



## IBRO-Kemali/MNS Mediterranean School in Neuroscience 2017

### "Brain connectivity and connectomics"

14-22 September 2017

Faculty of Sciences – Mohammed V University, Rabat, Morocco

**Organizers: Marina Bentivoglio and Marc Landry**  
**Co-organizer and local host: Nouria Lakhdar-Ghazal**

**School Secretariat: Silvia Gabrieli**  
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**Venue for all lectures: Mohammed V University, Faculty of Sciences «Salle des Actes»**

### **Thursday 14 September**

#### **14 -19 Opening Session and Celebration of 60<sup>th</sup> Anniversary of the Foundation of the Mohammed V University**

(program to be defined, will include:

Marc Landry: Presentation of the Mediterranean Neuroscience Society – 10 min

Marina Bentivoglio: “The never ending story of Mediterranean neuroscience” – Key note lecture- )

h 19: Cocktail and reception dinner

### **Friday 15 September**

#### **9 – 10: Getting started**

- "Tour de table" of Faculty and students
- Subdivision of students in groups and presentation of the School activities (for the: discussion of lectures; poster presentations by the students; preparation of a research project based on Mediterranean networking; hands-on practicals)

#### **Connectivity: methodological approaches 1 and circadian system**

**10 - 11 Lecture 1 Marina Bentivoglio:** Conventional tract tracing based on the axonal transport of tracers

**11 - 11.30 *Coffee break***

**11.30 – 12.30 Lecture 2 Nouria Lakhdar-Ghazal:** Tract tracing in the circadian system

**12.30 - 13.45: *Lunch and preparation for the discussion of students in groups***

**13.45 - 14.30 Lecture 3 Arshad Khan:** Multi-label immunohistochemistry

**14.30 – 15 *Preparation for the discussion of students in groups***

**15 – 16 Discussion of Lectures 1-3**

**16 - 16.30 *Coffee break***

**16.30 - 18 Hands-on:** Processing of sections of rat brains after intraocular injection of the tracer cholera-toxin B - Immunohistochemistry 1

***Return to the hotel***

**18.15 - 19.30 Preparation of a research project: students in groups**

**20 *Dinner***

**Saturday 16 September**  
**Connectivity: pain processing**

**9 - 10** Lecture 4 **Marc Landry**: General organization of pain circuits

**10 - 11** Lecture 5 **Marc Landry**: Functional processing in pain circuits

**11 - 11.30** *Coffee break*

**11.30 - 12.30** Lecture 6 **Pierrick Poisbeau**: Oxytocinergic systems for pain relief: from dysfunction to reprogramming after maternal separation

**12.30 - 13.45** *Lunch and preparation for the discussion of students in groups*

**13.45 - 14.45** Discussion of Lectures 4-6

**14.45 - 16** Poster session 1 *with coffee*

**16 - 17.45**: Hands-on: Processing of sections of rat brains after intraocular injection of the tracer cholera-toxin B - Immunohistochemistry 2

*Return to the hotel*

**18 - 19.30** Preparation of a research project: students in groups

**20** *Dinner*

**Sunday 17 September**  
**Connectivity: methodological approaches 2 and basal ganglia**

**9 - 10** Lecture 7 **Arshad Khan**: Trans-synaptic, genetic / viral tract tracing; functional tracing using opto- and pharmaco-genetics approaches

**10 - 11** Lecture 8 **Abdelhamid Benazzouz**: Anatomic-functional organization of the cortico-basal ganglia-thalamo-cortical circuits: Physiology of the motor circuit

**11 - 11.30** *Coffee break*

**11.30 - 12.30** Lecture 9 **Abdelhamid Benazzouz**: Anatomic-functional organization of the cortico-basal ganglia-thalamo-cortical circuits: Pathophysiology of movement disorders

**12.30 - 13.45** *Lunch and preparation for the discussion of students in groups*

**13.45 - 14.45** Discussion of Lectures 7-9

**14.45 – 16.15** **Arshad Khan**: Mapping connectivity pattern to atlases of the rodent brain and tutorial on mouse connectivity maps in the Allen Brain Atlas - 1 led by **Arshad Khan**

**16.15 - 16.45** *Coffee break*

**16.45 - 18** Round table on international networking, led by **Nouria Lakhdar-Ghazal** and **Marc Landry**, all mentors with the participation of **Sten Grillner** (Sweden), **Pierre Luabeya** (RD Congo), **Vivienne Russell** (South Africa)

*Return to the hotel*

**18.15 - 19.30** Preparation of a research project: students in groups

**20** *Dinner*

### **Monday 18 September** **From hypothalamus to the periphery and back**

**9 - 10** Lecture 10 **Christian Broberger**: Hypothalamic connectivity

**10 - 11** Lecture 11 **Luigia Cristino**: The neural code for eating: from single cell to eating dynamics

**11 - 11.30** *Coffee break*

**11.30 - 12.30** Lecture 12 **Luigia Cristino**: The gut-brain axis connectome: making sense of what you eat

**12.30 - 13.45** *Lunch and preparation for the discussion of students in groups*

**13.45 - 14.45** Discussion of Lectures 10-12

**14.45** *Free afternoon: tour of Rabat and medina*

**20** *Dinner*

### **Tuesday 19 September** **Neuroendocrine circuits**

**9 - 10** Lecture 13 **Pierrick Poisbeau**: Oxytocinergic microcircuit organization for neuroendocrine and neuronal communication

**10 - 11** Lecture 14 **Christian Broberger**: Hypothalamic control of reproduction and aggression

**11 - 11.30** *Coffee break*

### **Primate connectivity and connectome**

**11.30 - 12.30** Lecture 15 **Roberto Caminiti**: Design and logic of cortical connections: I. From tract tracing to connectomics of cortical networks in the monkey

**12.30 - 13.45** *Lunch and preparation for the discussion of students in groups*

**13.45 - 14.45** Discussion of Lectures 13-15

**14.45 - 15.45** Professional skills (publishing business, paper writing, etc) - **Marina Bentivoglio**

**15.45 - 17** Poster session 2 *with coffee*

*Return to the hotel*

**17.15 - 19.30** Preparation of a research project: students in groups

**20** *Dinner*

### **Wednesday 20 September**

#### **Primate connectome: monkey and human brain**

**9 - 10** Lecture 16 **Roberto Caminiti**: Design and logic of cortical connections. II. Temporal aspects of the information transfer within the parieto-frontal network in monkeys and humans

**10 - 11** Lecture 17 **Carlo Miniussi**: Analysis of the human brain by transcranial brain stimulation

**11 - 11.30** *Coffee break*

**11.30 - 12.30** Lecture 18 **Carlo Miniussi**: New prospects of electroencephalography in the exploration of cortical connectivity

**12.30 - 13.45** *Lunch and preparation for the discussion of students in groups*

**13.45 - 15.30** Tutorial on basic approaches of computational neuroscience led by **Radwa Khalil**

**15.30 - 16** *Coffee break and preparation for the discussion of students in groups*

**16 - 17** Discussion of Lectures 16-18 and tutorial

**16.30 - 18.00** Hands-on: Analysis at the microscope of processed sections

*Return to the hotel*

**18.15 - 19.30** Preparation of a research project: students in groups

**20** *Dinner*

**Thursday 21 September**  
**Human brain: DTI**

**9 - 10** *Lecture 19* **Said Boujraf**: Diffusion Tensor Imaging: From diffusion-weighted images to diffusion maps

**10 - 11** *Lecture 20* **Said Boujraf**: Applications of diffusion tensor imaging to the study of the human brain

**11 - 11.30** *Coffee break*

**11.30 - 12.30** Tutorial on recording electrical activity in *in vitro* models led by **Radwa Khalil**

**12.30 - 13.45** *Lunch and preparation for the discussion of students in groups*

**13.45 - 15** Discussion of Lectures 19-20 and Tutorial

**15 - 18** Presentation of the students' projects (with coffee break)

*Return to the hotel*

**19** Certificates - Prize for the best project

**20** *Dinner and reception*

**Friday 22 September: Departure**