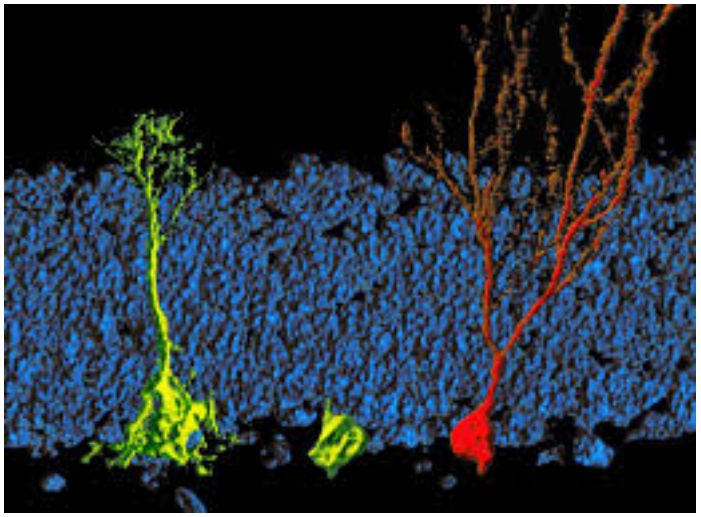
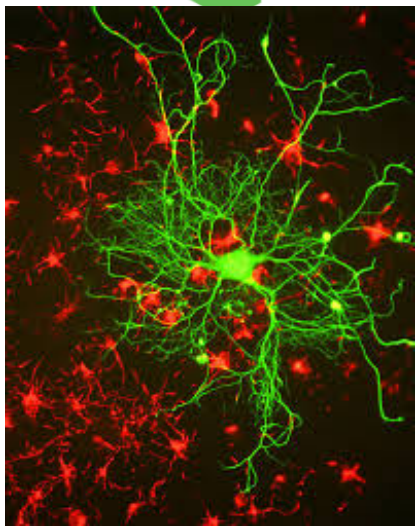
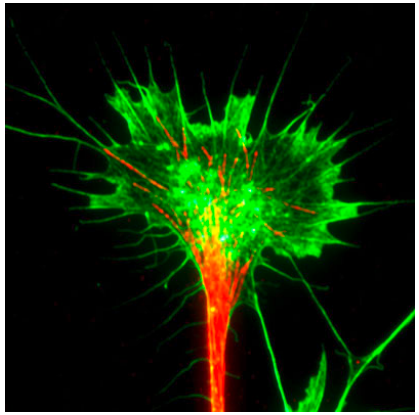
Master in Cellular and Molecular Biology

University of Torino

Neurobiological Curriculum

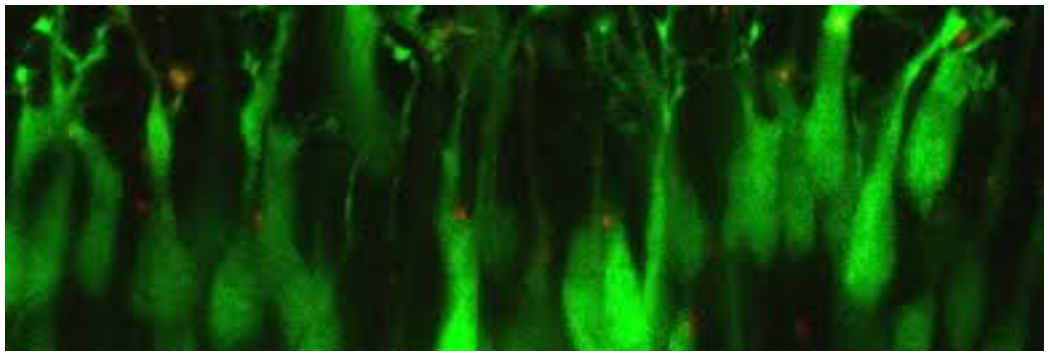






Developmental Neurobiology

a.a. 2017-2018



NICO
Neuroscience Institute Cavalieri Ottolenghi

RESEARCH

TEACHING

Biological Sciences
(I year: Cell & Tissue biology)

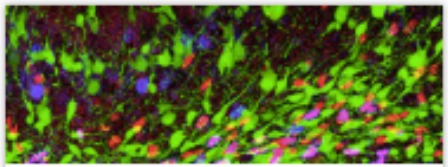
Developmental Neurobiology
(CMB – EMN-master online)

Silvia De Marchis

Associate Professor at the Department of Life Sciences and Systems Biology, University of Turin

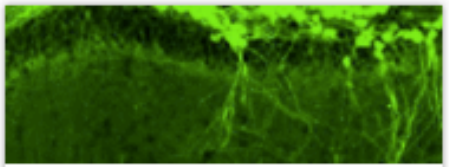
NICO
Neuroscience Institute Cavalieri Ottolenghi

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



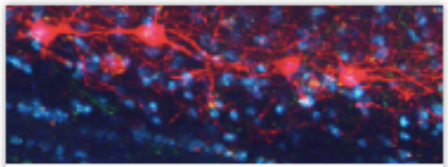
Neurobiology of brain plasticity

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.

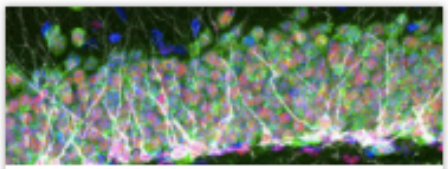


Brain development and disease

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

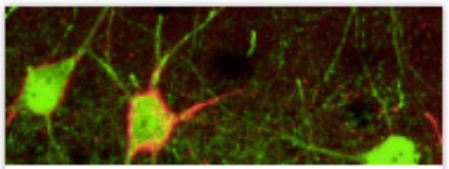
Clinical neurobiology

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



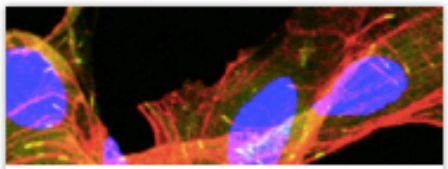
Adult neurogenesis

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.



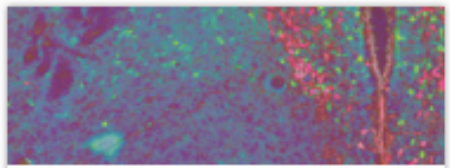
Neuropsychopharmacology

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.

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My research activity is focussed on Adult Neurogenesis

Neuroblast migration (in vitro models; HGF; BDNF)

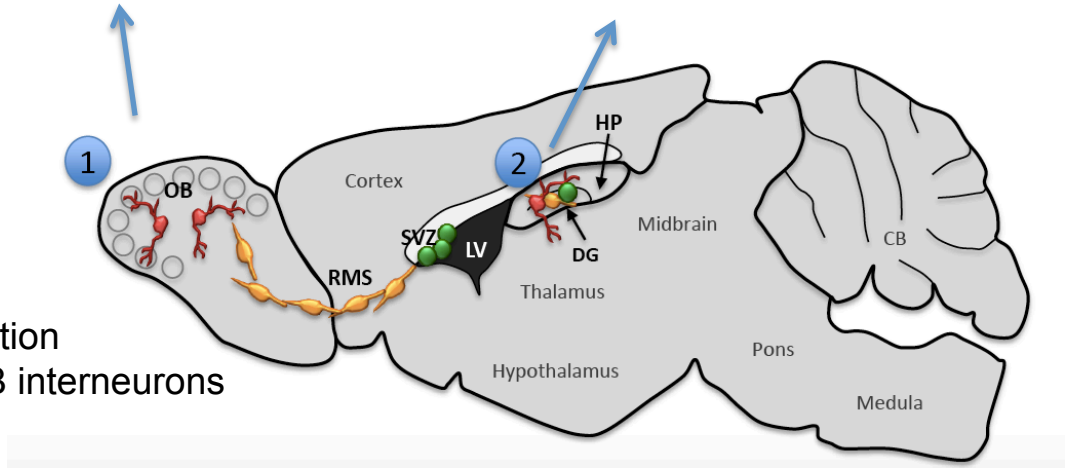
The generation and maintenance of specific OB neuron subtypes (intrinsic vs extrinsic factors)

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

Academic year 2017/2018

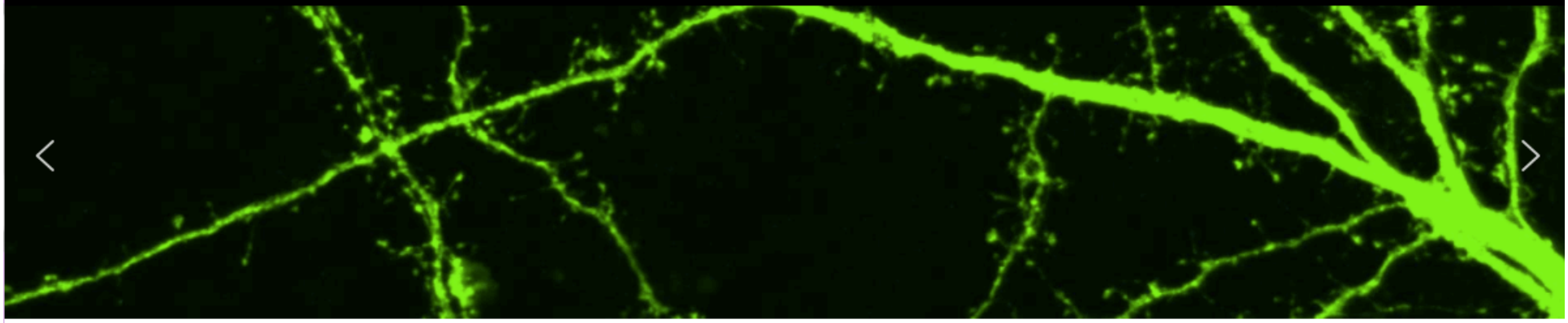
Course ID	SVB0064
Teacher	Prof. Silvia De Marchis
Degree course	Cellular and Molecular Biology
Year	1st year
Teaching period	Second semester
Type	Distinctive
Credits/Recognition	6
Course disciplinary sector (SSD)	BIO/06 - anatomia comparata e citologia
Delivery	Blended
Language	English
Attendance	Lessons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

4 (SDM) + 2 (Visiting Professor)

PASTERKAMP LAB

Neural Circuit Development and Disease

HOME | RESEARCH | MEMBERS | PUBLICATIONS | JOIN OUR LAB | CONTACT



About us

Our research focuses on understanding 1) the molecular mechanisms involved in the development of neuronal connections, and 2) the disease mechanisms responsible for changes in or loss of neuronal connectivity during epilepsy and motor neuron disorders (ALS, SMA). RNA biology (RNA binding proteins, non-coding RNAs) and axon guidance proteins play a central role in many of our projects, as do mouse genetics, humanized cell models (iPSC, organoids), molecular cell biology, and (light sheet) microscopy.

Tweets by @JeroenPasterk

Jeroen Pasterkamp
@JeroenPasterk

Impressive translational research @UMCUtrecht, including @U_BCRM : umcutrecht.nl/en/Subsites/Tr.... Check out the new booklet!

March 22 -23 (6 hour)
May 7-8 (8 hour)
May 28-29 (8 hour)

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**

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)

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.

Neural patterning

Neural induction

?

Neurogenesis

?

What are the main questions of Developmental (Neuro)biology

?

?

Regeneration

Generation of cell diversity

Methods

?

Models

…

…