPSCs), increasing the frequency of the synaptic currents but not their amplitude, that was induced by stimulation of metabotropic glutamate receptors (mGluRs) at presynaptic terminals. Therefore, astrocyte activation, through the dual control of excitatory drive and of inhibitory drive, modulates excitation/inhibition balance in cortical circuits, and thus influences integrative response features of neurons critical for sensory information processing.

NEW INSIGHTS INTO MEMORY, STRESS AND STRIATUM

Prof. Gina L. Quirarte

Departamento de Neurobiología Conductual y Cognitiva. Instituto de Neurobiología, Universidad Nacional Autónoma de México, Campus Querétaro, México 76230. E-mail: ginaqui@unam.mx

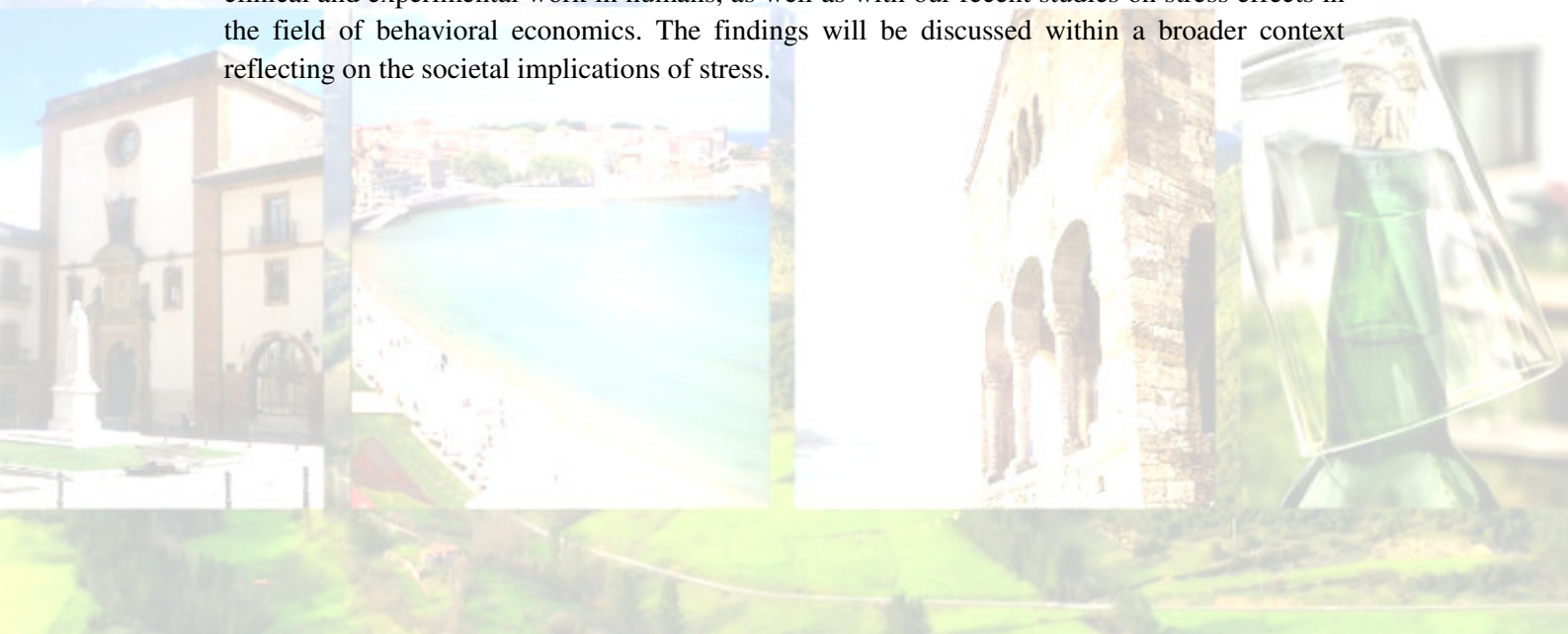
It is known that emotional experiences induce the release of stress hormones, such as epinephrine and glucocorticoids. It has been shown that glucocorticoids have influences upon diverse cerebral structures such as the amygdala, hippocampus, and prefrontal cortex, allowing for learned information to be stored. For a number of years we have been interested in studying the striatum, a basal ganglion involved in memory consolidation that has specific receptors for glucocorticoids. We have shown that activation of striatal glucocorticoid receptors of rats that had been trained in an inhibitory avoidance task facilitates memory. In another study we explored the possibility that striatal glucocorticoid receptors participate in procedural memory. To this end we trained rats in the water maze (WM) in either the spatial or the cued version; immediately after training we administered corticosterone into the dorsal striatum. Only procedural memory was facilitated. It has been suggested that the dorsomedial region of the striatum is involved in consolidation of spatial memory. We studied the role of glucocorticoids in this striatal region. We trained rats in the WM in either the spatial or the cued version; immediately after training we administered corticosterone into the dorsomedial striatum. As expected, only spatial memory was facilitated. Our findings suggest that glucocorticoids facilitate memory consolidation of procedural or spatial memory depending on the regionofstriatumthat is activated. These results give further support to the hypothesis that glucocorticoid hormones exert generalized effects in the brain that modulate memory consolidation of different learning tasks in animal and human models.

THE STRESSED SOCIAL BRAIN

Prof. Carmen Sandi

Brain Mind Institute. École Polytechnique Fédérale de Lausanne (EPFL). CH-1015 Lausanne, Switzerland.E-mail: carmen.sandi@epfl.ch; http://lgc.epfl.ch/

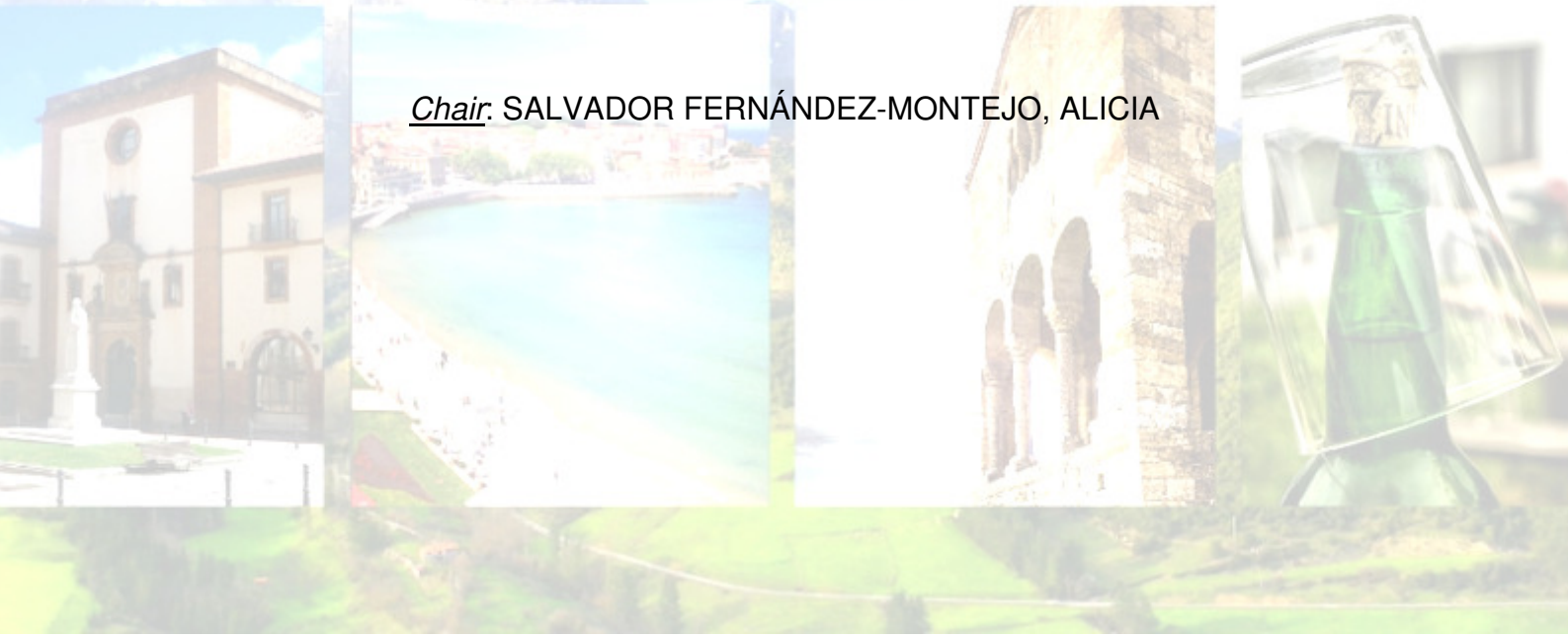
In addition to its well-known impact on cognitive function, stress has prominent effects in social behaviors. Exposure to high or sustained stress alters the nature of social interactions, individuals' sociability, and social dominance and aggression levels. These alterations in social behaviors can also be programmed by early life stress and can be transmitted to the next generation in the absence of social learning. I will discuss some of the neural mechanisms altered by stress and linked to the deficits in social behaviors. I will link these observations with clinical and experimental work in humans, as well as with our recent studies on stress effects in the field of behavioral economics. The findings will be discussed within a broader context reflecting on the societal implications of stress.



SYMPOSIUM 1

ADVANCES IN PSYCHOPHYSIOLOGICAL RESEARCH

Wednesday, July 15th, 2015



Chair: SALVADOR FERNÁNDEZ-MONTEJO, ALICIA

PSYCHOPHYSIOLOGICAL RESPONSE TO SOCIAL STRESS FROM AN INTEGRATIVE APPROACH

Alicia Salvador

Department of Psychobiology. University of Valencia, Spain.E-mail: alicia.salvador@uv.es

Social stress is the main source of stress in numerous human societies. Social interactions with an evaluative component emerge as critical situations that shed light on the effects and consequences of social stress on health. Different laboratory stressors have been employed to advance in this topic and research shows that more important than the situation itself is the way it is interpreted by the subject. This ‘‘appraisal’’ involves cognitive processes that contribute to explaining the neuroendocrine, cardiovascular and behavioral response to these interactions, helping to understanding the vulnerability or resistance to their effects. We defend the need to study human social stress from an integrative approach, while maintaining an evolutionary perspective, and taking advantage of the theoretical and methodological advances in psychology and psychophysiology in order to better understand the cognitive processes underlying the social stress response in humans.

LOW RESOLUTION STORAGE IN VISUAL SHORT-TERM MEMORY

Fernando Valle-Inclán

University of A Coruña

The capacity of human visual short-term memory (VSTM) is about four items for simple stimuli like color patches or line orientations (Cowan, 2001; Luck & Vogel, 1997; Pashler, 1988), and even less as stimulus complexity increases (Alvarez & Cavanagh, 2004). These findings are the basis for 'fixed-capacity' models, and imply that humans store "a high-resolution representation of a subset of the objects and retain no information about the others" (Zhang & Luck, 2008). Assuming that we discard all but four elements means, for example, that one second after a brief presentation of six colored circles, we would acknowledge to have seen four items at best, which is odd according to personal experience. It seems reasonable to assume that along with task relevant information, VSTM also stores task irrelevant information such as the size of the display, or the spatial relations among stimuli (Jiang, Olson, & Chun, 2000). A plausible account is that a wealth of information, with different levels of resolution, gets stored in VSTM, as proposed by 'resources' models (for a review see Ma, Hussain, & Bays, 2014).

We explored the VSTM capacity for low resolution representations using color patches, line drawings, or pictures of everyday objects, in different experiments. Memory and probe arrays ranged from three to seven items, both displays contained the same number of items in the same locations, and the number of changes could vary from zero to seven. Subjects indicated how many changes did they detect. The results were very similar in all the experiments and can be summarized as follows: (1) performance was better for the smallest memory arrays, (2) subjects easily recognized that no changes were present regardless of the number of items involved, (3) minimal changes were detected well above chance regardless of the number of displayed items, and (4) the size of the errors was smaller than ± 1 in all conditions. In summary, VSTM can hold relatively low resolution representations of up to seven items (the largest number used in our experiments).

BRAIN DYNAMICS OF THE IDENTITY PROCESSING AS REVEALED BY THE ACCESS TO AND RETRIEVAL OF BOTH "PURE" FACES AND VERBAL/SEMANTIC FACE-ASSOCIATED NFORMATION: AN ERP AND NEURAL SOURCE RECONSTRUCTION STUDY

Iglesias J, Olivares EI, Lage-Castellanos A, Saavedra C, Bobes MA

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

In the present ERP study we analyzed the brain dynamics concerning the access to and retrieval of "pure" structural face information in contrast to that concerning the access to and retrieval of face-related biographical information, both triggered by faces. Participants became familiar with both "pure" faces and faces with an associated occupation and a proper name according a systematic learning procedure of several sessions. After several days, ERPs were recorded in both face-feature and face-occupation matching tasks in which N400-like responses were elicited by incorrect eyes-eyebrows completions and occupations, respectively. Source origin of the activity elicited in mismatching trials (i.e. the N400 effect) was analyzed via Bayesian source reconstruction plus conjunction analysis of group effects. This revealed that the "pure" face N400 seemed to be generated in right posterior brain regions encompassing mainly OFA (Occipital Face Area) and, to some extent, FFA (Fusiform Face Area), likely reflecting neural operations triggered by structural processing concerning physical incongruities. On the other hand, the N400 elicited by mismatching occupations was related to more anterior left-sided fusiform and temporal inferior sources, similar to those described previously for the classic linguistic N400. In relation to earlier latencies, in both tasks the generated N170s were of similar amplitude but had different neural origin. Thus, whereas the facial N170 was associated to FFA and OFA, the N170 of occupations was associated to a bilateral very posterior activity, suggestive of basic perceptual processes. Also of note, the right-sided perceptual P200 and the identity-related N250 were evoked solely in the pure face-feature task, with sources in OFA and extensively in the fusiform region, respectively. All these results support the existence of differentiated neural streams for structural facial and face-related verbal processing triggered by faces, which can be activated differentially according to specific task demands.

This work was supported by "Ministerio de Economía y Competitividad" (Spain I+D+I National Programme PSI2013-46007-P).

FROM PSYCHOPHYSIOLOGY TO BEHAVIOURAL NEUROSCIENCES

José M. Martínez-Selva

School of Psychology, University of Murcia,Spain.

Our multidisciplinary team is involved in several research lines dealing with emotion, behavioural genetics, psychopharmacology and neuropsychology. Our interests and practice evolved from the study of peripheral correlates of behaviour (attention, orienting response, stress and hypertension) to a consolidated research group focused on four main areas and employing a wide array of laboratory and field techniques.

The psychophysiology of emotion is one of our main fields of research, with a special emphasis on the role of affective states in cognitive processes, such as decision-making and social interaction. We also study specific emotions like social anxiety and blood-injury-injection phobia. The main responses recorded are cardiovascular reactions, electrodermal activity, electromyography, electroencephalography and evoked potentials. Biochemical responses to affective stimuli, such as salivary cortisol and alpha-amylase, are also recorded. From time to time we are also involved in applied research in several fields, mainly in psychopathology (borderline personality disorders) and mental disabilities (Down syndrome).

Another important area of interest is behavioural genetics. Our team leads and manages the Murcia Twin Registry, an important research tool and also a source for many multidisciplinary projects. Life style, obesity, sleep quality, several specific psychopathologies such as depressive disorders, drug consumption, breast-feeding, cancer are some of the topics currently addressed by researchers from our University and from other laboratories around the world. Specific genetic data are also being collected and pooled into a biobank. A specific contribution to this conference deals with the main features and results obtained from the Murcia Twin Registry.

Psychopharmacology research, especially drug addiction is also a field of interest for some of our colleagues, in collaboration with other laboratories. Some studies have addressed the relationships between drug consumption relapse and the activity of the glutamatergic and dopaminergic systems on the one hand, and stress and social behaviour on the other. A new line of research has begun on multi-addiction in adolescents and adults.

Finally, neuropsychological studies on language acquisition and developmental dyslexia are also performed in the Neuropsychology Unit. This Unit is aimed both to research and clinical activity on brain-damage patients.

SYMPOSIUM 2

NEUROPLASTICITY AND BRAIN NETWORKS

Wednesday, July 15th, 2015

Chair: COLLADO GÜIRAO, PALOMA

VULNERABILITY OF BRAIN CIRCUITS TO UNDERNOURISHMENT IN MALE AND FEMALE RATS

H. Pinos[1], B. Carrillo[1], F. Díaz[2], J. Chowen[2], **P. Collado**[1]

[1]Departamento de Psicobiología, Universidad Nacional de Educación a Distancia (UNED), Spain.

[2]Departamento de Endocrinología, Hospital Infantil Universitario Niño Jesús, Instituto de Investigación La Princesa, Investigación Biomédica en Red (CIBER) de la Fisiopatología de la Obesidad y Nutrición, Instituto de Salud Carlos III, Madrid, Spain.

Pre and early postnatal periods are crucial for the establishment of neural circuits. It has been demonstrated that those which control feeding behaviour depend on an adequate nutritional status during development for suitable functioning of this system during adulthood. Several studies have shown that undernourishment produces adverse effects on physical development, brain morphology and behavioural performance depending on the period in which undernutrition takes place. Our results have demonstrated that a restricted diet from the 6th day of gestation (G6) until postnatal day 60 (P60) significantly alters neural parameters in brain structures that control energy expenditure and feeding behaviour in Wistar rats. Specifically, we have shown that pre and postnatal undernutrition reduces the volume and number of neurons of the locus coeruleus and the number of orexin-ir cells in the lateral hypothalamic area (LH) in male and female rats, and hypothalamic proopiomelanocortin (POMC) mRNA levels in female rats. In contrast, an increase in hypothalamic agouti-related peptide (AgRP) and neuropeptide Y (NPY) mRNA levels were found in undernourished female rats. Moreover, nutritional rehabilitation at P12 or P21 resulted in a differential recovery of some of these parameters depending on the period in which nutritional rehabilitation is implemented or the sex of the animal. It has been reported that there is a possible interaction between estrogens and peptides to control energy expenditure and feeding behaviour. Since estradiol plays a role in the modulation of food intake we also studied if this hormone during early postnatal period has any effect on the alterations produced by undernutrition. Our results showed that early postnatal treatment with 0.4 mg/kg of estradiol benzoate (EB) from postnatal day 6 (P6) until P13 to undernourished female rats reversed the effects of undernutrition on adult hypothalamic POMC mRNA levels, increasing them to control females levels. Moreover, significantly decreased adult plasma testosterone, estradiol and acylated ghrelin levels with respect to control and undernourished rats were found in this study.

Brain structures involved in the control of feeding behavior seem to be vulnerable to injury produced by a food restricted diet and estradiol during critical periods of development might have the capacity to modulate the alterations that undernutrition produces on energy metabolism. Further studies are necessary in order to clarify the role of estradiol in the development of the circuits that control food intake and the potential long term benefits/risks that intake of high doses of estrogenic compounds during this stage could produce on the physiology and behavior in adulthood.

Work supported by Grant: PSI2011-24943; BFU2011-27492; and CIBEROBN.

THE ORGANIZATION OF THE TELEOST FISH TELENCEPHALIC PALLIUM: SEARCHING FOR THE BAUPLAN OF THE CEREBRAL CORTEX.

Rodríguez F., Reiriz M, Rodríguez-Expósito B, Uceda S, Trujillo-Pozo I, Martín-Monzón I, Ocaña FM, Gómez A, Durán E, Broglio C & Salas C.

Laboratory of Psychobiology.University of Sevilla.Campus Ramón y Cajal. 41018. Seville, Spain.

Historically, the dominant view in Comparative Neurobiology has considered that the 'morecomplex' behavioral and cognitive capabilities –for instance, those based on the operation of the association multisensory pallium or in the hippocampal formation– are present only in a few, 'more evolved' vertebrate groups, such as mammals or birds. This belief is indeed consistent with the old idea that the vertebrate forebrain evolved in successive and sequential steps or phases, according to which the pallium of fishes consists of an olfactory-dominated paleocortex (olfactory pallium), whereas the subsequent emergence of the archicortex (hippocampal pallium) and, finally, the neocortex (isocortex) appeared only in the more 'recent' or more 'evolved' vertebrate groups. However, recent comparative evidence challenge such traditional view showing that the Wulst of birds, the dorsal cortex of reptiles, and the neocortex of mammals are comparable, and therefore, might have been inherited from the ancestral pattern of pallial organization present in the stem amniotes. Furthermore, the out-group analysis indicates that the telencephalic pallium of actinopterygians could contain subdivisions homologous to the hippocampus, amygdala and isocortex of land vertebrates.

In this talk we will present a set of experiments conducted in our laboratory to identify the basic pattern of organization of the telosteantelencephalic pallium that indicates the conservation of a common basic plan in the evolution of the vertebrate forebrain. The results of these experiments reveal that the anatomical and functional organization of the telencephalic pallium of teleost fish is strikingly similar to that of the land vertebrates. Like the mammalian cortex, the actinopterygian pallium presents several segregated sensory [i.e., visual, auditory, somatosensory, gustatory] and motor areas, placed in a topological position compatible with the general pallium or isocortex. Moreover, these sensory areas show a topographic organization, and the motor areas include several somatomotor maps of body movements, topographically ordered, as well as separate eye field areas. In addition, the results reveal the presence of two separate memory systems in the teleost fish pallium; a hippocampal pallium involved in spatial learning, relational memory and temporal stimulus processing; and an amygdaline pallium selectively involved in emotional memory as well as in encoding values and motivational signals. These results providing compelling evidence of the cortical-like organization of the telencephalic pallium of teleost have a high comparative value for the identification of the basic organizational pattern of the telencephalic pallium in vertebrates (the Bauplan) and, in particular for the understanding of the phylogenetic evolution of the mammalian cerebral cortex.

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CEREBELLAR HALLMARKS OF COCAINE-INDUCED CONDITIONED MEMORIES OF PREFERENCE

Marta Miquel; Carla Sanchis-Segura; María Carbo-Gas; Isis Gil-Miravet

Addiction and Neuroplasticity Research Team.Psychobiology.Jaume I University.Castellon.Spain

Pavlovian conditioning tunes the motivational drive towards drug-associated stimuli, fostering the probability of those environmental stimuli to promote and trigger drug seeking and taking. Evidence coming from the last three decades has shown that long-lasting plasticity modifications in striatum-cortico-limbic circuits underlie the long-term durability of drug-related conditioned memories. However, despite the increasing amount of data supporting the involvement of the cerebellum in drug-related alterations, this structure has been traditionally disregarded in the addiction field. Surprisingly, it is well known that the cerebellum mediates consolidation of emotional memories and persistence of behavioural repertories. The most recent research from our lab has tackled the investigation of cerebellar role in drug-dependent conditioned memories. Remarkably, we have found two very specific and distinctive cerebellar hallmarks of preference for cues linked to cocaine experience. When an animal expressed preference towards an odour associated with the drug, we observed an increase in cFOS expression in the dorsal part of the granule cell layer. Mostly in granule cells. This distinctive feature was not seen if animals did not exhibit conditioned preference. The other cerebellar trait for drug-induced preference was a higher proportion of Golgi inhibitory interneurons expressing strong perineuronal nets (PNNs). PNNs enwrap the soma and neurites of several neuronal types, mostly inhibitory cells, forming an extracellular matrix that protects against subsequent synapse remodelling. They have been recently proposed as a mechanism for very long-term memory storage. Either overexpression or down-regulation of PNNs changes the conditions for subsequent plasticity to be induced. Therefore, PNNs could be also acknowledged as a metaplasticity process. As Golgi neurons exert an inhibitory control onto granule cells, it is possible for granule cells to remain disinhibited for longer after the up-regulation of Golgi PNNs. Of note, cerebellar hallmarks were selectively observed in the dorsal area of the posterior vermis, lobules VIII, IX and X. These cerebellar regions connect to the sensorimotor and prefrontal networks, respectively. Would they be the cerebellar signatures of lasting drug-related memories?

In a different set of experiments we accomplished the inactivation of the prelimbic cortex and the posterior vermis before starting the conditioning procedure. Against our expectations, either the inactivation of prelimbic cortex or the cerebellar lesion increased up to 100% the percentage of animals acquiring conditioned preference for cocaine. Overall, our findings point to an inhibitory role of the prefronto-cerebellar networks during acquisition of drug-related emotional memories.

NATURAL AND INDUCED NEUROPLASTICITY IN HUMAN BRAIN DAMAGE: A NEUROPSYCHOLOGICAL AND NEUROIMAGING VIEW

Juan C. Alvarez Carriles, PhD.

Clinical Neuropsychology Unit – Liaison Psychiatry Service.Central University Hospital of Asturias and Department of Psychology.University of Oviedo, Spain

Neuroplasticity, used in its broadest sense, is an essential and core feature of Nervous System. It can be clearly seen in normal development (i.e. learning), but also in the basis of functional recovery after brain damage.

Traditionally, most information on neuroplasticity has been achieved by means of experiments in laboratory animals. Human classical neuropsychology was only able to infer indirectly its "presence" by the observation of the developmental achievements of normal subjects or by the study of functional recovery observed in brain damage patients. However, recent development of neuroimaging techniques meant an open window for neuroscience (and neuropsychology, in particular) for studying part of the processes involved in neuroplasticity.

From a brain networks perspective, Magnetic Resonance Imaging (MRI) seems to be an optimal technique in order to analyze neuroplasticity. So that, in one hand, it is able to describe the cortical (i.e. volumetry of the gray matter) and subcortical (i.e. tractography of the white matter) changes associated with neuroplasticity in normal and abnormal brain development. On the other hand, Functional MRI shows the temporal and spatial dynamics of activations related to "natural" or "induced" neuroplasticity.

In the present talk, we will briefly review "natural" neuroplasticity in human brain through structural and functional MRI studies, taking into account the modulator effect of variables as age and gender. From that reference framework and using epilepsy, multiple sclerosis and stroke as models of brain damage, we will review some of the variables that permit (or prevent) neuroplasticity to facilitate functional recovery of functions like motor response, language, memory and visuospatial perception. We will finally conclude with some examples of the principles, procedures, techniques, etc. used by clinical neuropsychology in order to "induce" neuroplasticity and, this way, functional reorganization or compensation.

SYMPOSIUM 3

NEUROPSYCHOLOGY

Thursday, July16th, 2015

Chair: PEREA BARTOLOMÉ, Mª VICTORIA

NEUROLOGICAL EVALUATION IN THE STUDY OF COGNITIVE PERFORMANCE

Mª Victoria Perea Bartolomé

Psychobiology Department. University of Salamanca, Spain

Cognitive function is supported by complex cerebral functional systems that are based on the existing relationship between different cortical, subcortical and diencephalic areas. Each of these areas will contribute with a "cognitive factor" to the establishment of a certain cognitive function.

Diagnosis of neuropsychological disorders must begin with the application of a systematic assessment. In order to study those disorders, Neuropsychology has its own methods and procedures. Neuropsychological tests contribute to define the relationships between structure and brain function. However, the study of cognitive performance must be understood as a result of an integrative process and not as the tested answer to a specific stimulus.

In the neuropsychological assessment, it is not always possible to apply strict protocols due to the complexity and variability of its semiology. This is the reason why the analysis of clinical and neurological expressions contributes, in a special manner, to the understanding of neuropsychological syndromes. The execution of a study in Neuropsychology that involves neurological, neuropsychological and behavioural aspects will help to understand how the neurological condition affects the patient. The neurological symptom usually has a predictable location and allows us obtaining crucial information when diagnosing certain neuropsychological alterations; since depending on a complex cerebral functional system, the neuropsychological symptom by itself offers less precise information about the cerebral location of the lesion.

The execution of an "integrated study" in Neuropsychology is crucial in the neuropsychology assessment; it allows early diagnose of neuropsychological syndromes and contributes to the establishment rational and physiopathological therapeutic approaches.

NEUROPSYCHOLOGICAL ASSESSMENT OF SPATIAL COGNITION USING VIRTUAL-REALITY BASED TASKS

José Manuel Cimadevilla, Irene León, Laura Tascón

Department of Psychology.University of Almeria, Spain

In the last decades, the never-ending technological development supported the origin of a parallel reality simulating the real world. This fact did not go unnoticed to neuroscientist who fully exploited the resources at their disposal to set up conditions for studying, characterizing and, occasionally, modifying human behavior.

Virtual reality-based tasks can provide interesting tools for research in Neuropsychology, making possible assessment of cognitive functions, like spatial orientation, difficult to measure during a typical neuropsychological session. Spatial orientation is an ability shared between all the mammals that need to know where they are in order to move to another place for getting food, shelter or couple.

Many different processes underlie spatial navigation. However, it is specially linked to memory processes. All the experiences were lived in a particular location, and due to this, places are part of our episodic memory.

In the last eight years, our research group was involved in the development of virtual-reality based tasks to assess spatial cognition in humans. We adopted behavioral models previously used in other species. Our tests showed high sensitivity, differentiating between groups according to their spatial performance and disclosing spatial memory alterations in several pathological conditions.

This work was supported by grant PSI2011-26985.

PAIN AND THE BRAIN: INSIGHTS FROM BIOLOGICAL PSYCHOLOGY

Pedro Montoya

Institute of Health Sciences Research (IUNICS-IdISPa), University of the Balearic Islands, Palma, Spain

According with the International Association for the Study of Pain (IASP), pain is traditionally defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Moreover, pain is a conscious experience, an interpretation of the nociceptive input influenced by multiple factors such as attention, memory, emotions, social and genetic factors. Neuroimaging research has shown that several brain areas are specifically related to the processing of pain, suggesting that there is a specific and widespread-distributed network representing the sensory and affective components of pain.

The traditional approach to investigate neural processes underlying pain processing in humans has involved the presentation of painful stimuli and the simultaneous recording of brain activity under different experimental conditions (e.g., directing attention towards pain or away from pain). In this sense, neuroimaging studies using positron emission tomography, functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and magnetoencephalography have provided increasing evidence for the activation of several brain regions in response to pain in healthy controls. Basically, these areas include: primary and secondary somatosensory, insular, anterior cingulate (ACC), and prefrontal cortices as well as thalamus, and periaqueductal gray matter. Indeed, evidence suggests that many of these areas participate in a modulatory pathway and may have significant effects on pain experience. In particular, the ACC seems to play an important role in pain perception and modulation, since it is linked to cognitive processes involved in pain processing such as attention, emotion, saliency, and self-regulation of behavior, as well as to several features of pain perception such as sensitivity, intensity, unpleasantness, and expectancy. Furthermore, the ACC, along with bordering prefrontal regions, has been consistently implicated as a key player in pain modulation in a variety of modulatory pain-releasing techniques ranging from distraction, expectancy manipulation, and placebo.

Clinical and experimental research also indicates that patients with chronic pain have enhanced somatic pain sensitivity, together with neuroendocrine abnormalities, and abnormal activation of pain-related brain regions. Psychophysical and neurophysiological studies suggest the existence of specific deficiencies in the brain correlates of nociceptive as well as non-nociceptive somatosensory stimuli processing in patients with chronic pain. In particular, the affective and cognitive processing of pain-related information seems to be disturbed. A significant influence of emotional context on pain processing among patients with chronic pain may indicate that affective mood states can modulate central nervous excitability thresholds without conscious cognitive processing. These findings point toward the importance of considering a biopsychosocial model, integrating affective, cognitive, and social factors, to understand the brain mechanisms involved in the origin and maintenance of chronic widespread pain.

This work was supported by a grant from the Spanish Secretary of R&D and European Regional Development Funds (FEDER) (#PSI PSI2013-48260)

COGNITIVE FUNCTIONING IN FRIEDREICH`S ATAXIA

Antonieta Nieto

University of La Laguna, Spain

The human cerebellum has been regarded as a motor mechanism, but this view of its function is being challenged by observations from neuroanatomical, physiological, neuroimaging and cognitives studies, which suggest that it also plays a role in cognitive activity. In this context, the neuropsychological study of subjects suffering from inherited cerebellar diseases contributes to the growing body of data on the non-motor functions of the cerebellum. Cerebellar heredodegenerative ataxias encompass a heterogeneous group of syndromes fundamentally characterised by progressive cerebellar ataxia of slow clinical course. Although established as the most common cerebellar ataxia, almost scarce attention has been paid to cognitive functions in Friedreich Ataxia (FRDA). However, pathological changes have been described in the dentate nucleus of FRDA patients, a deep cerebellar nucleus involved in the cerebellum-thalamus-cortex connections. We studied cognitive functioning of FRDA patients in a wide range of cognitive domains, trying to mitigate the possible effects of their motor disturbances on their performance in neuropsychological tasks. Participants completed an extensive battery of neuropsychological tests. Tests were chosen to examine cognitive functioning in various cognitive domains: attention, proccessing speed, verbal and spatial leraning and memory, visuoperceptive, visuoespatial and constructive abilities, executive functions, language. In addition, all tests were selected in such a way that no or only limited movements had to be carried out by the patient. Additionally, motor baseline tasks and statistical methods were used to control for the differences in motor coordination deficits, psychomotor slowness and dysarthria. FRDA patients showed slowed processing speed, impaired concept formation and verbal fluency, deficits in acquisition of verbal information and use of semantic strategies in retrieval, visuoperceptive and visuoconstructive problems and poor action naming. Attentional functions, working memory, visual memory and language comprehension were preserved. Taken together, these results point to a dysfunction of prefrontal and temporo-parietal systems that may be caused by the affectation of the cerebro-cerebellar circuits proposed as the anatomical substrate of the cerebellum's involvement in cognition.

FRAILTY IN THE ELDERLY: BIOMARKERS FOR EARLY DETECTION

Blanca Laffon[1], José C. Millán-Calenti[3], Vanessa Valdiglesias[1], Ana Maseda[3], María Sánchez-Flores[1,2], Laura Lorenzo-López[3], Diego Marcos-Pérez[1,2], Eduardo Pásaro[1]

[1]DICOMOSA Group, Department of Psychology, Area of Psychobiology, Universidade da Coruña, Spain

[2]Department of Cell and Molecular Biology, Universidade da Coruña, Spain

[3]Gerontology Research Group, Department of Medicine, Universidade da Coruña, Spain

The world population is experiencing extraordinary demographic changes, mainly due to declines in birth rates and increases in longevity, which are causing an alteration of the population pyramids. Consequent increases in age-dependent pathologies are related to important socioeconomic and sanitary implications.

The concept of 'frailty' has recently emerged as a new and more accurate measure of biological age. Frailty, as a condition opposed to full health or 'fitness', is a multidimensional syndrome of loss of reserves (cognition, energy, physical ability, health), with behavioural and physical connotations, which gives rise to vulnerability, understood as disability and/or dependence, generally imminent. Common signs and symptoms are fatigue, weight loss, muscle weakness, and progressive decline in psychological and physiological functions.

At present, frailty assessment is mostly based on phenotypic features, namely unintentional weight loss, self-reported exhaustion, low physical activity, slow walking speed and grip strength (Fried et al., 2001), or in a cumulative index of health deficits (Mitnitski et al., 2001). Nevertheless, as the biological basis of frailty is multifactorial, involving deregulation through many physiological systems, increasing evidence support the possible existence of other biomarkers for frailty, mainly at cellular and molecular levels. These biomarkers might be potentially employed for early identifying frail elder patients.

Determining and validating these biomarkers would provide a significant step forward in geriatric patients care, since it would allow to anticipate frailty state and detect vulnerable patients before clinical manifestations become evident. They may be even useful in preventing and reverting frailty, since this syndrome was found to be reversible in a certain degree. Thus, together with the improvement of quality of life in the elderly, identifying frailty biomarkers would also let promote personalized healthcare, introduce suitable dependency programs, and reduce socioeconomic and sanitary costs.

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Acknowledgments

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SYMPOSIUM 4

PSYCHOBIOLOGY OF EMOTIONS

Thursday, July 16th, 2015

Chair: SÁNCHEZ MARTÍN, JOSÉ RAMÓN

HORMONES AND AGGRESSION

Sánchez-Martín, J.R., Azurmendi, A. Y Pascual-Sagastizabal, E.

Departamento de Procesos Psicológicos Básicos y su Desarrollo. University of the Basque Country.

Our area of research mainly explores the hormonal correlates of aggression in school-aged children, taking into account the role of the interaction between hormones and emotional, cognitive and social variables in aggression, thus giving rise to a biopsychosocial analysis of this behavior. We have studied a variety of different sample groups of different ages (between 4 and 10). Aggressive behavior was assessed either through systematic observation or peer rating instruments, and hormone levels (testosterone, androstenedione, cortisol, estradiol and DHEA) were obtained through the analysis of saliva samples. The principal emotional and cognitive variables studied include anger, fear, empathy, IQ and theory of mind; the main family context variables analyzed include parenting style and family stress. The diverse studies carried out have consistently found that testosterone contributes to maintaining and developing aggression in early development phases. An association was also observed between cortisol and estradiol and aggressive behavior. Moreover, the interaction between emotional, cognitive and family context variables on the one hand, and hormone levels on the other, was found to predict aggression levels in children. For example, boys with authoritarian or directive mothers who had higher levels of androgens were found to be more physically aggressive than their age-mates. The results obtained in the different studies conducted have led us to conclude that, in prepubescent stages in which no sex differences generally exist in the majority of hormones analyzed, said hormones are associated with aggressive behavior, and this association is mainly found in boys.

WHAT ROLE DOES THE LPA1 RECEPTOR PLAY IN REGULATING EMOTIONAL-LIKE BEHAVIOURS?

Pedraza C, Sánchez-López J, Castilla-Ortega E, Rosell-Valle C, Moreno-Fernandez R, Zambrana-Infantes E, García-Fernández M, Rodriguez de Fonseca F, Chun J, Estivill-Torrús G, Santín LJ.

Departamento de Psicobiología y Metodología de las CC. Universidad de Málaga e Instituto de Investigación Biomédica de Málaga (IBIMA), Spain.

The LPA1 receptor is one of the six characterized G protein-coupled receptors (LPA1–6) through which lysophosphatidic acid acts as an intercellular signalling molecule. It has been proposed that this receptor has a role in controlling anxiety-like behaviours and in the detrimental consequences of stress. In general, the neurobiological mechanism of fear extinction is strikingly similar to that of the adaptative stress response (distress regulation), sharing similar neuroanatomical, neuroendocrine, and neurochemical basis. Inadequate control of the stress response could precipitate or provoke anxiety disorders. In this context, we tried to elucidate the LPA1 receptor involvement in emotional regulation. For this purpose, we first examined fear extinction, a type of emotional regulation, in normal wild-type (wt) and maLPA1-null mice using two different extinction procedures (cued fear extinction and contextual fear extinction). Additionally, to study the role of the LPA1 receptor in the absence of developmental abnormalities induced by its permanent loss, the effect of the LPA1 antagonist Ki16425 administration was examined in contextual fear extinction on wild-type mice. Next, we studied the consequences of the absence of the LPA1 receptor in two key areas involved in emotional regulation, characterizing the structure and GABAergic composition of the medial prefrontal cortex (mPFC) and the amygdala by immunohistochemical detection of neuron specific nuclear protein (NeuN), GABA-positive cells and calcium-binding proteins (calretinin (CR), parvalbumin (PV), and calbindin (CB)). Lastly, we examined the corticosterone response and the expression of a marker of neuronal activity, c-Fos protein, in the amygdala and the mPFC after acute stress. Our results revealed that lack of the LPA1-receptor induces exaggerated amygdala reactivity and endocrine responses to emotional stimuli (e.g., an acute episode of stress), revealing a role of the LPA1 receptor in regulating emotional-like behaviours. Considering that a reduction of GABAergic inhibitory control in the amygdala may be a common mechanism to generate a heightened emotional state, the abnormal emotional response reported in LPA1-null mice could be explained, at least in part, by a significant reduction of GABAérgic composition of the amygdala observed in these animals.

Taking together, the LPA1 receptor is involved in emotional behaviours and in the anatomical integrity of the corticolimbic circuit, the deregulation of which may be a susceptibility factor for anxiety disorders and a potential therapeutic target for the treatment of these diseases.

NEONATAL ALLOPREGNANOLONE LEVELS ALTERATION: EFFECTS ON EMOTIONAL BEHAVIOUR AND VULNERABILITY TO ALCOHOL ABUSE IN MALE RATS

Marc Pallarés, Llidó Anna, Bartolomé Iris, Mòdol Laura, Vallée Monique, Darbra Sònia

Departament de Psicobiologia i Metodologia de les Ciències de la Salut, Institut de Neurociències, Universitat Autònoma de Barcelona, Spain.

Endogenous levels of the neurosteroidallopregnanolone (AlloP) during development are crucial for the nervous system maturation and for adolescent and adult behaviours.NeonatalAlloP levels manipulations, by means of systemic administration of AlloP or its synthesis inhibitor Finasteride, alter adolescent and/or adult behaviours. For instance, neonatal AlloP administration: (1) increases novelty-exploration in the open field test, (2) induces anxiolytic-like profile and decreases the anxiolytic effect of the benzodiazepine lorazepam in the elevated plus-maze test, and (3) deteriorates prepulse inhibition (PPI) in adult age. Instead, neonatal Finasteride administration increases emotional reactivity in situations of stress or conflict in the adolescent age, as reflected by a reduction in exploration of a novelty situation (novelty-directed locomotion and head-dips exploration).

The alteration of the physiological levels of neurosteroids in early neonatal phases provokes alterations in the maturation of cerebral structures such as the GABAergic hippocampal and thalamic-cortical systems or the meso-striatal dopaminergic systems. At a molecular level, AlloP positively modulates GABAA receptors, being alpha4 and delta subunits especially sensitive to the AlloP fluctuating levels. AlloP has importantmodulatory effects in the hippocampus during the postnatal period, when the adult pattern of inhibitory GABAergic transmission is being established. Recent experiments in our laboratory have shown that neonatal AlloP levels are involved on the maturation of inhibitory hippocampal system and related behavioural functions, i.e. exposure to novel environments, emotional processing and sensory gating. Behavioural studies indicate that the effects of adult intrahippocampal administration of neurosteroids on locomotor activity, anxiety, passive avoidance learning and PPI are different depending on neonatal AlloP levels manipulation. Moreover, neonatal Finasteride increases alpha4 and delta GABAA receptor subunits expression in the hippocampus during early development by means of the alteration of AlloP and pregnenolone levels. Interestingly, this increase in GABAA subunits expression is maintained in the adult age, and it could be related to some of the behavioural effects observed in the previous experiments. Taken together, and without excluding other brain structures, our results point out the important role of neonatal AlloP levels for the inhibitory GABAergic hippocampal maturation and for behavioural responses to environmental stress, emotional processing and sensory gating.

Given that neonatal AlloP levels alteration affects emotional behaviourandGABAergic hippocampal and dopaminergic meso-striatal systems maturation, and thatnovelty seeking has been related to drug abuse, we have hypothesized that neonatal AlloP levels alterations can be related to an increased vulnerability to alcohol abuse. Our last experiments indicate that neonatal Allop levels manipulations alter voluntary alcohol intake, ventro-striatal monoamine levels and dopamine release in the nucleus accumbens in adult male Wistar rats. Our results highlight the importance of neonatal AlloP levels and its impact on GABAA receptor expression that can lead to an adult altered system that responds different to environmental cues.

ENRICHED ENVIRONMENTS: WHICH FACTORS MAY MODULATE ITS EFFECTS AS AN INTERVENTION STRATEGY AGAINST STRESS AND COGNITIVE AGING?

Rosa Redolat, Patricia Mesa, Marta Ramos

Department of Psychobiology, Universitat de València, Valencia. Spain.

In an increasingly ageing world with high levels of stress, there is a need for designing interventions that help to counteract, or at least delay, the cognitive impairment accompanying the aging process and the deleterious effects of social stress. Prior research suggests that factors such as complex environment or occupation, education, adequate stress coping, mental or physical activity, among other factors, can contribute to this goal. However, in studies with human subjects it is difficult to isolate the key components that constitute an enriched environment. For that reason, animal models based in environmental enrichment (EE) have been developed. This housing condition is characterized by high levels of social, physical and cognitive stimulation. In the present communication we will report the rodent model we have developed in order to study effects of enriched environments in mice evaluating how different variables (age at the start of exposure to EE, duration, type of enrichment, stress, pharmacological treatments…) may modulate their effects on exploratory and motor activity, anxiety and learning. In general, EE has shown positive effects on learning and anxiety, although in some animals it can increase aggressiveness, a question that must be considered when designing experiments which imply exposure to enriched environments during long periods. The most interesting results were obtained in studies that evaluated the effects of EE in animals undergoing social stress while exposed to these complex environments. The results suggest that the experimental group kept in enriched environment whereas exposed to chronic social stress along seven weeks displayed increased levels of anxiety in the elevated plus maze and higher levels of corticosterone than the other groups. At long term (one month after finishing social stress) these effects diminished and no significant differences were observed between groups. Future studies must include a broader behavioral battery and longer periods of evaluation in order to assess how the long-term effects of social stress can be modulated by the environment in which the animal remain both along the period of social stress and, in some groups, after stress has finished and mice remained exposed to enriched environments that may counteract some consequences of early stress exposure.

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SOCIAL STRESS, BEHAVIOR AND THE IMMUNE SYSTEM

Larraitz Garmendia Rezola, Arantza Azpiroz, Amaia Arregi, Garikoitz Beitia, Eneritz Gómez-Lázaro, Joana Pérez-Tejada, Andrea Lebeña, Ainitze Labaka, Oscar Vegas

Department of Basic Psychological Processes and their Development, University of the Basque Country

This area of research explores the neuroendocrine, neurochemical and immune mechanisms through which stress affects health. To this end, it analyzes how inflammatory processes affect behavior and examines the physiological mediators underlying this relationship. This topic of research can be approached from a number of different perspectives. Animal models of chronic social stress can be used to analyze the impact of stress on neurochemical, immune and behavioral variables in accordance with different coping strategies, and to examine the relationship which exists between the type of strategy adopted by subjects and their vulnerability to the development of depressive behavior. Bearing in mind that behavioral and physiological responses to stress depend on the subject's sex, and that situations that are stressful for male animals are not necessarily so for females, the aim is also to develop sex-appropriate animal models of social stress. As regards the study of the relationship between immune activation during disease and the development of depressive behavior, there is a large body of evidence from research in humans attesting to the high incidence of depression among tumor patients. Studies with laboratory animals enable us to explore the involvement of the HPA axis, proinflammatory cytokines and different neurotransmitters in this relationship, along with the impact of different types of coping behavior in response to social stress on both tumor development and depression. In humans, this relationship is currently being researched in a population of women highly susceptible to depression, namely breast cancer survivors. This research project analyzes the way in which coping strategies affect vulnerability to the symptoms of anxiety and depression, and examines the different physiological variables and biomarkers associated with a greater degree of vulnerability. The ultimate aim is to make headway in the study of how behavioral interventions may have a positive impact on the immune function. These studies open up interesting avenues of research from a social perspective, both as regards prevention and in relation to resistance to disease. They also seek to provide relevant data on the relationship between the nervous system and the immune system, which may help develop therapies and products to protect individuals against stress.

SYMPOSIUM 5

EXPERIMENTAL APPROACH TO PATHOLOGY

Thursday, July 16th, 2015

Chair: SÁNCHEZ SANTED, LUIS FERNANDO

DEVELOPMENT OF AN ANIMAL MODEL FOR AMBLYOPIA AND ITS TREATMENT

Sánchez-Santed, F., Castaño, S., Cardona, D., Nieto-Escámez, F.

Departamento de Psicología, Universidad de Almería, Spain.

Amblyopia, lazy eye, is a postnatal neurodevelopmental disorder of the primary visual cortex. It occurs when there is an imbalance in binocular visual information received by area V1. Thus, strabismus, anisometropia (difference in focus between the two eyes), or monocular occlusion (congenital cataracts, for example) produce a dissonant visual information on cortical causing in some cases, if not corrected, double vision (diplopia). One of the features of postnatal neurodevelopment is activity-dependent synaptic stabilization. According to this principle, the dissonant visual information (by absence, different degrees of sharpness or different visual field) will be inhibited, and presynaptic terminals of the "healthy" eye will substitute to those of "dissonant" eye on the control of the granular cells at layer IV of the primary visual cortex. The functional consequence is graduated loss of visual acuity in the deprived eye, or dissonant, according to the degree of impairment (degree of binocular disparity). Thus, we can find "completely lazy" eyes, almost total loss of visual acuity or eyes with varying degrees of amblyopia as a function of the degree of involvement of binocularity and/or its duration during the period of maturation of the V1 area. The inhibition of cortical input of information from the amblyopic eye seems to occur by GABAergic mechanisms, by which the input from the healthy eye laterally inhibit axons from the affected eye. Traditionally it has been assumed that amblyopia, as a phenomenon generated during neurodevelopment, becomes a permanent disease in an adult system. The discovery of the mechanism involved, and the current knowledge about the plastic capacity of the nervous system, leads to the search for new developments, technical or conceptual, allowing the modification of the acquired synaptic structure. In this sense, Transcranial direct continuous electrical stimulation (tDCS) is being proposed as a feasible technique to induce or enhance synaptic plasticity. Different report shows the potential of tDCS as cognitive enhancer, or as (co-) treatment of various psychopathologies. In brief, the pass of a positive, or a negative, current through the scalp will depolarize, or hyperpolarize, the underlying cortical cells, modifying their readiness for further functional activation. In this communication we will show a model for amblyopia in pigmented rats, and the treatment of this neurodevelopmental disease by tDCS application over V1 in adult animals.

This research has been financed by FIS grant PS09-01163, MINECO grant PSI2014-55785-C2-1-R, and EU FEDER funds

RECOGNITION MEMORY IN RATS: A MODEL FOR UNDERSTANDING AGING AND RELATED NEURODEGENERATIVE DISEASES

Beatriz Gómez-Chacón, Fernando Gámiz, Enrique Morillas and **Milagros Gallo**

Department of Psychobiology. Institute of Neurosciences. Centre for Biomedical Research (CIBM).University of Granada. Spain.

Impaired recognition of previously encountered stimuli is one of the earlier signs of Alzheimer's disease (AD). Given the fact that a similar dysfunction often appears in healthy aging, animal research might help to dissociate age and disease related changes. We have applied rodent versions of both visual and taste recognition memory tasks in order to explore the effect of aging in intact and brain damaged rats. Special emphasis has been devoted to the perirhinal cortex (PRh) because is one of the most heavily damaged cortical areas in Alzheimer's disease (AD) and the cortical focus for disease onset.

While age-related memory impairment is found in visual recognition memory at long retention intervals, the performance at one-hour retention interval seems to depend critically on the complexity of the object to be recognized. Regarding taste recognition memory, aged rats exhibited neophobia and attenuation of flavor neophobia although the results suggest that it was slower than in younger adult rats.

Both the deficits in visual recognition memory tasks and the impairment of the attenuation of flavourneophobia found in aged rats are similar to those detected in adult animals with PRh damage. Even when the behavioural performance does not differ between adult and aged rats different PRh activity patterns induced by novel and familiar flavors are evident. Whilst adult rats exhibited a higher number of c-Fos positive cells after exposure to the novel rather than the familiar flavor, the number of c-Fos positive cells is higher after exposure to the familiar rather than the novel flavor in aged rats.

In all, our results point to the value of using learning and memory tasks for understanding the impact of normal aging on PRh function. They may therefore contribute to dissociating normal and pathological changes at advanced ages which might be of clinical relevance. The relationship between aging and neurodegenerative diseases is discussed.

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MOUSE MODELS OF VULNERABILITY TO NEURODEGENERATION: GENE-ENVIRONMENT INTERACTIONS

Maria Teresa Colomina[1,3,4], Fiona Peris-Sampedro[1,3,4], Ingrid Reverté[1,3,4], Pia Basaure[1,3,4], María Cabré[2,4]

Department of Psychology Psychobiology Unit[1] and Department of Biochemistry and Biotechnology[2] and Research Center of Behavioral Assessment (CRAMC)[3]. Research in Neurobehavior and Health (NEUROLAB)[4]. Universitat Rovira I Virgili, Tarragona, Spain.

In industrialized societies, human beings are exposed to a great number of natural and synthetic substances that impact health. Identifying relevant gene-environment interactions that contribute to complex diseases is crucial to recognize high-risk populations and implement prevention strategies. Among multiple toxic exposures organophosphate pesticides (OP) have been suggested to increase the risk to Alzheimer's disease and other neurodegenerative disorders. We used two different transgenic mouse models of AD, the first one associated to the familiar early onset forms of Alzheimer's disease and the second associated to the late onset forms, to assess different targets and related behavioral effects after acute and repeated exposure to the OP pesticide chlorpyrifos (CPF). In the first study the Tg2576 mouse model for AD, which overexpresses the mutated form of APP linked to the early-onset of Swedish familial AD, was used to assess the effects of CPF on learning and memory and Aβ production. We demonstrated that CPF interferes with the amyloid peptide precursor (APP) processing, increase the levels of amiyloid beta protein and alters reference memory in a water maze task. Both the dose of CPF and the time elapsed between exposition and behavioral evaluations are key factors to explain observed effects. In another study, we used the human apoE transgenic mice, these animals express functional human apoE isoforms at physiological levels. Our results showed that adult dietary exposure of adult apoE transgenic mice to moderate levels of CPF triggered body weight increase, metabolic changes and memory impairment in apoE3 mice. Given that the apoE3 genotype is the most frequent in the population, the implications for human health are of special relevance. Our results demonstrate complex interactions between genotype and toxic exposures that could explain the high variability observed in general population.

This research was supported by PSI2010-21743-C02-01, the Ministry of the Economy and Competitiveness (MINECO, Spain), the European Regional Development Fund (ERDF), the Commission for Universities and Research of the Department of Innovation, Universities and Enterprise of the Generalitat de Catalunya (2013 FI_B 00170)

GENETIC VULNERABILITY OF TRANSSEXUALISM

Fernández R[1], Cortés-Cortés J[1], Rumbo T[1], Esteva I[2], Gómez-Gil, E[3], Lema E[1], Haro-Mora JJ[2], Almaraz MC[2], Roda E[3], Guillamón A[5], Pásaro E[1]

[1]Dto. Psicobiología, UDC. A Coruña; [2]Unidad de Transexualidad e Identidad de Género, Hospital Carlos Haya, Málaga; [3]Unidad de Identidad de Género, Hospital Clinic, Barcelona; [4]Dto. Psicobiología, UNED, Madrid, Spain.

Transsexualism is a gender identity disorder with a multifactorial etiology. Both, neurodevelopmental and genetic factors seem to be implicated.

The aim of this study was to investigate the possible influence of genetic factors on the etiology of FtM (female to male) and MtF (male to female) transsexualism by performing the molecular analysis of the variable polymorphisms of genes ERβ, AR, CYP19A1 and CYP17A1. We carried out the analysis in 715 transsexuals and 844 controls, geographically and sex-adjusted with the transsexual group.

FtMs differed from control females with respect to ERβ ($p = 0.002$) but not with respect to AR and CYP19A1 genes. The repeat numbers in ERβ were significantly higher in FtMs than in the female control group, and the likelihood of developing transsexualism was higher in the subjects (LL) (odds ratio: 2.001 [1.15-3.46]).

Our data support the finding that a functioning ERβ receptor is directly proportional to the size of the analyzed polymorphism, so a greater number of repeats implies greater transcription activation, therefore, an increase in ERβ receptor function, and finally, an increase in defeminization in females. Thus, one could propose that the greater efficiency of the estrogen-receptor complex by a high number of repeats would lead to a reduction in feminization, favoring a defeminization process.

Westberg et al., (2001) found that women with relatively few CA repeats of the ERβ gene displayed higher testosterone levels and lower sex steroid hormone-binding globulin levels than those with many CA repeats. The apparent association between a short CA repeat region and high levels of testosterone suggests that this variant of the gene leads to a less active receptor.

With regard to MtFs, they did not differ from the male control group with respect to the median length of none of the polymorphisms. Considering the data for categorical variables of S and L alleles, and the genotypes, we did not find any significant values for ERβ, AR or CYP19A1 genes.

Regarding CYP17 MspA1, the allelic frequencies differed significantly between FtMs and MtFs ($p = 0.041$), although it was not sex-dependent in control population. Our data confirm a sex-dependent allele distribution of the CYP17 MspA1 polymorphism in the transsexual population, FtM>MtF, that might suggest a hypothetical involvement of A2 allele in the genetic basis of transsexualism since allele frequencies in the general population seem to be clearly related to geographic origin and ethnic background, but not sex.

Our data support the implication of ERβ and CYP17A1 genes in transsexualism

ANIMAL MODELS OF EFFORT RELATED DECISION MAKING FOR THE STUDY OF MOTIVATED BEHAVIOR: INVOLVEMENT OF THE MESOLIMBIC DOPAMINERGIC SYSTEM

Correa M [1], López-Cruz L[2], San Miguel N [2], Monferrer L [2], Salamone JD [3]

[1]Área de Psicobiología.Universitat Jaume I, Castelló. Spain

[2]Área de Didáctica Ciencias Experimentales. UniversitatJaume I, Castelló. Spain

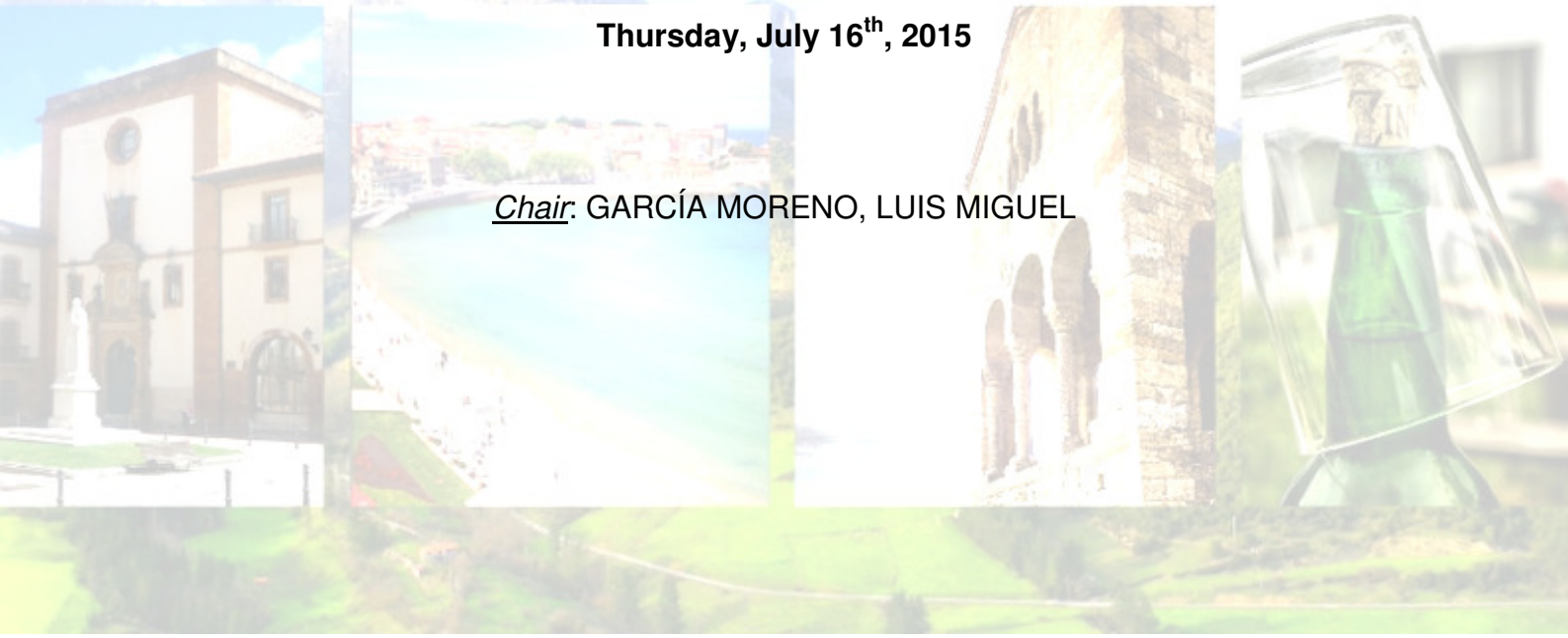
[3]Behavioral Neuroscience Division, University of Connecticut. Storrs, CT. USA

Motivation has two essential components: activational and directional. Motivated behavior is characterized by high levels of vigor and activation directed at a specific target. Impairments in behavioral activation and effort-related motivational function are often seen in different neurological and psychiatric conditions such as schizophrenics with negative symptoms, people with depression, multiple sclerosis, chronic fatigue syndrome, or Parkinson's disease. These motivational symptoms reported as psychomotor retardation, fatigue, anergia and apathy are the most common psychiatric symptoms seen in general medicine, and they are highly resistant to treatment. Nucleus accumbens dopamine (DA) is a critical component of the neural circuitry that regulates behavioral activation and effort-related processes. Effort-based decision making is studied with tasks offering choices between high effort options leading to highly valued reinforcers vs. low effort/low reward options, and it has been suggested that such tasks could be used as animal models to assess functions at the cusp of cognitive, psychomotor and motivational functions. DA depletions reduce the level of effort that an animal is willing to make when it has a less effort demanding option. However, DA depletion does not change preference between reinforcers. Drugs whose mechanism of action directly or indirectly promote dopaminergic transmission such as bupropion and methylphenidate, reverse these effects and have potential as drugs for treating anergia.

SYMPOSIUM 6

EXPERIENCES IN NEUROSCIENCE AND EDUCATION

Thursday, July 16th, 2015



Chair: GARCÍA MORENO, LUIS MIGUEL

NEUROEDUCATIONAL RESEARCH AND TEACHER TRAINING IN COGNITIVE NEUROSCIENCE

Luis Miguel García Moreno

Deparment of Psychobiology. Universidad Complutense de Madrid, Spain.

From The Decade of the Brain, Cognitive Neuroscience has undergone a great advancement in many scientific and social areas except in Education. It is being very hard to make that neuroscientific knowledge gets into the classroom, but, educational neuroscience is an emerging field that holds great promise for the future of education. There are two lines to take into consideration: first, research on neuroscience of education (neuroeducational research); second, training on neuroscience for teachers and educators in general.

If we use generic keywords like "neurodevelopmental disorders" or "learning disabilities" in the bibliographic databases PubMed or ScienceDirect, we obtain several thousands of registers. Similar results can be found with keywords like "dyslexia" and "dyscalculia" but these numbers soar with "autism" or "ADHD". However, little research dealing with how to apply neuroscience in a regular classroom. Currently, many professionals agree that the potential for translating neuroscience research into classroom practice is currently limited. According to Howard-Jones (2007), it is necessary to determine by what routes neuroscience should enter the classroom.

This author, heavily involved in this challenge, has sought the views of many teachers and concluded that educators are generally enthusiastic about the importance of understanding the role of the brain in educational activities. They are interested in new methods to improve student learning, but they may lack the scientific training needed to critically assess the advances of neuroscience and their utility for education. This lack of formation makes teachers victims of some of the ''neuromyths'' more extended; for example, the misconception that students preferentially use one type of processing (left-brained or right-brained), the idea that a certain type of learning only occurs within a critical period, and one of the most extended, the belief that human beings only use a small percentage of the brain. Moreover, the popularity of neuroscience may lead teachers to a premature and uncritical acceptance of "brain-based" teaching methods, most of them without empirical support and serving commercial interests.

In 1999, the Organization for Economic Cooperation and Development (OECD) launched the so-called 'Brain and Learning' initiative to bring together international researchers to discuss the potential of neuroscience for educational policy and practice. In 2005, the German Federal Ministry for Education and Research established the 'Neuroscience, Instruction and Learning' funding initiative as a reaction to Germany's relatively poor performance in the OECD's Program for International Student Assessment (PISA). There are other initiatives in different countries, but Spain is not among them. Yet, outside some exceptions, the formation of future teachers not includes neuroscience training and should do it.

THE EFFECTS OF APPLICATION OF PROGRAMS OF NEUROPSYCOLOGOCIAL ABILITIES IN THE SCHOOL

Pilar Martín-Lobo

Universidad Internacional de la Rioja, UNIR, Logroño, Spain. Email: pmartinlobo@unir.net; pmartinlobo@gmail.com

Introduction: The neuroscience and neuropsicologyapplicated to education is showing improvement in the scholar performance of the students. In the studies makes and financial at national level to analize the neuropsychological bases of scholar failure (CIDE,2000), and international level to study the brain processes relited to learning (OECD, 2007), we can notice the incidence on the neuropsychological factors from childhood that they are in the adquisiction of basic instrumentals skills for learning, such as reading, writing, speaking and learning lenguages and math.

Objective. Show the effects of the programs in children of preeschol who training neuropsychological skills in movements of eyes, acomodation, convergences, auditory skills, basic movement and balance, lenguage and memory.

Method: at the first stage, it was organized a multidisciplinar team of psychologist and experts in visión, audition and motricity to apply neuropsychological and optometric test to students of preeschoolar education. Afterwards, they designed diagnosis, activities and programs of intervention and courses were given to teachers in the schools. In a second stage, psychologists and teachers applied the programs for five months, on a daily bases, unthersupervisión and assesment from one of the experts who joined the activities in the classes and met them regulary. In the third stage, the professionals applied the postest and valoreted the actions made in the neuropsychological programs with the students in the school, teachers and headmasters.

Results: the resuts show significative differences in visual skills, movements of eyes, acomodation, convergences, auditory skills, basic movement and balance, lenguage and memory; the teachers and headmaster valuetedpositivly the programme and a oficial Master in Neropsychology and education was stablish in university.

Conclussions: it's possible the improvements of basic neuropsychological skills related in the adquisiction of basic instrumentals skills for learning, such as reading, writing, speaking and learning lenguages and math, therefore of the aplication of the specific neuropsychological programmes, procceses for the training of teachers and they open a new way for neuroeducational research, trainig on neuroscience and neuropsychology for teachers and educator in general and the aplication of the neuropsycholgy in scholar enverionment.

NEUROSCIENCE AND EDUCATION

José Ramón Gamo Rodríguez

Departamento de Neuroeducación. Centro CADE- Centro de Atención a la Diversidad Educativa. Madrid, Spain

The most relevant aspects of Neurodidactics are:

● Brain plasticity:

Neuroscience has shown the influence of environmental factors, including education, the structure and function of the brain. Neuroplasticity is a new educational paradigm because it reveals that mental training can alter the brain that is not fixed and unchanging, but malleable.

● Emotion:

One of the great discoveries of neuroscience has been to demonstrate that emotional and cognitive processes can not be separated

● Motivation

● Attention

● Physical exercise

Studies in children and adolescents about the practice of physical activity, have shown the same benefits that had been found in animals and in adults. Following the exercise a number of brain neurotransmitters and growth factors that stimulate the development of new neurons in the hippocampus and the strengthening of neuronal connections that facilitate memory and learning are segregated.

● Memory

Learning is an active process resulting from the experience that involves changes in the brain. The more content work better remains in memory, which is the ability to acquire and store a variety of information.

● Game:

If play is a vital impulse, a need that allows us to learn throughout life, there is no reason why we integrate adequately the recreational component in education. The game is an essential to motivate students and its relationship with new technologies, makes it a must adapt many educational interventions.

● Cooperative, social learning.

IMPORTANCE OF PROPER EVALUATION NEUROPSYCHOLOGICAL DIAGNOSIS OF ADHD

Mateos Gordo, Patricia[1], García-Moreno, Luis Miguel[1], Porras Truque, Claudia[1]

[1]Departmental section of Psychobiology. Faculty of Education. Universidad Complutense de Madrid, Spain. Email: patrimat@ucm.es

Introduction. ADD / ADHD is the most common neurodevelopmental disturbance in children. It is a consensual construct that sought to define a cognitive-behavioral, heterogeneous but identifiable pattern, which is supposed to have certain genetic and neuro identity. Given the current high prevalence of the disorder and major academic and adaptive implications, ADHD is one of the disorders with highest scientific and social resonance. Currently the diagnosis of ADHD is clinical, this means that the clinician is who, based on behavioral traits or characteristic symptoms of the disorder and backed by a clear functional impact on personal, family, academic and / or social, determines its whether or not in diagnosis. But to make a good diagnosis of any neurodevelopmental disorder is necessary to perform a neuropsychological assessment that lets us to determine your detailed profile of cognitive functioning, assessing their strengths and weaknesses and help us to make a proper differential diagnosis or comorbid, trying to reduce the number false positive in this population. Objective. Show the presence of false positives in the diagnosis of ADD / ADHD in children referred to our center with this diagnosis. Method: it was performed a neuropsychological evaluation of various cognitive, behavioral and emotional functions children diagnosed with ADD / ADHD. Results: In many cases we find the presence of false positives in the diagnosis of ADD / ADHD from neuropsychological profile obtained. This misdiagnosis carries a label and a very important academic implications, family and social. Conclusions: We consider it essential to make a proper child neuropsychological assessment to support the diagnosis and thus allows a better therapeutic approach, and identify comorbidities and facilitate the differential diagnosis.

SYMPOSIUM 7

PSYCHOPHARMACOLOGY

Friday, July 16th, 2015

Chair: GONZÁLEZ ARAGÓN, CARLOS MANUEL

ROLE OF INTRACELLULAR CALCIUM ON ETHANOL-INDUCED ACTIVATION OF PROTEIN KINASE A AND ITS BEHAVIORAL CONSEQUENCES

Carlos M. Gonzalez Aragon

Area de Psicobiología. Universidad Jaume I. Castellón. Spain

Ethanol interacts with multiple molecular targets but a particular specific mechanism of action by which ethanol can exert its actions at a central level remains to be identified. The participation of the cAMP-PKA in the neurobehavioral response to ethanol has been described. Intracellular Ca^{2+} appears to be a second messenger mechanism critical to signal and information transduction across the cell. Moreover, a great body of evidence has shown Ca^{2+} to be a critical mediator in the cAMP-PKA cascade. We hypothesized that in vivo cellular Ca^{2+} homeostasis disruption would be critical to further activating the cAMP-PKA cascade and therefore to determining the neurobehavioral response to ethanol. For this reason we propose that ethanol administration elicits modulation of the cellular Ca^{2+} fluxes to further activate PKA. As a result of this PKA activation, different substrates are modified, which play a key role in mediating the behavioral effects elicited by ethanol. Results of these experiments showed an ethanol-dependent activation of PKA in the CNS. Manipulations involving a disruption of intracellular Ca^{2+} fluxes resulted in a decrease ethanol-induced activation of PKA and a reduction of ehanol-induced behavioral effects. All these data provide further evidence of a possible new target for ethanol within the central nervous system.

CIRCADIAN RHYTHMICITY, NEUROCOGNITION AND PERSONALITY IN DUAL DIAGNOSIS PATIENTS. CORRELATES AND CLINICAL PREDICTIVE VALUE

Ana Adan [1,2]

[1.] Department of Psychiatry and Clinical Psychobiology, University of Barcelona, Barcelona, Spain.

[2.] Institute for Brain, Cognition and Behavior (IR3C), Barcelona, Spain.

Dual diagnosis (DD), is considered as the coexistence of a substance use disorder (SUD) and a severe mental illness (SMI) commonly schizophrenia, bipolar disorder and major depression disorder. Currently, DD represents a challenge in terms of both basic knowledge and clinical practices focused to its management. Although it is not yet considered as a clinical entity in psychiatric diagnostic manuals, recent prevalence data show rates between 65-85% and 45% in public healthcare settings of drug addiction and mental health, respectively. DD is associated to low treatment adherence and poor clinical outcomes, higher relapses and greater family, social and legal problems. There is already a long road ahead in characterizing these patients as well as in the study of common and differential aspects compared to their counterparts suffering from a SMI or a SUD alone. A summary of the main findings over the past six years by our research team,incorporated into the consolidated group of Neuropsychology at the University of Barcelona, will be discussed.

Generally, those DD patients under treatment and abstinent for more than three months, tend to show less amplitude in theircircadian rhythmic expression, different cognitive profile in terms of attention, memory and executive functioning, worse health related quality of life and poor coping strategies compared to those suffering from a SMI or a SUD alone. Further, DD show a mixed personality profile compared to their counterparts.Specifically, they show high impulsivity, novelty seeking and harm avoidance as well as low scores in persistence and reward dependence. On the other hand, the patient's age, medication intake, suicidal behaviour and caffeine consumption rates are clinical related factors modulating the results.

Overall suggest that DD is a single diagnostic entity with idiosyncratic characteristics, and not the simple sum of SUD and SMI disorder. However, considering circadian rhythmic functioning, cognitive performance and personality traits in general assessments may provide significant benefits in their clinical assistance contributing to minimize the relapses, chronicity and psychosocial problems that they currently present.

Acknowledgments: Grants from the Spanish Ministry of Science and Innovation (PSI2009-12300) and the Spanish Ministry of Economy and Competitiveness (PSI2012-32669).

INCREASED SUSCEPTIBILITY TO DYSKINESIA IN BDNF-OVEREXPRESSING RATS

Tronci E, Munoz A**,** Fidalgo C, Stancampiano R, Bjorklund A, Carta M.

Department of Biomedical Sciences, Section of Physiology, University of Cagliari, University Campus, SS554 km 4.5, 09042 Monserrato, Italy

Appearance of dyskinesia represents a serious side effect of long-term L-DOPA treatment in Parkinson's disease patients. In addition to its role in neuronal survival, the neurotrophin BDNF has been shown to influence serotonin transmission and synaptic plasticity in animal models, both of which strongly implicated in dyskinesia, suggesting that BDNF may play a role in the emergence of this motor complication.

In this study, drug-naïve and L-DOPA-primed 6-OHDA-lesioned rats received a striatal injection of an adeno-associated viral vector (AAV vector) to over-express either BDNF or GFP, as control vector. Eight weeks later, animals received daily treatment with either L-DOPA (4-6 mg/kg s.c.) or apomorphine (0.025 mg/kg s.c.), and dyskinesias were evaluated along with drug-induced rotations.

Results showed that striatal over-expression of BDNF resulted in increased susceptibility to development of dyskinesia following daily treatment with both L-DOPA and apomorphine in drug-naïve rats, and produced significant exacerbation of L-DOPA-induced rotation. By contrast, BDNF over-expression did not affect already established dyskinesias in L-DOPA-primed rats.

L-DOPA treatment has been shown to increase expression of BDNF in parkinsonian animals. We propose that such upregulation plays a role in development of dyskinesia. Thus, BDNF over-expression by viral vector in drug naïve 6-OHDA-lesioned rats may boosts changes that would normally take place over time upon L-DOPA-induced up-regulation of endogenous BDNF.

DIFFERENTIAL MODULATION OF GLUTAMATERGIC, GABAERGIC AND ENDOCANNABINOID SYSTEMS IN THE BASOLATERAL COMPLEX OF AMYGDALA DURING THE INCUBATION OF COCAINE, HEROIN AND SUCROSE CRAVING

David Roura-Martínez, Marcos Ucha, Raquel Santos-Toscano, Ana Contreras, Roberto Capellán, Javier Orihuel, Alejandro Higuera-Matas y Emilio Ambrosio

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

The incubation (progressive increase) of craving is a phenomenon commonly suffered by addicts during abstinence periods. Although reproduced in animal models with different drugs and natural reinforcers, most studies have focused on the incubation of cocaine craving. The aim of this study was to describe the changes in the glutamatergic, GABAergic and endocannabinoid systems, during the incubation of craving after the self-administration of a psychostimulant (cocaine), an opioid (heroin), and a natural reinforcer (tap water sweetened with sucrose). For this purpose, male Lewis rats underwent self-administration protocols that are known to induce incubation of craving: 6 h per day sessions (cocaine, heroin, saline), or 2 h per day (sucrose, water), for 10 consecutive days. Then, rats from each group were assigned to two withdrawal conditions: a half of the animals were sacrificed after one day of withdrawal and the other half after one month of forced abstinence. The brains were collected and the basolateral complex of amygdala (involved in incubationof craving for cocaine) was analyzed. After one month of withdrawal, drug craving incubation but not sucrose craving incubation provoked an augmentation of the protein level ratio PSD95/synaptophysin and an increase of the nape-pld/faahmRNA ratio.

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SYMPOSIUM 8

MASTERS AND DOCTORAL DEGREES IN PSYCHOBIOLOGY

Friday, July 17th, 2015

Chair: COSME SALAS

THE AREA OF PSYCHOBIOLOGY IN THE OFFICIAL MASTERS AND DOCTORATE DEGREES OF THE UNIVERSITY OF SEVILLA

Cosme Salas

Laboratory of Psychobiology. Campus Santiago Ramón y Cajal. University of Sevilla. Spain.

The Area of Psychobiology of the University of Seville takes part in two official University Masters´ Degrees, and in two Official Doctorate programs. The University Master of Physiology and Neuroscience is an interdisciplinary degree, in which participate several Departments of the Medicine, Biology, Pharmacy and Psychology Schools of the University of Sevilla. The Area of Psychobiology of the University of Sevilla participates also in the University Master of Advanced Studies of Brain and Behavior. This Master is taught in the School of Psychology and it is under the supervision of the Department of Experimental Psychology. It offers two possible areas of specialization: Behavioural and Neuroscience Research, and Clinical Neuropsychology. Both masters are addressed to post-graduate students. The educational period of these masters is two years, and both have been awarded with the Quality Mention by ANECA.

In regard to the Doctoral Programs, the Area of Psychobiology of the University of Sevilla participates in two official Doctorate Degrees. In the Program in Molecular Biology, Biomedical Sciences and Clinical Research participates 145 professors from 16 different Departments of the University of Seville, from 8 different Centers of the CSIC, and from Institutes and University Hospitals from the Andalusian Health System. This Doctorate program has approximately 300 students proceeding from degrees in Biology, Chemistry, Medicine, Pharmacology, Psychology, Physics, Environmental Sciences, Biotechnology, Biochemical, Engineering, etc. This Doctorate Degree offers three possible areas of specialization: in Molecular Research, Biotechnology and Molecular Genetics, in Physiology and Neuroscience, and in Biomedical Research. This Doctorate program has been awarded with the Quality Mention by ANECA. Finally, the Area of Psychobiology of the University of Seville also participates in the official Doctorate Degree in Psychology that is offered by the School of Psychology of the University of Seville, and in which participate all the Departments of the Faculty of Psychology. This Doctorate Degree has been recently implanted and offers different areas of specialization, including Experimental Psychology and Neurosciences, Social Psychology, Developmental Psychology and Clinical Psychology.

The strengths and weaknesses of the present Master and Doctoral degrees will be discussed during this presentation, and some improvements will be suggested.

PARTICIPATION OF THE AREA OF PSYCHOBIOLOGY IN THE POSTGRADUATE PROGRAMS AT THE UNIVERSITY OF VALENCIA.

Alicia Salvador

Coordinator of the Doctoral Program in Neurosciences, University of Valencia. E-mail: alicia.salvador@uv.es

The participation of the area of Psychobiology in the university postgraduate programs has changed during the last years in agreement with the modifications of autonomic and national norms.

From an unique Doctoral Program that started in 1986, the area of Psychobiology of the University of Valencia participate in at least two Doctoral Programs, Neurosciences and Research on Psychology, each one with a different trajectory and background.

Participation in the Doctoral Program of Neurosciences started in 2003 and has experienced different phases; during some years was associated with University of Murcia. This Program obtained and maintained the Mention of Quality during all years.

The Doctoral Program of Psychobiology had also the Mention of Quality during several years. In the last period, it was integrated in the Doctoral Program of Research in Psychology, main Doctoral Program of the Faculty of Psychology of Valencia. It involves two groups of Psychobiology with some different interests and topics.

With the implantation of official Masters´ Degrees approximately six years ago an important diversification of contributions from Psychobiology appeared, although there are two official masters that involve the most number of members of the area, the M.O. enNeurocienciasBásicas y Aplicadas y el M.O. de Drogodependencias: Investigación, Tratamiento y Patologías Asociadas.

THE STRATEGY OF THE UNIVERSITY OF THE BASQUE COUNTRY UPV/EHU

M. Gabriela Chotro

Director of the Doctoral Program in Psychology and Director of the Master and Doctoral School, University of the Basque Country UPV/EHU

I will explain how we have potentiated the quality, the interdisciplinarity and the critical mass of the postgraduate studies in the Faculty of Psychology, by bringing together in one research master and in a single doctoral program all the active research lines, including those of Psychobiology. This scheme allowed us to provide our graduate students with an appropriate environment for starting their research careers. In addition the quality of this program was recognize by the Spanish Ministry of Education (Quality award, Excellence award). Some of the advantages of pooling together all these research lines from different areas of Psychology were, for instance, the generation of trans-area research groups increasing the capacity for funds attraction. This facilitated the strengthening of the international collaborations of these research groups enhancing the international mobility of the master students and doctoral candidates, increasing the amount of international PhDs as well as providing the new researcher with a useful international network.

CURRENT STATUS OF PSYCHOBIOLOGY IN THE POSTGRADUATE PROGRAMS AT THE UNIVERSITY OF GRANADA

Milagros Gallo

Department of Psychobiology. Institute of Neurosciences. Centre for Biomedical Research (CIBM). University of Granada. Spain.

The role of Psychobiology in the university postgraduate programs has been changing along the last decades with the general growing interest in Neurosciences. This has produced dramatic changes in the focus of all psychological disciplines thus altering the existing balance between the traditional psychological areas. At the same time this has led to confusion among biomedical trained neuroscientists without psychological background who find difficult to distinguish the aim and approaches of Psychobiology of other Psychology areas. Therefore, at present the contribution of the psychobiologist to Master and Ph.D. programs has a special relevance for the development of both Psychology and Neurosciences.

The organization of the postgraduate programs at the University of Granada (UGR) and the involvement of members of the Psychobiology Department is reviewed. According to the historical roots of the discipline both in Psychology and the Biomedical Sciences, UGR psychobiologists participate mainly in two official masters: "Cognitive and Behavioral Neuroscience" and "Neuroscience and Pain". Both masters have been taught since the course 2006-2007 and they have been evaluated and updated several times afterwards.

"Cognitive and Behavioral Neuroscience" comes from a previous official postgraduate program in "Experimental Psychology and Behavioral Neuroscience" of the Psychology faculty and it is aimed to graduates in Psychology and other related fields. Most of the members of the teaching team are psychologists. It gives access to two of the "toward excellence" level Ph.D. programs of the University of Granada: Psychology and Biomedicine.

"Neurosciences and Pain" comes from a previous inter-university master of the Medicine faculty and it is explicitly aimed to graduates in Biology, Biochemistry, Biotechnology, Pharmacy, Medicine, Dentist and Psychology as well as nurses, physiotherapists and occupational therapists. The teaching team is formed by neuroscientists of various backgrounds including physiologists, embryologist, pharmacologists, neurologists, psychologists, biologists, etc,… It gives access to three of the "toward excellence" level Ph.D. programs of the University of Granada: Psychology, Biomedicine and Clinical and Public Health Medicine.

Although the main orientation of both masters is aimed at research it is proposed a crucial role of Psychobiology in training for professional development in applied areas of Psychology and Neurosciences.

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ORAL COMMUNICATIONS

PSYCHOSOCIAL STRESS EFFECTS ON AUTONOMIC RESPONSE AND COGNITIVE FUNCTION IN SUBJECTS WITH HIGHER AND LOWER PSYCHOPATY SCORES

Espín, Laura[a], Gómez-Amor, Jesús[a] , Salvador, Alicia [b] , Marques-Teixeira, Joäo [c], Barbosa, Fernando [c].

[a]Department of Human Anatomy and Psychobiology. University of Murcia, Spain. [b]Laboratory of Social Cognitive Neuroscience. University of Valencia, Spain. [c]Laboratory of Neuropsychophysiology. University of Porto, Portugal.

The role of psychosocial stress in the development and manifestation of psychopathic behavior has not been sufficiently studied and the results obtained are inconclusive. Identifying what are the effects of stress on the psychopathic personality can be useful to the evaluation and development of specific psychosocial interventions in order to treat such personality traits. Some studies have found that subjects with high psychopathic personality traits appear to be less vulnerable to stress than the general population, showing, on the one hand, irregularities (hyporeactivity) in the activity of the autonomic nervous system and, on the other hand, a low recognition of unpleasant words in situations of psychosocial stress. The aim of this study was to measure the effects of a standardized psychosocial stressor (Trier Social Stress Test, TSST) on autonomic and cognitive responses. Fifty subjects were selected through a general health questionnaire to become part of the study (ages between 18-35 years). Participants were recruited either from a sample of 1000 candidates with variable scores on Triarchic Psychopathy Measure (TriPM, Patrick, 2010), or among university students that filled the TriPM. Those 25 subjects that scored higher on TriPM were compared with those subjects showing lower psychopathy scores. In order to assess the cognitive function of participants, we used an emotional memory task based in the recognition of pictures from the International Affective Pictures System (IAPS, Lang et al., 2005); we computed a D-Prime index for the analysis of the participants´ sensitivity in the memory task. The autonomic activity was continuously measured and registered with different parameters of heart rate variability (HRV) during the experimental session. Our results confirm in part previous studies. However, our data provide a more complete view of the possible neurobiological deficits associated with psychopathy integrating psychophysiological and memory measures. In this study, the data are discussed in relation to the obtained results.

This study is part of a research project funded by the Ministry of Education and Science (PSI2013-46889-P). Spain.

MODULATION OF FACE-SENSITIVE ERPS BY ACQUIRED OCCIPITO-TEMPORAL BRAIN DAMAGE

E. I. Olivares, A. S. Urraca, E. Rodríguez-Alzueta, J. Iglesias.

Facultad de Psicología. Universidad Autónoma de Madrid, Spain.

In the present study we contrasted the neurophysiological profiles, as defined by Event-Related Potentials (ERPs) related to visual processing, from an agnosic patient (EC) with right occipito-temporal damage (following an encephalitis), with those from healthy participants which served as the control group. The aim is to better understand both the functional meaning and the neural origin of those brain responses commonly related to face processing and to determine the extent to which they might be, when compared with those responses associated to the verbal/semantic domain, modulated in latency, amplitude and topographic distribution by the presence of brain damage involving right posterior associative cortices. To that end, participants carried out several matching tasks with differentiated involvement of facial and verbal/semantic contents: face-feature matching, face-occupation matching and word pair matching, among others. We found in EC, in contrast to the control group, that the visual P1 and the posterior temporal face-sensitive N170 were either decreased notably in amplitude, markedly delayed or characterized by an unusual scalp distribution. Conversely, long-latency ERPs like N400 showed in EC a similar pattern to that found in the control group. These results suggest that analogue cognitive operations (as defined by several matching tasks) can be supported by differentiated neural mechanisms concerning different information domains, which are specially illustrated in the brain damage confined to right posterior associative cortices. Furthermore, these results could constitute neurophysiological indicators of the baseline and potential modulations of brain activity (in correlation with the patient's performance), as a consequence of a rehabilitation programme, involving both structural-analytic face processing and associative learning.

This work was supported by "Ministerio de Economía y Competitividad" (Spain I+D+I National Programme PSI2013-46007-P)

TITLE: VERBAL FLUENCY IN ELDERLY ADULTS: THE EFFECT OF EDUCATIONAL LEVEL

Rosa, B., Perea, M.V., Ladera, V. and García, R.

Universidade Lusófona de Humanidades e Tecnologias. Escola de Psicologia e Ciências da Vida, Copelabs, Lisbon, Portugal.

The purpose of this study was to analyze the effect of educational level on verbal and action fluency in elderly adults. A total of 105 healthy adults (40 male and 65 female) aged between 65 and 88 years participated in this study. They were recruited from different senior community centers of Lisbon. Four educational groups were created according to years of formal education completed: low (1-9 years), middle (10-12 years), high (13 or more years) and no education (0 years). The Mini Mental State Examination and the Beck Depression Inventory were used as cognitive and depression screening tests. All participants were native Portuguese speakers with vision correct to normal. None of them had neurological and psychiatric disorders, history of stroke, brain injury or alcohol and drugs abuse. Data from semantic verbal fluency were recollected using the Set Test (Isaacs & Akhtar, 1972) and the phonological verbal fluency was assessed using the Lexical Test from the Frontal Assessment Battery (Dubois, Slachevsky, Livton & Pillon, 2000). Action fluency was assessed using the Action Fluency Test (Piatt, Fields, Paolo & Troster, 1999). Results from analysis of covariance showed a positive effect of educational level on semantic and phonological verbal fluency and action fluency performance. Participants with more years of education reached higher scores in all measures however, no differences between low educational level and no education groups were found. The action fluency test seems to be the most sensitive task of educational level effect. Taken together, these findings corroborate the positive role of education in neuropsychological performance of elderly adults.

THE INFLUENCE OF PSYCHOPATHIC TRAITS ON BEHAVIORAL AND EVENT-RELATED POTENTIAL (ERP) RESPONSES IN THE ULTIMATUM GAME

Paiva, Tiago; Ferreira-Santos, Fernando; Vieira, Joana; Almeida, Pedro; Barbosa, Fernando; Fernandes, Carina; Marques-Teixeira, Francisco; Marques-Teixeira, Joao.

Laboratory of Neuropsychophysiology of the University of Porto, Portugal.

The triarchic model of psychopathy, operationalized into the Triarchic Psychopathy Measure (TriPM), suggests that three phenotypic constituents compose the construct of psychopathy: boldness, meanness, and disinhibition (Patrick, Fowles, and Krueger, 2009). These traits have been associated with different patterns of social and economic decision-making. This has been evidenced by studies that relate psychopathic traits and behaviour in economic games (Koenigs et al., 2010; Mokros et al., 2008; Rilling et al., 2007; Vieira et al., 2014a). Even when no behavioural effects of psychopathy are found, individuals higher in psychopathy show reduced activation of neural structures normally associated with automatic and emotional responses (e.g., amygdala) and an increased activation of the dorsolateral PFC in emotional and social tasks (Glenn et al., 2009; Rilling et al., 2007). However, these studies typically operationalize psychopathy by considering the total scores on psychopathy scales, which conflate the different constituent traits for boldness, meanness, and disinhibition. This may mask the differential effects of the distinct psychopathic traits on behaviour and brain activation patterns, and lead to inconsistent findings consistent with a dimensional approach to psychopathy, we examined the influence of different psychopathic traits (boldness, meanness, and disinhibition) on behavioural and event-related potential (ERP) responses in the Ultimatum Game (UG). EEG recordings were collected while participants from a community sample (n = 37) completed 48 independent runs of the UG. Psychopathic traits were assessed using the TriPM. We found that meanness predicted lower acceptance of fair offers, lower fairness ratings to fair offers, and lower MFN (Mid-Frontal Negativity) mean amplitudes at frontal and central electrodes, suggesting that high meanness is related to abnormal perceptions of fairness and a blunted response to unfairness. On the other hand, disinhibition predicted higher MFN mean amplitudes in the same locations, indicative of a stronger negative emotional reaction to unfairness. Boldness also predicted higher MFN mean amplitudes at C4. Overall, the MFN results also support previous findings suggesting that specific psychopathic traits are associated with different neural mechanisms for processing social information, although the behavioral outcome may, at times, be identical to individuals low on psychopathy (Vieira et al., 2014). Together, these results reveal the limitations of using overall psychopathy scores, and highlight the importance of dissociating between the phenotypic constituents of psychopathy.

EXECUTIVE FUNCTIONS IN OBESE INDIVIDUALS WITH BINGE EATING DISORDER

Fátima Gameiro, Victoria Perea, Valentina Ladera & Ricardo García

Universidade Lusófona de Humanidades e Tecnologias. Escola de Psicologia e Ciências da Vida, CopeLabs, Lisbon, Portugal.

According previous studies, deficits in executive functions plays an important role in the development and maintenance of binge eating disorder.The aim of this study was to compare the executive functions of obese Portuguese individuals with/without binge eating disorder (BED), with normal weight individuals. Method: In this study participated 114 adults (38 obese individuals with BED, 38 obese individuals without BED and 38 normal weight individuals). All individuals were assessed using the following instruments: Mini-Mental State Examination; Eating Attitudes Test-26; Binge Eating Scale; Sympton Check-List-90-R; Frontal Assessment Battery; Action Fluency; Color Trails Test; Stroop Neuropsychological Screening and Wisconsin Card Sorting Test. Results: Compared with normoponderal and binge eating disorder groups, obese participants had shown more difficulties in planning and sequencing and cognitive flexibility; the binge eating group reveals higher difficulty in the maintenance of response and distraction; in addiction, participants with obesity and binge eating disorder had shown poorer performance in conceptualization and abstraction, capacity of inhibitory control, ability to solve problems and verbal fluency. Taken together, our findings provide evidence of the important role of the executive functions in the weight control. In same way these results could contribute to the prevention of binge eating disorder and obesity by stimulation and improving of executive functions.

DEVELOPMENTAL TRAJECTORIES OF EXECUTIVE FUNCTIONING IN CHILDREN AGED BETWEEN 5 AND 12 YEARS

Joana Gonçalves and Fernando Barbosa

Faculty of Psychology and Education Sciences, University of Porto. Laboratory of Neuropsychophysiology, Porto, Portugal.

Neuropsychological research on executive functioning has significantly expanded over the past 20 years. Nonetheless, few studies examined executive functions using a developmental framework in normative samples, and considering several neuropsychological assessment measures across different age groups. We aimed at mapping the developmental trajectories of cognitive processes included in four domains of executive functioning: Attentional Control, Cognitive Flexibility, Information Processing, and Goal Setting. Also, we aimed at examining if the emergence and development of executive functions was attuned with previous findings on the neuroanatomic development of the prefrontal lobes. Bearing those aims in mind, we conducted a set of cross-sectional studies comprising 71 children clustered into seven age groups (5-6, 6-7, 7-8, 8-9, 9-10, 10-11 and 11-12 years) in order to examine the development of executive functions from 5 to 12 years of age. The Children`s Color Trails Test, the Iowa Gambling Task for Children and eight subtests from the Neuropsychological Assessment Battery NEPSY-II were used. Information Processing and Attentional Control domains presented a similar developmental pattern with a growth spurt between 5-6 and 6-7 years, while Cognitive Flexibility and Goal Setting appeared to develop more sharply between 5-6 and 7-8 years and more gradually up to 12 years. These results are consistent with evidence showing a late prefrontal cortex maturation, occurring through growth spurts, specifically between 3 and 5 years, between 7 and 10 years and a final one during adolescence, extending into early adulthood. Further work should focus on the relationship between brain and behavior, which stresses the importance of a contiguous dialogue between different scientific domains aspiring to understand those relations in the developing child.

STUDY OF LEARNING STRATEGIES AND ATTENTION LEVELS IN SIXTH GRADE STUDENTS

Isabel Martínez (isabel.martinezalvarez@uam.es), Eva Jiménez (evajima@gmail.com), Pilar Martín-Lobo (pmartinlobo@unir.net)

Universidad Internacional de la Rioja (UNIR), Logroño, Spain

Today's society offers students easy access to a vast amount of information provided from different sources, which often can be contradictory. Students need to manage this load of incoming facts selective and critically. Therefore, one of the biggest challenges for education is to support students to initiate and direct their own learning, and to independently make decisions directed toward a self-determined learning goal. Previous research has shown that students learning strategies (Ramírez, 2001) and their attention capacity (Kruschke, 2005) can be powerful tools to achieve this goal if they are used in a certain way. Moreover, students from different levels of education have learning difficulties when these processes are not properly taught. The learning potential of the integrated use of these variables have been less investigated, as well as the neuropsychological perspective of them. Following this context, and from an integrated neuropsychological and educational perspective, this research focuses on 6th grade primary school students and more specifically on the their attention span, the use of learning strategies, and how the variables are related to each other and the academic achievement. For its accomplishment two tools are used, D2 attention test and ACRA learning strategies questionnaire, run on a group of fifty-seven students of the 6th year of Primary who were divided into a high achievement set and a lower achievement set. Statistic analyses, T student comparative study and Pearson correlation were carried out. The most important results have showed the existence of a positive correlation between processing speed and the acquisition scale, as a facilitator of acquisition strategies. Relationship between scale of coding and the omissions D2 was also found. Additionally, a differential use in obtained marks in both variables was proved when comparing the two groups, high and low achievers. It seems that intervention on the integrate use of learning strategies and attention capacity could be helpful in order to promote an adequate global learning performing from primary levels of education.

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RELATION BETWEEN LATERALITY, VISUAL-PERCEPTION SKILL AND MATHEMATICAL PERFORMANCE

Lopez, M., Martínez, I., Bernabeu, E. and Martín-Lobo, P.

Universidad Internacional de la Rioja, UNIR, Logroño, Spain. Email: maialenlolu@hotmail.com

Introduction: Pisa's Report (OECD, 2012) shows that mathematics` performance in "almost 25% of Spanish students, who made the digital test in mathematics, are at the lowest levels (<1, 1); while only 4.5% of the students are at the highest levels (5 and 6)", according to the study presented in 2014 by the Education's Ministry of Spain. Neuroscience and neuropsychology show in different researches that mathematical performance problems can be associated to the development of laterality and spatial and temporal structures (Vlachos, Gaillard, Vaitsis, & Karapetsas, 2013; Geary, 2011, Jagannath, Garrido & González, 2001).

Objective: The main objective pursued in this study was to analyse the relation between laterality, visual-perceptual skill and mathematical performance.

Method: The research was conducted with 32 children aged 8-12 whose average age is 9.7, which were enrolled in third to sixth grade of Primary School. Firstly, it was individually applied a test of visual, aural, manual and foot laterality (Martin-Lobo, Garcia, Rodriguez and Vallejo, by an adaptation of Subirana´s test, 2010), and the visual-perception test from CUMANES test (Portellano, Mateos and Martínez-Arias, 2012), in addition to obtaining mathematics scores of each student. A descriptive and correlational analysis of laterality, visual-perception skill and mathematical performance level was held by SPSS statistical package.

The **results** obtained in this investigation showed that more than half of the sample had no distinct laterality. It also reflected, as expected, the existence of a significant correlation between laterality and mathematics indicating that as lateral disorganization is worst so it is the performance in this area. A positive correlation between the scores in mathematics and visual-perceptual skills were also found. By contrast, the analysis showed no significant correlation between the laterality and visual-perception skills.

Conclusion: Considering the results, we can confirm that both, laterality as well as visual-perception skill of students are essential components that must be considered due to their relation with the development of mathematical learning. This study provides new ways for further researches on neuropsychological factors that influence in mathematics achievement and recommend a design of neuropsychological intervention programs that can improve the mathematical performance of Elementary School students from neuropsychological basis.

PERINEURONAL NETS IN THE CEREBELLUM OF MICE HIGHLY MOTIVATED FOR COCAINE

Maria Carbo-Gas[1]; Isis Gil-Miravet[1]; Anna Esteve[2]; Irene Gracia-Rubio[2]; Olga Valverde[2]; Carla Sanchis-Segura[1]; Marta Miquel[1]

[1]Area de Psicobiología. Universidad Jaume I. Castellón. Spain. [2]Departamento de Ciencias Experimentales y de la Salud. Universitat Pompeu Fabra. Barcelona. Spain.

External factors might promote structural remodelling of brain circuitry by modulating the activity of regulatory molecules that restrict neuronal plasticity in order to stabilize circuits. These plasticity inhibitory mechanisms take place in a cartilage-like structure called Perineuronal net (PNN) consisting of several molecules of extracellular matrix. Therefore, by reducing or over-expressing extracellular matrix components, drugs and environmental factors might be able to modify conditions for synaptic change. In the cerebellum, both deep nuclear cerebellar projection neurons, those receiving strong innervation from GABAergic Purkinje axons, and Golgi inhibitory interneurons are enveloped by PNNs.

Previously, we have demonstrated that expression of PNNs in deep medial nucleus changes depending on the withdrawal period in sensitized mice. Also, PNNs are over expressed in Golgi neurons of mice that develop conditioned preference towards a cue related to cocaine. Therefore, in the present research, we explored the expression of PNNs in the large projection neurons of the medial cerebellar nucleus and in Golgi cells of the granular cell layer in mice trained to self-administrated cocaine.

Mice were trained to acquire intravenous self-administration of cocaine in a nose-poking operant chamber under a fixed ratio 1 schedule (FR1) ten days during 60 minutes. After these ten days, the motivational strength of cocaine as a reinforcer were evaluated using a progressive-ratio (PR) schedule in which the response requirement to earn an injection escalates according to the following series: 1–2–3–5–12–18–27–40–60–90–135–200–300–450–675–1,000. The PR session lasted for 2 h or until the mice did not complete the ratio for delivery of one reward within 1 h and was performed only once. Breakpoints to extinguish self-administration behaviour were determined in each animal. To properly identify PNNs, we employed Wisteria floribunda agglutinin (WFA), and we immunolabelled medial nuclear neurons with antibodies recognizing SMI-32. We performed an analysis of WFA staining intensity. Each net was assigned to one of three categories of staining intensity, ranging from the lowest to the highest value of WFA intensity: faint= 0-33%, medium= 34-66%, strong= 67-100% of the maximum staining intensity. We observed that mice with higher breakpoints showed a decrease in the proportion of PNNs exhibiting strong WFA intensity in the deep medial nucleus. Conversely, when animals showed lower breakpoints, there was a reduction in the number of PNNs expressing faint WFA intensity. Nevertheless, we did not observe differences in the expression of WFA intensity in the Golgi cells of the granular cell layer. Overall, our data suggest that when high motivation for cocaine is reached cocaine decreases the expression of PNNs in the medial neurons, making easier further remodelling in Purkinje synapses.

EFFECT OF SEROTONIN TRANSPORTER BLOCKADE ON L-DOPA-INDUCED DYSKINESIA IN ANIMAL MODELS OF PARKINSON'S DISEASE

Camino Fidalgo[1], Wai Kin D Ko[2,3,4] Elisabetta Tronci[1], Qin Li[4,5], Roberto Stancampiano[1], Qin Chuan[5], Erwan Bezard[2, 3, 4, 5] and Manolo Carta[1]

[1]Department of Biomedical Sciences, Section of Physiology, University of Cagliari, University Campus, SS554 km 4.5, 09042 Monserrato, Italy. [2]Univ. de Bordeaux, Institut des Maladies Neurodégénératives, UMR 5293, F-33000 Bordeaux, France; [3] CNRS, Institut des Maladies Neurodégénératives, UMR 5293, F-33000 Bordeaux, France; [4] Motac Neuroscience, Manchester, UK ; [5] Institute of Lab Animal Sciences, China Academy of Medical Sciences, Beijing, China

In the recent years, the serotonergic system has emerged as a key player in the appearance of L-DOPA-induced dyskinesia (LID) in animal models of Parkinson's disease (PD). Accordingly, pharmacological silencing of serotonin neuron activity by 5-HT1A/1B receptor agonists suppresses LID in parkinsonian rats and monkeys. Moreover, serotonin transporter blockade with selective serotonin reuptake inhibitors (SSRIs) was also shown to counteract LID in 6-hydroxydopamine (6-OHDA)-lesioned rats. However, this effect has never been described in PD patients with dyskinesia, despite the fact that they often receive SSRIs for treatment of depression. In the present study, we investigated the efficacy of the SSRI citalopram in two experimental models of PD, the 6-OHDA-lesioned rat and 1-methyl-4-phenyl 1,2,3,6-tetrahydropyridine (MPTP)-treated macaque. First, we studied the acute effect of citalopram (5 and 10 mg/kg, given 30 min before L-DOPA) on L-DOPA-primed parkinsonian rats treated with different doses of L-DOPA/benserazide (4/4, 6/6 and 12/10 mg/kg). Our results showed that acute citalopram treatment produced a significant reduction of LID at all treatment doses. Second, dyskinetic rats were chronically treated with citalopram (10 mg/kg) at 30 min or 12 hours before L-DOPA (4 mg/kg) administration. A significant and long-lasting reduction of LID was only observed when citalopram was given 30 min before L-DOPA, suggesting that the time of injection relative to L-DOPA is a key factor for the efficacy of treatment. Interestingly, an acute challenge with a moderate dose of the 5-HT1A/1B receptor agonist eltoprazine, given at the end of the chronic study, was equally effective in reducing LID in rats that previously received chronic treatment with L-DOPA or L-DOPA plus citalopram. These data suggest that no auto-receptor desensitization was induced upon repeated administration of citalopram. In a last experiment, dyskinetic MPTP-treated macaques were treated acutely with citalopram at three doses (5, 10 and 15 mg/kg) 30 min before L-DOPA. Our results show a significant anti-dyskinetic effect on LID at the highest citalopram dose; however a reduction of the therapeutic effect of L-DOPA was also observed, raising concerns for possible clinical application.

ASSESSING THE BRAIN THROUGHOUT THE EYE: HEPATIC ENCEPHALOPATHY

N. Arias[1,3], M. Méndez[2,3], I. Alcalde[3,4], A. Íñigo-Portugués[4], J. Merayo-Lloves[3,4,5], J. Arias[6], JL. Arias[2,3]

[1] Department of Experimental Psychology, University of Cambridge, UK; [2] Laboratorio de Neurociencias, Departamento de Psicología, Universidad de Oviedo. [3] INEUROPA, Instituto de Neurociencias del Principado de Asturias. [4] Fundación de Investigación Oftalmológica (FIO), Instituto Oftalmológico Fernández-Vega, Oviedo, Spain. [5] Surgery Department, School of Medicine, University of Oviedo, Oviedo, Spain. [6] Surgery Department, School of Medicine, Complutense University of Madrid, Spain

Hepatic encephalopathy (HE) is a neuropsychiatric disorder characterized by cognitive impairment and usually seen in patients with advanced liver disease or porto-systemic shunts. The HE spectrum varies from minor cognitive dysfunction to lethargy, depressed consciousness and coma. Minor cognitive dysfunction in patients with cirrhosis is termed minimal hepatic encephalopathy (MHE). This disease is estimated to affect up to 60% to 80% of patients with cirrhosis and may seriously impair daily functioning and health-related quality of life. Despite its importance, none of the neuro or psychophysiological methods used has proven to be of greater use in diagnosing MHE.The lack of a proper detection method could be explained by the multifactorial nature of this disorder which includes liver failure, an increased in ammonia levels due to a liver malfunction and the existence of portal hypertension. Among all factors, the presence of portal hypertension has been revealed as the main factor in the increased blood pressure, circulatory alterations, presence of inflammation, and the development of hepatic encephalopathy. Furthermore, both blood and lymph penetrate most tissues in the body except cornea. For this reason, the cornea has revealed a great place to examine these new vessels formation due to the fact that normal human cornea has no blood or lymphatic vessels, and just secondary to a disease the cornea can become vascularized, a phenomenon that has been described both clinically and histopathologically. In light to these data, the aims of this work were: (i) Reproduce the portal hypertension clinical symptoms which leads to a development of mHE; (ii) Highlight the existence of cognitive differences in the mHE animals through the performance of a stimulus-response task; (iii) Explore the existence of earlier and accessible biomarkers to determine the development of mHE throughout the cornea exploration.Rats were trained on a stimulus-response task using the Morris water maze. Two groups of animals were used: a SHAM (sham-operated) group (n = 5) and a portal hypertension (HT) group (n = 5). The triple portal vein ligation method was used to create an animal model of the early developmental phase of HE. Latencies to reach the platform, mast cells expression, pro-inflammatory factors and presence/absence of blood and lymphatic vessels were examined. There were differences in behavioural performance, with a deficit in the acquisition in the HT group. At the same time, differences between HT and SHAM were found in the number of mast cells and the presence of vessels being higher in HT group. In this study, we provide the first preliminary insight into the validity of exploring the eye as a possible tool to assess the diagnosis of mHE conditions.

EXPRESSION OF IMMEDIATE EARLY GENES C-FOS IN COMPULSIVE RATS SELECTED BY SCHEDULE-INDUCED POLYDIPSIA

Merchán A[1]., Mora S. [1], Moreno M.[1] and Flores P.[1]

[1]Department of Psychology, University of Almería & CeiA3, Almería, Spain

Psychogenic polydipsia, compulsive non-regulatory fluid consumption, is present in 6-20% of psychiatric patients with disorders related to compulsivity symptoms, such as obsessive-compulsive disorder, attention deficit and hyperactivity disorder and schizophrenia. Schedule-induced polydipsia (SIP), characterized by the development of excessive drinking under intermittent food-reinforcement schedules, has been proposed as a successful model to study neuropsychiatric disorders characterized by the presence of compulsive behavior. Based in the amount of water intake and licks, it is possible to differentiate two groups of rats, one with high or excessive drinking (HD) and a second group with low drinking or not SIP acquisition (LD). Compulsive drinking on SIP could be due to hyperactivity in serotonergic and noradrenergic pathways in the amygdala and hypoactivity in dopamine pathways in nucleus accumbens and prefrontal cortex. The mail goal is to know the differential activation of brain regions related to the compulsion circuitry in High Drinkers and Low Drinkers rats during the PIP session.

Wistar rats were exposed to a fixed time 60s schedule of food reinforcement during 20 sessions. After a resting time of 30 days, rats were divided in 4 groups: two groups of HD and LD were exposed to the PIP sessions for 10 days, and two groups of HD and LD were fed with the same amount of food without an intermittent schedule of food. All groups were exposed to PIP the previous 90 minutes to perfusion. The results show differences between HD and LD rats in medial prefrontal cortex and amygdala, brain areas related to inhibition and emotion respectively. LD rats express significantly a higher c-fos density in the infralimbic cortex than HD rats. These finding support the High Drinker endophenotype as a valid model for the study of compulsivity.

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AUTISM-RELEVANT SOCIAL AND ULTRASONIC VOCALIZATIONS ABNORMALITIES IN THE MDX MOUSE MODEL OF DUCHENNE MUSCULAR DYSTROPHY

Rubén Miranda[1,2,3], Thierry Aubin[1,2], Cyrille Vaillend[1,2]

(1) CNRS, Neuroscience Paris Saclay Institute, UMR 9197, Orsay, F-91405, France. (2) Univ Paris-Sud, UMR 9197, Orsay, F-91405, France. (3) Department of Psychobiology, Universidad Complutense de Madrid, Ciudad Universitaria, 28040, Madrid, Spain.

Comorbidity of autism spectrum disorders (ASD) with genetic syndromes associated with synaptic and cognitive dysfunctionssuggests that common biological mechanisms and a poorly understood combination of multiple gene mutations are involved in the etiology of autism. Our study addresses the etiology of ASD in Duchenne/Becker muscular dystrophies (DMD/BMD) in a genetic mouse model lacking dystrophin. As other medical syndromes associated with mental retardation (Fragile X, Down, Tuberous Sclerosis…), the DMD/BMD syndromes show significant comorbid diagnosis for ASD (incidence 3-19% in distinct cohorts), while recent high throughput genomic screening and genome CNV analyses in large cohorts of idiopathic ASD patients revealed that the genomic sequences encoding the dystrophin and associated proteins are new candidate risk loci for ASD. Moreover, functional interactions between dystrophins and autism-associated neuroligin proteins have been identified in synapses, which are affected by autism-related mutations and dystrophin loss in DMD mouse models, suggesting that dystrophin function overlap ASD synaptic pathophysiological pathways. Here we provide the first characterization of autistic-like phenotype in the dystrophin-deficient mdx mouse. We carried out an in-depth analysis of social behavior and bioacoustic communication (ultrasonic vocalizations) in this model, compared in distinct experimental contexts involving various degrees of executive/cognitive demand.

We identified an autistic-like phenotype in mdx mice, expressed as context-specific alterations in social behavior and ultrasonic communication during direct encounters in novel environments. Social behavior disturbances depended on intruders' genotype and behavior, suggesting alterations in executive functions and adaptive behaviors, and were associated with selective alterations of the rate, acoustic properties and use of the ultrasonic vocal repertoire. Our results unveil critical cognitive, emotional and conative factors contributing to the development of inherited autistic-related traits in this disease model and provide a strong basis to the idea that dystrophin and neuroligin-dependent synaptic mechanisms converge upon common autism-relevant biological pathways.

CORNEAL NERVE DEGENERATION ASSESSED USING CORNEAL CONFOCAL MICROSCOPY

Alcalde, Ignacio[1]; Íñigo-Portugués, Almudena[1]; González-González, Omar[1]; Bech, Federico[1]; Belmonte, Carlos[1,2]; Merayo-Lloves, Jesús[3]

[1]Fundación de Investigación Oftalmológica. Instituto Oftalmológico Fernández-Vega. Oviedo, Spain. [2]Instituto de Neurociencias. Universidad Miguel Hernández-CSIC. San Juan de Alicante. Spain. [3]Departamento de Oftalmología. Universidad de Oviedo. Oviedo, Spain.

Introduction: Corneal confocal microscopy is a novel diagnostic technique for the detection of nerve damage and repair in a range of peripheral neuropathies, including aged dependent degeneration, aberrant nerve regeneration or neurodegenerative diseases. The cornea presents the highest density of nociceptors and sensory fibers in the body. Altered morphology due to degeneration of corneal sensory nerves and terminals directly affects to the function of the neuron and to the kind and magnitude of perception. There is growing recognition that neuropathic pain is a frequent manifestation of neurodegenerative diseases.

Methods: Healthy volunteers and patients presenting historical records of peripheral neuropathies, corneal neuropathic pain and neurodegenerative diseases were selected from the Ophthalmologist office and underwent examination with the Heidelberg Retina Tomograph corneal confocal microscope. Images of the central corneal subbasal nerve plexus were acquired and analyzed using semiautomated tracing software (FIJI-ImageJ). Parameters studied included corneal nerve fiber density, branching, length and tortuosity.

Results: Corneal confocal microscopy examination revealed a reduction of corneal small fiber sensory nerve number and branching in aged healthy volunteers. Corneal nerve fiber density, nerve branching, subbasal fiber length and nerve fiber tortuosity were altered in patients presenting neurodegenerative diseases compared to control age-matched subjects.

Conclusion: This study provides new approaches to the study of progression of neurodegenerative diseases using a non-invasive method to measure peripheral sensory neuropathies related to central diseases. Importantly, this emerging concept of neurodegenerative disease mechanisms in the primary afferent nociceptor identifies novel molecular targets for the treatment neuropathic pain and neuroprotection.

PERSONALITY TRAITS IN DUAL DIAGNOSIS PATIENTS WITH DIFFERENT SEVERE MENTAL ILLNES: A PSYCHOBIOLOGICAL APPROACH

Julia E. Marquez-Arrico[1]; Ana Adan[1, 2].

[1]Department of Psychiatry and Clinical Psychobiology, University of Barcelona, Barcelona, Spain. [2]Institute for Brain, Cognition and Behavior (IR3C), Barcelona, Spain.

Background: Despite the frequent comorbidity between Substance Use Disorders (SUD) and Severe Mental Illness (SMI), and the important role of personality in the evolution and prognosis of both disorders, very few studies have investigated the personality profiles of these Dual Diagnosis (DD) patients [1].

Objective: Explore the possible differential personality profile of a sample of DD patients regarding the comorbid SMI.

Method: Sample was comprised by 100 males with a SUD, aged between 18 and 55 years old, considered in three groups: Schizophrenia (SZ; N=37), Bipolar Disorder (BD; N=28) and Major Depressive Disorder (MDD; N=35). Patients were assessed using the Spanish version of the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) [2] .

Results: Through MANCOVA analyses three differences were found among the groups in the ZKPQ scales regarding the comorbid SMI. Patients within the BD group showed the highest levels of Neuroticism-Anxiety ($F=5.838$, $p<0.01$, $\eta p2=0.108$) and Impulsivity-Sensation Seeking ($F=10.772$, $p<0.001$, $\eta p2=0.183$) compared to both SZ and MDD patients, which showed similar scores. The difference in Impulsivity Sensation Seeking was observed in both Impulsivity ($F=6.220$, $p<0.001$, $\eta p2=0.115$) and Sensation Seeking ($F=6.161$, $p<0.01$, $\eta p2=0.115$) subscales. Patients within the SZ group showed the lowest scores in Sociability ($F=3.887$, $p<0.05$, $\eta p2=0.075$) compared to BD patients only. This difference was explained by the results in the subscales of Family and Friends ($F=3.196$, $p<0.05$, $\eta p2=0.062$). Compared to the other two groups, MDD patients did not showed significant differences neither for the main scales nor for the subscales

Conclusions: Our findings indicate that DD patients show different characteristics regarding the comorbid SMI. According to our results, BD patients were more likely to be emotionally upset, worried, and fearful, they showed a higher lack of planning, as well as, a higher need for thrills and excitement. SZ patients were less likely to enjoy parties or interact with people; they tended to have fewer friends and prefer to be alone or in little groups. The understanding of personality as a dimensional construct could bring more tools to design personality-targeted interventions and development of specific therapeutic strategies according to the comorbid SMI of SUD patients.

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ALCOHOL INCREASES ANXIETY AND CORTISOL LEVELS IN ADOLESCENT WOMEN

Concepción Vinader-Caerols, Aránzazu Duque, Santiago Monleón.

Department of Psychobiology, University of Valencia, Valencia, Spain

The potential long-term consequences of adolescent alcohol exposure for stress response have only been studied recently. Since alcohol is a powerful physiological stressor and adolescence is a critical window in stress susceptibility, it is important to explore in more depth the effects of alcohol on stress response (anxiety and cortisol measures) in this high risk population. Adolescence (from 10 to 19 years; WHO, 1986) is a critical stage of development and is characterized by a wide variety of changes (physiological and hormonal, among others). There is strong evidence that binge-drinking (BD) during pubertal maturation has detrimental long-term effects for the healthy development of the Hypothalamic-Pituitary-Adrenal (HPA) axis, and dysregulation of the HPA axis has been shown to predict the development of mood disorders and addiction to alcohol and other substances. Following this line of research, cortisol is a reliable way to evaluate the physiological response to stress, while anxiety is an emotional response to stress. Thus, the objective of this study was to evaluate the effects of a BD pattern of consumption and/or acute alcohol intake on stress responses (i.e. anxiety and cortisol) in adolescent men and women. Subjects were 18-19 years old (n = 132; 60 men and 72 women). According to Drinking Pattern (Refrainers and Binge Drinkers) and Treatment (Control and Alcohol), subjects were assigned to one of four experimental groups: Refrainers-Control (abstemious subjects–refreshment intake); Refrainers-Alcohol (abstemious subjects who had tasted alcohol–alcoholic drink intake); Binge Drinkers-Control (subjects with a BD history–refreshment intake) or Binge Drinkers-Alcohol (subjects with a BD history–alcoholic drink intake). State anxiety (SA) and trait anxiety (TA) were measured 20 min after drink intake and cortisol level was measured 50 min after drink intake (COR50'). Data for each sex were analyzed separately due to the statistically significant differences in alcohol concentration between men and women. The results in women showed higher SA after alcohol intake than after consumption of a refreshment. TA in women was not statistically significant. COR50' in women showed that acute alcohol administration or a BD pattern increased cortisol levels. No significant differences were observed between the groups of adolescent men. Overall, these findings emphasize the increased vulnerability ofthe stress responseof adolescent women to the effects of alcohol when there has been acute alcohol intake and a BD pattern history.

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SOCIABILITY AND DOMINANCE IN APOE3 AND APOE4 TRANSGENIC MICE: SEX DIFFERENCES AND EFFECTS OF CHLORPYRIFOS EXPOSURE

Basaure P.[1,2,3], Soebagyo P. [1,2,3], Calzado J. [1,2,3], Peris-Sampedro F. [1,2,3], Reverte I. [1,2,3], Colomina M.T. [1,2,3]

[1]Research in Neurobehavior and Health (NEUROLAB), Universitat Rovira i Virgili, Tarragona, Spain. [2]Department of Psychology and Research Center for Behavioral Assessment (CRAMC), Universitat Rovira i Virgili, Tarragona, Spain. [3]Laboratory of Toxicology and Environmental Health, School of Medicine, IISPV, Universitat Rovira i Virgili, Reus, Spain

Perinatal exposure to chlorpyrifos (CPF), an organophosphate insecticide, has been associated with long-lasting alterations in *social behavior. T*o date no study has linked CPF exposure in adults with possible effects on social behavior. Human apolipoprotein E (apoE) is ubiquitous in the central nervous system and plays an important role in lipid transport and distribution. ApoE genetic polymorphisms confer different vulnerabilities to neurodegeneration, and cognitive impairment. However, very little is known about apoE phenotypes in social and other innate behaviors. The aim of the present study was to characterize social behavior differences between adult male and female mice carrying apoE polymorphisms (ε3, ε4) and changes produced by a sub-chronic oral CPF exposure. Male and female mice were exposed through a supplemented diet to CPF at doses of 0 or 2,5 mg/kg/day for one month, to evaluate *dominance hierarchies* through the tube test. Sociability and social novelty preference were assessed by the three chamber Crawley test, after two months of CPF exposure. Results on tube test indicated that apoE4 male mice are more dominant compared to apoE3 mice, while apoE3 female mice are more dominant than ApoE4 females. Moreover, CPF exposure increased the dominance in both apoE3 an apoE4 male mice. Results on the Crawley test showed less sociability tendencies in apoE4 mice compared to apoE3 mice. Females show more social behavior than males regardless of the genotype. Additionally, apoE4 showed no preference for novel stimulus. No treatment effects were observed in this task. These data indicate differences and possible interactions between sex and apoE genotype. Results suggest that the apoE transgenic mouse is a useful animal model to analyze differences in social behavior. The implication of these polymorphisms has not yet been studied in human population.

THE INVOLVEMENT OF THE NORADRENERGIC SYSTEM IN THE ANTIDEPRESSANT-LIKE ACTION OF DEEP BRAIN STIMULATION

Perez-Caballero L, Torres-Sanchez S, Mico JA, Berrocoso E

Department of Psychology, Universidad de Cádiz, Spain.

Background: Deep Brain Stimulation (DBS) in the subgenual cingulate (Cg25) is a new and promising non-pharmacological therapeutic alternative to treat severe and resistant depression. In the first clinical trials, patients displayed clinical benefits from DBS accompanied by a normalization of the metabolism in this region that is frequently overactive in depressed patients. The aim of this study was to evaluate the antidepressant-like effect of DBS in rats and explore the contribution of the noradrenergic neurotransmission.

Methods: The effect of DBS in the rat infralimbic cortex (rodent Cg25 correlate) was evaluated in the forced swimming test (FST), an animal model predictive of antidepressant-like activity. Spontaneous locomotor activity was also monitored in each experimental group. To investigate the contribution of noradrenergic system, the expression of tyrosine hydroxylase and the noradrenaline transporter was quantified through western blotting technique in the locus coeruleus nucleus (LC). Furthermore, single-unit extracellular recordings and UK14,304 (alpha2-adrenoceptors agonist) dose-response curves were performed in this nucleus. Results were analyzed by a one or two-way ANOVA followed by Bonferroni post-hoc test. $p<0.05$ were considered to be significant.

Results: DBS induced an antidepressant-like effect in the FST and this behavioural response is not due to an increase of locomotor activity. An increase of tyrosine hydroxylase expression and no changes in noradrenaline transporter levels in LC were observed after DBS. On the other hand, the electrical activity of LC neurons was increased accompanied by a shift to the right of UK14,304 dose-response curve.

Conclusions: These findings showed that DBS into infralimbic cortex produces an antidepressant-like effect which could be due to an increase of noradrenergic neurotransmission. This last is corroborated with the increase of both noradrenaline synthesis and LC activity and the desensitization of alpha2-adrenoceptors in this nucleus.

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THE EFFECT OF NEUROFEEDBACK TRAINING ON EEG COHERENCE IN PATIENTS WITH DEPRESSIVE AND ANXIETY DISORDERS

Melo e Castro J, Barbosa F, Ferreira-Santos F, Marques-Teixeira F, Monteiro A, Paiva T, Marques-Teixeira J

Faculty of Psychology and Educational Sciences of the University of Porto, Portugal

Objectives: Coherence, calculated as a squared correlation coefficient, measures the phase consistency between pairs of signals in each frequency band. Current approaches to QEEG-guided Neurofeedback training (NFT) in depressive patients involve efforts to normalize amplitudes in a given frequency, or to correct physiological alpha asymmetry. However, the indirect impact of these approaches in coherence regulation is not yet well explored. The purpose of this pilot study was to explore the impact of amplitude NFT in the coherence of depressive and anxiety patients.

Methods: The qEEG of 27 patients (12 with Anxiety disorder, 11 with Major depressive disorder, and 4 with Bipolar depression) were recorded following the International 10-20 system. Fast Fourier Transform of raw data was obtained by means of the Neuroguide(R) software in order to obtain frequency bands density over the brain sites, together with the coherence values between inter-hemispheric pairs of sensors for delta, theta, alpha and beta frequency bands. These calculations were made before and after 15 NFT sessions for amplitude regulation. Scores were presented as z values, representing the deviation of the norm of a normative sample.

Results: Fp1-Fp2 and F3-F4 hypocoherence together with T3-T4 and T5-T6 hypercoherence characterizes these type of patients before NFT. The effect of NFT was the normalization of the scores in 16 patients (59.2%) on all bands of frequency. Rather there was significate normalization of coherence of the delta band at F7-F8, and T5-T6, and alpha band at Fp1-Fp2. When considering the global effect sizes of the difference between pre and post NFT intervention in all electrodes and frequency bands, results show a trend towards the normalization of the different coherence scores. The maximum discrepancy (MD) between all the electrode sites in each subject was calculated by the difference between the highest and lowest z value of coherence, in order to have a measure of the consistency of coherence between electrode sites. Results show that there a tendency to a decrease of the discrepancy after the NFT.

Conclusions: Depressive and anxiety patients have hypocoherence between homologous electrodes on prefrontal and anterior frontal regions, wherein the alpha band is most affected. The improvement of absolute alpha power and the correction of the frontal alpha asymmetry by means of NFT have an indirect effect on the coherence consistency in most individuals; finally, the maximum discrepancy analysis appears to be a valid method for assessing the progress of each subject in terms of consistency of coherence between electrodes.

These preliminary results show promise regarding the applicability of NFT to intervention in psychiatric disorders and further work should extend the analysis including the relations between inter-electrode coherence and specific NF protocols.

SOCIAL STRESS AND BEHAVIOR: THE ROLE OF AGE AND MENSTRUAL CYCLE PHASE

Carolina Villada[1], Vanesa Hidalgo[1], Laura Espin[2], Sara Rubagotti[4], Jesús Gómez-Amor[2], Andrea Sgoifo[3], and Alicia Salvador[1].

[1]Laboratorio de Neurociencia Social Cognitiva, Universidad de Valencia, Spain. [2]Departamento de Psicobiología y Anatomía Humana, Universidad de Murcia, Spain. [3]Stress Physiology Laboratory, Department of Neuroscience, University of Parma, Parma, Italy

The biological response to stress changes along the lifespan and the neuroendocrine status may also influence the capacity to respond to stress. To investigate self-- - regulatorysystems adequately, recovery to normal levels should be considered as an indicator of the stress response's functioning well. Moreover, behavioral coping styles should also be considered because they provide an integrated visión of the social stress response. Our main objective was to compare the capacity to respond and to recover from a social stressor in Young women (in different phases of the menstrual cycle phase) and in older post-- - menopausal women. The second objective was to explore how the consequences of behavior influence the self-regulatorysystems. To analyze the stress response and capacity of recovery, we measured cortisol and heart rate before, during and after a social stressor(an oral speaking task in front of a committee) in seventy-eightwomen: 36 post-menopausaland 42 young women (folicular group n=13), (luteal group n= 17) and (oral contraceptive group n = 12). In addition, the behavior displayed during the speaking task was analyzed and related to physiological recovery indices. Menopausal women showed less cortisol and heart rate reactivity to stress compared to young women. These differences were less pronounced in women in their folicular phase. The capacity to recover from stress was also lower in menopausal women in both physiological parameters analyzed, especially compared to women in the luteal phase. Menopausal women displayed less behavior that reflected displacement and submission and carried out more gestures and assertive behaviors compared to Young women, reflecting a pattern of active coping styles. Relationships among behavior and capacity to recover from stress were different for each group of women. Behaviors that reflect active coping styles were related to better autonomic regulation in menopausal women. Contrariwise, heart rate and cortisol in young women seem to be modulated by passive and reactive behaviors. These results emphasize the importance of considering the age and menstrual cycle phase in the study of the reactivity and recovery from stressful situations. In addition, they highlight the menopausal phase as a critical period for the physiological self-regulatorysystems. Finally, affiliative behaviors, considered as evolutionary and positive behaviors, seem to facilitate a better autonomic regulation.

HORMONE LEVELS AND IMMUNE ACTIVITY IN ACCORDANCE WITH PSYCHOLOGICAL CHARACTERISTICS IN BREAST CANCER SURVIVORS

Joana Pérez-Tejada, Amaia Arregi, Arantza Azpiroz, Eneritz Gómez-Lázaro, Garikoitz Beitia, Oscar Vegas, Andrea Lebeña, Larraitz Garmendia

Department of Basic Psychological Processes and their Development, University of the Basque Country

Thanks to advances made in the field of cancer diagnosis and treatment, the survival rate for women suffering from breast cancer has increased significantly over recent years.Nevertheless, many of these women continue to suffer from psychological problems such as anxiety and depression, even after completing their course of treatment.Despite the research carried out in this field, the psychological or physiological mechanisms underlying the development of these symptoms have yet to be clarified.It is currently thought that immune deregulation, especially inflammation, may be one of the mechanisms underlying the development of psychological distress, triggering the neurochemical, neuroendocrine and behavioral changes related to this pathology. This study has two aims. Firstly, it seeks to analyze plasma cortisol and inflammatory cytokine levels in a preliminary sample of breast cancer survivors aged between 35 and 65, who finished their chemotherapy and radiotherapy treatment over one year previously. And secondly, it aims to analyze participants' scores on diverse tests designed to assess different psychological factors such as distress and coping style.A greater knowledge of the factors involved in the appearance of the symptoms of psychological distress will help us develop prevention methods and design specific psychological and pharmacological interventions, thus minimizing the impact of the disease and the deterioration in patients' health, and improving their quality of life.

SOCIAL STRESS IN FEMALE MICE: IMMUNE AND BEHAVIORAL CHANGES

Eneritz Gómez-Lázaro, Ainitze Labaka, Amaia Arregi, Arantza Azpiroz,Garikoitz Beitia, Oscar Vegas, Andrea Lebeña, Joana Pérez-Tejada, Larraitz Garmendia

Department of Basic Psychological Processes and their Development, University of the Basque Country

Epidemiological studies clearly demonstrate that women are more vulnerable than men to developing stress-related psychopathologies, such as depression. Moreover, today it is also known that physiological and behavioral responses to stress are sex-dependent. Nevertheless, few studies have been conducted on female experimental animals and there is a need for valid animal models for females. Consequently, this study analyzed the behavioral and physiological effects of chronic stress induced by social instability on female mice, with the aim of validating the technique as an animal model for depression. This stress model consists of applying consecutive periods of isolation (1 day) and regrouping (3 days) with different cage-mates over the course of a prolonged period (21 days). During the procedure body weight was recorded and vaginal and blood samples collected to analyze the effect of stress on the estrous cycle and hormone levels. Once the social instability period was over, the animals remained isolated for a further 4 days, during which two behavioral tests commonly used to analyze depressive-like behavior in animals were conducted: the sucrose preference test and the forced swimming test. Finally, the animals were sacrificed and brain and blood samples were taken for subsequent determination of immune and hormone parameters. The data obtained were compared with those of a control group which, during the same time period, was not subjected to either periods of isolation or regrouping. The analysis of the results revealed that, unlike subjects from the control group, the females subjected to social instability suffered a loss of body weight and an interruption of the estrous cycle following 21 days of stress. Furthermore, a preliminary analysis revealed differences between the two groups in the behavioral tests, with those females subjected to social instability performing worse than controls. Similarly, it was noted that this behavioral deficit seemed to be consistent with the different patterns of inflammatory and hormone responses observed in the two groups analyzed. In sum, the data suggest that the social instability model may be a useful model of animal depression which will enable us to learn more about the different mechanisms involved in the development of stress-related psychopathologies in females.

ACUTE EFFECTS OF ESTRADIOL AND GENISTEIN ON THE INSULIN SIGNALING PATHWAY IN THE CEREBRAL CORTEX OF AGED FEMALE RATS

Javier Morán, Pablo Garrido, Estefanía Cabello, Ana Alonso, Celestino González

Department of Functional Biology, University of Oviedo, Spain.

Menopause leads to a decrease in estrogen production that increases central insulin resistance, contributing to the development of neurodegenerative diseases. We have evaluated the influence of aging and estradiol or genistein treatments on some key stages of the insulin signaling pathway in the cerebral cortex. Young and aged female Wistar rats were ovariectomized and treated acutely with 17β-estradiol (1.4 µg/kg body weight), two doses of genistein (10 or 40 mg/kg body weight), or vehicle. The corticalexpression of several key insulin signaling pathway components was analyzed by western blotting. Our results showed an age-related deterioration in the interactions between the regulatory subunit of phosphatidylinositol 3-kinase (p85α) and the activated form of insulin receptor substrate 1 (p-IRS1tyr612), as well as between p85α and the 46kDa isoform of the estrogen receptor α (ERα46). Moreover, aging also decreased the translocation of glucose transporter-4 (GLUT4) to the plasma membrane. 17β-estradiol but not genistein reduced the negative impact of aging on central insulin sensitivity by favoring this GLUT4 translocation, and therefore could be neuroprotective against the associated neurodegenerative diseases. However, protein kinase B (Akt) activation by genistein suggests other possible mechanisms are involved in the neuroprotective effects of this phytoestrogen during the aging process.

INFLAMMATION IN THE CNS AND DEPRESSIVE BEHAVIOR

Andrea Lebeña[a], Oscar Vegas[a], Garikoitz Beitia[a], Eneritz Gómez-Lázaro[a], Amaia Arregi[a], Larraitz Garmendia[a], **Arantza Azpiroz**[a]

[a]Department of Basic Psychological Processes and their Development, University of the Basque Country , Avda. Tolosa 70, 20018 San Sebastián, Spain.

Aim: To study the effect of tumor development on the inflammatory response at a central level, and its relationship with depressive behavior. To study the possible mediators involved in this relationship.

Material and Methods: Male C57BL/6J mice were subcutaneously inoculated with B16F1 melanoma tumor cells into the right flank. After 7 or 21 days of tumor development, behavior was assessed using the open field test (OFT), the forced swim test (FST) and the sociability test (ST).

The mRNA expression of indoleamine 2,3-dioxygenase (IDO), proinflammatory interleukin (IL)-1β, IL-6, tumor necrosis factor-alpha (TNF-α) and anti-inflammatory IL-10 and IL-4 was determined in the whole brain by real time RT-PCR.

Plasma levels of serotonin (5HT), tyrosine (Tyr), phenylananine (Phe), kynurenine (Kyn) and tryptophan (Tryp) were analyzed via high-performance liquid chromatography (HPLC) with fluorescence and ultraviolet detectors.The tumor was collected and weighed at the end of the experiment.

Results: After 7 days of tumor development no behavioral or physiological changes were observed. After 21 days of tumor development, however, tumor-bearing subjects showed greater immobility in the OFT, a significant increase in IL-1β and TNF-α and increased spleen weight in comparison with controls. Furthermore, subjects who developed metastasis showed a significant increase in immobility behavior in both the OFT and the FST, in comparison with both controls and the rest of the sample group. Moreover, this affect on depressive behavior was accompanied by a greater expression of IL-1β and TNF-α at a central level and an increase in the Phe/Tyr ratio at a peripheral level.

Conclusion: Tumor development, especially during advanced stages, generates behavioral changes that may be mediated by inflammatory processes derived from the tumor development itself. Nevertheless, the activity of the IDO enzyme does not seem to be responsible for this relationship.

SOCIAL STRESS, INFLAMMATION AND TUMOR DEVELOPMENT: BEHAVIORAL AND PHYSIOLOGICAL EFFECTS

Andrea Lebeña[a], Arantza Azpiroz[a], Garikoitz Beitia[a], Eneritz Gómez-Lázaro[a], Amaia Arregi[a], Larraitz Garmendia[a], **Oscar Vegas[a]**

[a]Department of Basic Psychological Processes and their Development, University of the Basque Country, Avda. Tolosa 70, 20018 San Sebastián, Spain.

Aim: To study the effect of tumor development and social stress on depressive behavior. We also analyzed immune and neurochemical alternations as possible mediators of this relationship.

Material and Methods: A group of male C57BL/6J mice were subcutaneously inoculated with B16F10 melanoma tumor cells. Seven days after inoculation, a mixed group of inoculated subjects and controls were subjected to a situation of social stress using the sensory contact model. After twenty-one days of tumor development, the behavior of all subjects was assessed using the open field test (OFT), the forced swim test (FST) and the sucrose preference test (ST). Following behavioral assessment, the animals were put down and the following physiological measurements were carried out: a) the mRNA expression of indoleamine 2,3 dioxygenase (IDO), proinflammatory (IL)-1β, IL-6, tumor necrosis factor-alpha (TNF-α) and anti-inflammatory IL-10 and IL-4 interleukins were determined in the whole brain by real time RT-PCR; b) the plasma levels of serotonin (5HT), tyrosine (Tyr), phenylananine (Phe), kynurenine (Kyn) and tryptophan (Tryp) were analyzed via high-performance liquid chromatography (HPLC) with fluorescence and ultraviolet detectors; and c) plasma corticosterone levels were measured. The surface area of the tumor was also measured by analyzing the images obtained of the pulmonary lobes using the public domain ImageJ software.

Results: Inoculated subjects showed greater immobility in both the OFT and the RST, as well as a low sucrose preference. Social stress was not observed to produce any changes in any of these depressive behaviors. For their part, tumor-bearing mice exhibited greater mRNA expression of proinflammatory cytokines (IL1B, IL6 and TNF- α) than their non tumor-bearing counterparts. A significant increase was also observed in the Phe/Tyr ratio in tumor-bearing mice. In relation to physiological variables, stress only produced changes in corticosterone levels, with an increase in these levels being observed immediately after the stressful situation.

Conclusion: Tumor development generates changes in behavior that are characteristic of a depressive state. These changes may be attributed to the increase observed in the expression of proinflammatory cytokines which, consistently with the results obtained for plasma levels of amino acids, may alter the synthesis of cerebral monoamines.

INDIVIDUAL DIFFERENCES IN THE ENDOCRINE RESPONSE TO AN INTERGROUP CONFLICT IN LABORATORY

Adrián Alacreu-Crespo1, Miguel Ángel Serrano, Vanesa Hidalgo, Alicia Salvador, Vicente Mártinez-Tur, Vicente Peñarroja, Carolina Moliner, Esther Garcia y Agustín Molina

1. Universitat de València, Departamento de Psicobiología, Av. Blasco Ibañez, 46010 Valencia, España. Email: adrian.alacreu@uv.es

Conflicts in work induce cardiovascular and emotional distress responses. Previous studies have shown cortisol (C) and testosterone (T) increases during interpersonal conflicts being different for men and women. Moreover, these endocrine responses are influenced by cognitive and emotional factors and individual differences, the interaction between these hormones being important for social interactions. Thus, some personality traits would be able to induce different endocrine responses to social stress such as amiability or neuroticism. Our purpose was to study the endocrine response to a laboratory intergroup conflict in men and women taking into account their amiability. A simulated conflict between two teams (three people in each team) using a role-play paradigm was carried out; moreover, a control group was implemented, using the same protocol but without conflict. Sample was composed of 147 participants (94 conflict / 53 not conflict). Results showed an effect of conflict on C response, having participants during conflict higher cortisol response in comparison to control group. This response was influenced by amiability having people with higher punctuations in this trait more cortisol. In addition, women in conflict had lower punctuations than men and control group for T. Very interestingly, T changes predicted changes in C without influence of personality factors. Moreover, we appreciated gender differences on this interaction, being stronger in women than in men. In conclusion, C response to conflict could be influenced by amiability, whereas T influences C responses during conflict. Therefore, analyzing individual differences should more be taken into account in future research about human conflict.

BUILDING A TEST OF MOTOR DEVELOPMENT ASSESSMENT (5-11 YEARS)

Marta Díaz-Jara, Pilar Martín-Lobo, Enrique Navarro Asencio, Verónica López, Sandra Santiago, Esperanza Vergara-Moragues y GdI-14

Neuropsicología aplicada a la Educación, Universidad Internacional de la Rioja, Logroño, Spain.

Introduction: Many authors have made a clear relationship between movement and learning. Some simple movements are controlled from subcortical areas, but those more complex activate motor areas of the cortex which are also involved in some learning patterns and constitute one of the bases of children's neurological development. Nowadays, the motor developments of the child and the different stages through which the most fundamental movement patterns pass have been studied. Nevertheless, a standardized test to objectively measure the results has not been developed. Objective: The objective of this study focuses on the creation of a simple assessment of neuromotor development to specifically evaluate the basic patterns of movement (creeping, crawling, walking and running) and muscle tone, postural controland balance. Methodology: In the first phase, the development of the specification matrix has been created, based on a deep theoretical review of the construct of motor skills, building across tab with the theoretical dimensions and indicators (items) that allow their measurement. This matrix has been checked by 3 experts through the Delphi technique to verify that the indicators and the theoretical dimensions are suitable for measuring the motor skills. In a second phase, a first test version has been built and an assessment by 5 different experts has been carried out through a Likert questionnaire.They have been asked to evaluate if the item is suitable (relevance) to measure the construct, if it is clear and properly written (clarity) and, finally, if the rating options are adequate (adequacy of the scale). Furthermore, a section of observations that can be used to propose a new version of the item has been added. This information allows the estimation of a Content Validity Index (CVR: Content Validity Ratio) by analyzing the degree of inter-rater agreement by Kendal´s W. Results: Kendall statistic showed positive values (above 0.8) in all dimensions of the test, with the exception of clarity in the wording of the items "creeping, crawling and career", the pertinence of "drag" and "crawling" and the adequacy of the response scale drag items. A detailed studyof these items has been taken and the proposed amendments have been incorporated. As a result of thisstudy, asecond versionof the scale has been developed and it will be tested with a sample of Spanish students aged between 5 and 11 years. Conclusion: It is necessary to create a test of neuromotor development, as the one considered in this study, and the continuity of the works to validate its reliability, so the evaluation of different aspects of learning can be performed and, therefore, the intervention in the optimization of the learning process of the student.

PERINATAL EXPOSURE TO A CAFETERIA OR RESTRICTED DIET AFFECTS HYPOTHALAMIC ENDOCANNABINOID LEVELS AT BIRTH AND INDUCES ADIPOSITY AND BEHAVIORAL ALTERATIONS IN MALE OFFSPRING

Ramírez-López, M.T. [1,4], Vázquez, M. [1,2], Bindila, L. [3], Lomazzo, E. [3], Hofmann, C. [3], Blanco, R.N.[1], Alén , F. [1], Antón , M. [1], Ouro , D.[1], Orio, L . [1], Lutz, B. [3], Rodríguez de Fonseca, F. [1,2], Gómez de Heras, R[1].

[1]Departamento de Psicobiología. Facultad de Psicología, Universidad Complutense de Madrid. 28223 Pozuelo de Alarcón, Madrid (Spain). [2]Instituto IBIMA, Unidad de Gestión Clínica de Salud Mental, Hospital Regional Universitario de Málaga, Universidad de Málaga, 29010 Málaga (Spain). [3]Institute of Physiological Chemistry, University Medical Center of the Johannes Gutenberg-University of Mainz, 55128 Mainz, (Germany). [4]Hospital Universitario de Getafe, 28905 Getafe, Madrid (Spain)

Overnutrition and undernutrition during critical periods of life are both linked to the development of metabolic disorders and to behavioral alterations later in life. This process is known as nutritional programming, and it has been associated to several mechanisms. The endocannabinoid system is involved in food intake, metabolism as well as emotional control. However, to date, its role in this process has not been clarified. Here, we aimed to assess the effect of three perinatal diets on male offspring: Control diet (C), where dam rats were given standard chow ad libitum during the perinatal period, cafeteria diet (P), in which dams were allowed to choose between standard chow and a mixture of chocolates ad libitum during the perinatal period, and restricted diet (R), where dams were given a 20% calorie-restricted diet two weeks before mating and during the first twenty days of pregnancy. We evaluated perinatal outcomes and male hypothalamic endocannabinoid content at birth (PN0). We also followed the male offspring until adulthood, and studied metabolic indices as well as behavioral parameters. All offspring were weaned on standard chow diet. We found that exposure to P diet resulted in unaffected litter size although pups were underweight at birth. Additionally, P offspring displayed lower hypothalamic levels of arachidonic acid (AA) and of the two major endocannabinoids (Anandamide (AEA) and 2-araquidoyl glycerol (2-AG)). Palmithylethanolamide (PEA), but not oleoylethanolamide (OEA), was also decreased. After weaning, they exhibited hyperphagia until adolescence, and they ended up recovering weight and developing abdominal adiposity at adulthood. Furthermore, these animals displayed anxiety-like responses in the elevated plus-maze and a low preference for a chocolate diet in a choice test. In contrast, offspring from R dams tended to have smaller litter size at birth with unaffected birth weight. Similarly to P offspring, R offspring exhibited a significant decrease in AEA, 2-AG, AA and PEA at PN0. Moreover, these animals displayed a higher weight gain and adiposity at adulthood, without presenting alterations in food intake. Additionally, they showed a higher propensity to anxiety related responses. These results suggest that exposure to a cafeteria or restricted diet during perinatal period could program adiposity and long-term behavioral alterations. A potential role for the endocannabinoid system in these diet-induced responses is proposed since hypothalamic endocannabinoids are involved in promoting feeding and metabolic adaptations to diets, as well as in emotional regulation.

MATERNAL SEPARATION: SHORT AND LONG LASTING EFFECTS ON EMOTIONAL STATES, LEARNING AND MEMORY

Banqueri, M., Méndez, M., Vilella, M., Álvarez-Suárez, P., Arias, J.L.

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

Maternal separation is an extensive used animal model of early stress. We used an animal model consisted on 21 days of maternal separation. This separation was performed between the post-natal day (PND) 1 until the PND 21. The litters were separated from the dams 4 hours per day (10:00 a.m-14:00 p.m.) and placed in an incubator (60% of humidity, 30º C).

Our aim was to explore the effects of early stress on associative and spatial learning, memory and emotional alterations (depression, anxiety, alert). We explored these aspects in two different moments of development, adolescence and adulthood.

We used 40 Wistar rats, 20 males and 20 females (10 Control and 10 separated in each sex). To explore anxiety we used the elevated zero maze. We investigate the despair differences using the forced swimming test (Porsolt). Alert was explored by prepulse inhibition assessment. To explore learning and memory we used passive avoidance test, using a retention interval of 24 hours, and allocentric spatial memory was evaluated in the Morris Water Maze using a reference memory protocol in which the submerged platform was placed in the same position during 4 consecutive days.

Our results show that separated adult animals show more anxiety levels ($p < 0.005$). However, during adolescence we found no anxiety differences between groups.

We found no differences in anhedonia in young subjects. Adult females show more despair than adult males ($p < 0.005$).

While during adolescence we found no alert differences, in adulthood, separated animals show more prepulse inhibition than controls in the higher prepulse condition (85dB) ($p < 0.005$). In addition, females show greater prepulse inhibition scores than males ($p < 0.005$). These two results strongly disagree with previous research.

Associative memory resulted unaffected by early stress. We found no sex or age effect in passive avoidance. Allocentric spatial memory was better in adult control subjects that remember the task better than the separated ones. However, young subjects show the opposite pattern, young separated rats learn the task more efficiently than the control ones.

In conclusion, maternal separation lead to long term changes on spatial memory leaving associative memory intact. In addition, early stress causes anxiety in adulthood.

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CORTICAL-LIKE ORGANIZATION OF THE GOLDFISH TELENCEPHALIC MOTOR PALLIUM REVEALED BY FOCAL ELECTRICAL MICROESTIMULATION

Durán, E.; Ocaña, F.M.; Martín-Monzón, I.; Trujillo, I; Broglio, C.; Gómez, A.; Rodríguez, F.; Salas, C.

Laboratory of Psychobiology, University of Sevilla, Campus Santiago Ramón y Cajal, 41018, Sevilla, Spain.

Traditionally, the presence of cortical areas specialized in the control of voluntary movements was considered a distinctive attribute of advanced mammals. However, recent anatomical and functional evidences suggest that an M1 in the dorsal pallium is likely a primitive feature for amniotes. Here, we analyze the organization of the somatomotor areas in the forebrain pallium of a teleost fish by means of electrical microstimulation mapping and simultaneous recording of the evoked body movements. Stimulation of the goldfish pallium elicits short latency, coordinated movements of different body parts that closely resemble natural movements. Several motor pallial areas can be identified on the basis of stimulus thresholds, body part that move, type of evoked movements, direction and velocity of the movements, and correspondence with cytoarchitectural and histochemical boundaries. The lowest threshold stimulation points appear on a narrow strip with distinctive anatomical borders located in the most caudal telencephalic lobe. In this area, movements are elicited with intensities as low as 4-10 □A, whereas beyond these borders the thresholds raise abruptly. On these criteria, this region can be identified as the primary somatomotor pallial area (M1) of goldfish. Similar to M1 of tetrapods, M1 of the goldfish presents a somatotopic organization: mouth and face movements are represented in a medial position, followed by pectoral, trunk and caudal fin movements as the electrode moves to more lateral positions. This representation is inverted relative to that observed in mammals, in accordance with the embryonic eversion of the teleost pallium. A premotor area (M2) delimited by cytoarchitectural borders and characterized by higher stimulation thresholds, is located rostrally to M1. M2 contains several somatotopically ordered divisions. Stimulation of the goldfish M1 and M2 areas also elicits saccadic eye movements whose metrics and kinetics resemble the spontaneous saccades. Stimulation in M1 evokes coordinated eye, head, and body movements; and, in M2, saccadic eye movements, as well as orofacial and fin movements. In addition, two different eye fields (EF I and II) in which stimulation exclusively produce saccadic eye movements, occupy a more rostral position. In EFI, the elicited saccades are goal directed; in contrast, in EFII stimulation evokes fixed vector saccades. Finally, ipsilateral eye-movements of fixed direction and variable amplitude can be obtained through the dorsolateral area, which appears to have a topographical organization, as the direction of saccades change systematically with stimulation site. As a whole these results show that goldfish have a highly differentiated complex of pallial motor areas, with a functional and anatomical organization that closely parallel the cortical motor system of land vertebrates.

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RESPONSE TO ETHANOL IN 5 AND 14 DAY-OLD RATS AFTER ACETALDEHYDE SEQUESTERING D-PENICILLAMINE ADMINISTRATION DURING PRENATAL ETHANOL EXPOSURE

M. Gaztañaga[1], A.Angulo-Alcalde[1], N.E. Spear[2] and M.G. Chotro[1]

[1]Faculty of Psychology, University of the Basque Country UPV/EHU, Donostia-San Sebastian, Spain.
[2]Department of Psychology, Binghamton University, Binghamton, NY 13902, USA

Ethanol exposure during the last days of gestation increases ethanol acceptance in neonate, in infant and in adolescent rats. Recent studies with neonate rats evidenced the crucial implication of acetaldehyde, the first metabolite of ethanol, in ethanol reinforcement at this early age. Previous studies in our and other laboratories have shown that after ethanol exposure during the last gestational days, the intake and palatability of ethanol increases when measured on postnatal day (PD) 1, 5 and 14. Therefore, in this study we investigated the role of acetaldehyde on the prenatal ethanol exposure effect. We administered dams during gestational days 17-20 with water, ethanol or ethanol + D-Penicillamine (DP) and the offspring was tested with three different procedures. On Postnatal day 5 (Experiment 1) pups were assessed with an operant conditioning procedure using ethanol 6% as the reinforcer. On PD 14 (Experiment 2) pups' ethanol (6%) consumption was evaluated as well as their taste reactivity to this same ethanol solution. The results of both experiments confirmed that eliminating acetaldehyde produced after prenatal ethanol exposure reduces the postnatal positive response to ethanol, highlighting the important role of acetaldehyde on ethanol reinforcing properties during early development.

EFFECTS OF THE PRENATAL EXPOSURE TO ETHANOL AND D-PENICILAMINE ON THE RAT NEONATE CRAWLING TOWARDS ETHANOL ODOR

A. Angulo-Alcalde, M. Gaztañaga, and M.G. Chotro

Faculty of Psychology, University of the Basque Country UPV/EHU, Donostia-San Sebastian, Spain

Ethanol exposure on the last gestational days has been demonstrated to increase ethanol acceptance in neonate, infant and in adolescent rats. In previous experiments we have found that after prenatal exposure to ethanol, 1-day-old neonates recognize and crawl longer distances towards ethanol odor than neonates from water treated dams. We also found that manipulating the opioid receptor system decreases the prenatal ethanol exposure effect, reducing the attractiveness of ethanol odor. In addition to the relevance of the opioid system, acetaldehyde, the first metabolite of ethanol, has been recently implicated in the reinforcing properties of ethanol. The aim of this study was to determine the participation of acetaldehyde in the enhanced attractiveness of ethanol, induced by prenatal ethanol exposure, by evaluating newborn rats on postnatal day 1. Therefore, pregnant rats were administered with water, ethanol or ethanol + D-Penicillamine (DP) during gestational days 17, 18, 19 and 20. Twenty-four hours after birth the offspring of these dams was evaluated using the odor crawling locomotion technique, in which the distance travelled towards the odors of ethanol, water and vanilla was registered and used as an index of odor attractiveness.

DAILY VARIATIONS OF LIVER β-CATENIN DURING THE EXPRESSION OF THE FOOD ENTRAINED OSCILLATOR (FEO): DIFERENCES BETWEEN TOTAL β-CATENIN AND pSER33 β-CATENIN ALONG THE RAT HEPATIC ACINUS

De Ita D. and Díaz-Muñoz M**.**

Departamento de Neurobiología Celular y Molecular, Instituto de Neurobiología, UNAM. Campus Juriquilla, Querétaro, México.

B-catenin is a multifunctional protein with different subcellular distribution that plays structural (adherens junctions formation) and transcriptional (Wnt pathway activation) roles. These functions are regulated by post translational modifications, mainly phosphorylation, in different amino acids residues.

In the adult rat, Wnt/β-catenin activation promotes the establishment of the metabolic zonation pattern in the acinus and the transcriptional regulation of some metabolic genes such as the perivenous marker enzyme Glutamine Synthetase (GS), whose function is ammonia detoxification.

In our protocol, experimental animals were under a repeating fasting-refeeding model installed by a daily restricted feeding schedule (RFS) of 2h/day (from 12:00 to 14:00 h) during 3 weeks. That condition promotes the FEO appearance, a circadian clock uncoupled of the suprachiasmatic nucleus (SCN) and whose synchronizer is food access. The FEO influences the circadian physiology by modifying the daily expression profiles of metabolic and endocrine networks. In this work, we explored if different pools of β-catenin (pSer33 β-catenin and total β-catenin) show 24h rhythmicity in different hepatocyte subcellular compartments (total homogenate, cytosol and nucleus) and if their expression is modified along the hepatic acinus under FEO influence. Therefore, male Wistar rats were divided into the next groups: 1) Ad Libitum, 2) RFS, 3) 1 day fasting and 4) 1 day fasting with 2h refeeding. Animals were sacrificed every 3h along the day to cover 24h period. The rat's liver was dissected and fractionated, and embedded in paraffin for its posterior analysis by Western blot and immunohistochemistry.

Results show that the total β-catenin in hepatic homogenate showed a notorious increase under FEO expression, which did not correlate with the expression in the cytosol nor in the nucleus. However, in these last 2 compartments, the protein had a rhythmic pattern of 12h and 24 h, respectively. Therefore, the increased expression of total β-catenin is located in the plasma membrane. Immunohistochemistry confirmed this observation by showing a decreased protein expression in the cytosol of perivenous hepatocytes and a higher expression of protein in hepatocyte attached to the plasma membrane of hepatocytes from the mid and periportal zones of the acinus. On the other hand, pSer33 β-catenin expression increased in hepatic homogenate correlating with an increase in cytosolic and nuclear fractions. Both compartments showed a rhythmic pattern, as well.

We concluded that total β-catenin as pSer33 β-catenin respond in a different way to the RFS, both in their rhythmical expression as well as in their subcellular distribution along the hepatic acinus, under FEO influence.

REHABILITATION OF VISUAL FUNCTION IN AMBLYOPIA USING TDCS

Sergio Castaño-Castaño, Alejandro García-Moll, Miguel Morales-Navas, Fernando Sánchez-Santed, Eduardo Fernández, Francisco Nieto-Escámez.

Universidad de Almería, Spain

A number of recent studies have investigated the possibility that non-invasive stimulation of the visual cortex can improve vision in adults with amblyopia. In this study we examined the effects of transcranial direct current stimulation (tDCS) in an experimental model of amblyopia using the Long-Evans strain. Induction of amblyopia was performed by occlusion of one eye by eyelid suture between 12 and 75 postnatal days. The effects of tDCS treatment on visual function was assessed by measuring visual acuity (mono and binocularly) using as reference the optomotor reflex of the animals to stimuli presented through the ARGOS ® device.

The results indicate that the monocular occlusion during the critical period causes a reduction of visual acuity both mono and binocularly. Following tDCS anodal stimulation (8 days, 20 min/day) on the visual cortex contralateral to the amblyopic eye, an almost complete recovery of visual acuity in amblyopic animals was observed. The effects of tDCS were observed mainly at level of binocular processing in the visual cortex. Thus, although the improvement is significant at monocular level, only in binocular tests the performance of control and amblyopic rats was equal. One feature of binocular vision is the summation phenomenon, by which visual acuity of both eyes together is higher than individually. In this case, if the summation phenomenon occurs equally in control and treated rats we can say that both visual pathways collaborated in visual perception, and therefore the characteristic phenomenon of suppression was eliminated.

However, the same stimulation protocol in non-amblyopic animals caused a decrease of visual acuity. This reduction of visual acuity in healthy treated animals may result from overstimulation of the visual cortex. This could also be due to the phenomenon of "rebalancing" of the neural response to inputs from the two eyes. In this case an excess of stimulation would be affecting the "neuronal homeostatic balance", thereby GABAergic circuits would become active in order to rebalance the excitation and compensate the system. It would be a case of inhibition caused by overstimulation of the system.

These data indicate that tDCS can reverse the effects of monocular deprivation on visual acuity, although it is essential to use this technique with control by the possible adverse effects on healthy individuals.

A BEHAVIORAL ECONOMIC MEASURE OF SMOKING REINFORCEMENT PREDICTS SMOKING ABSTINENCE

Irene Pericot-Valverde, Sara Weidberg, **Alba González-Roz** & Roberto Secades-Villa.

Departamento de Psicología, Unidad Clínica de Conductas Adictivas (UCCA), Universidad de Oviedo, Spain

Measures of Relative Reinforcing Efficacy (RRE) are a core feature within behavioral economic theories of addiction. A common self-report measure of RRE among smokers is the use of Cigarette Purchase Task (CPT). Most of the previous studies that assessed the association between cigarette demand indices and nicotine dependence measures were conducted in special populations, limiting the generalizability of their results to adult smokers. The aim of this study was to assess the relationship between cigarette demand and both smoking-related characteristics and nicotine dependence measures and to examine cigarette demand indices as potential predictors of days of continuous abstinence from smoking at the end of-treatment. Participants were 168 patients who enrolled in a 6-week clinical trial for smoking cessation. Demand curve indices were generated from a hypothetical CPT at baseline. Smoking levels were high (20 cigarettes per day or more) at prices up to €0.10 per cigarette, and most participants continued to report smoking an average of 6.15 (SD 6.37) if cigarettes cost of €2 each. Data from the CPT showed the predicted inverse association between consumption and price. There was a significant association between all demand indices and both the number of cigarettes per day and nicotine dependence. Also greater elasticity significantly predicted days of continuous abstinence at the end-of-treatment. These findings support the convergent and divergent validity of CPT as a measure of RRE among a community sample of treatment seeking smokers.

DELAY DISCOUNTING AND ALCOHOL ABUSE AMONG EARLY ADOLESCENTS

Martínez-Loredo, Víctor; López-Núñez, Carla; García-Rodríguez, Olaya & Fernández-Hermida, José Ramón.

Departamento de Psicología, Unidad Clínica de Conductas Adictivas (UCCA). Universidad de Oviedo, Spain.

Aim: Delay discounting is a behavioral measure of impulsivity that describes how areinforcer loses value as the delay to its receipt increases. Early adolescence appears tobe the time of greatest increases in delay discounting, and alcohol use begins during thisperiod. The aim of this study was to assess the relationship between delay discountingrates and alcohol abuse among early adolescents.

Methods: The sample was made up of 494 adolescents (55.7% male) who wererandomly recruited from ten secondary schools in the Principality of Asturias (northernSpain). Mean age was 13.97 years (SD = 0.526). Participants completed a computerizedversion of a delay discounting task using hypothetical monetary rewards. They alsoreported whether or not they did binge drinking within the last month and completed aSpanish version of the Rutgers Alcohol Problem Index (RAPI) in order to assessproblems related to alcohol use. Mann-Withney U tests were conducted to determinewhether delay discounting rates (using the area under the curve, AUC) differ as afunction of both binge drinking within the last month and RAPI scores.

Results: Participants who engaged in binge drinking in the last month discounted significantly more by delay (Md = 0.06, n = 34) than those who did not (Md = 0.19, n =460), U = 5081, p < .01, p = .32. Also, participants who reported problems related toalcohol use had significantly higher delay discounting rates (Md = 0.05, n = 22) compared to those who did not (Md = 0.18, n = 472), U = 3839, p = .039, p = .37.

Conclusions: This study adds evidence about the association between impulsivity andalcohol abuse and related problems among early adolescents. Thus, a delay discountingtask could be a suitable screening tool when designing early intervention programs andstrategies for preventing alcohol use among early adolescents. Financial support: This work was supported by the Government Delegation for theSpanish National Drug Plan (MSSSI-12-2013/131) and by the Foundation for thePromotion of Applied Scientific Research and Technology in Asturias (FICYT) (BP12-037).

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ALTERATIONS IN THE GENE EXPRESIÓN OF PI3K/AKT/MTOR SIGNALLING PATHWAY COMPONENTS IN THE AMYGDALOID COMPLEX AFTER OPIOID SELF-ADMINISTRATION AND SUBSEQUENT ABSTINENCE

Ucha M, Coria SM, Roura-Martínez D, Contreras A, Orihuel J, Higuera-Matas A, Ambrosio E

Department of Psychobiology, School of Psychology. UNED. 28040, Madrid, Spain.

While the use of opioids both as analgesics and as drugs of abuse is widely extended, the neurochemical adaptations that occur after exposure and during abstinence remain poorly understood. The aim of this study is to characterize the effects of opioid self-administration and abstinence (withdrawal or extinction) on the expression of several genes related to the PI3K/Akt/mTOR pathway. This cascade plays a role in learning and memory processes and has been recently linked to drug abuse.

We first studied if morphine self-administration and extinction could regulate this pathway and then we set out a protocol to study the incubation of craving to heroin. In both experiments, half of the animals were sacrificed one day after the last self-administration session and the other half underwent different abstinence conditions. The heroin administered rats endured 30 days of forced abstinence, a protocol known to induce incubation of drug craving. By contrast, the morphine administered rats went through 15 days of extinction sessions. After that, all the rats were sacrificed and their brains extracted for the study of mRNA expression of the genes of interest using qPCR.

Morphine self-administered rats showed a trend to increased expression of *Rptor* and *Akt2* in amygdala, however these levels returned to basal conditions after 15 days of extinction. After one day of abstinence from heroin the mRNA levels of *Gsk3a*, *igf2r* and *Eif4ebp2* increased in the basolateral amygdala (BLA) and these changes remained 30 days after withdrawal.

This data suggest that heroin and morphine self-administration differently modulate the expression of certain elements of the PI3K/Akt/mTOR signaling pathway, this modulation being persistent in the case of heroin followed by withdrawal and temporary with morphine and subsequent extinction.

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DISTAL SKIN TEMPERATURE RHYTHM IN SUBSTANCE USE DISORDER. ASSOCIATED FACTORS

S. López-Vera[1], A. Martinez-Nicolas[2], I. Benaiges[1] & A.Adan[1, 3]

[1]Department of Psychiatry and Clinical Psychobiology, University of Barcelona, Barcelona, Spain. [2]Chronobiology Laboratory, Department of Physiology, University of Murcia, IMIB-Arrixaca, Spain. [3]Institute for Brain, Cognition and Behavior (IR3C), Barcelona, Spain.

Objectives: Emerging studies show negative consequences of substance use on circadian rhythmicity1. The aim of this work is to explore differences on distal skin temperature (DST) in individuals with substance use disorder (SUD) considering the age of consumption onset, the period of abstinence and the severity of addiction.

Methods: We studied DST in 81 male (36.21 ± 8.19 years) with SUD (7.99 ± 4.60 months of abstinence). Mostly, they were polyconsumers and followed a strong and very well synchronized routine to light-dark cycle associated to substance use treatment. DST monitoring was performed by means of an iButton sensor placed on wrist during 48h and it was analyzed by Circadian Ware® program. The influence of age of intake onset, length of abstinence and severity of addiction on DST data was explored by MANCOVA analyses.

Results: When the impact of SUD related factors were analysed, we found differences in amplitude ($F=4.29$; $p=0.04$; $\eta p2=0.05$) and interdaily stability ($F=5.85$; $p=0.02$; $\eta p2=0.07$) associated with age of intake onset, differences in amplitude ($F=4.33$; $p=0.04$; $\eta p2=0.05$) linked with length of abstinence and differences in rhythm of DST ($F=3.09$; $p=0.04$; $\eta p2=0.24$) related to severity of addiction. The groups with an earlier intake onset, lesser abstinence time and higher severity of addiction showed worse results in all cases.

Conclusions: SUD patients with earlier age of consumption onset, lesser period of abstinence and higher severity of addiction show a dysregulation in circadian rhythms and, consequently, in their quality of life. These features seem to play a key role as risk factors related to weak circadian rhythms. Therefore, chronobiological aspects should be considered as a target in the treatment. In this way, patients could benefit improving their therapeutic response. Finally, it must be considered that, despite spending a significant time after detoxification, maintain abstinence and follow a routine time linked to treatment, patients continue with chronodisruption. However, further studies are needed to support these preliminary results.

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COGNITIVE CORRELATES OF SUICIDE BEHAVIOR IN SCHIZOPHRENIA WITH COMORBID SUBSTANCE USE DEPENDENCE

Irina Benaiges [1], Silvia López [1] & Ana Adan [1,2]

[1] Department of Psychiatry and Clinical Psychobiology, University of Barcelona, Barcelona, Spain. [2] Institute for Brain, Cognition and Behavior (IR3C), Barcelona, Spain.

Introduction: Suicide is one of the most important causes of death in SZ patients, especially premature death. It has been described that between 20-50% of patients diagnosed by SZ will attempt suicide in their lifetime. The risk of suicide is even greater in Substance Use Disorder (SUD) comorbid conditions. However, no studies have been addressed sociodemographic and cognitive correlates of suicide behaviour in SZ with comorbid SUD (SZ+).

Matherial and Method: 45 male SZ+ patients (36.16± 7.46 years) were enrolled in a cross-sectional design. The individuals were considered in two groups according to the self-reported existence of previous suicide attempts: SZ+ attempters (n= 23) and SZ+ non-attempters (n= 22). They were inpatients and outpatients from different healthcare assistance clinical settings at Barcelona.

Results: SZ+ attempters showed higher rates of being divorced and separated than their counterparts as well as slightly higher rates of receiving a disability pension, being unemployed and or not receiving any income ($p< 0.05$, in all cases). Regarding SUD data earlier age of SUD onset and higher relapses were found in those suicide attempters ($p< 0.05$). No differences across groups emerged in clinical measures such as severity of depressive and psychotic symptoms. Regarding cognitive performance, SZ+ attempters showed worse verbal IQ and making decision process ($F \geq 4.60$). In the same line, worse cognitive flexibility was strongly associated with greater suicide attempts ($r=-0.63$).

Conclusions: SZ+ individuals met severe risk factors to commit lifetime suicide. The knowledge of suicide related factors is of great consideration since diminishing premature death in SZ+ population should be a target care in clinical settings. Our results show that higher rates of relapses to substances, an early age of SUD onset, worse verbal IQ as well as worse set-shifting abilities and poor decision making characterized by dysfunctional impulsivity are suicide-related factors.

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OLEOYLETHANOLAMIDE PREVENTS TLR4-MEDIATED NEUROINFLAMMATORY CASCADE IN FRONTAL CORTEX INDUCED BY ALCOHOL BINGE DRINKING IN RATS

Antón M[1], Alén F[1], Marbán T, Pavón J[3], Leza JC[2], Rodríguez de Fonseca F[3,1], García-Bueno B[2], Gómez de Heras R[1], **Orio L[1]**

[1]Department of Psychobiology, Faculty of Psychology, Complutense University, Madrid (UCM), Spain; [2]Department of Pharmacology, Faculty of Medicine, UCM, and Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM), Spain; [3]Instituto de Investigación Biomédica (IBIMA), Málaga, and Red de Trastornos Adictivos (RTA), Spain. Laura Orio: lorio@psi.ucm.es

Backgound: Alcohol abuse induces neuroinflammation and damage to the brain. Alcohol is frequently consumed in a specific pattern of binge drinking which contributes to develop an alcohol use disorder. The purpose of this study was to investigate the effects of alcohol binge drinking in brain and peripheral markers of inflammation and to evaluate the anti-inflammatory properties of oleoylethanolamide (OEA), an endocannabinoid which no binding activity at traditional cannabinoid receptors that plays a role in satiety and pain/inflammation processes. Methods: Rats were exposed to a binge pattern of alcohol by intragastric administration of a maximal dose of 3 g/kg of alcohol 3 times per day during 4 consecutive days, being the dose titrated by blood ethanol levels determination. Brain tissue samples were taken 1h, 6h and 24h after the end of alcohol binge protocol to study the time course of alcohol-induced up-regulation of main inflammatory parameters. In a second experiment, we reproduced the binge alcohol administration and OEA (10 mg/kg, i.p.) was administered as a pre-treatment previous each alcohol gavage administration. Blood and frontal cortex samples were extracted 2-4h after the last alcohol administration and proinflammatory parameters were checked. Results: This model of alcohol binge drinking induces the expression of several inflammatory parameters in blood and frontal cortex. We characterized the temporal profile of alcohol-induced increase in plasma corticosterone levels, release of the proinflammatory cytokine tumoral necrosis factor alpha (TNF-α) in blood and cortex, the expression of the nuclear subunit p65 of the proinflammatory nuclear transcription factor kappa B (NFκB) and its cytosolic inhibitory protein IkappaB in frontal cortex. We observed that repeated injections of OEA decreases the rise in plasma corticosterone levels induced by binge alcohol without modify blood alcohol levels. Pretreatment with OEA blocks the release of TNF-α induced by alcohol in plasma but not in brain samples. More interestingly, OEA prevents the alcohol-induced upregulation of the innate immune receptors toll-like receptors (TLR)-4 mRNA and protein and its adaptor molecule MyD88, and also reduces p65 subunit transcriptional activity, the mRNA expression of the inducible nitric oxide synthase (iNOS) enzyme and the concentration and activity of the pro-apoptotic enzyme Caspase-3 in frontal cortex. Conclusions: Our results suggest that OEA may interfere with the TLR4-mediated inflammatory signaling cascade induced by alcohol, showing potential beneficial effects to prevent alcohol-induced neuroinflammation and brain damage.

FROM EPIDEMIOLOGY TO EPIGENETICS. USE OF TWINS TO STUDY BEHAVIORAL PHENOTYPES: THE EXAMPLE OF PSYCHOACTIVE MEDICATION USE

Ordoñana JR, Sánchez-Romera JF, Colodro-Conde L, Madrid-Valero JJ, Morosoli JJ, Carrillo E, Pérez-Riquelme F, González-Javier F, Martínez-Selva, José M

Departamento de Anatomía Humana y Psicobiología, Universidad de Murcia, Spain.

Introduction: Twin registers have the potential to support different research approaches. As a collection of individuals born in multiple births they represent an invaluable resource to study behavioral traits from different perspectives, and provide insights into the role of genetics and environment in shaping inter-individual variability. The main aim of this study is to offer an outlook of the different research approaches available through the use of a twin registry, both as an epidemiological cohort and as a genetically informative sample. In doing that, the objective of these analyses focuses on psychoactive medication use. Psychotropic prescription depends on health personnel, but self-medication is also present, which collaborates in a high prevalence of consumption. Analysing those factors underlying the use of psychoactive medication is critical for the design of better educational and health strategies. We present results derived from different methodological approaches available through the use of a twin cohort.

Methods: To date, the Murcia Twin Registry (MTR) has collected information from about 2300 individuals born between 1940 and 1966 in the region of Murcia. There have been three waves of data collection and today the MTR databases include questionnaire and anthropometric data, as well as biological samples (DNA) from a subset of volunteers. Data has been gathered through telephone and personal interview, using standard epidemiological questionnaires, and include information on health and health-related behaviors. Zygosity has been ascertained through DNA or questionnaire. Methodological approaches include prevalence analysis, co-twin case-control analysis, quantitative genetic analysis, candidate gene approach and epigenetic approach.

Results: se of psychoactive medication increased between 2007 and 2009 for women and showed a slight decrease in 2013 (Tranquilizers: 15% - 31.2% - 26.7%; Antidepressants: 8.4% - 15.3% -12.9%). Consumption appears to be related to a decrease in life satisfaction. This association holds for antidepressants, but vanishes for tranquilizers after controlling for genetic influence in a co-twin control design, suggesting that this association is not direct, but mediated through genetic factors. Tetrachoric correlations for use of BZD were higher for MZ twins (r_{MZ} = .48) than for DZ twins (r_{DZ} = .08). Model fitting suggested that an AE model offers the best fit to data, with a heritability estimation of .43.

Conclusion(s): Twin registries have an enormous potential and are an invaluable resource for the study of behavioral phenotypes, such as psychoactive medication use. Different approaches offer new insights in the factors underlying such consumption. Ongoing candidate gene and epigenetic analyses using discordant MZ pairs will contribute to advance our knowledge in this area.

ENDOCRINE AND PSYCHOLOGICAL PROFILES ASSOCIATED WITH AGGRESSIVE BEHAVIOR IN SCHOOL-AGED CHILDREN

Aitziber Azurmendi, Eider Pascual-Sagastizabal & José Ramón Sánchez-Martín

University of the Basque Country UPV/EHU

The aim of this research project was to study the different profiles associated with aggressive behavior in 8-year-old children, bearing in mind both psychological and biological variables. The sample comprised 139 children (80 boys and 59 girls) in 3rd grade of primary from four schools in the Basque province of Guipúzcoa. Aggressive behavior was measured using a peer rating instrument called the Direct and Indirect Aggression Scale (DIAS). The psychological variables studied were empathy and anger, which were assessed using the Empathy Quotient questionnaire and the STAXI-NA inventory, respectively. The biological variables studied were testosterone and cortisol, samples of which were collected in the classroom at school at 9 o'clock in the morning and analyzed using an enzymoimmunoassay technique (ELISA). The cluster analysis revealed three groups based on these four variables. The group made up of children with higher anger levels, lower empathy levels and medium levels (neither low nor high) of testosterone and cortisol was the group for which highest levels of aggressive behavior were reported. In contrast, the group made up of children with high empathy levels and low levels of anger, testosterone and cortisol was the one with the lowest aggression scores. This study highlights the importance of taking into account profiles that include both psychological and biological characteristics, which are associated with marked differences in aggressive behavior.

EMOTIONAL MEMORY FOR MUSICAL EXCERPTS IN YOUNG AND OLDER ADULTS

Irene Alonso[1, 2, 3*], Delphine Dellacherie[1, 4] and Séverine Samson[1, 2]

[1]University of Lille, France. [2]Epilepsy Unit, Hôpital de la Pitié-Salpêtrière, France. [3]Inserm U 1127, CNRS UMR 7225, Sorbonne Universités, UPMC Univ Paris 06 UMR S 1127, Institut du Cerveau et de la Moelle épinière - ICM, Centre de Neuroimagerie de Recherche - CENIR, France. [4]Service de Neuropédiatrie, CHRU de Lille, Université de Lille 2, France

The emotions evoked by music can enhance recognition of excerpts. It has been suggested that memory is better for high than for low arousing music (Eschrich et al., 2005; Samson et al., 2009), but it remains unclear whether positively (Eschrich et al., 2008) or negatively valenced music (Aubé et al., 2013; Vieillard and Gilet, 2013) may be better recognized. Moreover, we still know very little about the influence of age on emotional memory for music. To address these issues, we tested emotional memory for music in young and older adults using musical excerpts varying in terms of arousal and valence. Participants completed immediate and 24h delayed recognition tests. We predicted highly arousing excerpts to be better recognized by both groups in immediate recognition. We hypothesized that arousal may compensate consolidation deficits in aging, thus showing more prominent benefit of high over low arousing stimuli in older than younger adults on delayed recognition. We also hypothesized worst retention of negative excerpts for the older group, resulting in a recognition benefit for positive over negative excerpts specific to older adults. Our results suggest that although older adults had worse recognition than young adults overall, effects of emotion on memory do not seem to be modified by aging. Results on immediate recognition suggest that recognition of low arousing excerpts can be affected by valence, with better memory for positive relative to negative low arousing music. However, 24h delayed recognition results demonstrate effects of emotion on memory consolidation, with a recognition benefit for high arousal and for negatively valenced music. The present study highlights the role of emotion on memory consolidation. Findings are examined in light of the literature on emotional memory for music and for other stimuli. The physiological aspects supporting the present behavioral results will be discussed together with the implication of the present results for potential music interventions in aging and dementia.

ENHANCING MEMORY CONSOLIDATION: EFFECTS OF MANIPULATING SENSORY STIMULATION AFTER LEARNING

Quiroga, María-López *, ZhuParris, Ahnjili *, Arkell, Daisy & Hardt, Oliver

Centre for Cognitive and Neural Systems, School of Biomedical Sciences, The University of Edinburgh, UK

* Shared first-authorship

Decreasing sensory stimulation after learning can promote long-term memory formation. This effect assumedly reflects attenuated interference during memory consolidation. In contrast, the synaptic tagging and capture hypothesis posits that such lack of stimulation should cause forgetting, while strong, i.e., increased sensory stimulation after learning will lead to long-term memory formation. In this study we used object and object location recognition memory tests to assess these opposing positions. We exposed rats briefly to objects placed into an open field, a procedure promoting short-term, but not long-term memory. We then tested whether increasing or decreasing sensory stimulation would promote formation of long-term recognition memory. First, we investigated the effects of reduced sensory stimulation after learning on formation of long-term object identity and object location memory. To this end, we placed rats into a highly familiar dark container immediately after object exposure in the open field. We found that this promoted long-term retention of object identity and object location recognition memory. Next, we tested whether increased sensory stimulation would promote or impair long-term memory retention. After exposing rats to objects in the open field, we placed them into a novel, highly stimulating environment, which caused formation of long-term object location memories. Similarly, exposing animals to novel objects in a highly familiar environment immediately after learning promoted formation of long-term object identity memory. These results suggest that both reduced as well as increased sensory stimulation can facilitate long-term memory formation. To tease apart these different effects, we explored whether exposing animals to novel objects in the same or different, but equal familiar open field would increase memory retention. According to the interference account, memory retention should suffer most in animals exposed to novel objects in the same open field. The tagging account would predict the opposite, namely that memory enhancement would be higher in the same open field. We found that both groups expressed long-term object recognition memory; although memory expression was stronger in animals exposed to object novelty in the same than in the different open field, statistically only a trend was observed. These results support the synaptic tagging and capture account. Taken together, our findings indicate that both reduced and enhanced sensory stimulation can promote long-term memory formation. Interference accounts cannot explain the latter, while the synaptic tagging and capture model cannot fully explain the former outcome. We conclude that reducing interference will promote memory formation, but that novelty signalling can overcome the otherwise detrimental effects of sensory stimulation on long-term memory formation.

ESTRADIOL AND CORTISOL LEVELS EXPLAIN A PART OF THE CHANGE IN AGGRESSIVE BEHAVIOR FROM 8 TO 10 YEARS OLD IN BOYS BUT NOT IN GIRLS

Eider Pascual-Sagastizabal, Aitziber Azurmendi & José Ramón Sánchez-Martín

University of the Basque Country UPV/EHU

The aim of this study is to explore potential changes in aggressive behavior in children between the ages of 8 and 10, and to determine whether changes in hormone levels during this interval may explain any increase or decrease in said behavior. The sample group comprised 90 children (49 boys and 41 girls) from 4 public schools in the Basque Country. The study design contemplated two data collection phases. In the first phase, subjects were age 8 and were in 3rd grade of primary school. The second phase was carried out two years later, when the children were 10 years old and were in 5th grade. Aggressive behavior was measured using a peer rating instrument called the Direct and Indirect Aggression Scale (DIAS). Hormone levels (testosterone, estradiol and cortisol) were measured using saliva samples which were collected in the classroom at school at 9 o'clock in the morning and analyzed using an enzymoimmunoassay technique (ELISA) in the laboratory. The results revealed an increase in aggressive behavior between the ages of 8 and 10 in boys only. In relation to hormone levels, an increase was observed in the testosterone levels of both boys and girls between the two ages, and a decrease in cortisol levels was observed in the same timeframe, although only for boys. To study the changes in aggressive behavior observed in boys, a regression analysis was performed with the aim of determining which changes in hormone levels predicted an increase in aggression. The regression analysis revealed that an increase in cortisol levels between the ages of 8 and 10 and a decrease in estradiol levels during that same period explained the change in aggressive behavior observed in boys. These results demonstrate the importance of studying aggressive behavior from a longitudinal perspective, taking both hormone levels and sex differences into consideration.

CORTISOL AWAKENING RESPONSE IN HYPERTENSIVE AND NORMOTENSIVE OLDER PEOPLE AND ITS RELATIONSHIP WITH COGNITIVE PERFORMANCE

Pulopulos Matías M, Hidalgo V, Puig-Perez Sara, Salvador Alicia

Department of Psychobiology and IDOCAL. University of Valencia, Spain

Systemic hypertension has been related to worse executive function and processing speed in older people. Moreover, an attenuated cortisol awakening response (CAR) and lower morning cortisol secretion have also been observed in older people with hypertension. In healthy older people, lower CAR has been related to worse performance on frontal cortex-related cognitive tasks; however, it is still unknown whether the same relationship can be observed in older people with systemic hypertension. We investigated differences in CAR and morning cortisol levels in 27 hypertensive and 29 normotensive older individuals (from 56 to 78 years old) and we examined the relationship between CAR and cognitive performance in these two subgroups. Cortisol levels were measured with eight saliva samples at home on two consecutive weekdays and a neuropsychological assessment focused on frontal cortex-related cognitive tasks was carried out. Results showed that hypertensive participants woke up earlier, slept less time and showed lower morning cortisol secretion than normotensive older people. These findings indicate that earlier awakening time and shorter sleep time in hypertensive older people might underlie the lower overall morning cortisol secretion observed in previous studies. No differences in CAR were observed; however, being treated with antihypertensives for a longer period of time was related to higher CAR. In hypertensive and normotensive participants, higher CAR was related to better executive function and processing speed. These results suggest that a CAR dysregulation might contribute to worse performance in hypertensive older people not receiving treatment, and that a possible protective effect of antihypertensive medication on cognition could be due to its effect on CAR. This study confirms previous research in healthy older people showing a relationship between lower CAR and worse performance on frontal cortex-related cognitive tasks, and extends this result to older people with hypertension. Finally, our results suggest a potential clinical use of antihypertensives in pathologies that show an attenuated CAR.

VOLTAGE-SENSITIVE DYE IMAGING OF GOLDFISH PALLIAL TELENCEPHALIC ACTIVITY DURING EMOTIONAL CLASSICAL HEART RATE CONDITIONING

Uceda, S; Ocaña, FM; Rodríguez-Expóstio, B; Reiriz, M; Martín-Monzón, I; Durán, E and Rodríguez, F.

Laboratory of Psychobiology, University of Sevilla, Campus Santiago Ramón y Cajal, 41018, Sevilla, Spain.

Understanding how neural ensembles encode behavioral programs at different time-scales and codify different types of memories is a major challenge in psychobiology. In the present experiment, we employed teleost fish as a model organism for studying the neural basis of fear memories as well as for analyzing the interaction between different pallial regions during emotional learning. Recent studies indicate that the dorsomedial region of the teleost telencephalic pallium (Dm) could be a heterogeneous division comprising not only an area homologue to the mammalian amygdala, but also discrete sensory areas comparable to those present in the mammalian neocortex. As these regions are accessible from a dorsal view of the goldfish pallium, we used *in vivo* voltage sensitive dye imaging to investigate the neural basis of auditory fear classical conditioning in goldfish. This methodological approach allows the simultaneous recording of activity in different neuron populations with high spatio-temporal resolution. Thus, we developed an acute goldfish preparation in which we were able to perform heart rate classical conditioning and simultaneously to record the pallial activity evoked by a 1000Hz tone (CS) before and after being paired with an unconditioned stimulus (electric shock at the base of the goldfish dorsal fin). In addition, we recorded the CS evoked activity after extinction of the acquired conditioned bradycardia.

We found that training goldfish in a fear classical conditioning procedure induce plastic changes in the ventral subdivision of Dm (Dmv) and in the caudal subdivision of Dm (Dmc), pallial regions that are respectively comparable to the amygdala and the auditory cortex of mammals. Specifically, at the end of the CS-US paired training, once the conditioned bradycardia response has been acquired, the tone (CS) became predictive of the US and the amount of activity in Dmv and Dmc was incremented in comparison with the activity evoked by this stimulus at the beginning of the experiment, before CS-US paired presentation. Furthermore, extinction produced not only a change in the behavioral significance of the tone, but also a significant decrease in the level of conditioned bradycardia responses as well as in the depolaritation response recorded in Dmc and Dmv. Interestingly, the increased signal recorded in these pallial regions at the end of the paired training was not observed in the animals trained in the unpaired paradigm. As a whole, these results suggest that the increased activity observed in Dmc and in Dmv was related to a “fear memory” associated with the tone. In addition, present results add functional support to the hypothesis that teleost fish Dmv and Dmc could be homologous to the mammalian pallial amygdala and the auditory cortex of mammals, respectively.

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VALIDATION OF NOVEL QUASI-DRY ELECTRODES FOR ERP RESEARCH PURPOSES

Pasion, Rita[1]; Paiva, Tiago[1]; Pedrosa, Paulo[2]; Gaspar, Hugo[2]; Fernandes, Carina[1]; Fonseca, Carlos[2]; Fernando, Barbosa[1]

[1]Faculty of Psychology and Educational Sciences of the University of Porto, Laboratory of Neuropsychophysiology. [2]Faculty of Engineering of the University of Porto, Portugal

Electroencephalography (EEG) is a brain recording technique that provides high temporal resolution of brain activity. Despite all technological advances over the last decades, EEG signal acquisition still remains a challenge, mainly due to the scalp-electrode signal transfer. The gold standard for the non-invasive EEG measurement is the silver/silver chloride (Ag/AgCl) electrode, due to their reliability, low level of intrinsic noise and electric potential stability. However, the EEG recording with such electrodes has to be preceded by skin scrubbing and gel application, which leads to long preparation times, gel drying and dirtiness, as well as gel allergy risk. Trying to overcome the limitations of conventional electrodes, dry electrodes were already developed, making use of inert conductive materials that couple with the scalp for signal transfer. Nevertheless, impedances with dry electrodes are higher, usually implying a pre-amplification stage for proper signal acquisition. In this work, we tested a novel EEG electrode (WICK) that combines the advantages of both wet and dry sensoring systems, while addressing most of the drawbacks. A wick polymer was developed as the core electrode material. A moistener reservoir incorporated into the electrode fueled continuously a saline solution to a pin sensor array in contact with the scalp. To assess the WICK electrode reliability in neuropsychophysiological research, we recorded the performance of WICK and Ag/AgCl electrodes in the same conditions during an auditory oddball paradigm (n = 10). As expected, we found increased P300 amplitude in rare/target stimuli at central and posterior brain areas, comparing to frequent/non-target stimuli, and we did not find significant differences – either for amplitudes or latencies - between ERPs recorded with WICK and Ag/AgCl electrodes. Analysis of the residual noise in the P300 waveform highlighted a multicolinear co-variation of standard-deviation points between WICK and Ag/AgCl electrodes. The lack of differences in Global Field Power provided further evidence for the WICK reliability recording, when compared to the most widely used electrodes in non-invasive EEG. Considering these main preliminary findings, WICK electrode may be a promising halfway alternative between wet and dry solutions, reducing significantly EEG time preparation and ensuring cost-savings in EEG/ERP research.

THE EFFECT OF RECORDING INTERVAL LENGTH IN BEHAVIORAL ASSESSMENT USING THE FORCED SWIMMING TEST

Álvarez-Suárez, P.[1], Banqueri, M.[1], Vilella, M.[1], Méndez, M.[12] and Arias, J.L[12]

[1]Laboratory of Neurosciences, Faculty of Psychology, University of Oviedo. [2]Institute of Neuroscience of the Principality of Asturias, Oviedo, Spain

Introduction: The forced swimming test (FST) is a method used in the assessment of depressive-like behavior in rodents. The total time of immobilization when the animal is introduced in an inescapable tank filled with water is an index of depression.

The recording method of the FST has not been further studied nor normalized, as there is a high variability in the literature. In the present study, we assessed the relevance of using a longer or shorter interval in the recording method, by comparing the behavioral results at 3, 5 and 10 seconds recording intervals in the same sample of control subjects and an early stress model by maternal separation procedure.

Methods: A total of 40 (20 male/20 female) 3 month-old Wistar rats were used, obtained from the University of Oviedo central vivarium and randomly assigned to Control group (CO: n = 20) or Maternal separation group (MS: n = 20).

The animal model of early stress consisted on 21 days of 4 h/day maternal separation. The FST was performed as previously described by Porsolt et al. (1977) and animal's behavior (immobility, swimming and climbing) was analyzed at 3, 5 and 10 s intervals.

Results: T-test for independent samples showed no significant differences between sexes in behavioral results of the FST at 3, 5 and 10 s intervals in CO group ($p > .05$). We found sex differences in MS group at 3 (immobility was greater in females and climbing was greater in males) and 10 s intervals (immobility was greater in females) ($p = .023$, $p = .043$ and $p = .037$, respectively).

One factor ANOVA showed significant differences between treatments in behavioral results, where immobility of the MS group is greater than immobility of the CO group in 5 and 10 s intervals ($p = .045$ and $p = .029$, respectively).

We found that immobility is greater than swimming and climbing in every recording interval in both CO ($p < .001$) and MS group ($p \leq .001$). Immobility showed no significant differences between intervals in both experimental groups ($p = .221$ and p = .215, respectively), as well as climbing ($p = .687$ and $p = .998$). Swimming showed differences only in the CO group ($p = .172$).

Conclusion: The lack of differences between sexes in the CO group but not in the MS group is probably due to the different sex effect of this pathological condition. The differences between behaviors are due to inherent characteristics of this test, as immobility behavior is more frequent than mobility. We conclude that there are no differences in the use of the 3 recording intervals in the FST. However, the use of 3 s recording intervals could drive to a loss of relevant information and recording at 5 s intervals seem to be a suitable method.

TDCS ANODAL STIMULATION ON M1 IMPROVES MOTOR LEARNING: INFLUENCES OF MUSIC TRAINING

Sánchez-Kuhn, Ana; Pérez-Fernández, Cristian; Moreno, Margarita; Flores, Pilar and Sánchez-Santed, Fernando.

Department of Psychology. Uiversity of Almería & CeiA3, Spain, Spain.

Anodal -tDCS- transcranial Direct Current Stimulation is a technique that stimulates specific brain areas producing an increase of its activity: anodal stimulation with low electricity current has shown to depolarize neurons; while catodal stimulation produces the polarization of the neurons and a decrease of its activity. Previous studies show high effects of tDCS on the improvement of cognitive and motor capacities and on the reduction of symptoms of diverse psychopathologies. Therefore, the aim of the present study is to investigate the online and offline effects of tDCS, the maintenance of these effects in the long term and the influence of the previous training of the stimulated area. In the present investigation we study if tDCS improves motor learning by the stimulation of the right Motor Cortex area (M1). For this objective, 20 healthy right-handed participants were trained on the Sequence Tapping task -SEQTAP- with their left hand. 10 out of 20 participants received 2mA stimulation during 20 minutes / 3 sessions while performing the test. Their Skill Index -SI- was registered before, during (online), 20 minutes after (offline) and one week later. The results show maintenance in the long term of the learned motor task in the stimulated participants, while the control group shows a decrease in their performance. These results got also influenced by the previous musical training of the participants. These results point up the beneficial effects that anodal-tDCS over M1 have on motor learning and underline the great potential of this technique in neurorehabilitation.

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A CROSS-SECTIONAL AND LONGITUDINAL STUDY ON AGEING AND THE MILD STAGES OFALZHEIMER'S DISEASE BY MEANS OF N170-VPP

Cristina Saavedra, Ela Isabel Olivares, Jaime Iglesias

Departamento de Psicología Biológica y de la Salud. Universidad Autónoma de Madrid, Spain

Introduction. Although the identification of faces that are familiar in daily life is preserved in ageing, changes have been observed in the initial process of structurally encoding the faces as a complex visual stimulus. In the mild phase of Alzheimer's disease (AD) the semantic processing underlying the recognition of familiar faces is also affected. N170- VPP are evoked potentials modulated by the processing of faces that are related with their structural encoding.

Aim. To explore the sensitivity of N170-VPP evoked potentials as possible markers of the changes in facial processing that occur in ageing and in the milder stages of AD. Subjects and methods. The evoked potentials of young adults, older adults and patients with cognitive impairment (mild cognitive deterioration and mild AD) were registered while they were performing face processing tasks. In the case of the older persons, the register was repeated after eight months and again two years later. Tomographic analyses (sLORETA) were performed.

Results. As regards VPP, the patients showed higher activation in the frontal areas with respect to the young and older adults. Regarding N170, the older adults and the patients displayed a more distributed activity than the younger adults. In the longitudinal follow-up, the patients showed greater activity in the occipital areas in comparison to the older adults. Conclusions. N170-VPP can be considered neurophysiological markers of normal ageing and of the neurocognitive deterioration associated with dementia.

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A COMPARISON BETWEEN MANUAL AND AUTOMATIC COUNTING METHODS FOR IMMUNOHISTOCHEMICAL PROCEDURES

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

Department of Psychobiology.Institute of Neurosciences.Center for Biomedical Research (CIBM).University of Granada. Spain. Email: alejandrograu@correo.ugr.es.

The quantification of positive cells in immunohistochemical procedures can be made by using manual or automatic counting methods. The manual method requires a visual counting of the positive cells which is sometimes called into questions due to the variability inter-raters, thus leading to the requirement of several raters. The automatic method requires the specific parameters to be established in order to count the number of cases meeting the criteria. Thus, the automatic method reduces variability and the number of experimenters. Objective: The aim of this experiment was to compare the number of c-Fos positive cells in the Piriform Cortex related to taste memory obtained by both counting methods. Methods: The brains of 21 male Wistar rats were used. Three coronal sections per hemisphere were selected and three images were captured at 20X magnification within each section. For the automatic counting method the ImageJ Software (National Institute of Mental Health) was used with the following parameters: image type (8-bit), area (20-150) and circularity (0.25-1). Results: A single factor ANOVA analysis indicated a higher number of positive cells using the manual counting method. However, the counting method used did not modify the effect of the rest of the factors included in the experiment. Thus, the number of c-Fos positive cells in the area was higher after drinking a familiar than a novel flavor. There was a 0.94 positive correlation between both counting methods. Conclusions: These results support the use of the automatic counting method in order to shorten the counting phase of the immunohistochemical procedure.

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PRIMARY MOTOR CORTEX EXCITABILITY ALTERATIONS INDUCED BY PARIETAL TDCS

G. Nathzidy Rivera-Urbina[1,2], **Andrés Molero-Chamizo[1,3]**, Giorgi Batsikadze[1], , Walter Paulus[1], Min-Fang Kuo[1], Michael A. Nitsche[1]

[1]Department of Clinical Neurophysiology, Georg-August-University Göttingen, Göttingen, Germany. [2]University Pablo de Olavide, Sevilla, Spain. [3]University of Huelva, Spain

The posterior parietal cortex (P3) is a region of the cortical network involved in motor learning and is structurally and functionally connected with the primary motor cortex. Neuroplastic alterations of neuronal connectivity might be an important basis for learning processes. These have however not been explored for parieto-motor cortical connections by transcranial direct current stimulation (tDCS). Exploring tDCS effects on this connectivity might be functionally relevant, because this non-invasive brain stimulation thechnique has been shown to improve motor learning. We aimed to explore plastic alterations of parieto-motor connections by tDCS in healthy humans. We measured neuroplastic changes of cortico-spinal excitability via motor evoked potentials (MEP) elicited by single pulse transcranial magnetic stimulation (TMS) before and after tDCS over the left P3. The results show polarity-dependent M1 excitability alterations after apply P3 tDCS. Single pulse-TMS-elicited MEPs were enhaced by P3 anodal stimulation and reduced by P3 cathodal stimulation. These results suggest an effect of remote stimulation of the posterior parietal cortex on primary motor cortex excitability, which could have implications for modulation processes of motor learning and for movement rehabilitation.

ELECTROPHYSIOLOGICAL RECORDINGS OF CORNEAL NERVE TERMINAL FIBERS AND THEIR ROLE IN SENSE PERCEPTION

González-González, Omar[1]; Alcalde, Nacho[1]; Íñigo-Portugués, Almudena[1]; Bech, Federico[1]; Belmonte, Carlos[1,2]; Merayo-Lloves, Jesus[1]

[1]Instituto Universitario Fernández-Vega. Universidad de Oviedo. Spain. [2]Instituto de Neurociencias. Universidad Miguel Hernández-CSIC. San Juan de Alicante. Spain.

Introduction: Perception is the process of recognizing and interpreting sensory stimuli, like those from external environment. The cornea is one of the most innervated tissues in the body. The dense population of corneal nerves respond to stimuli from external environment, having a critical role in protecting the eye. Electrophysiological recordings from the cornea contribute to characterize the nerve terminal fibers involved in pain and pleasure perception.

Methods: C57BL6/J mice of 3 and 24 months were studied. Mice were sacrificed by CO_2 exposure. The excised eye was drawn in a solution similar to tear and bubbled with carbogen gas. A peltier device was used to control the temperature. Extracellular electrical activity of single sensory nerve endings of the corneal surface was recorded with an Ag/AgCl borosilicate micropipette electrode filled with the same solution and placed with slight suction in to the cornea surface with a micromanipulator. All data obtained were filtered and analyzed in the computer with Spike2 software.

Results: Different types of nerve terminal fibers were found in young healthy mice's cornea: two different types of cold-sensitive nerve terminals: Low- (LTC) ad High- (HTC) Threshold Cold fibers. LTC presented a low cooling threshold, high background activity and vigorous respond to cooling; contrarily, HTC showed a high cooling threshold, very low background activity and weak response to cooling; polymodal-nociceptors presented no response to cooling, very low background activity, mechanical stimuli response and increased vigorously their activity with heating and with their agonist capsaicine; and mechanic-nociceptors, that have no background activity and only responded to mechanical stimuli. Pathological mice, old mice and post corneal-surgery mice presented a variation, in proportion and in functional characteristics, in corneal terminal fibers.

Conclusion: The fact that old, pathological and post corneal-surgery mice have differences in the functional characteristics and in the proportion of their corneal terminal fibers, may suggest that other pathological animal groups could show these differences, being important to take them into account before applying behavioral assessments related to visual perception.

ALLOCENTRIC AND EGOCENTRIC ORIENTATION ASSESSED IN YOUNG ADULTS BY CARD PLACING TESTS

Vilella, M., Banqueri, M., Méndez, M., and Arias, J.L.

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

In neuropsychological assessment, it was recently developed a test which allows the examination of orientation, using only egocentric strategies: the Card Placing Test (CPT). This test examines the ability to represent spatial locations of cards placed on the floor around a subject. No visual cues of the room are showed to the subject.

This is an easy-administration, quickly and interactive test. We tried to modify this test to assess, according to a similar procedure, allocentric orientation. In this version, all the visual clues of the room remain visible. After 10 seconds of cards observation, the examiner blindfolds the subject and takes him to a different point of the board, then, he is asked to replace the cards. We carried out a preliminary study to examine performance-based assessments of visuospatial skills, which include the original egocentric CPT part A and part B (score range 0-30 in each part) and the modified version that assess Allocentric orientation (score range 0-60).

A total of 115 subjects with no brain damage took part in the preliminary study (17 males/98 females). Reynolds Intellectual Screening Test was used to assess intelligence quotient (IQ). Normal IQ was set as criteria. The final sample was 94 subjects (14 males/80 females) with a mean age of 19.32±2.49 years. Other traditional tests which assess memory and visuospatial representation were also used. Benton's Judgment of Line Orientation Test (JLO) was used to assess spatial perception. Corsi Block Tapping Test was used to estimate visuospatial short-term memory. Image transformation was evaluated using a Mental Rotation Test. Executive Functions were assessed with The D-KEFS Trail Making Test (TMT).

The score obtained in the Allocentric version of the CPT correlates with IQ and the results of the Egocentric CPT, both part A and B, TMT (switching condition), Corsi Block Tapping Test, JLO and Mental Rotation Test. Both the part A and B of the Egocentric CPT significantly correlate with Corsi Block Tapping Test (scalar values). There is no correlation between part A and B of the CPT. There were not statistically significant differences between male and females in allocentric or egocentric orientation assessed with the CPT. Young adults do not show any difficulty in performing the egocentric and allocentric versions of the CPT. Their mean and SEM scores were 28.69±2.81 in CPT-A and 24.48±3.88 in CPT-B. Regarding Allocentric CPT, scores range from 43 to 60 (56.09±4.24).

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HYPERFAMILIARITY FOR UNKNOWN FACES AFTER NON-PARANEOPLASTIC LIMBIC ENCEPHALITIS: A CASE REPORT

Israel Contador[1]*, Jesús González de la Aleja[2,3], Rosa Ana Saiz-Díaz[2,3], Juan Francisco Gonzalo[2,4], Pablo Ruisoto[1], María Victoria Perea[1]

1Department of Basic Psychology, Psychobiology and Methodology of Behavioural Science, University of Salamanca, Salamanca, Spain. 2Department of Medicine, Faculty of Medicine, Complutense University, Madrid, Spain. 3EEG-Epilepsy Unit, Department of Neurology, University Hospital "12 de Octubre", Madrid, Spain. 4Department of Neurology, University Hospital "12 de Octubre", Madrid, Spain.

Currently, described cases of the hyperfamiliarity syndrome for unknown faces (HFUF) are scarce, and the neurophysiological boundaries are unclear.

Case report. This report describes the case of a 39 year-old woman, the first case of HFUF in the scientific literature, associated with non-paraneoplastic limbic encephalitis (NPLE). She showed no visual perceptual deficits and after misidentification, she accepted these recognitions as false. She displayed normal performance on the standard neuropsychological testing and limit scores on working memory. Furthermore,autobiographical episodic memories (adulthood and recent events) were impaired.

Conclusion. In this case, we suggest that hyperfamiliarity may be explained by the combination of post-ictal cortical release phenomena and bitemporal lobe dysfunction caused by the NPLE. The critical symptoms of the case and its origin are discussed in relation to other cases of HFUF in the scientific literature.

COGNITIVE DYSFUNCTION IN NON-DEMENTED PARKINSON'S DISEASE

Alonso Recio Laura, Serrano Juan Manuel Serrano, Pilar Martín

UDIMA, Universidad a Distancia de Madrid, Spain

Background: Cognitive impairment occurrs in patients with Parkinson disease and include both dementia and mild cognitive impairment without dementia. In the absence of dementia, studies have reported a heterogeneous cognitive profile. Specifically, it has been suggested that while some patients have predominant executive and attentional problems, others have a significant memory decline. However, the precise delimitation of these differential cognitive profiles is complicated due to several differences among studies in patients' motor impairment, neuropsychological tests employed, and criteria for determining cognitive impairment. Objective: The aim of the present study is to advance in the knowledge of cognitive impairment subtypes in Parkinson disease, by means of a broad assessment of their memory, attention and executive function abilities.

Method: 92 individuals (48 women) with idiopathic Parkinson Disease, and without dementia (MMSE>27) were evaluated by means of neuropsychological standardized tests to explore their possible cognitive impairment. We used an agglomerative hierarchical cluster analysis to classify their performance. Also, differences among conglomerates were analyzed respect to clinical variables such as age, disease duration, cognitive reserve, and depression.

Results: Three cluster solution distinguishes three quite homogeneous patient subgroups: Cluster 1 comprised 55.4% of individuals, and encompassed with a normal performance both in memory and atention/ executive function tests. Cluster 2 collected 26.1% of individuals and was characterized by a normal performance in memory tests, but altered in the atention/executive function tests. Finally, Cluster 3 included 18.5% of the PD individuals observed, and corresponded to a normal performance on atention/ executive function tests, and a lowered score in memory test. No differences among clusters were observed as a function of age, disease duration, cognitive reserve or depression.

Conclusions: Mild cognitive impairment is relatively common in patients with Parkinson disease without dementia, affecting either memory or executive abilities. Future studies would help to determine whether some of these different profiles of cognitive impairment may be considered as a increased risk factor for developing dementia.

DO OLDER PEOPLE HAVE GREATER DIFFICULTY FORGETTING IMAGES WITH NEGATIVE EMOTIONAL CONTENT? A EVENT-RELATED POTENTIALS STUDY

Paula Alfonso, Julio Menor

Departamento de Psicología. Universidad de Oviedo, Spain.

It has been shown that emotional stimuli are preferentially processed, which could result in increased resistance to forget. On the other hand, it has been proposed from the theories of cognitive aging that older people differ from young people in the way they process information with emotional content and their ability to inhibit irrelevant information. The aim of this study is to analyze the effects of aging on the electrophysiological correlates (event-related potentials) of intentional forgetting of images with negative emotional content. Negative and neutral pictures of the Spanish adaptation of the International Affective Picture System were presented through the procedure of directed forgetting (item method). A total of 24 people, 12 elderly (54-69 years old) and 12 young (18-30 years old) participated in this study who they were recorded brain electrical activity. In the study phase negative images provoked more positive than neutral between 300-700 msec. period in both groups of participants. In the older group this positivity is shown in anterior areas; however, in the younger group the effect is more pronounced in posterior areas and longer time. In addition, the processing instruction memory was different between young and old people. The instruction to forget (F) led to more negativity that remember (R) instruction between 100-200 msec. period in anterior areas only in the younger group. Also R instruction elicited more positive that F instruction on posterior areas between 200-500 msec, while on 500-700 msec period this pattern was reversed and F instruction was more positive than R instruction in the younger group. In the older group no differences between R and F instructions were found up to 500 msec. In subsequent recognition test there were no differences in accuracy between the young people and the elderly. In addition, both groups recognized the negative images worse than neutral images because more false alarms committed to the negative images. However, there was only directed forgetting effect in the younger group in neutral images. The results suggest that in relation to young people, older people had difficulty inhibiting F items, preventing the selective rehearsal of R items. The behavioral consequence is the lack of directed forgetting effect, regardless of the emotional content item.

NEUROPSYCHOLOGICAL ASSESSMENT IN A CASE OF RIGHT HIGH GRADE INSULAR GLIOMA: AWAKE BRAIN SURGERY

Raúl Espert Tortajada[1,3], Joana Pérez San Miguel[3], Ricardo Prat Acín[2], Anabel Campos García[3], Marien Gadea Doménech[1], Marta Aliño Costa[1]

[1]Departamento de Psicobiología, Universitat de València, Spain. [2]Servicio de Neurocirugía, Hospital Universitario La Fé, Valencia, Spain. [3]Unidad de Neuropsicología, Hospital Universitario La Fé, Valencia, Spain

A 57-year-old biologist was referred to our neuropsychological unit for pre, peri and post neurosurgical assessment. Preoperative MRI shows a right insular involvement perisylvian injury compatible with glial supported high-- - grade tumor. We proceeded to apply a battery of extensive testing in order to assess the possible cognitive impairments caused by the glioma. Specifically we evaluated handedness, attention, language, memory, praxias, gnosias, visuospatial, frontal functions and social cognition. The findings of the pre-- - surgical neuropsychological assessment reported that verbal memory and attentional audio-- - verbal span was normal. We also observed an alteration in working memory. Finally, we noted that although the visual-- - constructional function was within normal limits, planning and perceptual spatial organization was slightly altered. The rest of cognitive functions were within normal limits. However, the patient had difficulties related to theory of mind (Reading the mind of the eyes: RME). Once the previous neuropsychological assessment, the patient underwent neurosurgical procedure with awake brain mapping. First, we proceeded to general anesthesia for patient craniotomy. After craniotomy and dural opening, we proceeded to locate the tumor limits (with a neuronavigator). When the patient was awake, he began to perform cognitive and motor tasks. The surgical tasks consisted of counting (from 1 to 10, forward), pyramids and palm trees test, naming Test (D-- - 80) and RME. Our task was to observe any changes (cognitive, behavioral, motor or sensory) experienced by the patient to immediately notify the neurosurgery team. To any change that was consistent to stimulated specific brain area, the team of neurosurgeons signposted with numbers on the cerebral cortex. Then neurosurgeons proceeded to intraoperative resection of the high-- - grade glioma. The approximate length of the process in which the patient was awake it was around 90 minutes. The post-- - surgical neuropsychological evaluation was performed 6 days after surgery. The patient showed no motor deficits, no changes in mood, sensory or language, but we detected a mild attention deficit. There was no evidence of motor or language impairment as a consequence of surgery. Neurosurgery by brain mapping in awake patients provides a breakthrough in the quality of life of patients, allowing decisions during neurosurgical process, the patient being a member of the team having greater sense of control that is if it operated without consciousness.

NEUROPSYCHOLOGICAL FINDINGS REVEAL A PREDOMINANT IMPAIRMENT OF RIGHT-HEMISPHERESTRATEGIES IN A CASE OF VISUAL AGNOSIA

A. S. Urraca, E. I. Olivares, E. Rodríguez-Alzueta, J. Iglesias.

Facultad de Psicología. Universidad Autónoma de Madrid, Spain.

Visual agnosia is an impairment in the perception and/or recognition of objects. One of the main interests of its study lies on the possibility of establishing dissociations based on the patients´ functional deficit (e.g. apperceptive if failing to encode the structure of the stimulus, or associative if the deficit affects the link between relatively intact perception and subsequent mnesic processes). Such dissociations may allow to better understand the neural bases and cognitive operations underlying the processing of complex visual stimuli, as are faces.

Patient EC (woman, 30) suffered herpetic meningoencephalitis in 1997 causing visual agnosia due to right-sided occipito-temporal and parietal brain damage as seen in CT scans. With the aim of evaluating impaired and preserved cognitive domains or processes, extensive neuropsychological assessment was conducted, from the Wechsler Adult Intelligence Scale (WAIS) and the Barcelona Neuropsychological Test, which reflected the most severely affected cognitive areas, to specific tests pinpointing object and face processing deficits. The WAIS-IV revealed a Total Intellectual Quotient of 72, with a high-normal Verbal Comprehension Index, reflecting preserved verbal abilities, and very low Perceptual Reasoning, Working Memory and Processing Speed indices, showing poor spatial processing and memory and a very slow performance. These findings were coherent with those of the Barcelona Test, the latter additionally revealing normal auditory and tactile processing, subsequent testing therefore focusing on visual processing. Low-level visual perception is preserved as seen in the Visual Object and Space Perception (VOSP) screening test and in most low-level Birmingham Object Recognition Battery (BORB) tests. Visuo-spatial perception is slightly impaired as seen in the space VOSP subtests, as are spatial-praxic functions, in the Rey Complex Figure test and in Barcelona subtests involving drawing or copy of geometrical figures. Object perception is moderately to severely impaired, as seen in versions of the Poppelreuter-Ghent test, most VOSP object subtests and naming of the Snodgrass-Vanderwart figures. Object memory also showed impairments in old/new judgements of newly learnt objects. Finally, moderate to severe impairments were found in face processing tasks involving face detection, discrimination (Cambridge Face Perception test), learning (Cambridge Face Memory Test) and famous face naming.

Overall this pattern of performance reflects both an apperceptive component – with a severe impairment in configural processing (integrating information into a whole) and in cognitive functions generally associated to the right hemisphere, deriving in the use of analytic strategies by EC – and an associative component, with severe mnesic deficits. These findings are relevant for the design of both neurophysiological and rehabilitation studies focused on face processing.

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STUDY OF LATERALITY AND MULTIPLE INTELLIGENCES FROM NEUROSCIENCE

Elena Bernabeu, Cristina de la Peña and Pilar Martín-Lobo

Universidad Internacional de la Rioja, Spain.

Introduction: PISA Report (OECD, 2012) reveals that education in Spain demands urgent educational measures; therefore, the application of neuroscience in the educational field currently allows to identify the neuropsychological factors involved in the educational process to achieve a quality teaching. Recent studies have shown the importance of learning laterality (Vlachos et al., 2013). This work is focused on laterality and multiple intelligences, since they are two neuropsychological areas with significant contribution to student academic improvement.

Objective: The purpose of this study is to analyze the relationship between laterality and Multiple Intelligences from the perspective of neuroscience in 3rd grade students.

Method: The research was carried out with 22 8 to 9 year old children enrolled in 3rd grade in a primary school in Madrid. In the inicial phase, the children were individually provided with the tests, which consisted of visual, aural, handedness and footedness (Martin - Lobo, Garcia, Rodriguez and Vallejo, adaptation test Subirana, 2010) laterality tests in the first place, and secondly, the Teacher Questionnaire to diagnose Multiple Intelligences in Primary school (Armstrong, 2001). In a second stage, using the SPSS statistical package, we proceeded to perform descriptive analyzes and correlations of the variables under study.

The results obtained in this research show that only half of the sample students have a defined and homogeneous laterality, and that, of all multiple intelligences, musical one has the lowest average. Correlational analysis show that there is a significant correlation between lateral and logical- mathematical intelligence, and between laterality and spatial intelligence. As expected, significant correlations were also found among different types of multiple intelligences, being the intrapersonal intelligence the only one that correlates with all the multiple intelligences. Conclusion: According to the results, we may confirm that laterality is a factor that must be considered in the daily work at schools due to its relationship with the logical- mathematical and spatial intelligence, two fundamental types of intelligence which are fundamental for the development of the teaching-learning process and for the academic results of students in the different academic disciplines present in the Primary education. It is also necessary to stimulate intrapersonal intelligence as a source of other intelligences improvement, and, due to its underdevelopment, of musical intelligence. This study provides new ways of research on how to design neuropsychological intervention programs to improve the educational process of elementary students.

EFFECTS OF COMPETITION AND ITS OUTCOME ON CARDIOVASCULAR AND PSYCHOLOGICAL RESPONSES, IN YOUNG MEN

Miguel Fuentes[1], Diana Abad, Adrián Alacreu-Crespo, Raquel Costa, Alicia Salvador, Miguel Ángel Serrano.

[1]Universitat de València, Departamento de Psicobiología. Av. Blasco Ibañez 21, 46010 Valencia, Spain. Email: mifuenra@alumni.uv.es.

Competition has been considered an important social stressor that elicits different cardiovascular (CV) and emotional responses. Previous investigations showed an active coping pattern, characterized by higher CV response and positive mood increases, associated with winning. Complementarily, a passive coping style, characterized by lower cardiovascular response and increases in negative mood, was associated to losing. The first objective of this study was to analyse cardiovascularresponse to competition; a second objective was to analyze the effect of outcome on CV and emotional response. 47 healthy male (mean age =22.49±0.50) performed a laboratory task, in a competitive (14 winners *vs.* 16 losers), and a non-competitive situation (control group, N= 17), meanwhile heart rate variability and emotional responses (emotional valence, dominance and state anxiety) were measured. Competition elicited greater sympathetic response (R-R) and parasympathetic inhibition (RMSSD) in comparison with control group. Winners and losers did not differ on CV response to competition, although winners showed high positive emotional valence and dominance, and less anxiety than losers. We concluded that competition induced increases on sympathetic activity, not related to outcome, and that only emotional response was different between winners and losers.

INTERACTIONS BETWEEN PSYCHOLOGICAL AND PHYSICAL PAINS: REWARD DEVALUATION INDUCES HYPOALGESIA

Jiménez, A.M.[1], Cendán, C.M.[2], Papini, M.R.[3], Torres, C.[4] and Morón, I.[1,5].

[1]Departamento de Psicobiología. Universidad de Granada (España). [2]Departamento de Farmacología. Instituto de Neurociencias F. Olóriz. Universidad de Granada (España). [3]Department of Psychology, Texas Christian University (USA). [4]Departamento de Psicología. Universidad de Jaén (España). [5]Centro de Investigación Mente, Cerebro y Comportamiento (CIMCYC), Universidad de Granada (España).

There are extensive neurobiological similarities in the mechanisms underlying psychological and physical pain. Moreover, physical and psychological pains interact with each other. For example, psychological pain induced by reward devaluation (as in consummatory successive negative contrast, cSNC) produces hypoalgesia, as measured by a hot plate test. This hypoalgesic effect occurs in the second downshift session. Similarly, physical pain induced by a formalin injection in a hind paw potentiates the cSNC effect. In the present experiment, a Von Frey Test (VFT) was used to measure physical pain thresholds in the cSNC paradigm. Because the VFT does not induce an aversive pain experience, it can be used repeatedly without producing aversive conditioning. Wistar rats were trained in the cSNC situation. Group 32/1 (n=6) received access to 32% sucrose during 16 daily sessions followed by 3 sessions of access to 4% sucrose; the VFT was administered after the first downshift session. Group 32/2 (n=5) received a similar treatment, except that the VFT was administered after the second downshift session. Groups 4/1 (n=6) and 4/2 (n=6) received access to 4% sucrose in all 19 sessions and the VFT after equivalent sessions relative to downshifted groups. Moreover, two VFTs were administered to each animal, one immediately after the consummatory session and the other 5 h after. cSNC induced hypoalgesia immediately after either the first or second downshift session. However, hypoalgesia was observed after 5 h only in the second downshift session. These results confirmed the hypoalgesic consequences of psychological pain induced by reward devaluation. Unlike with the hot-plate test, the VFT detected evidence of hypoalgesia after the first downshift event. The underlying neurobiological mechanisms remain to be investigated.

THE ROLE OF TELEOST FISH HIPPOCAMPAL PALLIUM IN THE ACQUISITION, CONSOLIDATION AND RETENTION OF A TRACE CONDITIONAL DISCRIMINATION

Rodríguez-Expósito, B.; Reiriz, M.; Uceda, S.; Martín-Monzón, I.; Durán, E.; Broglio, C.; Salas, C.; Rodríguez, F.; Gómez, A.

Laboratory of Psychobiology, University of Sevilla, Campus Santiago Ramón y Cajal, 41018, Sevilla, Spain.

The hippocampus of mammals constitutes an essential neural substrate for the acquisition, storage and retrieval of complex-cognitive forms of eyeblink classical conditioning. Trace conditioning and conditional discrimination learning have become powerful tools for studying the neurobiology of relational learning and the reorganization of memory during the consolidation process. In teleost fish, the ventral division of the dorsolateral pallium (Dlv) has been proposed as the homologue of the medial cortex or hippocampus of land vertebrates on the basis of developmental, neuroanatomical and functional data. In fact, previous studies have demonstrated the engagement of Dlv in spatial map-like memories and trace eyeblink classical conditioning, two forms of relational memories critically dependent of the hippocampus in mammals. The present study was aimed to assess the involvement of teleost hipocampal pallium on the acquisition, consolidation and retrieval of eyeblink-like trace conditional discrimination. With this purpose, three different experiments were carried out. In the first one, Sham operated and Dlv lesioned goldfish were trained in a trace conditional discrimination paradigm using a light conditional stimulus (S+/S-) and a tone conditioned stimulus (CS) separated by a 1-s trace interval. Results showed that Dlv lesioned goldfish were severely impaired in the acquisition of conditional discrimination. To assess whether the consolidation of this memory requires de novo protein synthesis, in a second experiment we injected anisomycin -a protein synthesis inhibitor- into Dlv just after the acquisition of conditional discrimination learning. The results showed that indeed, the consolidation of conditional discrimination was disrupted by the inhibition of protein synthesis in Dlv. In a third experiment we evaluate whether Dlv is involved in the retrieval of this form of memory by inactivating this region with GABA A agonist muscimol, one day after training. The results show that Dlv inactivation completely disrupts the retention of the trace conditional discrimination learning. All together, these results reveal that the teleost Dlv, like the hippocampus of mammals, plays an important role not only in the acquisition but also in the consolidation and retention of relational memories. Furthermore, present results, in accordance with previous data revealing notable functional similarities among the dorsolateral pallium and the hippocampus, suggests the presence of neural substrate serving this conserved function in vertebrates.

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EFFECTS OF PHYSOSTIGMINE AND R-8-OH-DPAT ON INHIBITORY AVOIDANCE IN MALE AND FEMALE PREPUBERTAL MICE

Encarnación Rama, Concepción Vinader-Caerols and Santiago Monleón.

Department of Psychobiology, University of Valencia, Valencia, Spain

We have consistently observed impairing effects of several antidepressants on inhibitory avoidance (IA) in mice. These detrimental effects seem to be due mainly to their actions in the cholinergic and serotonergic systems. The present study is part of a series of experiments designed to investigate the role of the cholinergic and serotonergic systems in IA with more selective substances than the typical antidepressants. Physostigmine (0.15, 0.2, 0.3 mg/kg), a cholinergic agonist, and R-8-OH-DPAT (0.1, 0.2, 0.3 mg/kg), a 5-HT_{1A} agonist, were administered after IA training, alone and in combination, to male and female CD1 prepubertal mice, and their effects on step-through IA were assessed. R-8-OH-DPAT showed clear impairing effects in both sexes. Physostigmine generally increased latencies (better performance) but without statistically signification. The combination of the intermediate and the highest doses of both drugs showed IA learning in males and females. Therefore, physostigmine effectively counteracted the impairing effects of R-8-OH-DPAT. In conclusion, these results suggest that physostigmine is effective reversing memory when there is a previous impairment. Furthermore, these findings support the hypothesis of the contrasting role of cholinergic and serotonergic systems in the IA learning consolidation of prepubertal male and female mice.

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TEMPORAL INACTIVATION OF NEUROPEPTIDE Y2 RECEPTOR IMPROVES SPATIAL MEMORY AND MODIFIES BRAIN METABOLISM IN LIMBIC REGIONS

Marta Méndez-Couz[1], Ana Paula Silva[2], Joana Gonçalves[2,3], Héctor González-Pardo[1], Jorge Luis Arias, Nélida MaríaConejo[1*]

[1]Laboratory of Neuroscience, Department of Psychology, Instituto de Neurociencias del Principado de Asturias (INEUROPA), University of Oviedo, Oviedo, Spain.

Neuropeptide Y (NPY) is broadly distributed in the central nervous system, and it has recently been related to neuroprotective functions, and being suggested to be a possible target to counteract neural alterations and cognitive deficits derived from drugs of abuse or neurodegenerative diseases. However, the specific role of this peptide and its receptors distributed in the central nervous system on memory functions remains unclear. Here we examined the effect of the selective Y_2 receptor (Y_2R) antagonist BIIE0246 infused into the dorsal hippocampus on spontaneous activity, anxiety-related behaviors and reference spatial memory. Firstly, we showed that infusion of the Y_2R antagonist into the dorsal hippocampus of rats improved their performance in a spatial memory task evaluated in the Morris water maze, but did not seem to have anxiolytic or anxiogenic effects, neither altered the spontaneous locomotor activity. In order to determine the relationship between memory and neuronal activity, a brain metabolic mapping study was carried out.

For this purpose, quantitative histochemistry of the mitochondrial respiratory chain enzyme cytochrome oxidase was carried out, since it provides a reliable measure of brain metabolic capacity. Results showed increased cytochrome oxidase activity in the prefrontal cortex, the dorsal hippocampus and thalamus, whereas the ventral hippocampus, the mammillary bodies and the nucleus accumbens showed decreased cytochrome oxidase activity in the groups treated with the Y_2R antagonist as compared to the vehicle-treated control group.

These results support the involvement of central NPY neurotransmitter system in cognitive process and specifically in spatial memory functions.

EFFECT OF HABITAT CHANGES ON DEMOGRAPHY OF A POPULATION OF MANTLED HOWLER MONKEYS INHABIT FOREST FRAGMENTS.

Mónica Alcocer Rodríguez, Carmen Galán-Acedo, Ernesto Rodríguez-Luna, Jurgi Cristóbal Azkarate, Joaquin J. Veà Baró.

Facultat de Psicología, Universitat de Barcelona, Spain.

The effects of habitat transformation on animal demographics can vary at different time scales and accordingly information about long-term changes suffered by howler monkey populations, and their link to concomitant changes in landscape characteristics is essential to gain a better understanding of the implications that fragmentation holds for this subspecies.

We present the results of a long-term study (2000 - 2013) of certain biogeographical variables for 61 forest patches and their effects on the demography of Alouatta palliata m. in a fragmented landscape of 75,000 ha in Los Tuxtlas Biosphere Reserve, Mexico. For each forest fragment we calculated size, isolation and distance to the nearest human settlement and, furthermore, the number of groups, population size and number of individuals in each of the age-sex categories.

Of the 61 forest fragments studied, 19 were inhabited. We record a total of 53 groups, comprising 589 resident individuals and 16 solitary individuals. Our results suggest that the amount of available habitat has increased and fragments are now closer together, meaning that some of them have become connected. Generally, the data collected showed an increase in the number of individuals and a decline in howler monkey population density. The number of groups and individuals ($r=0.93$, $r=0.83$; $p<0.01$) per fragment, plus the number of individuals in each of the age-sex categories ($p<0.01$, for all) correlate positively with fragment size.

Therefore, we concluded that fragments of forest in our study area are beginning to regenerate increasing the available habitat for the howler monkeys populations.

COPYING STYLE IN YOUNGS OF COMMON MARMOSET (CALLITHRIX JACCHUS)

Fidalgo, Ana; Sánchez, Susana; Aguilera, Esther; Peláez, Fernando.

Dpto. Psicología Biológica y de la Salud. Facultad de Psicología. UAM. 28049 Madrid, Spain. ana.fidalgo@uam.es

Care received in the early infancy in primates has been linked to the copying style shown in novel situations. In the common marmoset, a primate with a cooperative breeding system -all individuals in the group are involved in infant rearing-, anogenital licking received as babies is a primary form of parental care that has been linked with the coping style shown later in their lifes. One previous study indicates that infants that receive more anogenital stimulation behaves in a more proactive way than less stimulated infants. Alternatively another study relates the behavioral explorative style to social transmition in the natal group. In our study we have experimentally evaluated the copying style to of a sample of 14 young (7 twin births) 3 months of age from 3 different familiar groups (A=4, B=4, C=6) to a novel stimulus. We continuously recorded for 15 minutes, proximity to the stimulus, visual exploration and contact behaviors. Infant carrying and all occurrences of anogenital licking received during the first month of life had been previously recorded for each infant, 3 times/week in an individual focal of 30min length. Mothers are the principal anogenital licker and do this behavior more frequently than fathers and other helpers too. We found a negative relationship between time carried and frequency of total anogenital licking received to proximity to the stimulus and exploratory behaviors with contact, respectively. We also found a negative relationship between the frequency of anogenital licking received from mothers and proximity to the stimulus, visual exploratory behavior and exploratory behavior with contact; and a positive relationship with the latency of stimulus approach and the latency of exploratory behaviors. We found no differences in the frequency of total anogenital licking received among infants from the 3 familiar groups although there is a trend towards significance in the anogenital licking received from mothers (A>B>C). The offspring of the 3 groups differ in the latency of approach to the stimulus and the latency of exploration (A>C), and the frequency of exploratory-visual behaviors and exploratory behaviors with contact (C>A). Our results support, against a previous study, that more care received is related to a less proactive coping style. Future studies might explore the coping style of the different groups and the role of social transmition. MEC-PSI2012-30744.

POSTER SESSION 1

Wednesday, July 15th, 2015

EFFECTS OF PERINATAL ASPHYXIA ON THE EXPRESSION OF THE ACYLETHANOLAMIDE/ENDOCANNABINOID SIGNALING SYSTEM IN THE HIPPOCAMPUS AND DORSAL STRIATUM OF ADULT RATS

Pablo Galeano[1, 2], **Eduardo Blanco**[3,4] , Tamara M. A. LogicaTornatore[2], Juan I. Romero[1], Mariana I. Holubiec[2], Juan Suarez [3] , Francisco Capani[2], Fernando Rodríguez de Fonseca[3]*

[1]Instituto de Investigaciones Bioquímicas de Buenos Aires (CONICET), Fundación Instituto Leloir, Buenos Aires, Argentina. [2]Facultad de Medicina, Instituto de Investigaciones Cardiológicas "Prof. Dr. Alberto C. Taquini" (ININCA), Universidad de Buenos Aires (CONICET), Buenos Aires, Argentina. [3]Laboratorio de Investigación, Instituto de Investigación Biomédica (IBIMA), Universidad de Málaga - Hospital Regional Universitario de Málaga (UGC Salud Mental), Málaga, Spain. [4]Departament de Pedagogia i Psicologia, Facultatd'Educació, Psicologia i Treball Social, Universitat de Lleida, Lleida, Spain.

Introduction. Perinatal asphyxia (PA) is an obstetric complication caused by oxygen deprivation or a reduced blood flow to different body organs, including the central nervous system (CNS). Within the CNS, the hippocampus and the striatum are particularly vulnerable to PA. Nowadays, PA is considered as one of the principal causes of morbimortality in term and pre-term neonates, and is associated with an increased likelihood of suffering from neurodevelopmental disorders. The endocannabinoid system (ENC) is a lipid transmitter system involved in a variety of physiological processes including appetite, pain, synaptic plasticity, memory and mood. The ENC has recently received growing attention as having potential neuroprotective functions in some neurological disorders. On the other hand, acylethanolamides are closely related to the ENC. For instance, palmitoylethanolamide (PEA) and oleoylethanolamide (OEA) acting in nuclear receptors (peroxisome proliferator-activated receptor alpha (PPAR-α)), or directly on endocannabinoid receptors, might have neuroprotective functions. **Objective**. We aimed to analyze the changes produced by PA in the signaling machinery for ENC and acylethanolamine compounds in the hippocampus and dorsal striatum using a murine model of PA. **Experimental procedures**. PA was induced by immersing foetuses-containing uterine horns, removed from ready-to-deliver rats, into a water bath for 19 min (perinatally asphyxiated rats, PA rats). Spontaneous (CTL) and caesarean-delivered pups (C+) were used as controls. At one month of age, recognition and spatial reference memory were assessed. Additional groups of behaviorally naïve rats were transcardially perfused, brains were post-fixed and cut into coronal sections (30 mm thick). Next, immunohistochemistry, cell counting, and densitometry procedures for NeuN, GFAP, DAGLα, NAPE-PLD, CB1, PPARα and FAAH were performed in hippocampus and dorsal striatum. **Results**. PA rats showed an impaired recognition memory, spatial learning and reference memory deficits and astrogliosis, without neuronal loss, in all hippocampal areas studied (CA1, CA3 and dentate gyrus). In addition, a decrement in NAPE-PLD and PPARα expression was detected in CA1, CA3 and dorsal striatum of PA rats. Finally, it was found that DAGLα and FAAH were increased in the dorsal striatum and CA3 area of the hippocampus, respectively, in C+ rats. **Conclusions**. Since NAPE-PLD is an enzyme that participates in the chemical process that converts lipids into OEA, and the latter is a PPAR-α agonist, these results support the use of OEA as a potential neuroprotective compound in PA. **Acknowledgments**. This research has been supported by grants to Fernando Rodríguez de Fonseca from Fundació "La Marató de TV3" (grant number 386/C/2011).

IMPLICATION OF SEROTONINERGIC 5-HT2A/C RECEPTORS IN HIGH COMPULSIVE RATS

Mora-Parada Santiago, Flores Pilar, Moreno Margarita

Department of Psychology, University of Almería, Campus de Excelencia Internacional Agroalimentario CeiA3, Almería, Spain

Converging lines of evidence suggest the implication of serotoninergic neurotransmission system and 5-HT2A/2C receptors on the pathophysiology and treatment of compulsive spectrum disorders. Previous results in our laboratory demonstrated Schedule-Induced Polydipsia (SIP), characterized by the development of excessive drinking under intermittent food reinforcement schedules, as valid model for studying the psychopharmacology of the compulsive phenotype in rats. The purpose of this study was to explore serotoninergic function in Prefrontal cortex (PFC) in rats with individual differences to compulsivity on SIP. Outbred male Wistar rats were selected as high (HD) or low (LD) drinkers according to their SIP behavior. In a first experiment, we assessed the effects of the 5-HT2A/C agonist DOI into mPFC in HD and LD rats on SIP. In a second experiment, selective 5-HT2A receptor antagonist M100907 and 5-HT2C receptor antagonist SB242084 were infused directly into the mPFC to assess its impact on compulsive behavior in previously SIP-selected rats. Intra-mPFCmicroinfusions of DOI significantly decreased compulsive drinking behaviour in HD rats on SIP, no significant changes were found in LI rats. These findings will be discussed in terms of SIP as a valid model for studying new trait markers of compulsive vulnerability.

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SHIFT FROM ACTIVITY-BASED TO SEDENTARY SOURCES OF REWARD IN A DECISION MAKING TASK FOR MICE: DOPAMINE DEPLETION AND ADENOSINE ANTAGONISM

López-Cruz L[1], San Miguel N[1], Carratalá C[1], Monferrer L[2], Salamone JD[2], Correa M[1,3].

[1]Area de Psicobiología.Universitat Jaume I, Castelló. Spain. [2]Area de Didáctica Ciencias Experimentales. Universitat Jaume I, Castelló. Spain. [3]Behavioral Neuroscience Division, University of Connecticut. Storrs, CT. USA

Organisms often make effort related decisions based upon assessments of motivational value and response costs. Dopamine (DA), particularly in nucleus accumbens, regulates effort related processes. DA depletion has been shown to induce anergia, a symptom present in pathologies such as Depression and Parkinson. Caffeine, a widely consumed psychostimulant, acts as a non-selective adenosine A1/A2A receptor antagonist. There is a functional interaction and co-localization of adenosine and DA receptors in dorsal and ventral striatum. In the present work, we evaluated the effects of caffeine on anergia and motor suppression induced by the VMAT-2 blocker tetrabenazine (TBZ) in mice. Anergia was evaluated in a mouse T-maze task developed for the assessment of preference between physical activity (running wheel, RW) in one arm vs. sedentary reinforcers such as a freely available sucrose pellets in another arm, as well as a non-social (neutral) odor in the third arm. Independent groups of animals were tested for locomotion in a RW or for sucrose consumption under no choice situations. DA D1 and D2 receptor-activity-related markers (pDARPP32-Thr75 and Thr34) were assessed after caffeine and TBZ administration using immunoblotting. In the t-maze, under control conditions mice spent more time running and less consuming sucrose or sniffing. Caffeine did not produce effects on those preferences, however TBZ produced a shift in the relative preference; it reduced the choice of the reinforcer that involved vigorous activity, but increased consumption of a reinforcer that required little effort (sucrose). None of these doses of TBZ reduced RW performance or sucrose consumption when animals could not choose between them. Caffeine was able to reverse the shift in preferences induced by a low dose of TBZ in the t-maze and motor suppression induced by high doses of TBZ. These behavioral effects were parallel to pDARPP32 changes. These results suggest that caffeine is a tool to reverse anergia induced by DA depletion and support the idea of a functional adenosine-DA interaction at the receptor level that modulates motor and motivational processes.

VOLTAGE-SENSITIVE DYE IMAGING REVEALS THE CORTICAL-LIKE ORGANIZATION OF THE GOLDFISH SENSORY TELENCEPHALIC PALLIUM

Ocaña, FM; Gómez, A; Durán, E; Rodríguez-Expósito, B; Uceda, S; Broglio, C; Rodríguez, F and Salas, C.

Laboratory of Psychobiology, University of Sevilla, Campus Santiago Ramón y Cajal, 41018, Sevilla, Spain.

The classical theories on the evolution of vertebrate brain postulated that the telencephalon of actinopterygian fish is dominated by olfactory inputs and lacks the pallial regions equivalent to the mammalian neocortex. However, recent neuroanatomical, developmental, and psychobiological comparative research indicates that the evolution of the vertebrate brain has been more conservative than previously thought, and that notwithstanding obvious morphological and cytoarchitectural differences between the forebrains of actinopterygians and land vertrebrates, the teleost telencephalic pallium (area dorsalis) receives inputs from all sensory modalities, similar to the tetrapodsisocortex. However, physiological studies are scarce and critically needed to establish how the individual sensory modalities are represented in the teleost pallium.

The aim of the present experiment is to precisely localize the primary sensory fields of the teleost pallium and to characterize their functional properties. With this purpose we developed an acute in vivo goldfish preparation in which responses evoked by visual, auditory, somatosensory, and gustatory stimuli can be recorded using voltage-sensitive dye imaging. We observed that the goldfish sensory pallium is organized in an isocortical-like manner; the areas responsive to stimuli of different modalities were mostly segregated, corresponding their main boundaires with macroanatomical landmarks as well as with citoarchitectonic and histochemical borders. The visual area was located in the dorsal part of the lateral region of the area dorsalis (Dld), whereas auditory-somatosensory and gustatory information were represented in different zones within the dorsal part of the medial region of the area dorsalis (Dm). We also found that topographic organization is an essential feature of the teleost sensory pallium; tones of different frequencies, distinct taste qualities, and touching different body parts activated specific pallial domains within the auditory, gustatory and somatosensory areas, respectively. Moreover, pallial sensory activity was stimulus strength-dependent. In summary, our data indicate that the teleost pallium is parcellated in a constellation of distinct sensory pallial fields that are comparable in functional terms to that of the tetrapod isocortex and suggest the necessity of re-evaluate the hypothesis of teleost pallial homologies, as well as evolutionary theories proposing that discrete sensory areas with topographic representations is a exclusive character of the amniote pallium.

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MEDIAL TEMPORAL LOBE ATROPHY CORRELATES WITH MEMORY DEFICITS IN EARLY PARKINSON'S DISEASE

Álvarez-Avellón, Tania, Ribacoba Montero, Renée, Suárez San Martín, Esther, Menéndez-González Manuel, Cuetos Vega Fernando

Departamento de Psicología, Universidad de Oviedo, Spain.

Aims

Some studies found areas of significant gray matter loss in patients with early Parkinson's disease (PD) while others did not. Particularly, medial temporal lobe has been reported in patients with PD and amnestic mild cognitive impairment.

Herein we aim to correlate functioning of different cognitive domains with the Medial Temporal lobe Atrophy index (MTAi), a simple method for assessing the relative atrophy of the medial temporal lobe (MTL) on Magnetic Resonance Imaging (MRI).

Methods

We took a group of 30 patients with early PD. We assessed the executive functioning, verbal memory, visual memory, visuospatial orientation, semantic fluency, fluency of actions and visuoconstruction. We also performed a MRI to every subject and computed the MTAi on both hemispheres.

Results

The MTAi correlated significantly with scores on the verbal and visual memory tests, while the MTAi did not correlate with the executive, visuoconstruction, fluency of actions and semantic fluency. The strongest correlations were found for the left-MTAi with scores on verbal memory and for the right-MTAi with scores with scores on visual memory.

Conclusion

Atrophy in medial temporal lobe structures may account for the memory deficits present in early stages of PD.

ALEXITHYMIA AS AN EXECUTIVE DYSFUNCTION

Mirete Fructuoso, Marcos; Pellicer-Porcar, Olga; Molina-Rodríguez, Sergio; Martínez-Amorós, Estefanía; Martín-del-Río, Raquel; De Albornoz-Moreno, Álvaro Carrillo.

Deparment of Health Psychology. University Miguel Hernández of Elche, Spain.

In order to regulate dysfunctional emotional states, it is necessary to identify them in time, and to put in motion the correct confrontation strategies. On the contrary, these states can become chronic and thus several repercussions on physical and mental health can be produced. These shortfalls in the identification of the own emotions are known as "alexithymia". Several studies have try to determinate which brain functions are altered in alexithymia in order to be able to intervene on them, pointing some of them in paper, not just related areas of the emotional processing, but also the areas which process a group of cognitive functions know as executive functions.

Our objective is to determinate the contribution of several executive functions to the alexithymia, such as the executive control, the emotional control, the social conduct, motivation and attention. Two hundred healthy participants, the mean age of 22 years (D.T. = 4.62) with a 74.4% of women were included in the study. The information was picked up by the subscale Emotional signal discrimination of the Toronto's Alexithymia scale, and the prefrontal symptoms inventory. No sex dependent differences were observed. A multiple correlation and regression analysis were performed. The results showed that the combination of all the variables of the executive functions explained the 37.9% of the alexithymia, being the emotional control, executive control and the motivation the three executive functions which contributed mainly to the model. This discovery highlights the importance of the executive functions in the alexithymia and the necessity of considering these variables of cognitive type to perform the most accurate intervention for this problem.

SEMANTIC AND PHONEMIC FLUENCY IN PATIENTS WITH MILD COGNITIVE IMPAIRMENT: EFFECT OF THE AGE GROUPS

Pellicer O, Mirete M, Molina S, Perez N, Díaz C.

University Miguel Hernández, Murcia, Spain.

The mild cognitive impairment (MCI) is a syndrome which has been considered as a previous phase to dementia, thus, it is of particular importance to identify the best tools to perform an early diagnose and treatment. The verbal fluency tests might look like a good indicator; however, the results are inconsistent because they do not control variables like the age of the MCI's type.

The objective of this study is to analyze the different performances of the tasks of verbal fluency, semantic and phonemic evocation, depending on the diagnostic and the age. The sample was composed of 257 patients (148 with MCI amnesic subtype and 109 with subjective memory complaints), the 56.4% being women. The patients with both diagnoses were subdivided in two groups, one regarding ages between 50 and 70 years and the other one comprising patients older than 70. Each group performed two verbal fluency tasks –i.e, semantic and phonemic fluency-, both included in the Neuropsychological Exploration Integrated Program Test Barcelona. The phonemic fluency consists of asking a person to say words during three minuts starting with the letter "p". The semantic fluency consists of asking the patient to say in a minute words which belong to a determinate category, such as animals. The data was analyzed using a two factor ANOVA and a T-test for the related samples. All the groups showed a higher performance in phonemic fluency rather than in semantic fluency, except for patients older than 70 years of the MCI group, where no significative difference was found. While the "Age" showed a low effect in the obtained performance, the "Diagnosis" explained around of the 20% in both tests, being the MCI patients the ones presenting a lower general performance. In general, no clinical relevant interaction effect was observed between "Age" and "Diagnosis". To conclude with, the verbal fluency tests regardless of the age, constitute a discriminative relevant test to detect the MCI amnesic subtype. The performance of longitudinal studies it is needed to relate it with the process of demency.

A PROPOSAL FOR EVALUATION OF MILD COGNITIVE IMPAIRMENT

García-González Sara, Fernando Cuetos Vega, Antonello Novelli, Juan Carriles, Carmen Martinez

Departamento de Psicología, Universidad de Oviedo, Spain

The incidence of Alzheimer's disease (AD) doubles every 5 years after the age of 65, affecting over 47'5 million adults in the world. Therefore, this devastating illness has become the major cause for dementia as well as a very important health, social and economic issue, particularly in view of increasing life expectancy. Nowadays, there is growing recognition that mild cognitive impairment (MCI) constitutes a risk factor for AD and other neurodegenerative disorders.

Identifying individuals with MCI who will progress to dementia or more severe cognitive impairment is a challenge. The aim of this poster is to propose an appropriate neuropsychological battery that tap the important cognitive domains that should be assessed to achieve an early diagnosis.

In order to create such a battery, a process of three steps was followed. Firstly, a literature review of the past three years was made. Although memory decline is often the first sign heralding the emergence of mild cognitive impairment or dementia regardless of etiology, many studies also demonstrated decline in visuospatial tasks, language abilities, activities of daily living, mood, attention and executive function (especially in inhibitory control) in healthy adults and mild cognitive impairment. Hence, predictive accuracy of a cognitive battery might be optimized by selecting both memory and non-memory measures. Secondly, a group of neuropsychologists, psychologists and neurologists were asked about the tests they passed and what they think about our battery. Finally, the ultimate version of the protocol were passed to a sample of subjects between 60 and 90 years old.

The proposed protocol may differentiate between people with mild cognitive impairment and healthy adults. This study shows that a well selected amount of cognitive measures might provide valuable information regarding the early diagnosis of people with MCI.

WORKING MEMORY IN PARKINSON´S DISEASE: A PRELIMINARY STUDY

Velasco Angela[1], Menéndez-Granda Marta[1], Gutiérrez-García Gema[1], Díaz Cáceres Elena[1,2,3], Nevares Ariana[1,4], Ribacoba René[5,6], Suárez Esther[5,6], Méndez Marta[1,5], Arias JorgeL[1,5].

[1] Departamento de Psicología, Universidad de Oviedo, Spain. [2] Facultad Padre de Ossó, Oviedo, Spain.[3] Servicio de rehabilitación, Hospital Universitario Central de Asturias, Oviedo, Spain.[4] Unidad Residencial de Meres, Oviedo, Spain.[5] Instituto de Neurociencias del Principado de Asturias (INEUROPA), Spain.[6]Neurología, Hospital Universitario Central Asturias, Spain.

Parkinson's disease (PD) has been linked to cognitive changes that occur even at early stages of evolution of the disease, affecting memory, executive function, and visuospatial abilities. The aim of this study is to evaluate working memory and general cognitive status of PD. To do this, the two basic components of working memory have been assessed: the phonological loop and the visuo-spatial sketch pad with the following tasks: Digits span (forward and reverse) of the Wechsler memory scale and Spatial Span (SSP) (forward and reverse) of the CANTAB battery. We have also assessed general cognitive status with the Montreal Cognitive Assessment (MOCA) and Subtest of Animals Evocation Categorial of Barcelona Test . The sample of the study consists of 17 subjects with PD, where 8 were women and 9 men. According to the initial manifestation of PD, 11 of them they were tremor-dominant and 6 akinetic-rigid. Furthermore, following the Hoehn and Yahr stages 6 subjects belong to stage 1 (unilateral symptoms) 2 belong to stage 1.5 (unilateral and axial) and 9 belong to stage 2 (bilateral symptoms). Statistical results show a significant correlation between MOCA and SSP scores, both forward and reverse. In turn, we found a significant correlation between patient's scores in digits span (forward and reverse) and SSP (forward and reverse). Finally, scores in SSP (reverse mode) and categorical Evocation were significantly correlated. These are preliminary results. We are conducting further assessments in patients and controls in order to obtain more reliable results at different stages of PD.

ATTENTION AND PLANNING IN PARKINSON'S DISEASE: A PRELIMINARY STUDY

Gutiérrez-García Gema[1], Menéndez-Granda Marta[1], Velasco Angela[1], Díaz Cáceres Elena[1,2,3], García Nevares Ariana[1,4], Méndez Marta[1,5], Ribacoba René[5,6], Suárez Esther[5,6], Arias Jorge L[1,5]

[1]Departamento de Psicología, Universidad de Oviedo, Spain. [2]Facultad Padre de Ossó, Oviedo, Spain. [3]Servicio de rehabilitación, Hospital Universitario Central de Asturias, Oviedo, Spain. [4]Unidad Residencial de Meres, Oviedo, Spain. [5]Instituto de Neurociencias del Principado de Asturias (INEUROPA), Spain. [6]Servicio de Neurología, Hospital Universitario Central Asturias, Spain.

Parkison's disease has been related to cognitive impairments that already appear at early stages of the disease. These impairments affect to memory, executive functions and visuospatial abilities. The aim of this study is to analyze executive functions (attention and planning) and general cognitive state in Parkinson's disease. The sample consisted of 17 patients diagnosed with Parkinson disease (9 men and 8 women) 61 to 80 years old. According to Hoehn and Yahr stages, 6 patients belong to the stage 1 (unilateral symptoms), 2 to the stage 1, 5 (unilateral and axial) and 9 to stage 2 (bilateral symptoms). We have assessed the following executive functions: selective attention and mental processing speed with Stroop Test; and planning skills, problem solving and concentration with Tower of London Test. The general cognitive state was assessed with MOCA. Statistical analyses show a significant correlation between the results of the patients in the Stroop test (word, color, and word-color) and general cognitive state assessed with MOCA. However, we do not find any relation between planning assessed with the Tower of London and general cognitive state (MOCA) or attention (Stroop Test). These preliminary results suggest that attention and mental processing speed correlates with general cognitive state in Parkinson disease. However, these are preliminary results in a small sample and we are conducting further assessments in patients and controls in order to obtain more reliable results at different stages of Parkinson's disease.

ALLOCENTRIC AND EGOCENTRIC ORIENTATIONIN PARKINSON'S DISEASE: A PRELIMINARY STUDY

Menéndez-Granda Marta[1], Gutiérrez-García Gema[1], Velasco Angela[1], Díaz Cáceres Elena[1,2,3], Nevares Ariana[1,4], Ribacoba René[5,6], Suárez Esther[5,6], Arias Jorge L[1,5], Méndez Marta[1,5].

[1] Departamento de Psicología, Universidad de Oviedo, Spain. [2]Facultad Padre de Ossó, Oviedo, Spain. [3]Servicio de rehabilitación, Hospital Universitario Central de Asturias, Oviedo, Spain. [4]Unidad Residencial de Meres, Oviedo, Spain. [5]Instituto de Neurociencias del Principado de Asturias (INEUROPA), Spain.6 Neurología, Hospital Universitario Central Asturias, Spain.

Parkinson's disease has been related to cognitive impairments that already appear at early states of the disease. These impairments affect to memory, executive function and visuospatial abilities. Spatial memory has been found to be impaired in this neurodegenerative disease but egocentric and allocentric orientation has not been specifically assessed. Therefore, the aim of this study is to assess specifically egocentric and allocentric orientation memory and general cognitive state in Parkinson's disease. The sample consisted of 17 patients diagnosed with Parkinson disease (9 men and 8 women) 61 to 80 years old. According to Hoehn and Yahr stages, 6 patients belong to the stage 1 (unilateral symptoms), 2 to the stage 1, 5 (unilateral and axial) and 9 to stage 2 (bilateral symptoms). We analyze the egocentric spatial memory with the Card Placing Test (CPT) part A and part B, a recently developed test which allows the examination of orientation, using only egocentric strategies. This test examines the ability to represent spatial locations of cards placed on the floor around the subject when no visual cues are present. A modified version that assesses allocentric orientation is also administered. Benton's Judgment of Line Orientation Test (JLO) is used to assess spatial perception. The general cognitive state is assessed with MOCA (Montreal Cognitive assessment). The scores obtained by patients in these tests show a significant correlation between general cognitive state and JLO, allocentric CPT and part A of egocentric CPT. Also, JLO correlates with egocentric CPT part A. Scores of patients in part A and part B of egocentric CPT are significant related. Finally, we find a correlation between patient's scores in part A of egocentric CPT and allocentric CPT scores. These, however, are preliminary results in a small sample and we are conducting further assessments in patients and controls in order to obtain more reliable results at different stages of Parkinson's disease.

MULTIPLE SCLEROSIS IN SEMANTIC AN WORKING MEMORY

Sandra Rubio[1], Marta Cerezo[2], Yolanda Alandro[2], Pilar Martín[1], Jéssica Fernández[3], Raquel García[3] and Laudino López[4]

[1]Universidad Autónoma de Madrid, [2]Servicio de Neurología. Hospital Universitario de Getafe. [3]Servicio de Neurología. Centro Médico de Asturias, [4] INEUROPA - Universidad de Oviedo, Spain.

Multiple sclerosis (MS) is a central nervous system disease in which the immune system, normally charged with fighting invading organisms, attacks the body's myelin sheath, the protective insulation that surrounds nerve cells and facilitates proper neuronal communication. Cognitive changes are common in people with Multiple Sclerosis. Approximately half of all people with MS will develop problems with cognition. One of the cognitive functions that can be impaired in MS is memory. Therefore, the aim of the study was the evaluation of two types of memory: semantic memory and working memory, the latter of verbal and spatial form.

Semantic memory was evaluated by the Verbal Learning Test Spain-Complutense (TAVEC) in 100 patients with MS and 30 control subjects. No differences in age, education or sex between groups were observed (t-test, $p > 0.05$). In the TAVEC the results show that patients with MS have a deficit in total words recalled in the five trials (t-test, $p = 0.002$), in the short term and long-term free recall (t-test, $p < 0.001$) and in short-term and long-term with key semantic (t-test, $p = 0.001$).

The verbal working memory was evaluated with the test Letters and Numbers of the Wechsler Adult Intelligence Scale (WAIS-III) with the same sample of 100 patients and 30 controls. No differences between groups were observed in this test (t-test, $p>0.05$). Finally, the spatial working memory was evaluated by testing Spatial Working Memory (SWM) of the Cambridge Neuropsychological Test Automated Battery (CANTAB). The sample used in this test was of 51 patients and 30 controls. Nodifferences in age, education or sex between groups were observed (t-test, $p > 0.05$). In the SWM two dependent variables were selected: the total number of errors and a "strategy" score, which indexes the number of times the participant started a search with a different box, the latter being an inefficient strategy (i.e., high strategy scores denote poorer performance). In both variables no differences between patients and control subjects were observed (t-test, $p > 0.05$).

The study results appear confirming a clear impairment of semantic memory in patients with MS, both in the short-term and long term memory. The TAVEC is known to be sensitive to posterior hippocampal functioning based on imaging, and has also been shown to be impaired in populations with degeneration or damage to the hippocampus. By contrast, patients with MS show a preserved working memory, cognitive function associated with the dorsolateral prefrontal cortex.

PREVALENCE OF MILD COGNITIVE IMPAIRMENT AND ASSOCIATED FACTORS IN AN URBAN POPULATION.THE DERIVA STUDY

Mora Simón Sara; Perea Bartolomé, Mª Victoria; García García, Ricardo; Ladera Fernández, Valentina; Unzueta Arce, Jaime; Patino Alonso, María C.; Rodríguez Sánchez, Emiliano

Psicología Básica, Psicobiología y Metodología de las Ciencias del Comportamiento Universidad de Salamanca, Spain.

Objective: To estimate the prevalence of Mild Cognitive Impairment (MCI) and study its relationship to sociodemographic and clinical factors in an urban population of people older than 65 years old.

Methods: Cross-sectional, descriptive and observational study. Participants: MCI-Group: 48 participants diagnosed as MCI and with a mean age of 80.40 (SD: 8.77). Diagnosis of MCI was made according to the already established criteria in the DERIVA Study (Rodríguez Sánchez et al., 2011). Cognitive Normal – Group: 265 cognitively healthy participants, with a mean age of 75.46 (SD: 6.84). All participants were older than 65 years old and residents in Salamanca city. Sociodemographic and medical data were collected, and subsequently contrasted to medical history. Descriptive and a logistic regression analyses were performed. In the logistic regression, the presence of MCI was considered as the dependent variable (0: No MCI/ 1: MCI); as independent variables: years of education, absence of arterial hypertension, of dyslipidemia, Diabetes Mellitus, and depression; as adjusting variables: age and gender.

Results: The prevalence of MCI in the studied sample was 14.7%. In MCI-Group, 79.2% were women and 20.8% men; a mean of 7.02 (SD: 2.88) years of education was shown. In this group, 54.2% presented arterial hypertension, 10.4% dyslipidemia, 33.3% Diabetes Mellitus, and they showed a mean score of 4.17 (SD: 2.59) points in the SPES Mental Health scale. In Cognitive Normal – Group, 61.5% were women and 38.5% men; a mean of 8.77 (SD: 2.77) years of education was shown. In this group, the 47.2% presented arterial hypertension, 22.6% dyslipidemia, 20% Diabetes Mellitus, and they showed a mean score of 3.57 (SD: 2.97) points in the SPES Mental Health scale. In the logistic regression analysis, we found that age (OR= 1.06; 95%CI= 1.01-1.11; p=0.013) and Diabetes Mellitus (OR= 2.24; 95%CI= 1.07-4.68; p=0.033) were risk factor for MCI, whereas years of education (OR= 0.82; 95%CI= 0.71-0.93; p=0.003) acted as protective factor.

Conclusions: The prevalence of MCI among people older than 65 years old in the city of Salamanca is 14.7%. It seems that higher age and the presence of Diabetes Mellitus are factors that increase the risk of presenting MCI, whereas a higher educational level is associated with a lesser risk of MCI. In order to improve the development of MCI, it would be convenient to monitor certain clinical related factors, especially Diabetes Mellitus.

THE AGING BRAIN AND SOCIAL COGNITION: A SYSTEMATIC REVIEW

Fernandes, Carina; Gonçalves, Ana; Ferreira-Santos, Fernando; Barbosa, Fernando; Marques-Teixeira, João

Laboratory of Neuropsychophysiology.Faculty of Psychology and Educational Sciences of the University of Porto, Portugal.

Older adults are at increased risk of neurological disease and cognitive deficits. However, little is known about the impact of age-related brain changes in social cognition. Moreover, existing studies are few and have conflicting results.

Social cognition determines the success of the social interactions and comprises the mental representations of the relationships with others. It can be divided in four main components: (1) emotional processing; (2) theory of mind/empathy; (3) moral judgments; and (4) social economic decision. The study of social cognition in aging has important implications, since social inclusion/engagement seems to have a protective effect on aging and is associated with a reduced neurocognitive decline, suggesting a cognitive reserve potentiation. Moreover, older adults make constant social and economic decisions, including decisions related to managing their own health.

In order to clarify the development of the four components of the social cognition in typical aging, a systematic review of the literature was performed. We conducted a systematic search on PubMed, EBSCO and Web of Science, using the search expression “AB (aging OR ageing OR "older adults" OR elderly)” systematically combined with the expressions: “AB (“social cognition”)”; “AB (empathy OR empathic)”; “AB (“theory of mind” OR mentalizing)”; “AB (“emotional processing” OR “emotional recognition”)”; “AB (“social decision” OR “economic decision”)” and “AB (moral*)”. Only papers of the last ten years and published in English were reviewed. Reviews and studies lacking the analyses of the components of interest across the age were excluded, as well as studies missing details about the inclusion/exclusion criteria of the participants. A total of 102 papers were reviewed: 35 regarding emotional processing and recognition; 40 regarding theory of mind; 18 regarding moral judgment and 9 regarding social economic decision.

Most studies evidenced deficits in typical aging across the four components of social cognition. However, some studies demonstrated preserved or even improved performance in the same components, which can be explained by the existence of behavioral strategies and neural compensatory mechanisms in typical aging. On the other hand, it is not clear if the reported deficits are independent or correlated with the cognitive declines that are observed in typical aging, such as in executive function, memory, processing speed or language. Despite the lack of consensual findings, this review may highlight further directions in the research of the effects of aging on social cognition and its neurobiological basis.

ASSESSMENT OF MOTOR AND PROCESS SKILLS (AMPS) AND COMPLEMENTARITY TO NEUROPSYCHOLOGICAL EVALUATION

García Nevares Ariana[1,2], Díaz Cáceres Elena[1,3,4], Fernández-Artamendi Sergio[5,6], Arias Jorge L[1,6], Méndez Marta[1,6] .

[1]Departamento de Psicología, Universidad de Oviedo, Spain. [2] Unidad Residencial de Salud Mental de Meres, Oviedo, Spain. [3] Escuela Universitaria Padre de Ossó, Oviedo, Spain. [4] Servicio de rehabilitación, Hospital Universitario Central de Asturias, Oviedo, Spain. [5] Centro de Investigación Biomédica en Red de Salud Mental (CIBERSAM). [6]Instituto de Neurociencias del Principado de Asturias (INEUROPA), Spain.

The Assessment of Motor and Process Skills (AMPS) is a standarized observational tool of Occupational Therapy designed to assess the quality of the execution of one individual in the activities of daily living (ADL) in natural environments relevant to the task. While the factors evaluated in most tests of daily living activities are personal ADLs (self-care) and/or instrumental activities (housework tasks), the factors explored with the AMPS are the performance skills necessary for ADLs: motor skills and process skills. This assessment tool can be administered to individuals from 2 years of age with any type of diagnosis or disability and / or healthy people, which facilitates its use with different populations and from different age ranges. The purpose of this communication is to present the Assessment of Motor and Process Skills (AMPS) and to review the most recent studies in which the scale was administered in childhood and adolescence in pathologies such as cerebral palsy and Attention Deficit Disorder and Hyperactivity Disorder (ADHD), and the application of the scale with adult population in diseases such as Parkinson and Stroke (CVA). Finally, we discuss the assets of the AMPS that make it a suitable complement to the neuropsychological assessment, since many of the factors evaluated in processing skills are also explored in the protocols used by the neuropsychologists.

ASSOCIATIONS BETWEEN ANXIETY AND DEPRESSION IN MIGRAINE PATIENTS

Katiac Montesiirin[1], Julio Pascual[2], Nélida María Conejo[1]

1-Laboratory of Neuroscience, Department of Psychology, Instituto de Neurociencias del Principado de Asturias (INEUROPA), University of Oviedo, Oviedo, Spain. 2 NeuroscienceArea, Service of Neurology, University Hospital Central de Asturias and Ineuropa, Oviedo, Spain

Worldwide combined prevalence of migraine, anxiety and depression is high; however, the relationship among migraine and common mental disorders has not been fully addressed. Possible associations between different personality traits and scores of depression and anxiety were studied here in two different groups of migraine patients, chronic migraineurs (CM) and episodic migraineurs (EM). 81 subjects completed several tests assessing personality disorders (Salamanca questionnaire for personality disorders) and depression and/or anxiety scores (MINI Neuropsychiatric International Interview, Hamilton Depression Scale, Hamilton Anxiety Scale). Significant correlations between migraine diagnosis and depression was found ($p=0.015$), and also between migraine diagnosis and anxiety ($p<0.0001$). The likelihood of anxiety and/or depression diagnosis in this sample was 2.2 times greater in the CM group. In conclusion, although no significant differences were found between CM and EM diagnosis and depression or anxiety scores, the CM group showed the highest prevalence of these mental disorders. Lastly, no specific personality trait was associated with migraine diagnosis.

A TWIN STUDY ON THE CHRONOBIOLOGY OF SLEEP

Sánchez-Romera JF [1], López J[2], Bandín C[2], Colodro-Conde L[1], Madrid JA[2], Garaulet M[2], Ordoñana JR[1]

[1] Murcia Twin Registry, School of Psychology, University of Murcia, Murcia, Spain.[2] Department of Physiology Faculty of Biology, University of Murcia, Murcia, Spain.

Introduction: Circadian rhythms are cycles which run around 24 hours, determined by the circadian system. They have a fundamental impact on people's life and are associated with widespread physiological effects. However, in spite of their relevance, the relative influence of genetic and environmental factors on the inter-individual variations in circadian rhythms is not well understood. The aim of this study was to analyze this variability, with a specific focus on sleep patterns, and estimate the heritability of circadian rhythmicity in a sample of adult female twins.

Method: The sample comprised 53 pairs of female twins (28 monozygotic [MZ] and 25 dizygotic [DZ]), with a BMI 26.03±3.8 and mean age 52.3±6. The sample was selected from the participants in the Murcia Twin Register, and volunteered to wear activity and temperature sensors continuously during one week. Circadian patterns were studied by analyzing wrist temperature and actimetry. Rhythmic parameters were obtained using an integrated package for temporal series analysis "Circadianware®". Zygosity was ascertained by DNA. Heritability estimates were calculated using maximum likelihood structural equation twin modelling for each variable with the Open Mx Package in R.

Results: Results show a consistent pattern in the main variables of higher intra-pair correlations between MZ twins [e.g., Sleep duration (MZ:r=0.73; DZ:r=-0.12); Minutes of sleep during the day (MZ: r =0.57; DZ: r =-0.06); Sleep depth (MZ: r =0.65; DZ: r =0.25); Mesor (MZ: r =0.75; DZ: r =0.10); Inter-daily stability (MZ: r =0.64; DZ: r =0.03); or Intra-daily variability (MZ: r =0.44; DZ: r =-0.12)]. Other variables, however, like the Rayleigh test, did not show enough variability to produce correlation differences (MZ: r =0.09; DZ: r =-0.05). This pattern of correlations points to a relevant influence of genetic induced variability for most of the variables analyzed, with moderate to high heritability estimates between .5 and .7.

Conclusions: Inter-individual variability in the chronobiology of sleep patterns shows a relevant genetic influence, including dominant factors. As expected, no influence of shared-environment has been detected in this sample. The rest of the variance (between 30%-50%) depends on environmental factors specific to the individual. These results support the interest of future molecular genetic analyses in the pursuit of polymorphisms associated to these patterns and the need for controlling genetic factors when analyzing environmental effects on sleep.

ACUTE CLORGYLINE TREATMENT BLOCKS THE ETHANOL-ELICITED PROTEIN KINASE A ACTIVITY AND ETHANOL-INDUCED LOCOMOTION.

Juan Carlos Ledesma, Lidia Bellés and **Carlos M.G. Aragón**

Universitat Jaume I, Castellón, Spain

Hydrogen peroxide is the co-substrate that the enzyme catalase uses to form Compound I (the catalase-H2O2 system), which is the major pathway for the conversion of etanol into acetaldehyde in the brain. This acetaldehyde has proven to be responsible for some of the psychoactive actions of ethanol. Thus, treatments that change the levels of cerebral H2O2 available to catalase modulate some of the behavioral effects produced by ethanol in rodents. In addition, it has been demonstrated that the cAMP-PKA signaling transduction pathway plays an important role in the modulation of several ethanolinduced behaviors. Moreover, previous reports showed that acetaldehyde is the ultimately responsible for the enhancement of the PKA activity in different brain regions after ethanol administration. Nevertheless, the source of H2O2 which is used by catalase to form Compound I and mediates the psychopharmacological properties of EtOH is unknown. One cause of the generation of H2O2 in the brain comes from the deamination of biogenic amines by the activity of MAO-A. Here we explore the consequences of the administration of the MAO-A inhibitor clorgyline on the ethanolelicited PKA response and ethanol-induced locomotion. We injected Swiss (RjOrl) mice intraperitoneally (IP) with clorgyline and later with ethanol. Following these treatments, mice were sacrificed and brains dissected after to analyze the ethanol-elicited PKA activity, or they were placed in open field chambers to measure their locomotion. We showed that clorgyline prevented the activation of PKA after ethanol administration and decreased ethanol-induced locomotion. We therefore propose that the H2O2 derived from the deamination of biogenic amines could play a role in the neurobehavioral properties of EtOH via the cAMP-PKA signaling molecular pathway.

EFFECT OF PRE-EXPOSURE TO ETHANOL ON VOLUNTARY ETHANOL CONSUMPTION IN ADULT RATS: DIFFERENCES BETWEEN MALE AND FEMALE WISTAR RATS

M. Lourdes de la Torre*, M. Dolores Escarabajal* y Ángeles Agüero*

*Department of Psychology, University of Jaén (Spain)

Vulnerability to ethanol abuse may be a function of the balance between the opposing (aversive and rewarding) motivational effects of the drug. The study of these effects is particularly important for understanding alcohol addiction. Research in this field seems to point out that ethanol effects are determined by a set of internal factors (sex, ethanol intake history, etc.), as well as by environmental conditions surrounding the individual (i.e., stress) and, of course, the interactions between all these factors. This work explores sex differences in sensitivity to aversive effects of ethanol using the procedure of flavor avoidance learning (FAL), as well as the effect of this learning experience on subsequent voluntary ethanol consumption, in adult rats. The results obtained indicated no sex differences in acquisition and expression of ethanol-induced FAL (experiment 1), and a differing influence of previous experience with the aversive effects of ethanol on the voluntary consumption of the drug in male and female rats (experiment 2). In particular, it was observed that female ethanol-naive rats showed a higher intake level and preference for ethanol than both ethanol-experienced female rats and ethanol-naive male rats. In contrast, the ethanol-experienced male rats showed a greater consumption of and preference for ethanol than ethanol-naive male rats and ethanol-experienced female rats. These data are discussed noting a range of possible explicative factors (sex hormones, hedonic processing, etc.), but further studies are warranted to elucidate the mechanisms by which ethanol pre-exposure influences the subsequent intake of ethanol differently by sex.

PREFERENCE OF FEMALE WISTAR RATS FOR DIFFERENT SWEETENERS

Paula Núñez Martínez, Juan Argüelles, Carmen Perillán.

Facultad de Medicina y Ciencias de la Salud. Biología Funcional. Área de Fisiología. Universidad de Oviedo, Spain.

The behavioral affinity among mammals for sweet tastes makes sense in terms of the adaptive advantage of detecting and preferring carbohydrates. Rodents show preferences for some sweeteners that humans prefer; for example, sucrose but not for others, for example, aspartame. In addition, rat and mice strains have large differences in consumption of sweeteners.

In our experiments, adult female Wistar rat were chosen as an animal model, since is currently one of the most popular subjects used for laboratory basic research. Female rats were used because their responses to sweeteners are more pronounced than those for male.

The purpose of this study was to determine the pattern of preference for female Wistar rats. We used a series of two-bottle tests that compared a wide range of sweeteners concentrations to characterize taste responses.

POSTER SESSION 2

Thursday, July 15th, 2015

ELECTROCORTICAL ACTIVITY DURING THE ANTICIPATION AND PROCESSING OF PHOBIC STIMULI IN SUBJECTS WITH BLOOD-INJECTION-INJURY AND SNAKE PHOBIA

Juan Pedro Sánchez Navarro, José María Martínez Selva, Vladimir Kosonogov, **Eduvigis Carrillo Verdejo**, Sara Pineda y Ginesa Torrente

School of Psychology, University of Murcia, Spain

The aim of this study was to investigate the electrocortical activity during the anticipation and processing of phobic stimuli in blood-injection-injury (BII) phobia subjects and in snake phobia subjects. We selected 12 subjects with blood phobia and 10 subjects with snake phobia from a total sample of 312 participants. We employed an S1-S2 task, with a word as the S1 (blood, snake or neutral) followed 3 s later by a picture (S2) related to the word. We employed 15 pictures of each category (blood, snake, neutral) selected from the IAPS. Each picture was presented 2 times. From the EEG (32 channels), we studied the brain electrical anticipation by means of the stimulus preceding negativity (SPN) during the 300 ms prior to the picture presentation. We also studied the ERPs provoked by the pictures (P200 and P300). In subjects with snake phobia, the SPN was higher before snake pictures, whereas this effect did not appear in BII phobia subjects in anticipation to their phobic stimuli. The P200 and P300 were larger to the phobic pictures than to the neutral images. In addition, the P200 component was larger to snake pictures than to neutral ones in snake phobic subjects. Blood-related pictures provoked a larger P300 component in both phobic subjects, and snake pictures evoked a larger P300 wave in snake phobic subjects. Overall, BII phobic subjects did not show a cortical anticipatory response (SPN), nor an early attentional response (P200) to the pictures related to their phobia, what could be related to a failure in emotional regulation, responsible for some of the behavioural and physiological alterations that characterise this type of phobia.

PSYCHOLOGICAL STRESS AND HEALTH INDICATORS IN UNIVERSITY STUDENTS

Pablo Ruisoto[1,2], Silvia Vaca[2], Paula Mayoral[1], Israel Contador[1], M Victoria Perea[1]

ruisoto@usal.es; slvaca@utpl.educ.ec, icontador@usal.es, vperea@usal.es

[1]University of Salamanca, Spain. [2]University Técnica Particular de Loja, Ecuador

Introduction. A high level of stress is often associated with poorer status of health and psychological well-being in the population. However, studies in the Latin American context are scarce and cross cultural validation of previous results is needed.

The aim of this study is to analyze the relationship between the perceived psychological stress and different indicators of health (physical and psychological) in a sample of university students in Ecuador.

Methodology. A total sample of 3232 college students from a southern University in Ecuador were anonymously surveyed using the following scales:

Perceived Stress Scale (PSS-14; Cohen, Kamarck, and Mermelstein, 1983); Revised UCLA Loneliness Scale, (short form); Hughes, Waite, Hawkley, Cacioppo, 2004); Type A Behavior Scale (Haynes, Baker, 1982); Alcohol Use Disorders Identification Test (AUDIT; self-report version) (Kriston, Hölzel, Weiser, et al. 2008) and Life Satisfaction Questionnaire (LSQ; Helliwell, Layard, Sachs, 2012). Individuals were classified according to the scores (median) in the PSS scale (≤ 26 = low level of stress vs. > 26 = high). Non-parametric tests were performed to compare categorical variables (chisquare test) and quantitative variables (Mann-Whitney U). The statistical significance was $p < 0.05$.

Results. The percentage of women was significantly higher in the group of high-stress compared to men. Higher levels of stress were associated with a poorer perception of health. Therefore, the high-stress group reported a shorter sleep-time and worse habits in terms of physical activity, diet, alcohol consumption and psychotropic drug intake. In fact, cholesterol, hypertension, allergies, cognitive complaints, anxiety and depression were significantly increased in those with higher levels of stress. Finally, the high-stress group reported a lack of perceived social support, and type A personality was more frequent in comparison with the low stress group.

Conclusion. The level of stress is a good indicator of physical and psychological health in the university population.

CORNEAL INNERVATION AS A POSSIBLE TESTING OF NEURODEGENERATIVE DISEASES

Bech Federico, Alcalde Ignacio, Íñigo-Portugués Almudena, González González Omar,

Artime Enol, Braga Paola, Merayo-Lloves Jesús

Instituto Universitario Fernández-Vega. Universidad de Oviedo, Spain

INTRODUCTION: Recent studies have shown that some neurodegenerative diseases present morphofunctional alterations in the peripheral nervous system. Small fiber neuropathies are predictive in cases of nerve polyneuropathy and this can be detected on skin biopsies analysing the density of intraepithelial sensory nerve fibers (IENFD index). As the cornea is the most innervated tissue of the body, with more than 600 sensory terminals/mm^2, we speculate with the possibility of finding similar changes in the cytoarchitecture of the corneal nerve endings of patients affected by neurodegenerative diseases and apply it as a diagnostic tool. Our purpose is to establish a reliable method for determining degenerative events in the cornea using a transgenic mouse model of Alzheimer's disease.

METHODS: Plantar glabrous skin and corneas were obtained from transgenic APP/PSE1 double knock out and wild type C56BL/6J mice. IENFD was set as the number of intraepithelial terminals per linear mm. We first compared IENFD index in transversal 10 μm sections of plantar skin and cornea using immunohistochemical techniques to β- Tubulin III (Covance). Then we performed whole mount immunohistochemical preparations of cornea to adapt the measurements to the whole organ and to characterize the changes in the morphology of the fibers and terminals of transgenic mice. We used confocal microscopy (Leica TCS-SP2-AOBS; Leica Microsystems, Wetzlar, Germany) and 3D image reconstruction to study differences in terminal morphology between wild type and diseased mice.

RESULTS: We adapted the IENFD index to transversal sections of cornea finding direct correlation with the results of plantar skin biopsies. Alterations in the morphology of corneal nerve terminals were described in Alzheimer transgenic mice. In flat whole mount preparations of cornea subbasal nerve fibers and terminals showed signs of degeneration as fibers ending without emitting any terminal and changes in density and ramification of the fibers.

CONCLUSIONS: Whole mount preparations of cornea allow to better quantify and describe peripheral degenerative changes in density and morphology of subbasal sensory nerve fibers and terminals in diseased mice. Once understood the peripheral neuropathies in the cornea associated with Alzheimer's disease, neurologists and ophthalmologists could use in vivo confocal microscopy on patients to follow the progression of the disease using a non invasive method.

DEGENERATIVE EFFECTS OF AGE IN THE MORPHOLOGY, NEUROCHEMISTRY AND FUNCTIONALITY OF THE CORNEAL COLD SENSORY NEURONS AND THEIR AFFERENT PROJECTIONS AND IMPLICATIONS IN THE REGULATION OF SECRETION OF BASAL TEAR.

Íñigo-Portugués, Almudena[1,2]; Alcalde, Ignacio[1,2] ; González-González, Omar[1,2]; Gallar, Juana[3]; Merayo-Lloves, Jesús[1,2] ; Belmonte, Carlos[1,3].

[1]Superficie Ocular. Fundación de Investigación Oftalmológica, Oviedo, Asturias, Spain. [2]Universidad de Oviedo, Oviedo, Asturias, Spain. [3]Instituto de Neurociencias, Universidad Miguel Hernández-CSIC, Alicante, Spain.

PURPOSE: To determine the degenerative effects of aging on density, morphology and neurochemical properties of corneal cold sensory nerve fibers and their implication in the regulation of the secretion of basal tear in mice.

MATERIALS AND METHODS: Corneas and trigeminal ganglion (TG) obtained from transgenic TRPM8-EYFP mice of different ages (from 90 to 720 postnatal days) were studied. Corneal cold nerves were identified in whole mount corneas using ABC-Peroxidase immunohistochemical technique. Extracellular electrical activity of single sensory nerve endings of the corneal surface was recorded in excised and superfused eyes. TG neurons projecting to the cornea were traced with Fast Blue applied onto the cornea of the mice and were processed for immunofluorescence staining using antibodies against peripherin, neurofilaments 200, TrkA neurotrophic receptor and calcitonin gene related peptide (CGRP). Basal tearing was measured in anesthetized animals using phenol red threads.

RESULTS: The density of TRPM8 fibers in the subbasal plexus and of epithelial nerve terminals in the cornea decreased with age. One half of TRPM8+ subbasal nerve fibers of p90 TRPM8-EYFP mice showed characteristic beaded morphology and their nerve terminals ended in the uppermost ephitelium layers as a cluster of free endings. The other half of TRPM8+ subbasal nerve fibers did not show beads and their terminals mainly ended as simple or double bulbous branches. In old mice, the total amount of TRPM8+ fibers did not show beads ending as single or double bulbous terminal branches. Two different populations of sensory nerve endings responding to cold were distinguished electrophysiologically: Low and High-threshold cold terminals. With aging, the incidence of low-threshold cold nerve endings decreased while more high-threshold nerve endings were found. In the TG two populations of TRPM8 corneal neurons with different neurochemical signature were identified and classified as intense (IF-EYFP) and weak (WF-EYFP) immunofluorescent neurons and their neurochemical properties changed with age. Basal tear production was altered in aged mice.

CONCLUSIONS: Dysregulation of basal tearing rate was observed in aged mice that could be related with the disturbances in morphology.

PARKINSON'S DISEASE: MOTOR AND PROCESS SKILLS IN DAILY LIVING ACTIVITIES

Díaz Cáceres Elena[1,2,3], García Nevares Ariana[3,4], Méndez Marta[3,5], Ribacoba René[5,6], Suárez Esther[5,6], Arias Jorge L[3,5].

[1]Facultad Padre de Ossó, Oviedo, Spain. [2]Servicio de rehabilitación, Hospital Universitario Central de Asturias, Oviedo, Spain. [3]Departamento de Psicología, Universidad de Oviedo, Spain. [4]Unidad Residencial de Meres, Oviedo, Spain. [5]Instituto de Neurociencias del Principado de Asturias (INEUROPA), Spain. [6] Neurología, Hospital Universitario Central Asturias, Spain.

The aim of this study was to assess motor and process skills to determine the quality of execution of activities of daily living (ADL) in people diagnosed with Parkinson. Our hypothesis was that Parkinson's diagnosis could adversely affect the performance of ADL. The quality of performance in ADL was assessed by an standardized observational Occupational Therapy tool called AMPS (Assessment of Motor and Process Skills) .This scale was designed to assess the quality of the execution of ADL in natural environments relevant to the task and it is based on the observation of motor and process problems during its execution. In this study we assessed the tasks: making a bed with standard sheets and blanket or duvet (K-1), Vacuuming-moving lightweight furniture (J-4) Grilled cheese sandwich and beverage (F-4), Scrambled or fried eggs- toast and boiled/brewed coffee or tea (D-2). These were grouped in pairs (EV1 and EV2 assessments). We assessed 19 patients diagnosed with Parkinson disease (11 men and 8 women) 61 to 83 years old. The onset of Parkinson's disease in this sample was tremor in 12 patients, rigid-akinetic in 5 patients and unknown in 2 patients. According to the Hoehn and Yahr Staging Scale, 5 subjects presented unilateral involvement only, 2 subjects had unilateral and axial involvement and 12 subjects showed bilateral involvement without impairment of balance. The results obtained in the EV1 (tasks k-1 and J-4) were a motor logit in the range of -1.23 to 2.70, being the mean of motor logit 1.09. Regarding process logit, the results were -0.74 to 1.64 with a mean process logit of 0.66. The results obtained in the EV2 (Tasks F-4 and D-2) showed a motor logit in the range of 0.57 to 2.98, being the mean of motor logit 1.42. Regarding process logit, the results were 2.74 to 1.73 with a mean logit of 0.38. Based on the results of EV1 and EV2 AMPS evaluations in people diagnosed with Parkinson, we could conclude that these patients need moderate to maximum assistance during the performance of ADL.

FACIAL THERMAL VARIATIONS: A NEW MARKER OF EMOTIONAL AROUSAL ?

Kosonogov[1], V., De Zorzi[2], L., Honoré[2], J., Martínez-Velázquez[3], E. S., Delbarre[2], L., Nandrin[2], J.-L., **Martinez-Selva, J. M**.[1] and Sequeira, H.[2]

[1]School of Psychology, University of Murcia, Spain. [2]SCALab, CNRS UMR 9193, University of Lille, France. [3]Institute of Neuroscience, University of Guadalajara, Mexico.

It's well known that faces are an important vehicle for emotional communication. Considering that the facial thermography, an upcoming technique of psychophysiology, can detect cutaneous thermal variations related to emotional stimulations, this study aims to explore whether the facial temperature is sensitive to the valence and arousal of emotional pictures.

We measured the facial temperature from the nose, a major region of interest for facial thermal variations. Simultaneously, skin conductance responses (SCRs) and heart rate (HR), robust indices of emotional activations, were recorded in 24 healthy participants (22.4 ± 1.8 years old, 19 females) in response to neutral, unpleasant and pleasant pictures (the two latter were equalized in arousal). There were six blocks (two for each category) with 10 pictures presented for 4 s with a 3 min rest period between blocks.

The peak amplitude of temperature decrease was greater for unpleasant and pleasant pictures than for neutral pictures ($F = 4.84$, $p = .012$). The peak latency of temperature decrease was shorter for unpleasant and pleasant pictures ($F = 8.56$, $p = .001$). Amplitude and frequency of SCRs together with HR showed classical modulations: unpleasant and pleasant pictures provoked greater changes than neutral ones in SCR amplitude ($F = 3.71$, $p = .032$), SCR frequency ($F = 10.22$, $p < .001$) and HR deceleration ($F = 5.13$, $p = .010$). No valence effect was observed.

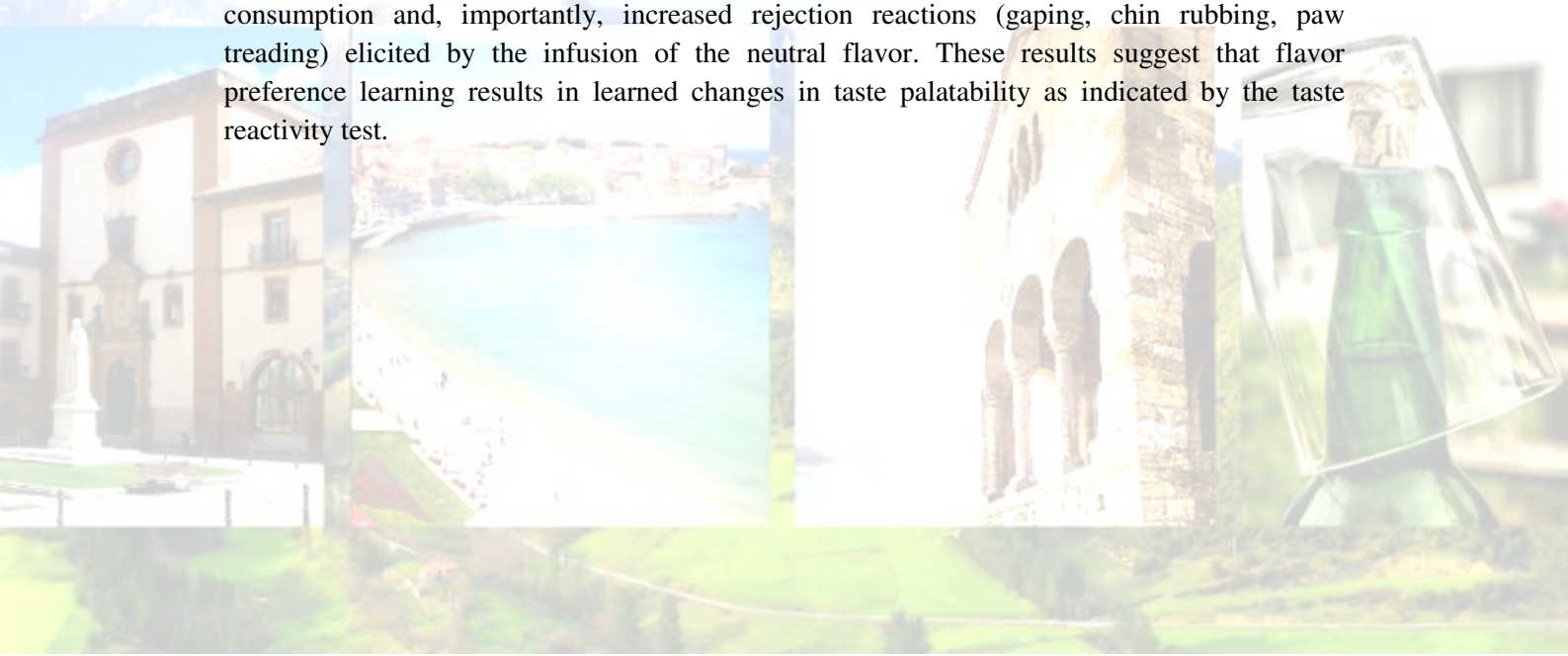
Overall, the facial temperature varies as a function of arousing content of emotional pictures and reflects sympathetic activation, as showed by electrodermal measures.

HEDONIC CHANGES IN FLAVOR PREFERENCE LEARNING AS MEASURED BY THE TASTE REACTIVITY TEST

Alberto Soto, Patricia Gasalla, Stefana Bura, y Matías López

Department of Psychology, University of Oviedo, Oviedo, Spain

In this study we used the taste reactivity method to examine changes in hedonic responses to taste stimuli in flavor preference conditioning. Rats exposed to a simultaneous compound of a neutral flavor (grape or cherry) and a nutrient (8% sucrose) US showed an increased consumption of the neutral flavor when presented alone. When tested in the taste reactivity test, the rats displayed ingestion reactions (mouth movements, tongue protrusions, paw licking) when intraorally infused with the neutral flavor previously paired with the sucrose. The subsequent devaluation of either sucrose or maltodextrin by pairings with illness reduced flavor consumption and, importantly, increased rejection reactions (gaping, chin rubbing, paw treading) elicited by the infusion of the neutral flavor. These results suggest that flavor preference learning results in learned changes in taste palatability as indicated by the taste reactivity test.



AMYGDALA FOS-LIKE IMMUNOREACTIVITY AND THE FORMATION OF SAFE TASTE MEMORY IN RATS

Ruggieri, S.[1, 2], **Gómez-Chacón, B[1]** , Morillas, E.[1] and Gallo, M.[1]

[1]Department of Psychobiology. Institute of Neurosciences.Center for Biomedical Research (CIBM).University of Granada. Spain. [2]Department of Life Sciences and Biotechnology, University of Ferrara, Italy.

Previous studies have shown the amygdala role in consolidation of memories. While the basolateral amygdala (BLA) has been related with aversive taste memories, the central nucleus of amygdala (CeA) is involved both in fear conditioning and in the acquisition of safe taste memories. The formation of safe taste memories can be studied using behavioral procedure leading to the attenuation of taste neophobia. Little is known about the brain mechanisms involved in the consolidation of safe taste memories. Some results point to a role of BLA, but there are no data that show the potential involvement of the CeA. The aim of the present study was to explore the changes of the amygdala nuclei activity associated with the habituation of taste neophobia. Fos-like immunoreactivity (FLI) was examined as a marker of neural activity in the amygdala nuclei. Twenty-one male Wistar rats were subjected to a behavior drinking procedure with six consecutive exposures (15 min) to a 0.3 % cider vinegar solution. They were assigned to three different groups, sacrificed 90 min after drinking the vinegar solution during the first (Novel group, n=7), the second (Familiar I, n=7) and the sixth (Familiar II, n=7) exposure. The results indicated that the attenuation of taste neophobia had achieved the asymptote from the third exposure on. This indicated that the safe taste memory was well consolidated. Increased c-Fos positive nuclei were found in Familiar II in comparison with Novel and Familiar I. The increased neural activity was evident in the CeA but neither in the BLA or the medial amygdala. Therefore, our results demonstrate for the first time a relationship between CeA activity and consolidation of safe taste memory. It is consistent with a CeA role in extinction of aversive memories and prompts an interpretation of the attenuation of taste neophobia in terms of elimination of the aversive neophobic unconditioned response.

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EMPATHY DIFFERENCES IN CORTICAL REACTIVITY TO AFFECTIVE STIMULI

Sergio Molina-Rodríguez, Marcos Mirete-Fructuoso, Carolina Villada, Sandra Abadía-Fernández, Andrea Romaguera-Álvarez, Alicia Salvador

Laboratory of Social Cognitive Neuroscience, University of Valencia, Spain.

According to the theory of mind, the ability to represent one's thoughts, beliefs, knowledge, and internal processes, as well as those of others often depends on empathic

processes. In the general population, it is common to find differences between the empathy levels without this being pathological. These differences of empathy must be found as concrete changes of cortical activity.

The main objective was to analyze possible differences in the cortical response to diverse stimuli attending to the empathy of the participants. Thirty-Eight healthy young, 22 males and 16 females (oral contraceptive users), mean 21 years old (D.T.= 2.53), were included on the research. Eighty images from the International Affective Pictures System (IAPS) classified by their affective valence (positive, negative and neutral) and their arousal (high and low) were presented in an oddball paradigm. Participants were instructed to press a button to target stimuli that occurred infrequently and irregularly and ignore the standard stimuli (mask of red and white squares). The empathy levels where measured by the Empathy Cognitive and Affective Test (TECA) and the simple was divided in two groups, high and low in empathy, depending on the 25th and 45th percentile.

The stimuli generated a different cortical response depending on empathy. The amplitude of P300 and N100 (frontal location) components were greater in participants with higher scores on empathy for low arousal negative stimuli, than for high arousal positive stimuli. In contrary, participants low in empathy showed greater amplitude in these components only with negative high arousal stimuli. No differences were observed for positive low arousal or neutral stimuli.

These results provide electrophysiological evidence of the cognitive processes underlying the affective response. Particularly they emphasized the capacity of the empathic people to react to higher pleasant stimuli, in consonance with previous research that has observed higher amplitude both in these earlier and in late components.

STRESS AND DYSLEXIA: CARDIOVASCULAR AND AFFECTIVE CORRELATES TO SOCIAL STRESS IN CHILDREN WITH DYSLEXIA.

Jose Antonio Picazo[1], Carolina Villada[1], Irene García[2], Alicia Salvador[1] Jesus Gómez-Amor[2], Laura Espín[2].

[1]Social Cognitive Neuroscience Laboratory, Department of Psychobiology, University of Valencia, Spain.

[2]Department of Human Anatomy and Psychobiology, University of Murcia, Spain.

The study of the stress response in pediatric or preteen population is scarce, especially in particular subgroups such as Dyslexia. This subgroup is characterized by difficulties in tasks that require evaluating as well as planning social context due to a higher activation anda worse connection of the front circuit. Our main objective was to analyze the correlation between cardiovascular reactivity indexes and subjective perception in response to a social laboratory stressor, which entails planning a task to be assessed by a committee. Eighty-eight children (45 dyslexic) between 11 and 14 years underwent a psychosocial laboratory stressor, the Trier Social Stress Test- Child (TSST-C) or a control condition in an inter-subjects design. A continuous record of the cardiovascular activity was performed and the cardiac reactivity was calculated subsequently (RR, RMSSD y SDNN). The state anxiety and perceived mood were evaluated before and after the task. The results showed a positive correlation for dyslexics and a negative one for non-dyslexics between the reactivity index for the RR variable and the delta for STAI-C. These results confirmed, from a psychophysiological perspective, the neuroimaging studies findings suggesting that deregulation of the frontal cortex of dyslexic may be related to low cardiac reaction to socially stressful events.

EFFECTS OF NEUROPEPTIDE Y ON SPATIAL MEMORY AND GLIAL FIBRILLARY ACIDIC PROTEIN-IMMUNOREACTIVE ASTROCYTE POPULATION IN RAT HIPPOCAMPUS.

Raquel Ordás[1], Marta Méndez-Couz[1], Ana Paula Silva[2], González-Pardo H[1], Jorge Luis Arias[1], Nélida María Conejo[1]

[1]Laboratory of Neuroscience, Department of Psychology, Instituto de Neurociencias del Principado de Asturias (INEUROPA), University of Oviedo, Oviedo, Spain. [2]Institute for Biomedical Imaging and Life Sciences (IBILI), University of Coimbra, Portugal; Center for Neuroscience and Cell Biology-Institute for Biomedical Imaging and Life Sciences (CNC.IBILI) Research Unit, University of Coimbra, Portugal

Neuropeptide Y (NPY) is widely expressed in the central nervous system (CNS) and it has been involved in the modulation of several brain functions, including mood, learning and memory. In this regard, previous studies have shown the enhancement of spatial learning in rats through the administration of the NPY Y2 receptor antagonist BIIE0246 in the dorsal hippocampus. Furthermore, previous researches suggest a neural system underlying the retrieval of a spatial reference memory that includes a brain network essentially comprising the hippocampus, the medial prefrontal cortex and the anterior thalamic nuclei, among other brain regions. On the other hand, the NPY may be a modulator of astrocyte expression. However, despite the recently recognized role of astrocytes on cognitive processes, it is still unknown if NPY could modulate together spatial memory and astroglial density. The present study aimed to evaluate the role of NPY in spatial reference memory and its influence over the density of astrocytes in the brain regions related with the "prefrontal-hippocampal-thalamic system". For this purpose, we used the Y2 receptor antagonist BIIE0246, which was injected into the CornuAmmonis (CA) 1 subfield of the dorsal hippocampus in animals of the experimental group. Zero maze test and actimeter were carried out to evaluate anxiety-like behavior and locomotor activity. Later, animals were trained during three consecutive days in Morris water maze to test their spatial memory. In order to estimate the possible differences between the experimental and control groups in astroglial cell density, we performed glial fibrillary acidic protein (GFAP) inmunocytochemistry. In agreement with previous studies by our research group, behavioral results showed the improvement of spatial learning in the experimental group, but no differences in anxiety and locomotor activity were observed after the administration of the NPY antagonist. Increased number of astrocytes was appreciated too, but only in the dentate gyrus of the dorsal hippocampus (DGd). Our study demonstrates that the infusion of a Y2 receptor antagonist into the CA1 area of hippocampus of rats enhances spatial learning and increases astroglial density in the DGd.

THE ABSENCE OF LPA1 RECEPTOR RESULTS IN ANHEDONIA

Román D. Moreno-Fernández[1], Estela Castilla-Ortega[2], Cristina Rosell-Valle[1], Margarita Pérez-Martín[3], Jerold Chun[4], Fernando Rodríguez de Fonseca[2], Guillermo Estivill-Torrús[5], Luis J. Santín[1], Carmen Pedraza-Benítez[1].

[1]Departamento de Psicobiología y Metodología de las Ciencias del Comportamiento, Universidad de Málaga, and Instituto de Investigación Biomédica de Málaga (IBIMA), Málaga, Spain. [2]Hospital Regional Universitario Carlos Haya, Instituto de Investigación Biomédica de Málaga (IBIMA), Spain. [3]Departamento de Biología Celular, Genética y Fisiología, Facultad de Ciencias Universidad de Málaga, Málaga, Spain. [4]Dorris Neuroscience Center, The Scripps Research Institute, La Jolla, USA. [5]Unidad de Microscopía and Unidad de Gestión Clínica de Neurociencias, Hospital Regional Universitario Carlos Haya, Instituto de Investigación Biomédica de Málaga (IBIMA), Málaga, Spain. Corresponding author: Pedraza-Benítez, Carmen; mdpedraza@uma.es

Loss of interest or pleasure, also known as anhedonia, is one of the main symptoms of mood disorders. Several animal models mimic this behaviour and help to understand the underlying neurobiological mechanisms. On the other hand, previous research has demonstrated a role for lysophosphatidic acid (LPA) through the LPA1 receptor in emotional regulation and anxiety-like behaviours. In fact, the absence of the LPA1 receptor has been associated with an increase in emotional reactivity and anxiety, which are comorbid with mood alterations, being anhedonia a core symptom of these disorders. Hence we have examined the putative role of LPA1 receptor in anhedonicbehaviours. For this purpose, we have studied the behaviour of maLPA1-null male mice and normal wild type mice in two anhedonic paradigms: Saccharine Preference Test (SPT) and Female Urine Sniffing Test (FUST). Both tests base their rationale on the impairment of primary reward seeking behaviours, i.e. sweet flavour or opposite sex stimulus, respectively. Besides, c-Fosimmunoreactivity analysis was used in order to determine the activation of brain regions involved in emotion and reward-seeking in both groups.

Our results revealed that lack of the LPA1 receptors diminishes saccharine preference comparing to the control group. Concurrently, the percentage of time sniffing female urine, as hedonic behaviour, was significantly lower in maLPA1-null mice. In addition, stereological quantification of c-Fos positive cells showed reduced activation of nucleus accumbens, basolateral amygdala and dorsal raphe nucleus after FUST in comparison with wild-type. Regarding the association of behaviour with c-Fos expression, we observed positive correlations between the percentage of time sniffing urine and the activation of basolateral amygdala and dorsal raphe nucleus separately in both groups.

These results provide further evidence to the participation of the LPA1 receptors in mood regulation. Specifically, our data suggests that the absence of the LPA1 leads to anhedonic states and this can be linked to abnormal activation of brain structures implicated.

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BRAIN STRUCTURES INVOLVED IN THE METACOGNITION

Carlos Valiente-Barroso & Virginia Pascual

Universidad Internacional de La Rioja, Logroño, Spain

Introduction: The advance of the psychology, as an empirical science, it necessarily implicates a deepest knowledge of the neurobiology basis which support the many phenomenons that it studies. In a particular way, the cognitive neuropshycology is served of the structural and functional study of the brain to clear up and delimit the different processes that are included in its field. Among them, the metacognition is reaching a noted importance as much the progress of the investigations and the publications focus in its study as the relevance that this skill develops at any learning process.

Objective: Summarising the neurobiology discoveries which currently constitute the question´s condition related to the brain basis of the metacognition.

Methodology: Reviewing bibliography through the most relevant scientist sources (NCBI-PubMed and Cochrane). It is done by a systematic search using the term ` metacognition´ together with ` brain´, ` fMRI' and ` medical'.

Results: The metacognition activity is associated to a special importance of different cortical and subcortical structures. Standing out the function of the prefrontal cortex (PFC), anterior cingulate cortex (ACC), intraparietal sulcus/inferior parietal lobule. Also it should be mention the outstanding function of the bilateral putamen, right caudate, thalamus, precuneus and the limbic system. The results are discussed and the metacognitive functions linked to the mention sructures are emphasised.

Conclusion: Gradually, the specific regions which are stimulated during the mental processes including the metacognition have been identified. It should be stood out the preponderance executive component in such cognitive activity. It is needed the execution of investigations that continue clarifing the neurobiology basis of the metacognition. Identifing and explaining the neuronal network of activation, as much elementary perspective as applied perspective (educative) and clinic (associated to ADHD, schizophrenia, etc.).

COMPETITION AND PSYCHOPHYSIOLOGICAL RESPONSE: THE ROLE OF HIGH SELF-EFFICACY

Diana Abad[1], Adrián Alacreu-Crespo, Raquel Costa, Alicia Salvador, Miguel Ángel Serrano.

[1]Universitat de València, Departamento de Psicobiología. Av. Blasco Ibañez 21, 46010 Valencia, España. Email: diator@alumni.uv.es.

Competition is a social stressor able of elicit changes in our physiological, cognitive and emotional activity depending on outcome. Moreover, subjective appraisal could modify psychobiological changes to competition. However, psychological variables, such as self-efficacy, can influence over the psychophysiological response to a competition. The aim of this study was to analyze the effects of the outcome in psychophysiological responses in a general sample of young people. Secondly, we aim to focus on high self-efficacy subjects; in order to analyze the influence of this variable in the psychobiological response to a competition. Seventy-seven university students (men and women) were confronted in pairs on a laboratory competition, meanwhile cardiovascular, electrodermal, cognitive and emotional changes were measured. From this sample, 37 participants were selected depending on their scores in self-efficacy trait (higher than 75% of the total score). Our results indicated that the group of high self-efficacy had a higher cardiovascular and electrodermal response to competition than general sample as well as a tendency to a greater emotional activation in high self-efficacy losers compared to losers of the general population. These results support the importance of self-appraisal previously to competition in the psychophysiological response to competition.

EFFECTS OF CHRONIC SOCIAL DEFEAT STRESS ON MEMORY, MOTOR ACTIVITY, ANXIETY AND ANALGESIA IN MICE

Santiago Monleón, Aránzazu Duque, Concepción Vinader-Caerols.

Department of Psychobiology, University of Valencia, Valencia, Spain

In this study, the effects of Chronic Social Defeat Stress (CSDS) on Inhibitory Avoidance (IA) in post-pubertal male CD1 mice were evaluated. Subjects were randomly distributed into three groups (n = 15-16): NS-CO (non-stressed control) group, M-CO (manipulated control) group and S (stressed) group.Stressed animals were exposed to a daily 10-min social defeat by a larger and aggressive mouse in its home cage on 20 consecutive days. After each encounter, both animals were maintained in sensory contact for 2 h by means of a wire mesh that divided the resident home cage into two halves. The M-CO group was submitted to the 2h exposure but not to the agonistic confrontation. 24 h after the last session of CSDS, mice were evaluated in a one-trial step-through version of IA. As complementary tests, animals were also evaluated in the elevated plus maze for 5 min (locomotor activity and anxiety measures) as well as in the hot plate paradigm (analgesia measure). IA learning (test latencies significantly higher than training latencies) was confirmed in the NS-CO group but not in the M-CO and S groups. No significant differences between groups were observed in motor activity, anxiety or analgesia. In conclusion, this degree of CSDS (10-min encounters) prevents the memory formation of IA in mice. These effects of CSDS on memory are not secondary to motor, emotional or analgesia effects of stress. Furthermore, the NS-CO group seems to be more appropriate than M-CO group as a control group in this model.

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PSI2013-44491-P from “Ministerio de Economía y Competitividad” and PROMETEO/2011/048 from “GeneralitatValenciana”, Spain.

IS DEEP BRAIN STIMULATION OF THE SUBTHALAMIC NUCLEUS (DBS-STN) A SURGICAL PROCEDURE COGNITIVELY SAFE IN PATIENTS WITH PARKINSON´S DISEASE (PD)?

Carmen Sáez-Zea[1,2], Francisco Escamilla-Sevilla[2], María José Pérez-Navarro[2] and Adolfo Mínguez-Castellanos[2]

[1]Area of Psychobiology, Department of Psychology, Faculty of Humanities and Education, University of Jaén, Spain

[2]Movement Disorders Unit, Department of Neurology, Virgen de las Nieves University Hospital, Granada, Spain

PD is a neurodegenerative disorder traditionally defined by their motor symptoms. Nevertheless, a great deal of interest have aroused from the psychiatric and psychological sphere in the last years, especially in the study of cognitive impairment. These aspects are leading causes of morbidity and mortality, significantly impacting quality of life and contributing heavily to cause patients disability. The DBS-STN is used in patients with advanced PD, whose symptoms cannot be adequately controlled with pharmacological treatment. It may help to reduce the risk of medication side effects, such as involuntary movement (dyskinesia). In spite of the confirmed utility of this procedure to relieve the motor symptoms, at present the cognitive effects continue to be a matter of debate. Numerous studies have evaluated these effects in short, medium and long-term after surgery, but few are controlled. These studies have the advantage of allowing to contrast cognitive outcomes of medically treated PD patients versus those undergoing surgery, thus helping to clarify whether the results come from cognitive changes after surgery or simply due to disease progression. In this work an exhaustive literature review in PubMed (MEDLINE) has been made using several descriptors. 11 publications were found with follow-up periods ranging from 3.5 months to 3 years. Regardless of the different methodological approaches used, there is a major consensus claiming that there is an early deterioration of verbal fluency (VF) often accompanied by a moderate decline in other cognitive domains (8/11): verbal and visuospatial memory, executive functions (EF), working memory, selective attention and processing speed information. Notwithstanding, if a detailed analysis is made of the cognitive processes involved deeply into the nature of them, then all studies agree that a decline occurs in different aspect of EF. VF tasks, independently of the modality evaluated, require planning skills, targeted search of information, inhibition mechanisms, etc. The worst performance in the long-term visual and verbal memory may be due not only to deficit in the storage stage, but also to deficit in the recovery phase among a set of possible distractors or due to a problem when encoding information if there exists inadequate organization of it. In both cases there may be an executive deficit. Finally, it should be acknowledged that attention is a supramodal cognitive domain, hardly discernible from EF and it is difficult to be assessed because it entails complex and multiple cognitive processes. In conclusion, STN-DBS from a cognitive standpoint is safe; although changes have been reported in EF, especially in VF, surgery effects can also be related to PD progression and medication reduction.

STRESS EFFECTS ON COGNITIVE PERFORMANCE AND EMOTIONAL RECOGNITION IN EPILEPSY: PRELIMINARY DATA

Tomé, E.; Diez, C.; Cano, I.; **González-Bono, E**.

Background: Stress can modulate the cognitive performance and emotional recognition in healthy persons. Individuals with an epilepsy diagnosis suffer repeated and uncontrollable seizure, which can suppose a chronically stressful condition. Additionally, stress may have a role as a risk factor for the development of epilepsy, may be a trigger for the occurrence of seizures, may exacerbate seizure frequency, or may be an important component of a prodrome preceding a seizure. However, the interaction between epilepsy and stress remains unclear. The purpose of the study is determining whether an acute episode of stress modulates the performance in cognitive and emotional tasks in persons with epilepsy.

Method: For this, ambulatory EEG was continuously registered in thirteen participants with a diagnosis of epilepsy. Total sample was matched on demographic variables and distributed into two groups, experimental (EG) and control group (CG). EG was composed of seven persons who were exposed to a Cold Pressor Test. CG was composed of six persons who were exposed to a control situation of similar characteristics of Cold Pressor Test but minimizing stress, while psychological, cardiovascular and electrodermal responses were measured. Cognitive and emotional tasks referred to faces, scenes and words were evaluated before and after stress and control situations.

Results: The present study is an initial part of a wider study and provides preliminary data of different patients of epilepsy, with and without neurosurgery intervention of temporal lobe. Results will help to clarify the relationship between the magnitude of stress response and performance in this population.

Conclusion: Results will be interpreted in terms of sensitive areas in cognitive and emotional recognition for stress effects in order to detect target aspects for intervention in this population.

CAN CANNABIS DAMPEN THE TOXIC EFFECTS OF ALCOHOL ON FACES RECOGNITION IN IMMEDIATE VISUAL MEMORY?

Concepción Vinader-Caerols, Aránzazu Duque, Santiago Monleón.

Department of Psychobiology, University of Valencia, Valencia, Spain

Adolescence (from 10 to 19 years; WHO, 1986) is a critical stage of development corresponding to the transition from childhood to adulthood, and is characterized by a wide variety of physiological and psychological changes. Adolescents develop risk behaviors, like alcohol binge drinking (BD), alone or in polydrug use with cannabis (94.4% of Spanish cannabis users consume it together with alcohol). This polydrug use can be especially toxic for brain development, but no study has investigated the effects of Cannabis-BD on memory in teenagers. The Wechsler Memory Scale (WMSIII) is a neuropsychological test designed to measure different memory functions. In the present study we explore the effects of a history of BD alcohol consumption, alone or with cannabis, on the Visual Immediate Memory (IVM) of the WMSIII in adolescents. For IVM index we used the following subtests: 1) Faces I, in which subjects recognize faces they have been shown previously; and 2) Scenes I, subjects are presented with four family scenes and later have to recall the people in the scene, what they were doing and their position. Subjects were 18-19 years old (n = 97; 40 men and 57 women). Along with other inclusion and exclusion criteria, AUDIT and CAST tests (for dependence of alcohol and cannabis, respectively) were employed for the selection of non-dependent subjects. In each sex, subjects were assigned to one of three experimental conditions taking into account their drinking pattern history: 1) Refrainers; 2) Binge Drinkers; and 3) Cannabis-BD consumers. Faces I and Scenes I measures and IVM index were obtained. The results showed that the subjects with a history of polydrug Cannabis-BD performed significantly better in the face recognition test than those with a history of BD. Furthermore, women performed better than men in this test. No significant differences were observed in the Scenes test or IVM index. Though therapeutic effects of cannabis have been reported, we believe that the recreational use of this drug in combination with alcohol is toxic for the adolescent brain's development. However, our results suggest that cannabis dampens the toxic effects of alcohol on face recognition. These results should be interpreted with caution and investigated more thoroughly.

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EVALUATION OF COLOUR PREFERENCES IN ANGELFISH (*PTEROPHYLLUM SCALARE*): A COMPARISON OF TWO APPROACHES

Luis M. Gómez Laplaza y Emilio Hijes

Departamento de Psicología, Universidad de Oviedo, 33003 Oviedo, Spain. E-mail: lmgomez@uniovi.es

Fish are becoming one of the most useful vertebrate models for behavioural and biomedical investigation, including studies of learning, perception and higher-order processes. However, knowledge about many aspects of their behaviour is still limited. We are trying to develop novel colour-based learning and memory paradigms for the angelfish (Pterophyllum scalare). This cichlid species is being used as a model organism in a diversity of studies, including colour discrimination of conspecifics and in learning and memory assays. In the latter, visual colour stimuli are often used as cues. However, the natural colour preferences of this species are unknown and preferences towards a specific colour may lead to changes in visual discrimination learning, memory and decision making. As colour is a fundamental aspect of perceptual experience of the external world and one of the basic building blocks of visual perception, we need to establish a natural preference and/or aversion, or any pre-existing biases towards specific colours in angelfish. This is more important today since both evolutionary considerations and recent research suggest that colour serves signaling functions in different human and non-human animal species. The aim of this study was to determine the preference of angelfish for different colour environments using different methodologies based on binary choice tests. A two-chamber aquarium was used for the preference tests, and the time spent in each coloured chamber was considered as an index of preference. In one of the procedures, test fish was placed in the center of the test aquarium in a transparent cylinder (7 cm diameter) and after a 1-min period, the fish was released and allowed to swim freely in each of the coloured chambers. In the other procedure, two parallel, transparent partitions delimited a 10-cm central passage area (start compartment) between the two coloured chambers. Each partition contained three 'windows' through which the fish had access to both chambers. Adopting this procedure we madethe task more difficult for the fish as compared with our former approach, when no partitions were used. Binary preference tests were designed among four colour treatments (Blue, Red, Green and Black), and fish were tested individually. Using the first methodology, we found a significant preference of angelfish for blue colour, and for black over red colour, whereas no preference was found among the red and green gravel substrates, which apparently are equally pleasant or aversive. With the second, more demanding methodology, results show again that angelfish preferred the blue colour in all dual combinations, although blue-green preference was more difficult than the other combinations. A tendency towards red colour aversion was not found with this approach. Overall, fish chose the blue colour whenever present in a combination and proved to be the most preferred colour, while the green substratum was neither detrimental nor beneficial. These results should have implications for future colour-based learning and memory assays in angelfish, and might be useful for validating experiments involving aversion, anxiety, or fear as well as for their application to fish welfare. The preference of fish for the blue substratum may imply that this choice is strong enough to be taken into consideration for laboratory facilities. This research was supported by Grant PSI2013-40768-P from the Ministerio de Economía y Competitividad (Spain).

ELECTROENCEPHALOGRAPHIC ACTIVITY RELATED TO COGNITIVE PERFORMANCE IN EPILEPSY

Irene Cano López; Esperanza González-Bono

Faculty of Psychology. University of Valencia. Avda. Blasco Ibáñez, 21. 46010. Valencia, Spain. Irene.Cano@uv.es, Esperanza.Gonzalez@uv.es

Background: Epilepsy consists in spontaneous epileptic seizures originated in focal or generalized brain structures, and may contribute to dysfunctions in the underlying cognitive capabilities. Several studies suggest a link between cognitive deficits and EEG activity; however, this link remains unclear. The purpose of this study is determining cognitive performance in patients with epilepsy, and his association with EEG activity patterns.

Methods: For this, thirteen participants with a diagnosis of epilepsy completed a neuropsychological battery assessing verbal memory, visual memory, working memory, executive functions and attention. EEG activity was recorded before, during and after the neuropsychological assessment, using the simultaneous-recording paradigm. The frequency of epileptic EEG discharges occurring during cognitive testing, the seizure and epilepsy type, the localization of epileptiform activity, the age at seizure onset, the duration of disorder and the seizure frequency were also evaluated. Personality and quality of life will be also assessed.

Results: This study provides preliminary data of a larger study which includes different patients of epilepsy with and without neurosurgery intervention of temporal lobe. Results will shed light on EEG activity related to cognitive performance in epilepsy, and the role of intermediary variables in this association.

Conclusion: Results could be useful to identify EEG markers of cognitive deficits in epilepsy.

Índice de autores

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