Testi del Syllabus

Resp. Did. **Matricola: null**

Anno offerta:	**2018/2019**
Insegnamento:	**999SV - NEUROFARMACOLOGIA AVANZATA**
Corso di studio:	**SM54 - NEUROSCIENZE**
Anno regolamento:	**2018**
CFU:	**3**
Settore:	**BIO/14**
Tipo Attività:	**D - A scelta dello studente**
Anno corso:	**1**
Periodo:	**Secondo Semestre**
Sede:	**TRIESTE**

Testi in italiano

Lingua insegnamento	English
Contenuti (Dipl.Sup.)	The course in Advanced Neuropharmacology is intended to provide students with a detailed up-to-date knowledge of certain specific subject areas of topical, clinical and neuropharmacological relevance that are not covered elsewhere (or in such detail) in the rest of the Masters Course. The first week focuses on the important area of common drugs of abuse, explaining the nature of the drugs involved, how they are abused, their pharmacology/central mechanisms of action via the pleasure/reward system, dependence potential, withdrawal characteristics and current treatment options available for treating seriously addicted patients. The second week deals with the subjects of local and general anaesthesia, the mechanisms involved in the control of appetite and factors contributing to obesity, and finally a basic introduction to epileptic seizure classification, current antiepileptic drug therapies and their effectiveness and the different animal models currently available for studying epilepsy mechanisms and for evaluating novel antiepileptic/anti-epileptogenic drugs. Each lecture is designed to provide an initial basic introduction to the subject area, any relevant historical development, detailed relevant pharmacology/mechanisms of action, molecular mechanisms involved (where known), and clinical relevance where appropriate.
Testi di riferimento	A folder of recent article pdfs relating to the Advanced Neuropharmacology Course is posted on Moodle at the start of the course along with copies of all the Powerpoint lecture presentations and transcripts of each lecture as Word documents for students to refer to at any stage.
Obiettivi formativi	1) Knowledge and understanding. The course is designed to cover and provide detailed knowledge of several currently relevant/controversial areas in neuropharmacology (i) to familiarise the students with the concept of drug addiction, the pleasure reward system and how it is essentially “hijacked “ by the currently available drugs of abuse to produce euphoric states, the known molecular mechanisms of addiction and current strategies available for management of addiction disorders (ii) to explain detailed aspects of local and general anaesthesia, history of development, proposed

molecular mechanisms of local/general anaesthetic drug action, clinical applications, drug side-effects (iii) to outline current knowledge concerning the control of appetite and development of obesity with a focus on central mechanisms and current available therapies for appetite control/weight loss (iv) to provide an introduction to epileptic syndrome classification, definitions, currently available antiepileptic therapies (v) to familiarise students with some popular experimental animal models of epilepsy with a focus on their usefulness/limitations in clarifying the mechanisms underlying human epilepsy and in assisting the development of novel antiepileptic and antiepileptogenic drug therapies.

2) Applying knowledge and understanding.
At each stage, students will also learn about experimental protocols and systems that can be used to investigate the molecular mechanisms of action of the various drugs mentioned in the course. The interactive style of teaching will also encourage students to acquire the ability to design appropriate experimental approaches for studying drug action mechanisms and to investigate various hypotheses put forward to explain critical subject areas such as common underlying mechanisms of drug addiction, whether general anaesthesia is a physiochemical phenomenon or involves specific receptor/ion channel targets, the involvement of endocannabinoids in appetite control, and the likely mechanisms underlying epileptogenesis.

3) Making judgements.
The students will be encouraged to develop abilities for the critical reading of scientific publications, analysis and interpretation of scientific data in the specific fields covered in the Advanced Neuropharmacology course. In particular, during the group Powerpoint presentations that they will make as part of their course assessment, they will be encouraged to suggest possible future experiments that could be carried out to further pursue the main topics of each paper they are reviewing.

4) Communication skills.
The group Powerpoint presentations the students are required to make at the end of the course as part of their formal assessment (in English; 15 minutes with Discussion) are specifically introduced to assist with their oral communication skills, essential for a future career in Neuroscience. In addition, the inclusion of a discussion period after the end of each presentation where the student audience is encouraged to ask questions of the speakers is intended to improve critical thinking and build confidence in public speaking.

5) Learning abilities.
At the end of the course, the students will possess specific detailed and current knowledge of the specialist areas covered as well as critical reading/searching abilities to continue their training independently in neuroscience/neuropharmacology, being able to assimilate and interpret new knowledge and technologies that develop in the field, with the ultimate aim of become successful independent researchers.

Prerequisiti

Knowledge of fundamental biophysics as applied to the electrical activity of neurones and neurotransmission; basic neuropharmacology, neurotransmitter receptor/second messenger systems, ion channel function and basic pharmacology, structure and function of different brain areas, particularly the mesolimbic dopamine pathway, hypothalamic areas controlling appetite and cortical/thalamic areas involved in seizure generation.

Metodi didattici

Lectures with Powerpoint slide presentations.

Altre informazioni

None

Modalità di verifica dell'apprendimento	At the end of the course, the ability of students will be assessed on the basis of group Powerpoint presentations (maximum 4-5 students per group, each student contributing to the oral presentation) based on a specific scientific paper related to the topics of the course, chosen from a list of 15 pdfs provided to the students on Moodle at the course beginning. Students select their own group distributions, and the paper they wish to review. Each group presents a different paper. Each presentation is 15 minutes long (timed) followed by audience discussion and answers to specific questions asked by the attending examiners (each student in the group participating). Students are then assigned an agreed group mark/30 based on the general quality of their presentation, and on the knowledge displayed of the paper they reviewed and the related field. Presentations deemed to be of excellent quality are assigned a 30 cum laude. This type of assessment is intended to improve student's communication skills (in English) and to stimulate their understanding and critical evaluation of scientific papers in the neuroscience/neuropharmacology field.
Programma esteso	The course of 9 lectures: 1) ILLEGAL DRUGS OF ABUSE. Introduction; the mesolimbic pathway; opiates-morphine, codeine, heroin, methadone, pethidine, buprenorphine, fentanyl. Opiate antagonists. Heroin effects, dependence, tolerance, withdrawal. Opiate addiction, treatment. Cannabis- use, effects, medicinal uses, cannabinoids, dependence tolerance, withdrawal. Hallucinogens – LSD, ketamine. Psychomotor stimulants – Cocaine, amphetamine, MDMA, dependence, tolerance, withdrawal. Legal Highs. 2) VOLATILE SUBSTANCE ABUSE. Definition; Prevalence, Product types, methods of use, dangers/hazards, mortalities, abuse detection, VSA effects, Dependence, Mode of action, legal status, N20 abuse; Prevention, Treatment, Recommendations. 3) OPIATES/HEROIN. Opium, Morphine, Codeine. Heroin. Heroin names, modes of administration, effects, signs of abuse, tolerance, dependence withdrawal, psychological/physical dependence –definitions, Heroin and pregnancy, treatments for opiate addiction- methadone, buprenorphine, lofexidine, narcotic antagonists – naloxone, naltrexone. Detoxificaton programmes. Neonatal Abstinence Syndrome. 4) CANNABIS AND CANNABINOIDS. Cannabis sources, constituents, use, legislation. Routes of administration, effects, cannabinoid receptors, Endogenous cannabinoids. Short/long-term effects. Medicinal uses. Dependence, tolerance, withdrawal. Treatment. The endocannabinoid system; Cannabinoid agonists and antagonists. cannabinoid research. 5) PLEASURE/REWARD/ADDICTION. Introduction; Experimental identification of reward pathways. Other neural pathways/neurotransmitters involved. Craving/withdrawal. How drugs of abuse act via reward pathway; central opiate receptors and addiction. Molecular mechanisms - CREB, ΔFosB; DBS for addiction, application, mechanism of action. 6) LOCAL ANAESTHETICS. Introduction, history, local anaesthetics structure, physiochemical properties, lipid solubility, protein binding, pKa/degree of ionisation, sensitivity of nerve fibres, mechanism of action –Hille model; metabolism, toxicity, CNS/cardiovascular side effects, allergic reactions, toxic effects, lipid rescue, clinical uses, properties of common local anaesthetics. 7) GENERAL ANAESTHETICS. Introduction, history, inhalational/intravenous agents, stages of anaesthesia, mechanism of action, old/modern concepts of anaesthesia, bioavailability of inhaled anaesthetics, anaesthetic potency. Gaseous anaesthetics, N2O, Xenon; Volatile anaesthetics – halothane, isoflurane, desflurane. I/V– Propofol, Barbiturates, Etomidate, Ketamine. 8) CONTROL OF APPETITE AND OBESITY. Obesity causes, assessment,

medical complications, current and future treatments. Leptin, endocannabinoids, Orexin. Obesity research/genetic links.

9) INTRODUCTION TO EPILEPSY/ANIMAL MODELS. Introduction/definitions. Seizure classification. Diagnosis. Brain scanning methods; Epilepsy causes; Treatment; Antiepileptic drugs/modes of action. Treatments for specific seizure types. Surgery. Animal models: simple partial seizures: acute/chronic, complex partial, generalised tonic-clonic, generalised absence, status epilepticus. Other models: hyperthermia, hypoxia, TBI, Stroke, Dysplasia. Cautions in evaluating animal model data.

10) POWERPOINT PRESENTATIONS.

Testi in inglese

English

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2) Applying knowledge and understanding.
At each stage, students will also learn about experimental protocols and systems that can be used to investigate the molecular mechanisms of action of the various drugs mentioned in the course. The interactive style of teaching will also encourage students to acquire the ability to design appropriate experimental approaches for studying drug action mechanisms and to investigate various hypotheses put forward to explain critical subject areas such as common underlying mechanisms of drug addiction, whether general anaesthesia is a physiochemical phenomenon or involves specific receptor/ion channel targets, the involvement of endocannabinoids in appetite control, and the likely mechanisms underlying epileptogenesis.

3) Making judgements.
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4) Communication skills.
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Knowledge of fundamental biophysics as applied to the electrical activity of neurones and neurotransmission; basic neuropharmacology, neurotransmitter receptor/second messenger systems, ion channel function and basic pharmacology, structure and function of different brain areas, particularly the mesolimbic dopamine pathway, hypothalamic areas controlling appetite and cortical/thalamic areas involved in seizure generation.

Lectures with Powerpoint slide presentations.

None

At the end of the course, the ability of students will be assessed on the basis of group Powerpoint presentations (maximum 4-5 students per group, each student contributing to the oral presentation) based on a specific scientific paper related to the topics of the course, chosen from a list of 15 pdfs provided to the students on Moodle at the course beginning. Students select their own group distributions, and the paper they wish to review. Each group presents a different paper. Each presentation is 15 minutes long (timed) followed by audience discussion and answers to specific questions asked by the attending examiners (each student in the group participating). Students are then assigned an agreed group mark/30 based on the general quality of their presentation, and on the knowledge displayed of the paper they reviewed and the related field. Presentations deemed to be of excellent quality are

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The course of 9 lectures:

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2) VOLATILE SUBSTANCE ABUSE. Definition; Prevalence, Product types, methods of use, dangers/hazards, mortalities, abuse detection, VSA effects, Dependence, Mode of action, legal status, N20 abuse; Prevention, Treatment, Recommendations.

3) OPIATES/HEROIN. Opium, Morphine, Codeine. Heroin. Heroin names, modes of administration, effects, signs of abuse, tolerance, dependence withdrawal, psychological/physical dependence –definitions, Heroin and pregnancy, treatments for opiate addiction- methadone, buprenorphine, lofexidine, narcotic antagonists – naloxone, naltrexone. Detoxificaton programmes. Neonatal Abstinence Syndrome.

4) CANNABIS AND CANNABINOIDS. Cannabis sources, constituents, use, legislation. Routes of administration, effects, cannabinoid receptors, Endogenous cannabinoids. Short/long-term effects. Medicinal uses. Dependence, tolerance, withdrawal. Treatment. The endocannabinoid system; Cannabinoid agonists and antagonists. cannabinoid research.

5) PLEASURE/REWARD/ADDICTION. Introduction; Experimental identification of reward pathways. Other neural pathways/neurotransmitters involved. Craving/withdrawal. How drugs of abuse act via reward pathway; central opiate receptors and addiction. Molecular mechanisms - CREB, ΔFosB; DBS for addiction, application, mechanism of action.

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10) POWERPOINT PRESENTATIONS.