Testi del Syllabus

Resp. Did.	**STOCCO GABRIELE**	**Matricola: 011178**

Docenti	**BUSAN PIERPAOLO, 3 CFU** **STOCCO GABRIELE, 4 CFU**
Anno offerta:	**2021/2022**
Insegnamento:	**779SM - NEUROANATOMIA E NEUROFARMACOLOGIA**
Corso di studio:	**SM54 - NEUROSCIENZE**
Anno regolamento:	**2021**
CFU:	**7**
Settore:	**BIO/14**
Tipo Attività:	**B - Caratterizzante**
Anno corso:	**1**
Periodo:	**Primo Semestre**
Sede:	**TRIESTE**

Testi in italiano

Lingua insegnamento	English
Contenuti (Dipl.Sup.)	The course is composed of three parts: PART 1 (Prof. Pierpaolo Busan): NEUROANATOMY -Main macro-components of the Nervous System; -Micro-components of the Nervous System: structure of neurons and other components of the system (e.g. glial cells); -Functionality of neurons and their communication systems; -Neurotransmitters and neuromodulators; -Main afferent systems (i.e. useful for perception) in the Central Nervous System; -Main efferent systems (i.e. useful for action) in the Central Nervous System; -The importance of the concept of “neural network” in understanding the complex functioning of the brain; -Description of the main bundles of cerebral (axonal) fibers; -Cortico-basal-thalamo-cortical networks; -The cerebellum and its cortical connections; -Other examples of neural networks in the brain: visuo-motor networks useful for reach-to-grasp movements, and the “mirror neurons” system; -Complex systems in complex brains, part 1: long term potentiation and long term depression, mechanisms useful for learning; -Complex systems in complex brains, part 2: mechanisms useful to regulate emotions and biological rhythms; -The “talking” brain: mechanisms useful for planning and production of language (in health and pathology), a look at available neurocomputational models; -Recover or replace of lost functions: brain plasticity and neurorehabilitation.

PART 2 (Prof. Gabriele Stocco): NEUROPHARMACOLOGY
PHARMACODYNAMIC: Drug molecular target: classification. Dose-effect relationship: Gradual and quantal dose-response curves. Affinity and intrinsic efficacy. Allosteric modulation.
PHARMACOKINETIC: ADME (drug absorption, distribution, metabolism and excretion). Distribution volume, Renal clearance, Elimination half-time. Bioavailability and Bioequivalence. Pharmacokinetic models: linear and non-linear.
THE AUTONOMIC NERVOUS SYSTEM: Anatomical and functional aspects. Cholinergic transmission: nicotinic and muscarinic receptors, classification and pharmacological features. Adrenergic transmission: receptor classification and pharmacological features.
THE ENDOGENOUS OPIOIDS' SYSTEM: Endogenous opioids synthesis and degradation. Opioid receptors classification and pharmacological features
PART 3 (Prof. Gabriele Stocco): PHARMACOGENOMICS AND DRUGS OF THE CENTRAL NERVOUS SYSTEM
Elements of human genetic variation - basis on genetic variants affecting protein function and epigenetic effects of pharmacological relevance
OPIOIDS and opioid derivatives: pharmacogenomics aspects
ANTIDEPRESSANT DRUGS: ethiopathogenesis of depression. The monoaminergic, neuroendocrine and neurotrophic theories. Antidepressant drugs classifications and mechanisms of action
ANTIPSYCHOTIC DRUGS: ethiopathogenesis of psychosis. The dopaminergic and neurodevelopmental theories. Typical and atypical antipsychotic drugs and mechanisms of action. ANXIOLYTIC DRUGS. Neuronal circuits of anxiety. Anxiolytic drugs: classification and mechanisms of action
ANTI-EPILEPTIC DRUGS: ethiopathogenesis of epilepsy. Antiepileptic drugs: classification and mechanisms of action

Testi di riferimento

Part 1: Computer-aided teaching material will be supplied (concepts taken from "Physiology of Behavior", Carlson N.R. -Pearson-);
Parts 2 and 3: Rang, Ritter, Flower, Henderson "Rang & Dale's Pharmacology" Eighth Edition, Elsevier 2016

Obiettivi formativi

The overall aim of the part 1 is to provide students with a basic understanding of the structural (and functional) organization of the human central nervous system (Knowledge and understanding), in sufficient depth to form the basis for further clinical or research studies (Applying knowledge and understanding; Making judgements; Communication and Learning skills).
The purpose of the parts 2 and 3 is to provide robust basis of Neuropharmacology, discussing the principles at the basis of the pharmacokinetic, pharmacodynamics and pharmacogenomics properties of drugs, particularly of those acting at the peripheral and central nervous system
1) Knowledge and understanding: at the end of the course, the students should have acquired the basic notions for the comprehension of the pharmacokinetic and pharmacodynamics properties of drugs and of their mechanism of action, with particular reference to drugs acting at the central nervous system.
2) Applying knowledge and understanding: at the end of the course, the students should be able to use the knowledges acquired (see point 1) for a proper use of drugs in experimental set-ups (in vivo as well as in vitro) as tools to validate hypothesis regarding the involvement of endogenous neurotransmitters in controlling physio-pathological conditions
3) Making judgements: at the end of the course, the students should be able to apply their pharmacokinetic and pharmacodynamics knowledges for a critical consideration of experimental results aimed at investigating the involvement of signaling molecules in physiological and pathological processes
4) Communication skills: at the end of the course, the students should be able to discuss clearly and with appropriate scientific terms pharmacological concepts
5) Learning skills: at the end of the course, the students should have a well-build background that should enable them to continue to enlarge autonomously and critically their knowledges about the pharmacokinetic and pharmacodynamics properties of drugs

Prerequisiti	Part 1: Knowledge of the fundamentals of biology. Parts 2 and 3: Knowledge of principles of synaptic transmission and of mechanisms of intracellular signaling transduction pathways
Metodi didattici	Part 1: frontal lectures (slides with images and short texts summarizing the essential aspects of the lessons) Parts 2 and 3: Computer-aided frontal lectures (slides with images and short texts reassuming the essential aspects of the lessons)
Altre informazioni	Part 1: Students are provided by the slides used during frontal lessons (by Moodle). For further information, please write to pbusan@units.it Part 2 and 3: Students are provided by the slides used during the frontal lessons thought Moodle. For further information, students are invited to contact prof. Stocco by mail (stoccog@units.it) using their institutional E-mail address Any necessary change in the course modalities due to COVID19 emergency will be published at the Department, Master Programme and Course websites.
Modalità di verifica dell'apprendimento	Part 1: Students are required to take a final written examination (multiple choice questionnaire). The mark/30 must be equal or higher than 18 Parts 2 and 3: At the end of the course, students are required to take a final oral examination of 20-40 min consisting on three different topics covering the course program (1. Basic Pharmacology (pharmacokinetic and pharmacodynamics) or Autonomous nervous system, 2. Pharmacogenomics and 3. Drugs acting at the Central Nervous System). The student should demonstrate to be able to link together different topics of the program and to communicate the acquired knowledges in a precise and efficacious manner. The mark/30 must be equal or higher than 18. The final mark/30 is the arithmetic mean of Part 1 (Neuroanatomy) and Parts 2-3 (Neuropharmacology and Pharmacogenomics)

Testi in inglese

	English
	The course is composed of three parts: PART 1 (Prof. Pierpaolo Busan): NEUROANATOMY -Main macro-components of the Nervous System; -Micro-components of the Nervous System: structure of neurons and other components of the system (e.g. glial cells); -Functionality of neurons and their communication systems; -Neurotransmitters and neuromodulators; -Main afferent systems (i.e. useful for perception) in the Central Nervous System; -Main efferent systems (i.e. useful for action) in the Central Nervous System; -The importance of the concept of “neural network” in understanding the complex functioning of the brain; -Description of the main bundles of cerebral (axonal) fibers; -Cortico-basal-thalamo-cortical networks; -The cerebellum and its cortical connections; -Other examples of neural networks in the brain: visuo-motor networks useful for reach-to-grasp movements, and the “mirror neurons” system; -Complex systems in complex brains, part 1: long term potentiation and long term depression, mechanisms useful for learning; -Complex systems in complex brains, part 2: mechanisms useful to regulate emotions and biological rhythms; -The “talking” brain: mechanisms useful for planning and production of language (in health and pathology), a look at available neurocomputational models; -Recover or replace of lost functions: brain plasticity and neurorehabilitation.

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