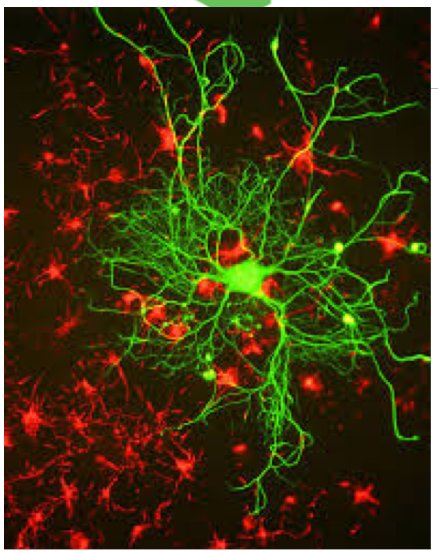
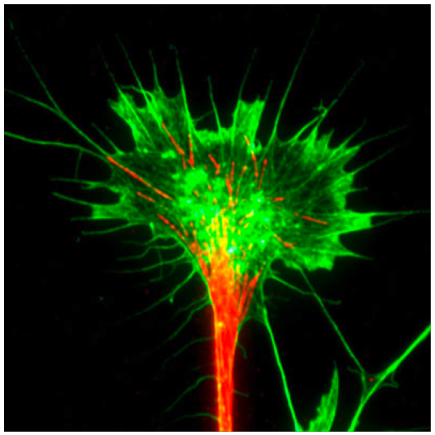
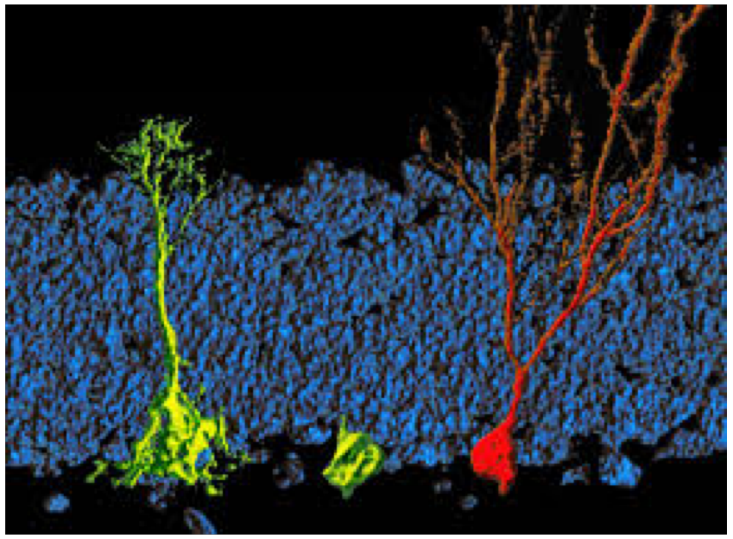
Master in Cellular and Molecular Biology

University of Torino

Neurobiological Curriculum

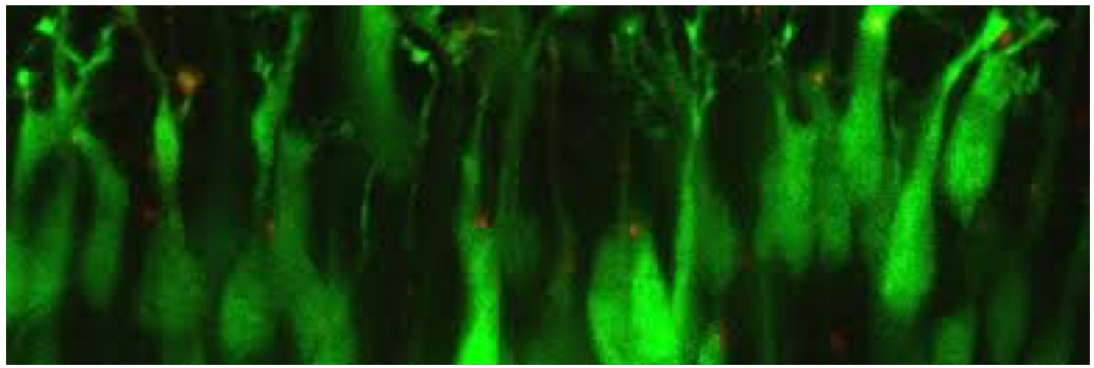






Developmental Neurobiology

a.a. 2018-2019



NICO
Neuroscience Institute Cavalieri Ottolenghi

Silvia De Marchis

TEACHING

Biological Sciences
(I year: Cell & Tissue biology)

Developmental Neurobiology
(CMB)
E-learning EMN-master online
strat@Unito

RESEARCH

Neural plasticity
Adult neurogenesis

1994 – Degree in Biological Sciences (University of Turin)
2000 - PhD in Endocrinology & Metabolic Sciences
(University of Milan)
2000 – 2001 Post Doc (Department of neuroanatomy -
University of Maryland-Baltimore & DBios UNITO)
2001 - 2015 Researcher (Assistant Professor) @DBios
2015 – now Associate Professor @DBios

DBios Dipartimento di Scienze della Vita e Biologia dei Sistemi

UNIVERSITÀ DEGLI STUDI DI TORINO

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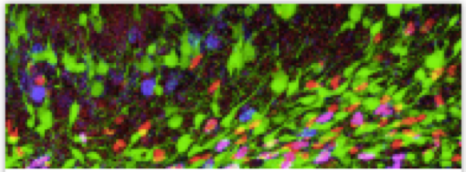
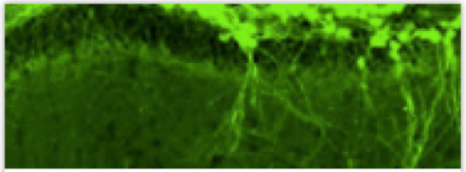
NICO
Neuroscience Institute Cavalieri Ottolenghi

http://www.nico.ottolenghi.unito.it/eng/Research/Research-Groups



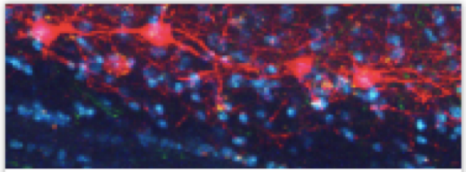
Neurobiology of brain plasticity

We are interested in understanding the mechanisms that regulate development and repair of the central nervous system.



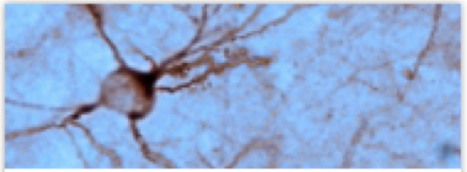
Neurophysiology of neurodegenerative diseases

We study the deficits of electrical signals of nerve cells at the basis of some neurodegenerative and psychiatric disorders.



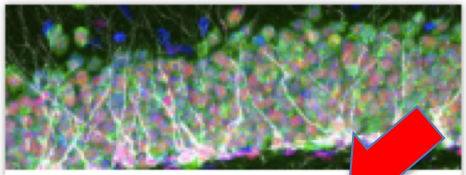
Brain development and disease

We study cellular and molecular mechanisms underlying neural development and neurodegeneration, to understand brain function and develop new therapeutic strategies.



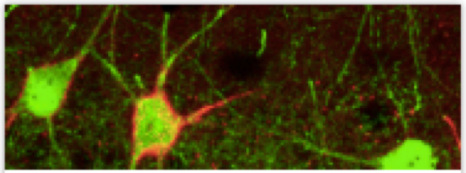
Clinical neurobiology

We study the immune-pathogenesis of multiple sclerosis and the responsivity of patients to pharmacological treatments, in order to develop new diagnostic tools.



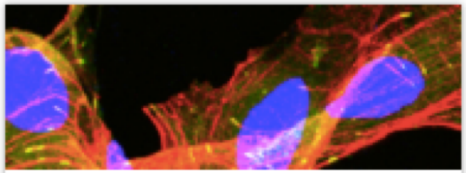
Adult neurogenesis

Our research is focused on persistent neurogenesis in adult mammals. We study both neural stem cell niches and parenchymal neurogenesis in order to foster brain repair.



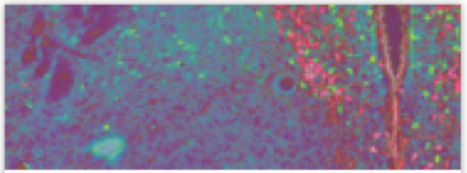
Neuropsychopharmacology

The focus of our research is delineating the neural circuitry underlying anxiety, stress response and mood at molecular and cellular levels.



Nerve regeneration

The focus of our research is the definition of innovative strategies of tissue engineering for improving peripheral nerve repair and regeneration.



Neuroendocrinology

Our goal is the study of the interactions among steroid hormones and the nervous system, their roles in the differentiation and plasticity of neural circuits.

My research interests

Neuroblast migration (in vitro models; HGF; BDNF)

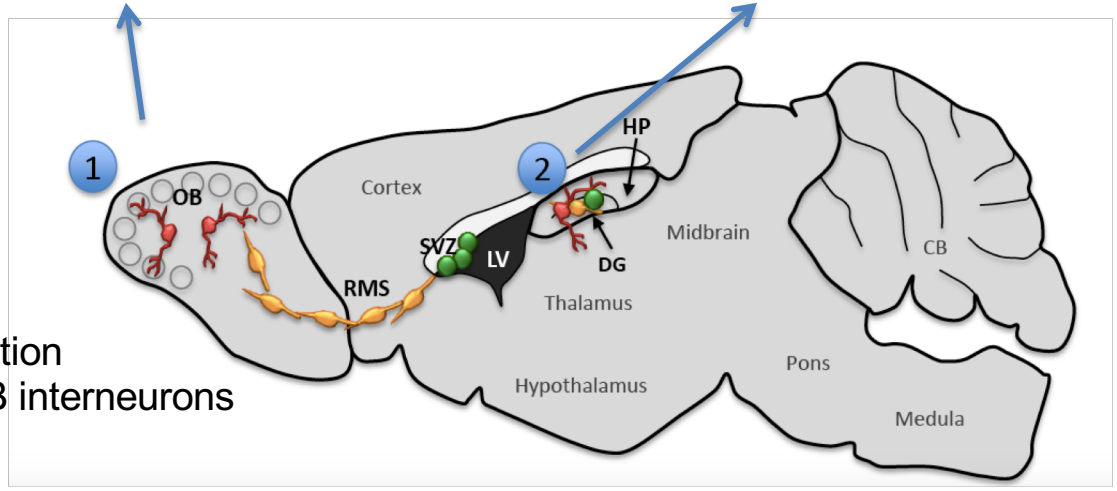
The generation and maintenance of specific OB neuron subtypes (intrinsic vs extrinsic factors)

olfactory enrichment→adult neurogenesis (dopaminergic interneurons)

Basic processes neuronal deveopment

Drug abuse and Psychiatric disorders

Regulation of neural stem cell function



Sensory input
Activity-dependent regulation of TH in dopaminergic OB interneurons
→ COUP-TFI function

DEVELOPMENTAL NEUROBIOLOGY

DEVELOPMENTAL NEUROBIOLOGY

Academic year 2018/2019

Course ID	SVB0064
Teacher	Prof. Silvia De Marchis
Degree course	Cellular and Molecular Biology
Year	1st year
Teaching period	Semester 2
Type	Distinctive
Credits/Recognition	6
Course disciplinary sector (SSD)	BIO/06 - anatomia comparata e citologia
Delivery	Blended
Language	English
Attendance	Lessons optional and laboratories mandatory
Type of examination	Written and interview (optional)
Prerequisites	Basic knowledges of developmental biology and citology/histology of the nervous system.

4 (SDM) + 2 (Visiting Professor)

Topics (SDM)

March 2019

- Intro-basic concepts/terms in developmental biology
- Animal models and methods;
- Neural induction & Neural patterning
- Cell specification

May 2019

- axonal pathfindings;
- adult neurogenesis

Class schedule - March 2019

Tuesday 05 (11.00-13.00)

Monday 11 (14.00-16.00)
Tuesday 12 (11.00-13.00)

Tuesday 19 (11.00-13.00 + 14.00 -16.00)

Monday 25 (14.00-16.00)
Tuesday 26 (11.00-13.00)

Institut de Biologie Valrose

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Michèle STUDER

Development and Function of Brain Circuits

Main interests

- COUP-TFI/NR2F1 in neurodevelopmental cortical disorders
- Transcriptional regulation and activity-dependent mechanisms during mammalian circuit formation
- Mechanisms controlling topographic neuronal connectivity
- Mapping neuronal populations involved in sensorimotor auditory circuits

CV

Building up cortical organization:
molecular/cellular mechanisms and implications for neurodevelopmental disorders

Class schedule - April 2019
Monday 01 (14.00-16.00)
Tuesday 02 (11.00-13.00 + 14.00-16.00 to be confirmed)
Monday 15 (14.00-16.00)
Tuesday 16 (11.00-13.00 + 14.00-16.00 to be confirmed)
Monday 29 (14.00-16.00)
Tuesday 30 (11.00-13.00 + 14.00-16.00 to be confirmed)

Course organization:

- Lectures on basic principles + specialized lectures/seminars
- Work in small group (pairs or trios): to discuss scientific papers on specific topics
- Work on moodle platform (documents - videos – web sites – tasks)

Results of learning outcomes

KNOWLEDGE AND UNDERSTANDING

- identify fundamental concepts in developmental biology
- use appropriate terminology in developmental biology
- explain the principles of neural induction (molecular mechanisms and conservation among metazoa)
- associate specific genes to acquisition of regional identity in the developing nervous system
- define what is an organizing center in developing brain
- describe the cellular/molecular mechanisms underlying neural circuit development
- identify the features and potential of neural stem/progenitors cells and define their regulation by cell-autonomous vs non autonomous factors.
- link specific cellular/molecular dysfunctions to neurodevelopmental disorders

APPLYING KNOWLEDGE AND UNDERSTANDING

- identify the best model systems to address specific scientific questions in developmental neuroscience
- grasp the core concept of a scientific paper
- find and elaborate data related to gene expression/distribution in the developing nervous system starting from public availabe resources (i.e. Allen Brain Atlas)
- find possible experimental approaches and choose the right technology to address specific questions in the field of developmental neuroscence

INDEPENDENT JUDGEMENT

- interpretation and discussion of scientific data.
- peer revision of other students tasks

COMMUNICATION SKILLS

- discussion of scientific papers and/or active participation to scientific discussion following lectures and seminars.
- organization of a student's workshop focused on the last frontiers in developmental neuroscience (presentation given by the students).

LEARNING SKILLS

- **learning skills will be fostered through activities with peers working in group**

Learning assessment methods

Tasks and activities during the course will be evaluated and will weight 30% of the final grade.

Final exam (70% of the final grade) will be on the moodle platform: it will consist in open questions based on topics covered in lectures, assigned readings, and online activities. Upon student's request, an integrative oral examination can be taken (written/oral: 1/1).

IMPORTANT: Early registration to the e-learning platform (moodle) is mandatory !

Suggested readings and bibliography

There is no specific textbook for this course. For basic and general reference, see Development of the Nervous System (D.H. Sanes, T.A. Reh, W. A. Harris) Academic Press - Elsevier, 3rd Ed.

Specific scientific Articles and Reviews will be uploaded on the Moodle course website.

Websites containing support videos, texts, images and other materials are also indicated.