Testi del Syllabus

Resp. Did.	**LORENZON PAOLA**	**Matricola: 005762**

Docenti	**BERNAREGGI ANNALISA, 2 CFU** **LORENZON PAOLA, 3 CFU** **SCIANCALEPORE MARINA, 3 CFU**

Anno offerta:	**2018/2019**
Insegnamento:	**901SM - NEUROFISIOLOGIA MOLECOLARE**
Corso di studio:	**SM54 - NEUROSCIENZE**
Anno regolamento:	**2018**
CFU:	**8**
Settore:	**BIO/09**
Tipo Attività:	**B - Caratterizzante**
Anno corso:	**1**
Periodo:	**Primo Semestre**
Sede:	**TRIESTE**

Testi in italiano

Lingua insegnamento	English

Contenuti (Dipl.Sup.)	Contents of the course will be discussed in the light of recent theoretical concepts and experimental data about mechanisms regulating signal transduction, electrical membrane properties of excitable cells and the organization of central and peripheral synapses. The course consists of three Parts and the contents are illustrated hereafter. Part 1 (Prof. Paola Lorenzon): Signal transduction. Intracellular receptors. Receptor tyrosine kinases. G protein-coupled receptors. Signaling through second messengers. Regulation of the intracellular Ca2+ homeostasis. Spatial and temporal organization of intracellular Ca2+ signalling: oscillations and waves. Spatial organization of the intracellular cAMP signalling. Experimental approaches to study the signal transduction in living cells: fluorescent probes and imaging techniques. Part 2 (Prof. Annalisa Bernareggi): Basic principles of synaptic transmission. The neuromuscular junction: anatomic organization, role of trophic factors in neuromuscular junction development (agrin, MusK and rapsyn), properties of neuromuscular nicotinic cholinergic receptors (fetal and adult). Disorders in the neuromuscular junction: myasthenia gravis, the Lambert-Eaton myasthenic syndrome, the congenital myasthenic syndrome and the muscular dystrophies. Part 3 (Prof. Marina Sciancalepore): Synaptic transmission in CNS. Characterization of ion channels, intrinsic membrane electrical properties of neurons, pacemaker mechanisms. Principles of chemical and electrical synaptic transmission: quantal release, neurotransmitters, synaptic receptors, integration of synaptic potentials, synaptic plasticity, dendritic spines and their remodelling.

Testi di riferimento	B. Hille, “Ion Channels of Excitable Membranes”, Sinauer Associate Inc. Part I: Chapter 1-5 (third edition). L. R. Squire et al., “Fundamental Neuroscience”, Academic Press. Selected scientific papers or other didactical material could be provided.
Obiettivi formativi	1) Knowledge and understanding The purpose of the course is to provide a sound basis of membrane biophysics, ion channels and receptors to understand the fundamental molecular processes responsible for chemical and electrical cell communication. In particular, the course will focus on the mechanisms responsible for cellular excitability, in both central and peripheral nervous systems. The students will also learn the principal experimental methods for in vitro studies at the single cell level. 2) Applying knowledge and understanding The students will acquire the ability to design the most appropriate experimental plan to investigate molecular mechanisms involved in cell signalling in excitable cells. 3) Making judgements The students will develop abilities for the critical reading of scientific publications, analysis and interpretation of scientific data in the field of cell communication in neurobiology. 4) Communication skills The written test and the oral examination encourage the students to develop scientific writing abilities and oral communication skills. 5) Learning skills At the end of the course the students will posses knowledge and critical reading abilities to continue their training independently, adapting themselves to new knowledge and technologies in cell signalling in neurobiology.
Prerequisiti	Knowledge of fundamental cell biology.
Metodi didattici	Lectures and practical experiences.
Altre informazioni	None.
Modalità di verifica dell'apprendimento	One written test is organised during the course. It consists in writing the abstract of a scientific paper related to the topics of the course. The scientific paper is provided to the students in the classroom with Abstract and Discussion hidden to stimulate their understanding and critical skills and scientific writing abilities. At the end of the course, students are required to take a final oral examination consisting in a discussion of 30 min, during which the students are invited to describe and comment on topics covered in the course. The final mark is decided also considering the results of the written test (+ max 1.5/30).
Programma esteso	Contents of the course will be discussed in the light of recent theoretical concepts and experimental data about mechanisms regulating signal transduction, electrical membrane properties of excitable cells and the organization of central and peripheral synapses. The course consists of three Parts and the contents are illustrated hereafter. Part 1: Signal transduction. Intracellular receptors. Receptor tyrosine kinases. G protein-coupled receptors. Signaling through second messengers. Regulation of the intracellular Ca2+ homeostasis. Spatial and temporal organization of intracellular Ca2+ signalling: oscillations and waves. Spatial organization of the intracellular cAMP signalling. Experimental approaches to study the signal transduction in living cells: fluorescent probes and imaging techniques. Part 2: Basic principles of synaptic transmission.

The neuromuscular junction: anatomic organization, role of trophic factors in neuromuscular junction development (agrin, MusK and rapsyn), properties of neuromuscular nicotinic cholinergic receptors (fetal and adult). Disorders in the neuromuscular junction: myasthenia gravis, the Lambert-Eaton myasthenic syndrome, the congenital myasthenic syndrome and the muscular dystrophies.
Part 3: Synaptic transmission in CNS.
Characterization of ion channels, intrinsic membrane electrical properties of neurons, pacemaker mechanisms. Principles of chemical and electrical synaptic transmission: quantal release, neurotransmitters, synaptic receptors, integration of synaptic potentials, synaptic plasticity, dendritic spines and their remodelling.

Testi in inglese

English

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	Knowledge of fundamental cell biology.
	Lectures and practical experiences.
	None.
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