

Testi del Syllabus

Resp. Did.	STOCCO GABRIELE	Matricola: 011178
Docenti	MARCON GABRIELLA, 3 CFU STOCCO GABRIELE, 4 CFU	
Anno offerta:	2022/2023	
Insegnamento:	975SV - NEUROANATOMY AND NEUROPHARMACOLOGY	
Corso di studio:	SM54 - NEUROSCIENZE	
Anno regolamento:	2022	
CFU:	7	
Settore:	BIO/14	
Tipo Attività:	B - Caratterizzante	
Anno corso:	1	
Periodo:	Annualità Singola	
Sede:	TRIESTE	



Testi in italiano

Lingua insegnamento

English

Contenuti (Dipl.Sup.)

The course is composed of two parts:

PART 1 (Prof. Marcon Gabriella):
NEUROANATOMY

- Introduction to the Neuroanatomy
- Overview to the main histological structures of the Central Nervous System and Peripheral Nervous System.
- Overview to development of CNS, brain plasticity and brain aging.
- General features and external morphology of the CNS
- Meninges, cisterns, ventricles
- Internal morphology:
 1. Spinal Cord: gray horns and ascending and descending pathways
 2. Autonomic Nervous System
 3. Brainstem
 4. Cerebellum
 5. Reticular Formation
 6. Thalamus, Hypothalamus and Epithalamus
 7. Basal Ganglia
 8. Limbic System
 9. Telencephalon
- Blood supply of the brain and spinal cord

PART 2 (Prof. Gabriele Stocco): NEUROPHARMACOLOGY

PHARMACODYNAMICS: Drug moleculars target: classification. Dose-effect relationship: Gradual and quantal dose-response curves. Affinity and intrinsic efficacy. Allosteric modulation.

PHARMACOKINETICS: 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

OPIOIDS and opioid derivatives

ANTIDEPRESSANT DRUGS: etiopathogenesis of depression. The monoaminergic, neuroendocrine and neurotrophic theories. Antidepressant drugs classifications and mechanisms of action

ANTIPSYCHOTIC DRUGS: etiopathogenesis 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: etiopathogenesis of epilepsy. Antiepileptic drugs: classification and mechanisms of action

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. Clinical pharmacogenetic implementation guidelines for drugs acting on the central nervous system.

Testi di riferimento

PART1: NEUROANATOMY

1) Lecture notes (PDF)

2) Fitzgerald's Clinical Neuroanatomy and Neuroscience, Authors: Estomih Mtui, Gregory Gruener, Peter Dockery; 8th Edition - August 4, 2020

PART 2: NEUROPHARMACOLOGY

Rang, Ritter, Flower, Henderson "Rang & Dale's Pharmacology"

Obiettivi formativi

PART 1 - NEUROANATOMY

- Knowledge of the microscopic and macroscopic structures and functions of the Central Nervous System.
- Understanding morphology of the different neuroanatomical areas in relation to their function: (A) Central Nervous System (from Spinal Cord to Multimodal Association Cortex and Ascending and Descending Tracts); (B) Peripheral Nervous System and Autonomic Nervous System (course and function of Spinal Nerves and Cranial Nerves)-
- Being able to know the anatomical areas and their functions in normal and pathological conditions in relation to the main neurological disorders
- Ability to use the correct neuroanatomical terminology; improving knowledge autonomously by reading scientific papers and textbooks and consult the scientific websites relevant to the topic.

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).

PART 2: NEUROPHARMACOLOGY

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	No prerequisites
Metodi didattici	<p>PART1 - NEUROANATOMY: The program is constituted by frontal lessons (slides, neuroanatomy and techniques of brain cutting video and examples of clinic cases).</p> <p>PART 2 - NEUROPHARMACOLOGY: Computer-aided frontal lectures (slides with images and short texts reassuming the essential aspects of the lessons)</p>
Altre informazioni	<p>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</p> <p>Any necessary change in the course modalities due to COVID19 emergency will be published at the Department, Master Programme and Course websites.</p>
Modalità di verifica dell'apprendimento	<p>PART 1- NEUROANATOMY: a) During the course: written test with multiple choice questions (30 questions with one correct answer and several wrong answers with a point for each correct answer and zero for wrong answers or no answers); b) At the end of the course: oral examination, in which the student must be able to use the correct neuroanatomical terminology and to know the main anatomical areas and their main functions, the sensory and motor pathways, the autonomic nervous system and blood supply of the brain. The final grade is explained below.</p> <p>PART 2 - NEUROPHARMACOLOGY: At the end of the course, students are required to take a final oral examination of 20-40 min consisting on two different topics covering the course program. 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.</p> <p>The final mark/30 is the arithmetic mean of Part 1 (Neuroanatomy) and Parts 2 (Neuropharmacology)</p>
Programma esteso	<p>NEUROANATOMY</p> <p>Main features of structure of Central and Peripheral Nervous System: Structure of the Neuron and Glia and Organization of the Nervous Tissue. DEVELOPMENT, AGING AND PLASTICITY:</p> <p>The Role of Environment in Development of the Nervous System; Age-Related Changes in the Normal Brain and Their Consequences</p> <p>Age-Related Changes in Neurodegenerative Disorders</p> <p>THE AUTONOMIC NERVOUS SYSTEM</p> <p>Sympathetic System</p>

Parasympathetic System
 PARS OF THE CENTRAL NERVOUS SYSTEM :
 the Spinal Cord; The Brain Stem; the Cerebrum; the Cerebellum.
 The Meninges; the Cerebral Ventricles and the Cerebrospinal Fluid.
 The Blood Supply: the Blood-Brain Barrier; Arterial System; Venous System
 SENSORY SYSTEMS:
 Central Somatosensory Pathways: spinothalamic tract and dorsal column-medial lemniscus pathway, The Somatosensory Cortical Regions.
 The Visual System
 The Auditory System
 The Sense of Equilibrium
 The Olfactory System and the Sense of Taste
 MOTOR SYSTEMS
 The Motor Cortical Areas and Descending Pathways, The Pyramidal Tract (Corticospinal tract), Indirect Corticospinal Pathways-
 The Basal Ganglia:
 Structure and Connections of Basal Ganglia-
 The Cerebellum-
 THE BRAIN STEM AND CRANIAL NERVES:
 The Reticular Formation
 The Cranial Nerves
 Hypothalamus
 The Thalamus
 LIMBIC STRUCTURES
 THE CEREBRAL CORTEX
 The Cerebral Cortex: Intrinsic Organization and Connections, Functions of the Neocortex, Association Areas, The Division of tasks between the Hemispheres-

Obiettivi per lo sviluppo sostenibile

Codice	Descrizione
--------	-------------

Testi in inglese

	English
	<p>The course is composed of two parts:</p> <p>PART 1 (Prof. Marcon Gabriella): NEUROANATOMY -Introduction to the Neuroanatomy -Overview to the main histological structures of the Central Nervous System and Peripheral Nervous System. -Overview to development of CNS, brain plasticity and brain aging. -General features and external morphology of the CNS -Meninges, cisterns, ventricles -Internal morphology: 1. Spinal Cord: gray horns and ascending and descending pathways 2. Autonomic Nervous System 3. Brainstem 4. Cerebellum 5. Reticular Formation 6. Thalamus, Hypothalamus and Epithalamus 7. Basal Ganglia 8. Limbic System 9. Telencephalon -Blood supply of the brain and spinal cord</p> <p>PART 2 (Prof. Gabriele Stocco): NEUROPHARMACOLOGY PHARMACODYNAMICS: Drug moleculars target: classification. Dose-effect</p>

relationship: Gradual and quantal dose-response curves. Affinity and intrinsic efficacy. Allosteric modulation.

PHARMACOKINETICS: 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

OPIOIDS and opioid derivatives

ANTIDEPRESSANT DRUGS: etiopathogenesis of depression. The monoaminergic, neuroendocrine and neurotrophic theories. Antidepressant drugs classifications and mechanisms of action

ANTIPSYCHOTIC DRUGS: etiopathogenesis 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: etiopathogenesis of epilepsy. Antiepileptic drugs: classification and mechanisms of action

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. Clinical pharmacogenetic implementation guidelines for drugs acting on the central nervous system.

PART1: NEUROANATOMY

1) Lecture notes (PDF)

2) Fitzgerald's Clinical Neuroanatomy and Neuroscience, Authors: Estomih Mtui, Gregory Gruener, Peter Dockery; 8th Edition - August 4, 2020

PART 2: NEUROPHARMACOLOGY

Rang, Ritter, Flower, Henderson "Rang & Dale's Pharmacology"

PART 1 - NEUROANATOMY

- Knowledge of the microscopic and macroscopic structures and functions of the Central Nervous System.

- Understanding morphology of the different neuroanatomical areas in relation to their function: (A) Central Nervous System (from Spinal Cord to Multimodal Association Cortex and Ascending and Descending Tracts); (B) Peripheral Nervous System and Autonomic Nervous System (course and function of Spinal Nerves and Cranial Nerves)-

- Being able to know the anatomical areas and their functions in normal and pathological conditions in relation to the main neurological disorders

- Ability to use the correct neuroanatomical terminology; improving knowledge autonomously by reading scientific papers and textbooks and consult the scientific websites relevant to the topic.

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).

PART 2: NEUROPHARMACOLOGY

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.

No prerequisites

PART1 - NEUROANATOMY: The program is constituted by frontal lessons (slides, neuroanatomy and techniques of brain cutting video and examples of clinic cases).

PART 2 - NEUROPHARMACOLOGY: Computer-aided frontal lectures (slides with images and short texts reassuming the essential aspects of the lessons)

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.

PART 1- NEUROANATOMY: a) During the course: written test with multiple choice questions (30 questions with one correct answer and several wrong answers with a point for each correct answer and zero for wrong answers or no answers); b) At the end of the course: oral examination, in which the student must be able to use the correct neuroanatomical terminology and to know the main anatomical areas and their main functions, the sensory and motor pathways, the autonomic nervous system and blood supply of the brain. The final grade is explained below.

PART 2 - NEUROPHARMACOLOGY: At the end of the course, students are required to take a final oral examination of 20-40 min consisting on two different topics covering the course program. 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 (Neuropharmacology)

NEUROANATOMY

Main features of structure of Central and Peripheral Nervous System:
Structure of the Neuron and Glia and Organization of the Nervous Tissue.

DEVELOPMENT, AGING AND PLASTICITY:

The Role of Environment in Development of the Nervous System;
Age-Related Changes in the Normal Brain and Their Consequences
Age-Related Changes in Neurodegenerative Disorders

THE AUTONOMIC NERVOUS SYSTEM

Sympathetic System

Parasympathetic System

PARS OF THE CENTRAL NERVOUS SYSTEM :

the Spinal Cord; The Brain Stem; the Cerebrum; the Cerebellum.

The Meninges; the Cerebral Ventricles and the Cerebrospinal Fluid.

The Blood Supply: the Blood-Brain Barrier; Arterial System; Venous System

SENSORY SYSTEMS:

Central Somatosensory Pathways: spinothalamic tract and dorsal column-medial lemniscus pathway, The Somatosensory Cortical Regions.

The Visual System

The Auditory System

The Sense of Equilibrium

The Olfactory System and the Sense of Taste

MOTOR SYSTEMS

The Motor Cortical Areas and Descending Pathways, The Pyramidal Tract (Corticospinal tract), Indirect Corticospinal Pathways-

The Basal Ganglia:

Structure and Connections of Basal Ganglia-

The Cerebellum-

THE BRAIN STEM AND CRANIAL NERVES:

The Reticular Formation

The Cranial Nerves

Hypothalamus

The Thalamus

LIMBIC STRUCTURES

THE CEREBRAL CORTEX

The Cerebral Cortex: Intrinsic Organization and Connections, Functions of the Neocortex, Association Areas, The Division of tasks between the Hemispheres-

Obiettivi per lo sviluppo sostenibile

Codice

Descrizione