

Latin American Training Program 2016
FROM MOLECULAR AND CELLULAR NEUROSCIENCE TO COGNITION:
CLUES TO UNDERSTAND BRAIN DISEASES

MODULE 1. CELLULAR AND MOLECULAR NEUROPHYSIOLOGY: NEURONS, GLIA AND THEIR PLASTIC INTERACTION

September 26th to October 1st, 2016

Coordination: Michel Borde and Raúl Russo

This module will focus on core concepts of cellular neurophysiology from membranes to neuronal communication, neurodevelopment, stem cells and neurogenesis from a multi-technical and multidisciplinary perspective. Cutting edge experimental approaches will be discussed.

Monday September 26th

Chair: Omar Macadar

09:00-09:10 | Opening Introduction to the School by *Directors Ruben Budelli, Federico Dajas and Omar Macadar.*

09:10-10:00 | Revisiting the brain: from Cajal to the connectome - *Omar Trujillo-Cenóz.*

10:00-11:00 | An introduction to the development of the Central Nervous System in Vertebrates - *Flavio Zolessi.*

11:00-11:30 | **Coffee break**

11:30-12:30 | Molecular basis of excitability - *Gonzalo Ferreira.*

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

Tuesday September 27th

Chair: Raúl E. Russo

09:00-10:00 | Cytoskeletal assembly, dynamics and neuronal polarity - *Alfredo Cáceres.*

10:00-11:00 | The integrative properties of neurons: intrinsic properties and neuronal compartments - *Michel Borde.*

11:00-11:30 | **Coffee break**

11:30-12:30 | Electrical synaptic transmission - *Alberto Pereda.*

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

Wednesday September 28th

Chair: Michel Borde

09:00-10:00 | RhoGTPase signaling mechanisms and axon formation - *Alfredo Cáceres.*

10:00-11:00 | Asymmetry in electrical synapses - *Alberto Pereda.*

11:00-11:30 | **Coffee break**

11:30-12:30 | Synaptic transmission and retrograde signaling - *Pablo Castillo.*

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

Thursday September 29th

Chair: *Alberto Pereda*

- 09:00-10:00** | Synaptic plasticity of NMDA receptors: mechanisms and functional implications - *Pablo Castillo*.
10:00-11:00 | The tripartite synapse – *Stéphane Oliet*.
11:00-11:30 | **Coffee break**
11:30-12:30 | Experience dependent remodeling of adult-born neuron connectivity - *Benedikt Berninger*.
12:30-14:30 | **Lunch break**
14:30-19:00 | Hands on
20:00-21:00 | PROFESSIONAL SKILLS I " How to write a successful fellowship application" - *Benedikt Berninger* & "Scientific publishing. A look into the process" - *Pablo Castillo*.

Friday September 30th

Chair: *Pablo Castillo*

- 09:00-10:00** | Excitation and inhibition in neuronal circuits - *Antonia Marín-Burgin*.
10:00-11:00 | Contribution of astrocytes to NMDA receptor activity – *Stéphane Oliet*.
11:00-11:30 | **Coffee break**
11:30-12:30 | Connexins and glial cell biology - *Juan Carlos Sáez*.
12:30-14:30 | **Lunch break**
14:30-19:00 | Hands on

Saturday October 1st

Mini-Symposium I: Neural Stem Cells and Adult Neurogenesis

Chairs: *Benedikt Berninger and Raúl E. Russo*

- 09:00-09:30** | Input processing by adult born neurons - *Antonia Marín-Burgin*.
09:30-10:00 | Reawakening the sleeping beauty in the adult brain: neurogenesis from parenchymal glia - *Benedikt Berninger*.
10:00-10:30 | Homo and hetero cell-cell communication pathways of NPCs and glial cells – *Juan Carlos Sáez*.
10:30-11:00 | **Coffee break**
11:00-11:30 | The central canal as a stem cell niche: implications for the regeneration of the damaged spinal cord - *Raúl Russo*.
11:30-12:00 | Divergent contribution of lipid mediators in spinal cord injury - *Rubèn López-Vales*.
12:00-12:30 | Molecular aspects of the neuroepithelial polarity: from neurulation to neurogenesis - *Flavio Zolessi*.

Afternoon – Hotel Regency Montevideo

- 16:00-16:50** | Student presentation
16:50-17:10 | Coffee break
17:10-18:00 | Student presentation

MODULE 2. CNS PATHOLOGIES: NEUROCHEMICAL, MOLECULAR BASIS AND NEW THERAPEUTIC STRATEGIES

October 3rd to October 8th, 2016

Coordination: Patricia Cassina and Cecilia Scorza

During this week the students will learn how the basic mechanisms learnt in the previous module can be deranged in pathologies of the brain such as Parkinson's Disease, Amyotrophic Lateral Sclerosis, Metabolic diseases and Addiction. Beyond the theoretical lectures in the morning, they will have the opportunity to manipulate in vitro and in vivo models of these diseases. They will be able to apply approaches from neuronal cultures to behavioral, using techniques such as immunohistochemistry, brain microinjections, *in vivo* microdialysis, chromatography and behavioral tests.

Monday October 3rd

Chair: Patricia Cassina

09:00-09:15 | Welcome and Module Opening - *Federico Dajas*.

09:15-10:00 | Overview of brain pathologies from preclinical studies - *Federico Dajas*.

10:00-11:00 | Hemichannels in the neurovascular unit and white matter under normal and inflamed conditions - *Juan Carlos Sáez*.

11:00-11:30 | **Coffee break**

11:30-12:30 | A role for glial cells in brain pathologies - *Luis Barbeito*.

12:30-13:00 | Perinatal asphyxia and a translational model to evaluate neuroprotective strategies- *Fernanda Blasina*.

13:00-14:30 | **Lunch break**

14:30-19:00 | Hands on

Tuesday October 4th

Chair: Hugo Peluffo

09:00-10:00 | New experimental approaches to modulate inflammation in Central Nervous System disorders - *Rubèn López-Vales*.

10:00-11:00 | Microglia in health and disease - *Hugo Peluffo*.

11:00-11:30 | **Coffee break**

11:30-12:00 | Mitochondrial function in glial cells - *Patricia Cassina*.

12:00-12:30 | Oligodendrocytes in neurometabolic diseases - *Silvia Olivera*.

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

Wednesday October 5th

Chair: Federico Dajas

09:00-10:00 | Neurochemistry and neuropharmacology of basal ganglia - *Mario Herrera-Marschitz*.

10:00-10:30 | **Coffee break**

10:30-11:30 | Overview of Experimental Parkinson Disease - *Fabio Blandini*.

11:30-12:30 | Alpha-synuclein in Parkinson's Disease - from pathogenesis to therapeutic Potential - *Analía Bortolozzi*.

12:30-14:30 | **Lunch break**

16:00-17:30 | Seminar Presentation I (Hands-on September 26th to October 4th)

Thursday October 6th

Chair: Cecilia Scorza

09:00-09:30 | Therapeutic potential of cytinoids in Parkinson Disease - *Juan Andrés Abin Carriquiry.*

09:30-10:30 | Novel therapeutic strategies in major depression: Focus on RNAi and ketamine - *Analía Bortolozzi.*

10:30-11:00 | **Coffee break**

11:00-11:30 | Overview of neuropeptide neurotransmission in brain pathologies - *Patricia Lagos.*

11:30-12:30 | Melanin-Concentrating Hormone (MCH): Role in REM Sleep and Depression - *Pablo Torterolo.*

13:00-14:30 | **Lunch break**

14:30-19:00 | Hands on

20:00-21:00 | PROFESSIONAL SKILLS II "Opportunities in Neuroscience"- *Ramón Bernabeu & Cecilia Scorza.*

Friday October 7th

Chair: Giselle Prunell

09:00-10:00 | Epigenetics mechanisms involved in drug reward behavior - *Ramón Bernabeu.*

10:00-11:00 | Role of active adulterants in drugs of abuse - *Cecilia Scorza.*

11:00-11:30 | **Coffee break**

11:30-12:30 | Dopamine distinct roles on prefrontal cortical circuits: addiction or neuroenhancement - *Verónica Bisagno*

12:30-14:30 | **Lunch break**

14:30-18:00 | Hands on

Saturday October 8th

Morning - IIBCE

Mini-symposium II: Dopamine in different CNS pathologies

Chairs: Cecilia Scorza and Federico Dajas

09:00-10:00 | DA in basal ganglia - *Mario Herrera-Marschitz.*

10:00-10:30 | DA in Parkinson - *Fabio Blandini.*

10:30-11:00 | **Coffee break**

11:00-11:30 | DA in Schizophrenia - *Analía Bortolozzi.*

11:30-12:00 | DA in Drug addiction - *Verónica Bisagno.*

12:00: 13:00 | Closure Module II

Afternoon - Free

MODULE 3. NEURAL SYSTEMS, COGNITION & BEHAVIOR

October 10th to October 14th, 2016

Coordination: Leonel Gómez and Ana Silva

This module will focus on neural circuits solving problems integrating computational and behavioral perspectives. The neural mechanisms underlying behavior, perception, and cognition will be explored in iconic invertebrate and vertebrate model systems. We will combine multi-level experimental approaches with theoretical modeling to highlight general strategies of neural computing across evolution.

Monday October 10th

Chair: Ana Silva

09:00-10:00 | Neural Circuits - *Leonel Gómez & Ana Silva.*

10:00-11:00 | Neuronal Networks - *Eduardo Mizraji.*

11:00-11:30 | **Coffee break**

11:30-12:30 | Cortical networks – *Cyril Monier.*

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

Tuesday October 11th

Chair: Angel Caputi

09:00-10:00 | Neural bases of perception. Mapping and coding visual information in arthropod neuropils - *Daniel Tomsic.*

10:00-11:00 | Neural bases of perception. Neural basis of early visual motion processing - *Leonel Gómez.*

11:30-12:30 | Neural bases of perception. Synaptic integration and plasticity in visual cortical neurons – *Cyril Monier.*

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

Wednesday October 12th

Chair: Daniel Tomsic

09:00-10:00 | Neural bases of decision making. Getting to the truth: from expectations and sensory inputs to logic decisions and their access to consciousness – *Angel Caputi.*

10:00-11:00 | Neural bases of decision making. Modified synaptic connections in the leech – *William Kristan.*

11:00-11:30 | **Coffee break**

11:30-12:30 | Neural bases of decision making. Neural bases of social interactions in mental disorders - *Victoria Gradín.*

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

18:30-21:00 | PROFESSIONAL SKILLS III: Neuroethics. “Social cognition and the origin of morality” – *Annabel Ferreira.* “Animal Models relevant to Latin America” – *Ana Silva.* “Cognition and aging” – *Gladys Maestre.*
Espacio Interdisciplinario, Universidad de la República J.E. Rodó 1843

Thursday October 13th

Chair: Laura Quintana

09:00-10:00 | Neural bases of decision making. Modified network dynamics in the leech – *William Kristan*.

10:00-11:00 | Neural bases of decision making. Neural traces of long-term visual memory in an arthropod - *Daniel Tomsic*.

11:00-11:30 | **Coffee break**

11:30-12:30 | Neural bases of social behavior. Integrative Study of Neural Systems and Behavior - *Hans Hofmann*.

12:30-14:30 | **Lunch break**

14:30-19:00 | Hands on

Friday October 14th

Chair: Leonel Gómez

09:00-10:00 | Neural bases of social behavior. What's behind affiliative behavior? maternal and sexual motivations in the female rat – *Daniella Agrati*.

10:00-11:00 | Neural bases of social behavior. Neuroendocrine modulation of agonistic behavior – *Ana Silva*.

11:00-11:30 | **Coffee break**

11:30-12:30 | Neural bases of social behavior. The vertebrate social decision-making network – *Hans Hofmann*.

12:30-14:30 | **Lunch break**

15:30-17:30 | Seminars Presentation II

17:30-18:00 | **BREAK**

18:00-19:00 | Closing Ceremony - IIBCE

Hands on Lab Seminars

I - September 26th to October 4th -

1. Electrophysiological properties and electrical coupling in mesencephalic neurons in the rat.

Professors: Alberto Pereda, Sebastián Curti.

Location: Depto. de Fisiología, Fac. de Medicina, UdelaR.

2. Short- and long-term synaptic plasticity in rat hippocampal slices.

Professors: Pablo Castillo, Michel Borde.

Location: Depto. de Fisiología, Fac. de Medicina, UdelaR.

3. Dynamic calcium imaging in neurons and muscle cells. Fluorescence and confocal microscopy applied to the measurement and analysis of calcium signals in excitable cells. Slices and isolated cells.

Professors: Gustavo Brum.

Location: Depto. de Biofísica & Depto. de Fisiología, Fac. de Medicina, UdelaR.

4. The dynamics of neuronal intrinsic electrophysiological properties: patch clamp recordings in slices.

Professor: Raúl Russo. Collaborator: Adrián Valentín.

Location: Depto. de Neurofisiología Celular y Molecular, IIBCE.

5. Cell polarity and neural differentiation in vertebrates: gene manipulation techniques and microscopy observation in zebrafish.

Professor: Flavio Zolessi. Collaborators: Paola Lepanto, Gonzalo Aparicio, Camila Davison

Location: Depto. de Biología Celular, Fac. de Ciencias, UdelaR.

6. Isolation and characterization of glial cells in culture.

Professors: Patricia Cassina, Rubèn López-Vales. Collaborators: Laura Martínez-Palma, Ernesto Miquel, Sebastián Rodríguez.

Location: Depto. de Histología & Embriología. Fac. de Medicina, UdelaR.

II - October 6th to October 14th -

1. Experimental models of Parkinson disease and neuroprotection

Professor: Giselle Prunell. Collaborators: Gustavo Costa, Carolina Echeverry, Camila Mouhape, Mariángeles Kovacs.

Location: Depto. de Neuroquímica, IIBCE.

2. In vivo approaches to study the mechanism of action of drugs of abuse.

Professors: Ramón Bernabeu, Cecilia Scorza. Collaborators: José Pedro Prieto, Jessika Urbanavicius, Lucía Martínez.

Location: Depto. de Neurofarmacología Experimental, IIBCE.

3. Psychophysics and EEG recording of early sensory processing.

Professors: Leonel Gómez, Alejandra Carboni

Location: Lab. Neurociencias, Fac. de Ciencias, UdelaR.

4. Sensory-motor integration in weakly electric fish.

Professors: Angel Caputi, Pedro Aguilera. Collaborator: Alejo Rodríguez

Location: Dept. Neurociencias Integrativas y Computacionales, IIBCE.

5. Assessing sexual motivation in the female rat.

Professors: Annabel Ferreira, Natalia Uriarte, Daniella Agrati. Collaborator: Marcela Ferreño.

Location: Laboratorio de Experimentación Animal, Fac. de Ciencias, UdelaR.

6. Neuroendocrine modulation of aggression in different hormonal scenarios.

Professors: Ana Silva, Laura Quintana, Rossana Perrone, Carlos Passos.

Location: Unid. Bases Neurales de la Conducta, Instituto Clemente Estable, Sección Etología, Fac. de Ciencias, UdelaR

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