



Core curricula

Discipline: Veterinary pharmacology

A. GENERAL DATA ABOUT DISCIPLINE

Pharmacology is a specific discipline included from EAEVE, as compulsory requirement and indicator for veterinary training in Europe, being considered a fundamental discipline, included in all educational core curricula of veterinary medicine faculties in Group A, (specific basis discipline)

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|---------------------------------------|---|
| 1. Scholar year: | IIIth (V and VI scholar semesters) |
| 2. Time fond (lectures) | 14 weeks in V th Semester x 2 h. = 28 hour.
14 weeks in VI th Semester x 2 h. = <u>28 hours.</u>
TOTAL = 56 hours |
| 3. Time fond (practical works) | 14 weeks in V th Semester x 2 h. = 14 hours.
14 weeks in VI th Semester x 2 h. = <u>14 hours.</u>
TOTAL = 56 hours |
| 4. Study group: | mid group |
| 5. Evaluation mode: | oral / written examination |

6. Discipline's objectives:

The general purpose is accomplished through the assimilating of **the fundamentals of pharmacology (or bases of pharmacology)**, where are studied the drug's invasion and evasion stages, namely: the ways of drug administration, absorption, pharmacokinetics and pharmacodynamics, protein bounding, diffusion, metabolism and excretion in first semester and also by the help of the second part of the course, in the second semester: the **special pharmacology (or the veterinary therapeutic)**, where essential data about drug classes, therapeutic action, specific therapeutic recommendations, incompatibilities, secondary effects, waiting period and drug residues and them legislation are presented.

- 7. Beneficiary disciplines:** all clinic disciplines.

B. CORE CURRICULA'S CONTENT

1. FRONTAL COURSES Total / year: 56 hours (100%)

General pharmacology (Bases of pharmacology) 2 h x 14 = 28 / Semester I / Year III / 50%

CORE TOPICS / course unit	Hours
1.1. Introduction Object and historic. Pharmacology branches. Notions of: aliment, drug, toxic, veterinary remedy and medication. Pharmacopoeia(s). Directions and achievements in the drugs' industry. Scientific research bases of the medicine substances. Drug development and clinical trials	2
<div style="text-align: right;"><u>The invasion phase</u></div> 1.2. Administration ways and drugs' absorption in the body. Processes between body and medium. Therapeutic ways: oral, respiratory, trans-coetaneous, intra-venous, intra-muscular, hypodermic, rectal, vaginal, intra-mammary etc.	2



<p>1.3. Drugs' transport Factors influencing drug transport in blood (structure, coupling for transport, importance of globulins, and lipoproteins). Drugs diffusion, histo-morphologic features. Physical-chemical factors involved in distribution. Protein coupling and the hydric spaces diffusion. The pH/pK_a relation and the drug's diffusion.</p>	2
<p>1.4. Drugs' distribution and fate in the body Main tissue distribution mechanisms. Barrier passage (haemato-encephalic, haemato-ophthalmic, placenta, coetaneous). Drugs' redistribution and the consequences of the unequal distribution.</p>	2
<p>1.5. Aspects about drug – receptor interaction. Drug receptors theories. Receptors' activity and them nature characterisation. Isolating and receptors identifying. Agonists – Antagonists - Secondary messengers.</p>	2
<p>1.6. Coupling answers quantifications. Theories (Clark's, Ariens's, Stephenson's, Paton's, and enzymologic theory.</p>	2
<p>1.7. Drug metabolism The evasion phase Factors that influencing drug's metabolism: physiologic (renal blood flow, urinary pH, plasmatic proteins bound, enzymatic factors). Animal linked factors: species, individuality, age, sex, pregnancy, alimentation, the health status and the genetic factors. Exogenic factors: circadian rhythm, exogenic compounds, stress.</p>	2
<p>1.8. Drug biotransformation: Microsomal, non-microsomal, bio-transformation digestive tract's micro flora bio-transformations, drug conjugation, acetylating, methylation, sulphone-conjugation, glycerol-conjugation, peptide-conjugation, mercaptation).</p>	2
<p>1.9. Drug elimination and their body accumulation. Renal, digestive, biliary, respiratory, skin, mammary gland and egg way elimination.</p>	2
<p>1.10. Elements of pharmacokinetics Kinetic of disposal Pharmacokinetic models: mono-compartmented, bi-compartmented, and tri-compartmented. Bateman's function.</p>	2
<p>1.11. Drug's effect influencing factors Species, age, individual peculiarities, nervous type activity, pathologic status, way of administration, drug's formulation. Therapeutic effect influenced by: drug's quantity. Factors that determine dose establishing. Concomitant drug therapy. Factors who determine administration frequency. Stereo specificity of the drug. Zero-order kinetics. The drug residues. The risk-benefice reports.</p>	2
<p>1.12. Drug induced body changes General and local action of the drugs: direct, indirect, reflex, main, secondary and the etiotrope actions. Symptomatic therapy rules. Correlation between chemical structure and the pharmacodynamic action.</p>	2
<p>1.13. Dose-effect correlation. Effect's latency and intensity. Pharmacon's action duration. Biopharmaceutical factors and the therapeutic effect. Statistical methods used in the effect's pharmacometry.</p>	2
<p>1.14. Drug associations. Phaenomena which can met after the repeated drug administration and association: drug interactions, accumulation, habits, synergism, potentiation, antagonism. Antidotism. Drug legislation, Pharmacovigilance, Safe handling, storage and dispensing of veterinary medicines. Secondary effects (unwanted). Therapeutic or toxic action of the drugs at the moment and in the administration place. Drug incompatibilities.</p>	2
TOTAL	28

Note: The power point presentations are focused into presenting logically of the specific aspects, from simple to complex, with a simple terminology from: anatomy, histology, cell biology, biochemistry and of physiology disciplines for a rapid and solid understanding of the introducing notions in the pharmacology field.



Special pharmacology (The veterinary therapeutics) 2h x 14 = 28 h. / Sem. II (50%)	Hours / Topic
<p>2.1. The antiseptic and disinfectant substances General characteristics. Classifications Mode of action. Indications and contraindications condition that favours or stops the action of disinfectants and others. Group of unstable antiseptic and disinfectant substances. Oxidants: chlorines, iodines and derivatives, perhydrols and oxygenate water, permanganates. Reducers: formaldehyde, urothropine etc. Group of stable antiseptic and disinfectant substances: acids, bases, salts, tensioactives, organic substances.</p>	2
<p>2.2. Chemotherapeutic substances General characteristics. Mode of action. The chemotherapeutic substances from the groups: arsenical, bismuth, benzidine, quinoleins, oxyquinoleins, thiazides, triphenylmethane, quinaldines, fourans and others. Description of specific commercial products.</p>	2
<p>2.3. Sulphonamides General characteristics. Classification. Physical and chemical properties. Mode of obtaining. Antimicrobial spectrum. Mode and mechanism of action. Sulphonamides potentialities. Sulphonamidic resistance. Absorption. Diffusion. Metabolism (destabilization). Elimination. Secondary effects. Indications and contra-indications. Mode of administration and posology. Sulphonamides with local and general action. Deposit formulations. Associations between sulphonamides and with potentializators. Diaminopyrimidines. Description of the specific commercial products.</p>	2
<p>2.4. Antimicrobial drugs (anti-bacterials) / I General characteristics. Origin (history). Definition. Classifications. Antimicrobial spectrum. Mode and mechanism of action. Antibiotic resistance phenomena. Secondary and toxic effects. Pharmacokinetics. Therapy schemes utilization. Posology. <i>Antibacterial antibiotics:</i> The betalactamins (natural penicillins, semi-synthetics, cephalosporins). Oligosaccharides. Macrolids. Cyclic-polypeptides.</p>	2
<p>2.5. Anti-bacterials / II Synergistins. Tetracycline and chloramphenicol. 2.5. Anti-bacterials: antifungals and anti-virals Antifungal agents (systemic and external), antiviral agents, antiprotozoal agents, Antineoplastic drugs, cytostatics, fitoncides and zooncides. Unspecific stimulant therapy. Description of the specific commercial products used in the current practice</p>	2
<p>2. 6. Antiparasitary drugs General characteristics. Classification. Mode and specific mechanisms of action. Anthelmintics' enzymatic induction. Toxicity. Secondary effects. The resistance phenomena to antiparasitary drugs. Indications and contra-indications. Posology. Internal use anthelmintics: anthelmintics with action on nematodes (old anthelmintics, benzimidazoles group): methyl-benzimidazole-carbamates, benzimidazole-halogens, pro-benzimidazoles). Other derivatives internal use: imidazothyazoles, tetrahydropyrimidines, pyridines, organophosphates. Anthelmintic macrolids. Other drugs with nematodicide action. Continuous and programmed anthelmintic release systems. Anthelmintic agents against cestodes and trematodes: salicylanilides, bromsalicylanilides, tioldiphenols, nitrophenols, organophosphates, carbamates. Other anthelmintics. Anti-coccidial drugs and therapy. Description of the specific commercial products. Ectoparasiticides: with mineral, vegetal and synthetic structures, anti insect agents (pyrethrins, pyrethroids and triazopentadienes).</p>	2
<p>2.7. Drugs affecting the Central Nervous System / I General anaesthetics - central nervous system depressants: gaseous, volatile and stable</p>	2



<p>narcotics, hypnotics, tranquilizers, analgesics, sedatives and antipyretics. Mode of action, pharmacokinetics and pharmacodynamics, indication and contra-indications. Hypnotic agents (barbiturates, magnesium derivatives). Analgesic agents (opiate agents and other alkaloids, isoquinoleins, synthetic products). Antipyretic agents (pyrazolones, salicylic acid and its derivatives, anilines, quinoleins). Local anaesthetics (derivatives of cocaine). Central nervous system stimulants: mode of action, indications, pharmacodynamics (caffeine, camphor, pentetrazole, nicetamides, strychnine). Drugs used to modify behaviour. Description of the specific commercial products.</p>	
<p>2.8. Drugs affecting the Central Nervous System / II Drugs affecting the peripheral nervous system: mode of action, pharmacodynamics, indication and contra-indications. Classification and description of drug groups. Parasympathomimetics: muscarinic-choline reactive systems nicotin-choline reactive systems, acetylcholine, vasoperif, pilocarpine, ezerine, myostin, arecoline. Parasympatholytics: atropine, tropicamide, cyclopentoate, scobutyl. Sympathomymethics: noradrenalin, phenilephrine, naphozaline, asmopent, isoprenaline, bamethane, adrenaline, sympathol, amphetamine, ephedrine). Sympatholytics: guanidines, clonidine, claviceps, ergometrine, methyldopa, tolazoline, yohimbine). Description of the specific commercial products.</p>	2
<p>2.9. Antihistaminic agents Promethazine, phenyramine, halopyramine, pyribenzamine. Description of the specific commercial products. Anti-inflammatory drugs and mediators of inflammation</p>	1
<p>2.9. Ganglioplegics Nicotine, paracetine, lobeline, sparteine, cytizine, hexamethonium, thrymetaphane, tetraethylamonium.</p>	1
<p>2.10. Drugs affecting the digestive system, intestinal motility and secretion Description of mode of action, indications and contra-indications, pharmacodynamics, kinetics. Classification. Eupeptic agents: chloride acid, pepsin, trypsin, pancreatine, bromulyne, papaine, amylase. Description of the specific commercial products. Digestives: physiological, bitter, aromatic and saline agents. Ruminant pharmacology (emetic, medicinal plants, products and associations). Emetics and anti emetics (with central, reflex and peripheral actions) Laxatives and purgatives (oily, saline agents of large intestine, others). Anti diarrhoeal medication (sedative, spasmolytic, protector, mucilaginous, adsorption, antiseptic agents). Carminatives, anti fermentation and anti foamy agents.</p>	2
<p>2.11. Drugs affecting the respiratory system. Mode of action, indications and contra-indications, pharmacodynamics. Kinetics. Classification. Respiratory stimulants, ant cough, expectorants. Expectoration mechanism. Bronchodilators. Fluidificants. Excreta-motors. Anti excretory agents.</p>	1
<p>2.11. Drugs affecting the heart and blood vessels Mode of action, indications and contra-indications. Description. Cardiovascular medication. A systolic medication. Cardiovascular analeptics. Vasoconstrictor and vasodepressor agents. 2.11. Drugs affecting haemostasis and fibrinolysis Haemostatic agents. Anticoagulants and plasma replacements. Description of specific commercial products.</p>	1



<p>2.12. Agents affecting the urinary system. Renal diuretics (purine analogues, mercurial, renal sulphonamides, vegetal agents). Adrenal and extra renal diuretics. Ant diuretics. Urinary antiseptics. Description of the specific commercial products.</p>	1
<p>2.12. Agents affecting the metabolism. Mode of action, kinetics, indications and contra-indications. Classification. Nutritive analeptics. Plastic and roborant agents (ferric derivates, calcium and derivates, phosphorus and derivates). Food additives and bio stimulators. Blood glucose control Effects of drugs on sodium ion/potassium ion balance, on acid-base balance, on mineral balance, fluid therapy principles</p>	1
<p>2.13. Water-soluble and fat-soluble vitamins Therapeutic indication and description of most frequently used conditioning and associations of vitamins. Enzymes.</p>	1
<p>2.13. Hormones Pharmacological control of cycles in female domestic animals. Steroids: androgens, oestrogens (based on oestradyol and synthetic products) and progestagens products (natural and synthetic). Prostaglandins. Pharmacology of parturition. Medication for uterus and mammary gland. Hipophysal products (anterohipophysis and neurohipophysis). Adrenal products. Anti diabetics, thyreostatics, parathyroid products. Other endocrine products (endorphins, interferons, somatomedins). Indications and contraindications. Description.</p>	1
<p>2.14. Agents affecting the skin and mucosa Emollients (oily, viscous and solid, alcoholic, mucilaginous emollients, esters), absorbents, mechanic protectors and astringents, sedatives, local anaesthetics, haemostatics, antiseptics and skin disinfectants (oxidants, reducing agents, acids, alkali, phenols, cresols, chlorhexidine, tension activity agents). Keratolytics. Corticosteroids. Therapeutic schedules. Irritating, rubefacient, vesicatory agents, caustics, sclerotic agents. Topic antibiotics and sulphonamides. Antihistaminic agents. Description of the specific commercial products.</p>	1
<p>2.14. Basic elements of the veterinary homeopathy Description of hahmenian principles. The remedies classification. Active principles. Remedies preparation techniques. Homeopathic therapeutic schemes.</p>	1
TOTAL	28

Note: The second semester course is designed to prepare the vet student for the clinic education and therefore the presentations are in the aim of student's practical skills enrichment with information providing data about: drugs' activity mode, spectrum, kinetics, dynamics, sites of activity and expected effects, AR and secondary effects, waiting period, available conditionings, etc all in consonance with EMEA, FDA and UE regulations and directives.

2. PRACTICAL WORKS Total / year: 56 hours

General part (The bases of pharmacology) 2h x 14 = 28 hours	
THEMES / practical works units / Semester I / Year III (50%)	Hours / Topic
<p>1.1. Pharmacology lab presentation. Pharmacopoeias. Introducing veterinary drug classes and veterinary specific formulas etc. Romanian Pharmacopoeia, European and USP. Veterinary drugs, the classes of conditioning, EU legislation related to testing new drugs.</p>	2
<p>1.2. Usual calculations in pharmacology Dose and concentration calculation</p>	2



1.3. Usual calculations in pharmacology Calculation of solvent reduction or recipes multiplication calculation	2
1.4. Usual calculations in pharmacology Calculating dilutions, micro-quantities and drug blood and body concentrations	2
1.5. Usual calculations in pharmacology Drug dosage extrapolation from human medicine in veterinary medicine (calculation by Losher and Lowe formulas after metabolic weight after body surface area)	2
1.6. Pharmacography (Drug's prescribing) Instructions for correct prescribing. Component parts of the ordinances. Ordinances types. Purpose and importance of the study. The wording of ordinances, about the receipt. Common abbreviations.	2
1.7. Pharmacography (Drug's prescribing) Components of the ordinance: <i>Inscriptio, Invocatio, Designatio materiarum</i>	2
1.8. Pharmacography (Drug's prescribing) Components of the ordinance: <i>Subscriptio, Signatura et nomen aegroti, Nomen medici</i>	2
1.9. Pharmacography (Drug's prescribing) Embossed recipe. Keeping records of recipes. Further information relating to the issue network related legislation, example prescriptions in the EU and USA. Categories and examples of recipes on groups of diseases.	2
1.10. Incompatibilities Physical chemical and pharmacological incompatibilities	2
1.11. Drug interaction Pharmacokinetic and pharmacodynamic	2
1.12. Drug combinations Synergistic associations, indifferent, mitigative, antagonistic	2
1.13. Adverse reactions to drugs Toxic, idiosyncratic, drug allergy, mutagenic, teratogenic, carcinogenic, tolerance and dependence to drugs.	2
1.14. P.W. Colloquium / Semester I	2
TOTAL	28
Special pharmacology (therapeutics) 2h x 14 = 28 hours / Semester II / Year III (50%)	Hours
2.1. Antiseptics and disinfectants. Unstable and oxidants. Unstable reducers. Stable (acids, alkali, soaps and detergents, heavy metals salts). Organic origin A & D.	2
2.2. Chemotherapy group description.	2
2.3. Sulphonamides, group description.	2
2.4. Antibiotics, group description.	2
2.5. Antiparasitary (intern and extern) group description.	2
2.6. Topic substances	2
2.7. Volatile and fix narcotics. Sedatives, tranquillisers, analgesics, antipyretics group description.	2
2.8. Local anaesthetics and courarisants.	2
2.9. C.N.S. excitants group description	2
2.10. V.N.S medication group description	2
2.11. Respiratory tract, Cardio - Circulatory, tract medication groups' description.	2
2.12 Urinary, and digestive tract medication groups description.	2
2.13. Vitamins and hormones groups' description.	2
2.14. Colloquium / Semester II	2
TOTAL	28



Evaluation methodology

Final mark establishing / shares	Evaluation / type of activity:	(%)
	Course examination (in writing)	70
	Intermediary course tests (in writing / one per Semester)	5
	Intermediary practical works tests (oral /one per Semester)	5
	Bibliographic essays (one per Semester)	5
	Practical works examination (one per Semester)	15
	Projects	NO
		100

BIBLIOGRAPHY Books to the discipline	Course (titles in original):
	<p>Cristina R.T. ⁽²⁰⁰⁴⁾ Bazele farmacologiei veterinare. Brumar, Timișoara, ^{973-9295-78-9,}</p> <p>Cristina R.T., P.A. Darău. ⁽²⁰⁰⁵⁾ Biotehnologii farmaceutice și Industrializarea medicamentului de uz veterinar. Vasile Goldiș Univ. Press, Arad. ⁹⁷³⁻⁶⁶⁴⁻⁰⁷²⁻⁸</p> <p>Cristina R.T. ⁽²⁰⁰⁶⁾ Introducere în farmacologia și farmacia veterinară. Solness Timișoara ^{ISBN (10) 973-729-064-X; I, (13) 978-973-729-064-9}</p> <p>Cristina R.T., Boboloacă I. ⁽²⁰⁰⁸⁾ Suport de curs electronic. Biotehnologii farmaceutice și Industrializarea medicamentului de uz veterinar. Ediția a II-a Impact Media ^{Timișoara 978-973-7996-24-4}</p> <p>Cristina R.T., Teușdea V. ⁽²⁰⁰⁸⁾ Ghid de farmacie și terapeutică veterinară. Brumar Timișoara. ^{ISBN 978-973-602-354-5}</p> <p>Cristina R.T. ⁽²⁰¹⁰⁾ Suport electronic de curs: Farmacovigilenta și toxicovigilenta veterinară.</p>
	Practical works:
	<p>Cristina R.T. ⁽²⁰⁰³⁾ Receptură, Calcul și Interacțiuni în Medicina Veterinară. Sedona Timișoara, ^{973-9345-42-5,}</p> <p>Cristina R.T. ⁽²⁰⁰⁴⁾ Ghid de dozaj și teste de Farmacologie veterinară. Ed. 1, Ed. 2 ad. Brumar Timișoara ^{973-8057-46-9, 973-602-020-7}</p> <p>Cristina R.T., P.A. Darău, E. Dumitrescu ⁽²⁰⁰⁵⁾ Practicum de farmacologie și terapie veterinară Vasile Goldiș Univ. Press, Arad. ^{973-664-071-X}</p> <p>Cristina R.T. ⁽²⁰¹⁰⁾ Elemente de farmacovigilență și toxicovigilență în medicina veterinară. Brumar Timișoara.</p>
	Optionals:
	<p>To this discipline is accepted any other pharmacology course material appeared in the last ten years who respecting the above pharmacology curricula</p> <p>Cristina R.T., Eugenia Dumitrescu, Teușdea V. ⁽²⁰⁰⁷⁾ Dicționar bio-medical. Impact Media Timișoara. ⁹⁷⁸⁻⁹⁷³⁻⁷⁹⁹⁶⁻²¹⁻³</p> <p>Pop Pavel, R.T. Cristina ^(1995, 1996) Dermatologie medicală - veterinară Mirton Timișoara, ⁹⁷³⁻⁵⁷⁸⁻⁰²⁵⁻⁹</p> <p>R.T. Cristina (Head editor) Issues of Journal <i>Medicamentul veterinar / Veterinary drug</i> ^{1843-9527,}</p>

I undersigned,

Course titular:

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