# Postgraduate Certificate

## Update on Veterinary Chemotherapy

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# Postgraduate Certificate

## Update on Veterinary Chemotherapy

Course Modality: **Online**

Duration: **12 weeks**

Certificate: **TECH Technological University**

Teaching Hours: **300 hours.**

Website: **www.techtitute.com/pharmacy/postgraduate-certificate/update-veterinary-chemotherapy**

# Index

01

# Introduction

Anti-infective pharmacology is characterized by the study of drugs that have to act on cells other than those of the veterinary patient, which are intended to be eliminated in their entirety. They are capable of destroying or inhibiting the development of live germs that cause infections by acting through different pharmacological targets. These drugs can act by destroying or inhibiting the development of tumor cells. This is why this scientific program is of great interest to the pharmaceutical professional, due to the increasing incidence of neoplastic diseases in animals, with a greater emphasis on small animals.

*All the advances in pharmacology and their application in the field of chemotherapy in animals, in a Postgraduate Certificate with a high level of competence".*

Antineoplastic pharmacology studies drugs that act on neoplastic cells that may occur in animals. Pharmacology intervenes by trying to eliminate them in their entirety, affecting the patient's normal cells as little as possible. This Postgraduate Certificate offers you all the advances in this field, in a high-quality program that offers the most advanced resources in online learning, to guarantee the student an effective, real and practical learning that boosts their competencies to the highest level in this field.

The content of each topic provides the student with comprehensive knowledge in the theoretical and practical aspects of Veterinary Pharmacology. The practical cases that are presented make the program unique by applying different simulated situations that will allow the student to develop skills for their performance in a real clinical environment.

The scientific program includes practical activities to facilitate students' acquisition and mastery of the theory learned, supporting and complementing the knowledge acquired in the theoretical teaching. The contents are presented to the professional in an attractive and dynamic way in multimedia packages that include videos, images and diagrams in order to reinforce knowledge.

Thanks to its innovative teaching methodology, it allows the student to follow its contents in a totally flexible and personalized way, with great availability on the part of the teachers for consultations, doubts or tutorials.

This Postgraduate Certificate will bring you up to date on all of them and the new forms and protocols of action.

This **Postgraduate Certificate in Update on Veterinary Chemotherapy** contains the most complete and up-to-date scientific program on the market. The most important features include:

- Practical cases presented by experts in Veterinary Pharmacology.
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice.
- Practical exercises where self-assessment can be used to improve learning.
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection

*A Postgraduate Certificate created to examine and explain the main pharmacological properties of the antineoplastic drug groups".*

*A revolutionary program for its ability to reconcile the highest quality of learning with the most complete online specialization".*

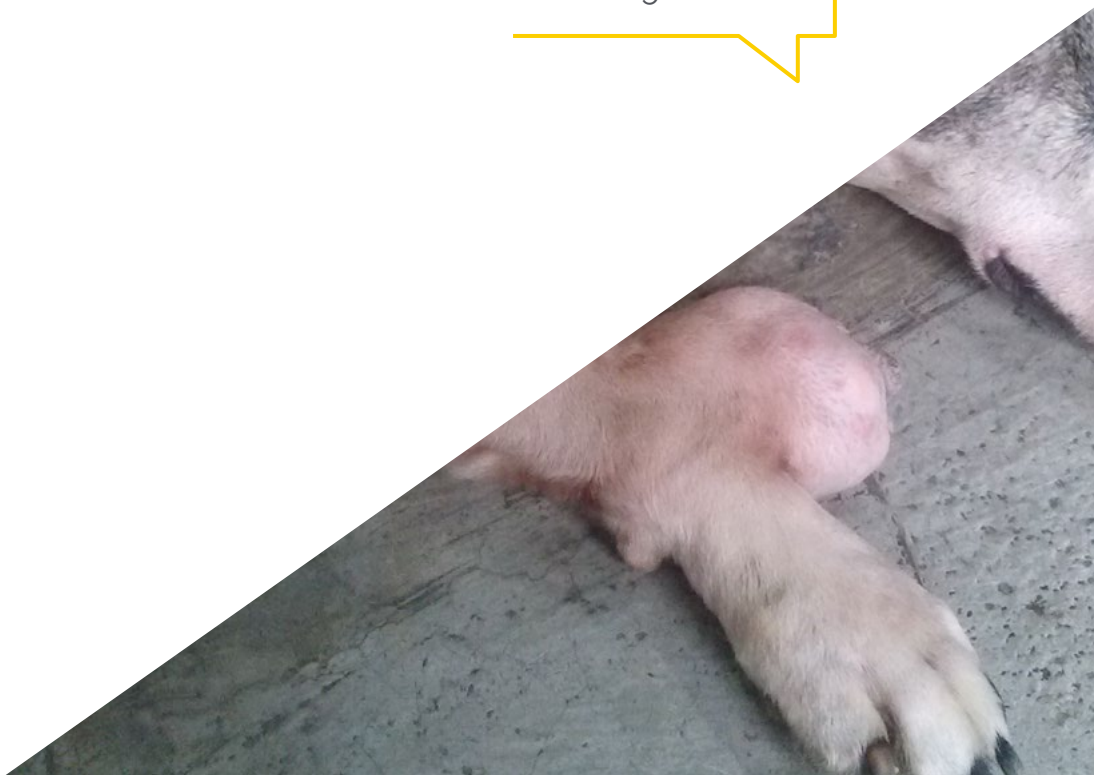
*A great opportunity for the veterinary medicine professional to advance his or her competencies and catch up on all the latest developments in pharmacological approaches.*

*Learn in an efficient way, with a real qualification objective, with this Postgraduate Certificate, unique for its quality and price, in the online teaching market.*

The scientific program includes in its teaching staff professionals from the sector who bring to this program the experience of their work, in addition to recognized specialists from prestigious reference societies and universities.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive knowledge programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise throughout the program. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.



02

# Objectives

The design of the Postgraduate Certificate will allow the student to acquire the necessary competences to update in the profession after delving into the key aspects of Veterinary Pharmacology. Its objective is to provide the students with the required competencies in relation to preclinical or clinical research of drugs used in veterinary medicine, and their application in the therapeutic use of drugs so that they can better incorporate into the professional field. The knowledge acquired in the development of the points of the syllabus will drive the professional from a global perspective, with full capacity to achieve the proposed goals.

*A complete update that will allow you to act according to the most up-to-date protocols in the use of antineoplastic drugs"*

## General Objectives

- Examine and explain the main pharmacological properties of the anti-infective drug groups
- Identify the different pharmacological targets involved in anti-infective agents.
- Recognize the main pharmacological characteristics (mechanism of action, pharmacokinetics, and therapeutic and toxic effects) of groups of anti-infective drugs.
- Examine and explain the main pharmacological properties of the antineoplastic drug groups
- Identify the different pharmacological targets involved in antineoplastic agents.
- Know the main toxic effects of antineoplastic drugs.



## Specific Objectives

### Module 1. Antiseptics and Chemotherapeutics I

- Analyze the historical development of antiseptic and chemotherapeutic substances.
- Point out the general principles of chemotherapy and the drugs that comprise it.
- Define the concepts of antiseptic and antibiotic.
- Explain the mechanisms of antibiotic resistance.
- Classify antibiotics according to mechanism of action
- Describe each of the groups of antibiotics and know their mechanism of action.
- Classifying antifungal and antiviral drugs
- Describe each of the groups of antifungal and antiviral drugs and their mechanism of action.
- Analyze the importance of antiparasitics in veterinary medicine.

### Module 2. Chemotherapy II: Antineoplastic Drugs

- Analyzing cancer in small animals
- Point out the general principles in the use of antineoplastic drugs.
- Know the care in the application of antineoplastic drugs.
- Classify the main families of chemotherapeutics.
- Determine the main drugs for palliative use in neoplasms.
- Consider the use of each antineoplastic according to the pathology.
- Analyze the main toxicity effects of antineoplastic drugs.
- Describe each of the groups of antifungal and antiviral drugs and their mechanism of action.
- Analyze the importance of antiparasitics in veterinary medicine.

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# Course Management

The teaching team of this Postgraduate Certificate is formed by professionals specialized in the study of Pharmacology, both human and veterinary, with clinical experience in small and large animals. They have extensive and recognized teaching and research experience, with officially recognized six-year research periods, participation in numerous research projects and dissemination of their research globally, in high impact journals, books and conferences.

*A unique opportunity to learn from internationally renowned professors, with teaching, clinical and research experience"*

## Management

**Dr. Santander Ballestín, Sonia**

- Associate Professor of the Department of Pharmacology and Physiology. University of Zaragoza
- Degree in Biology and Biochemistry, specializing in the area of Pharmacology.
- Teaching Coordinator, Department of Pharmacology, University of Zaragoza, Spain.
- PhD with the European Degree from the University of Zaragoza.
- Master's Degree in Environment and Water Management. Andalusia Business School
- Lecturer in the Postgraduate Certificate "Introduction to Pharmacology: Principles for the Rational Use of Drugs" Basic Program of the University of Experience of Zaragoza.
- Lecturer in the Postgraduate Certificate "Introduction to Pharmacology: Principles for the Rational Use of Drugs" Basic Program of the University of Experience of Zaragoza.
- Lecturer in the Postgraduate Certificate "Introduction to Pharmacology: Principles for the Rational Use of Drugs" Basic Program of the University of Experience of Zaragoza.
- Evaluation professor in objective structured clinical evaluation of the medical degree.
- Lecturer in the Postgraduate Certificate "Introduction to Pharmacology: Principles for the Rational Use of Drugs" Basic Program of the University of Experience of Zaragoza.



## Professors

### Dr. García Barrios, Alberto

- Interim Professor at the University of Zaragoza
- Casetas Veterinary Clinic
- Utebo Veterinary Clinic
- Nanoscale Biomagnetics R&D Researcher
- Veterinary Clinic Utebo. Clinical Veterinarian
- PhD in Veterinary Science
- Teacher with an interim contract. University of Zaragoza
- Degree in Veterinary Medicine
- Postgraduate Veterinary Oncology (Improve International). Homologation of the qualification to work with experimental animals

### Ms. Luesma Bartolomé, María José

- Veterinarian. Study Group on Prion Diseases, Vectorial Diseases and Emerging Zoonoses at the University of Zaragoza.
- University Research Institute Study Group
- Film and anatomy teacher. University degree: Complementary Academic Activities
- Professor of Anatomy and Histology University degree: Graduate in Optics and Optometry. University of Zaragoza
- Professor of Final Degree Project University Degree, Bachelor's Degree in Medicine
- Professor of Morphology. Development Biology University degree: Master's Degree in Initiation to Research in Medicine.  University of Zaragoza
- Doctor of Veterinary Medicine. Official Doctorate Program in Veterinary Sciences. University of Zaragoza
- Degree in Veterinary Medicine. University of Zaragoza

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# Structure and Content

This Postgraduate Certificate provides all the necessary knowledge to be able to provide, in the best possible way, pharmacology services in veterinary medicine. It is important to take into account that the contents allow the student to obtain specialized knowledge of pharmacology, as well as the ability to deal with different solutions for veterinary pathologies. A complete and accessible journey that will make a difference in your career progression.

*A complete scientific program that will take you to the exhaustive knowledge necessary to intervene as a specialist in the theoretical and practical aspects of Veterinary Pharmacology"*

## **Module 1.** Antiseptics and Chemotherapeutics I

1.1. Introduction. Definition of Antiseptic and Chemotherapeutic. Antiseptics
- 1.1.1 Introduction
- 1.1.2 Antiseptic and Disinfectant Concept
- 1.1.3. Factors Affecting the Potency of Antiseptics and Disinfectants
- 1.1.4 Characteristics of an Ideal Antiseptic and Disinfectant
- 1.1.5 Classification of Disinfectants and Antiseptics
- 1.1.6 Main Antiseptics and Disinfectants for Clinical Use
  - 1.1.6.1. Alcohol
  - 1.1.6.2. Biguanides
  - 1.1.6.3. Halogenated Products
  - 1.1.6.4. Peroxygens
  - 1.1.6.5. Other Antiseptics

1.2. Introduction to Antimicrobial Therapy. Types of Antibiotics. Rational Use
- 1.2.1 Introduction
- 1.2.2 Historical Review of Antimicrobial Therapy
- 1.2.3. Side Effects
- 1.2.4 Principles of Antibiotherapy
- 1.2.5 Resistance: Types and Mechanisms of Occurrence
- 1.2.6 Waiting Times
- 1.2.7 Requirements for an Antimicrobial
- 1.2.8 Classification of Antimicrobials
  - 1.2.8.1. According to its Spectrum
  - 1.2.8.2. According to its Effect
  - 1.2.8.3. According to its Mechanism of Action
  - 1.2.8.4. According to its Chemical Group
  - 1.2.8.5. Depending on the Microorganism Affected
- 1.2.9 Criteria to be Followed in the Selection of a Drug

1.3. Antimicrobials that Act Against the Bacterial Wall. Antibiotics that Inhibit Protein Synthesis
- 1.3.1 Antibiotics Acting Against the Bacterial Wall
  - 1.3.1.1. General Aspects
  - 1.3.1.2. Beta-Lactamics (b-lactamics)
    - 1.3.1.2.1. Penicillins
    - 1.3.1.2.2. Cephalosporins
    - 1.3.1.2.3. Vancomycin and Bacitracin
- 1.3.2 Antibiotics that Inhibit Protein Synthesis
  - 1.3.2.1. Aminoglycosides
  - 1.3.2.2. Tetracyclines
  - 1.3.2.3. Chloramphenicol and Derivatives
  - 1.3.2.4. Macrolides and Lincosamides
- 1.3.3. β-Lactamase Inhibitors

1.4. Antibiotics that Act on the Synthesis of Nucleic Acids. Antibiotics Acting on the Bacterial Membrane
- 1.4.1 Fluroquinolones
- 1.4.2 Nitrofurans
- 1.4.3. Nitroimidazoes
- 1.4.4 Sulfamides
- 1.4.5 Polymyxins and Thyrotricins

1.5. Antifungal
- 1.5.1 General Description of the Mycotic Structure
- 1.5.2 Classification of Antifungal Agents by Chemical Structure
- 1.5.3. Systemic Antifungals
- 1.5.4 Topical Antifungals

1.6. Antivirals

1.6.1 Objective of Antiviral Chemotherapy
1.6.2 Groups of Antivirals According to their: Origin, Chemistry, Pharmacological Action, Pharmacokinetics, Pharmacodynamics, Posology, Therapeutic Uses, Adverse Reactions, Contraindications, Interactions and Pharmaceutical Forms
1.6.2.1. Inhibitors of RNA and DNA Synthesis
1.6.2.2. Purine Analogs
1.6.2.3. Pyrimidine Analogs
1.6.2.4. Reverse Transcriptase Inhibitors
1.6.2.5. Interferons.

1.7. Antiparasitics II
1.7.1 Introduction to Antiparasitic Therapy
1.7.2 Importance of Antiparasitic Drugs in Veterinary Medicine
1.7.3. General Concepts: Antinematodic, Anticestodic, Antitrematodic, Antiprotozoal, Ectoparasiticide and Endectocide.

1.8. Antiparasitics for Internal or Endoparasitic Use
1.8.1 Antinematodes
1.8.2 Antistatics
1.8.3. Antitrematodic
1.8.4 Antiprotozoals

1.9. Antiparasitics for External or Ectoparasitic Use
1.9.1 Introduction to External Parasites
1.9.2 Antiparasitics II

1.10. Antiparasitics for Internal and External Use or Endectocides
1.10.1 Introduction
1.10.2 Macrocyclic Lactones
1.10.3. Main Combinations of Endectocide Use

## **Module 2.** Chemotherapy II: Antineoplastic Drugs

2.1. Introduction to Antineoplastic Therapy
2.1.1 Cancer in Veterinary Medicine: Pathophysiology and Etiology of Cancer
2.1.2 Antineoplastic Treatment Approach: Drug Posology
2.1.3. Administration of Chemotherapy Drugs
2.1.3.1. Care in the Application of Chemotherapeutic Agents
2.1.3.2. Standards and Instructions for Chemotherapy Application: Preparation During Preparation/Administration of Cytotoxic Drugs

2.2. Palliative Antineoplastic Pharmacology. Introduction to Special Antineoplastic Pharmacology
2.2.1 Introduction to Palliative Antineoplastic Pharmacology: Oncologic Pain Control/ Assessment. Pharmacological Principles for Palliative Pain Management. Nutritional Management of the Oncology Patient
2.2.2 Non-Steroidal Analgesics
2.2.3. Opioids
2.2.4 Others: NMDA Antagonists, Bisphosphonates, Tricyclic Antidepressants, Anticonvulsants, Nutraceuticals, Cannabidiol
2.2.5 Introduction to Special Antineoplastic Pharmacology. Main Antineoplastic Drug Families

2.3. Family I: Alkylating Agents
2.3.1 Introduction
2.3.2 Nitrogen Mustards: Cyclophosphamide, Chlorambucil and Melphalan
2.3.3. Nitrosoureas: Lomustine/Procarbazine
2.3.4 Others: Hydroxyurea
2.3.5 Main Uses in Veterinary Medicine

2.4. Family II: Antimetabolites
2.4.1 Introduction
2.4.2 Folic Acid Analogs (Antifolates): Methotrexate
2.4.3. Purine Analogues: Azatioprina 2.4.4. Pyrimidine Analogues: Cytosine Arabinoside, Gentabicin, 5-Fluorouracil
2.4.5 Main Uses in Veterinary Medicine

2.5. Family III: Antibiotics

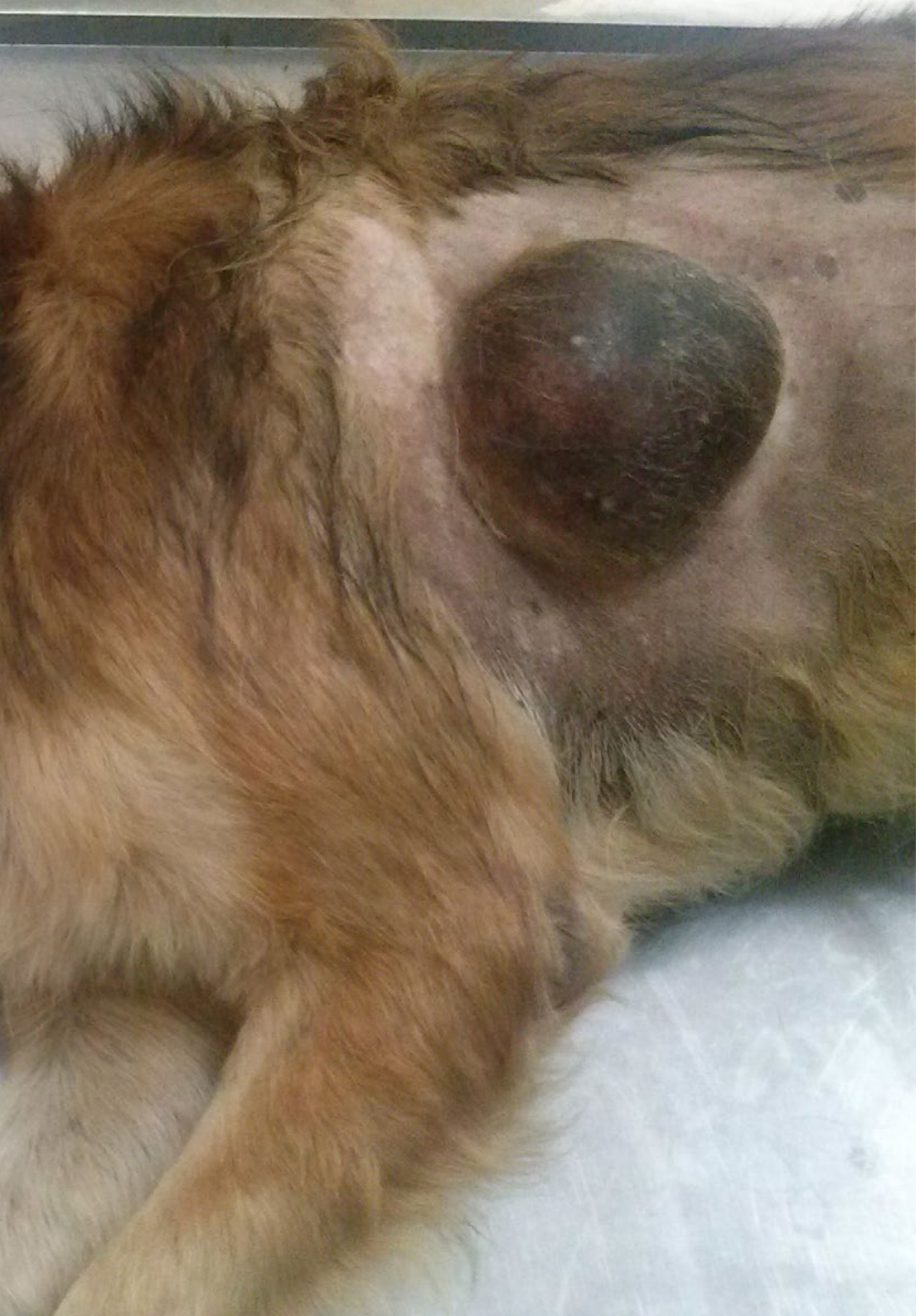
2.5.1 Introduction
2.5.2 Anthracycline-Derived Antibiotics (Doxorubicin/Other Anthracyclines) and Non-Anthracycline-Derived Antibiotics (Actinomycin-d, Mitoxantrone, Bleomycin)
2.5.3. Main Uses in Veterinary Medicine

2.6. Family IV: Antineoplastics of Plant Origin2.6.1. Introduction
2.6.2 Alkaloids: History/Antitumor Activity. Vinca Alkaloids
2.6.3. Epipododiphyllotoxin-Derived Ligands
2.6.4 Camptothecin Alkaloid Analogs
2.6.5 Main Uses in Veterinary Medicine

2.7. Family V: Tyrosine Kinase Inhibitors
2.7.1 Introduction
2.7.2 Protein Kinases: Non-Receptor Tyrosine Kinase Proteins (NRTK; Receptor Tyrosine Kinase RTK)
2.7.3. Toceranib
2.7.4 Masitinib
2.7.5 Main Uses in Veterinary Medicine

2.8. Platinum Derivatives
2.8.1 Introduction
2.8.2 Carboplatin
2.8.3. Cisplatin
2.8.4 Main Uses in Veterinary Medicine

2.9. Miscellaneous. Monoclonal Antibodies. Nanotherapy L-asparaginase





2.9.1 Introduction
2.9.2 L-asparaginase
2.9.3. Monoclonal Antibodies
2.9.4 Tigylanol Toglate (Stelfonta)
2.9.5 Immunotherapy
2.9.6 Metronomic Therapy

2.10. Toxicity of Antineoplastic Drugs
2.10.1 Introduction
2.10.2 Hematological Toxicity
2.10.3. Gastrointestinal Toxicity
2.10.4 Cardiotoxicity
2.10.5 Urinary Toxicity
2.10.6 Specific Toxicities: Hepatic, Neurological, Cutaneous, Hypersensitivity, Breed/Species Associated.
2.10.7 Pharmacological Interactions

*It advances towards excellence with the help of the best professionals and teaching resources of the moment".*

05

# Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: ***Relearning***.

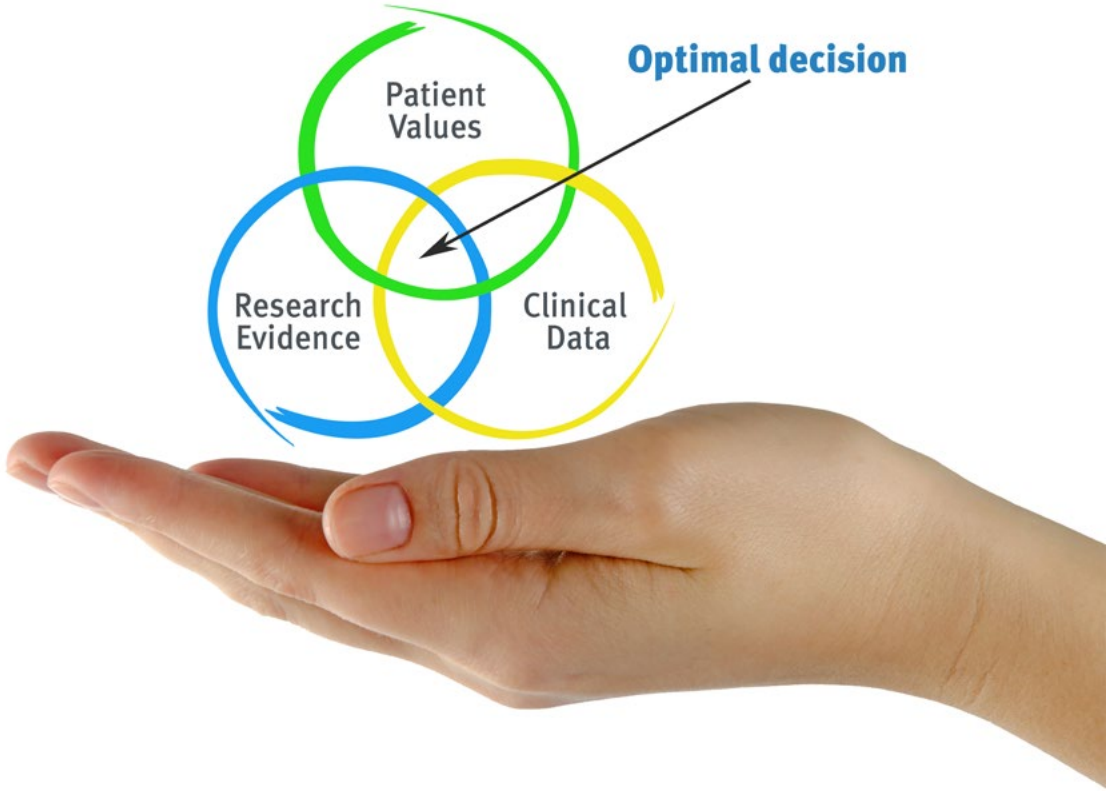
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the ***New England Journal of Medicine*** have con Aspect red it to be one of the most effective.

*Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"*

## At TECH, we use the Case Method

What should a professional do in a given situation? Throughout the program, students will be confronted with multiple simulated clinical cases based on real patients, in which they will have to investigate, establish hypotheses and ultimately, resolve the situation. There is an abundance of scientific evidence on the effectiveness of the method. Pharmacists learn better, more quickly and more sustainably over time.

*With TECH you will experience a way of learning that is shaking the foundations of traditional universities around the world.*




According to Dr. Gérvas, the clinical case is the annotated presentation of a patient, or group of patients, which becomes a "case", an example or model that illustrates some peculiar clinical component, either because of its teaching power or because of its uniqueness or rarity. It is essential that the case is based on current professional life, attempting to recreate the actual conditions in a pharmacist's professional practice.

*Did you know that this method was developed in 1912, at Harvard, for law students? The case method consisted of presenting students with real-life, complex situations for them to make decisions and justify their decisions on how to solve them. In 1924, Harvard adopted it as a standard teaching method.*

**The effectiveness of the method is justified by four fundamental achievements:**

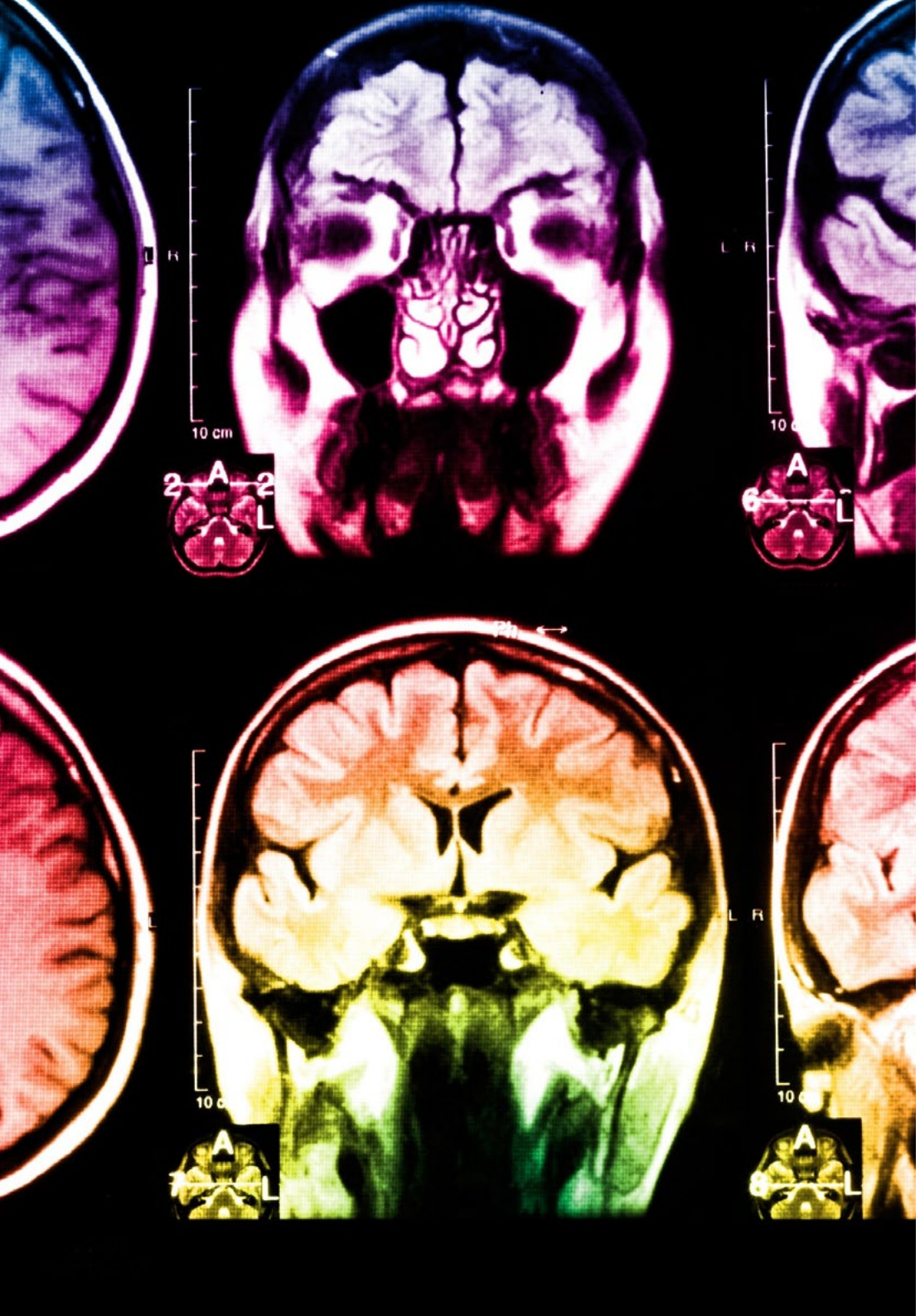
1. Pharmacists who follow this method not only grasp concepts, but also develop their mental capacity, by evaluating real situations and applying their knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.

## Relearning Methodology

TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines 8 different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

*Pharmacists will learn through real cases and by solving complex situations in simulated learning environments. These simulations are developed using state-of-the-art software to facilitate immersive learning.*



At the forefront of world teaching, the Relearning method has managed to improve the overall satisfaction levels of professionals who complete their studies, with respect to the quality indicators of the best online university (Columbia University).

With this methodology, more than 115,000 pharmacists have been trained with unprecedented success in all clinical specialties, regardless of the surgical load. This pedagogical methodology is developed in a highly demanding environment, with a university student body with a high socioeconomic profile and an average age of 43.5 years.

*Relearning will allow you to learn with less effort and better performance, involving you more in your specialization, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation to success.*

In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically.

The overall score obtained by TECH's learning system is 8.01, according to the highest international standards.

**This program offers the best educational material, prepared with professionals in mind:**

### Study Material

All teaching material is created specifically for the course by specialist pharmacists who will be teaching the course, so that educational development is highly specific and accurate.

These contents are then adapted in audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high-quality pieces in each and every one of the materials that are made available to the student.

### Video Techniques and Procedures

TECH introduces students to the latest techniques, to the latest educational advances, to the forefront of current pharmaceutical care procedures. All of this, first hand, and explained and detailed with precision to contribute to assimilation and a better understanding. And best of all, students can watch them as many times as they want.

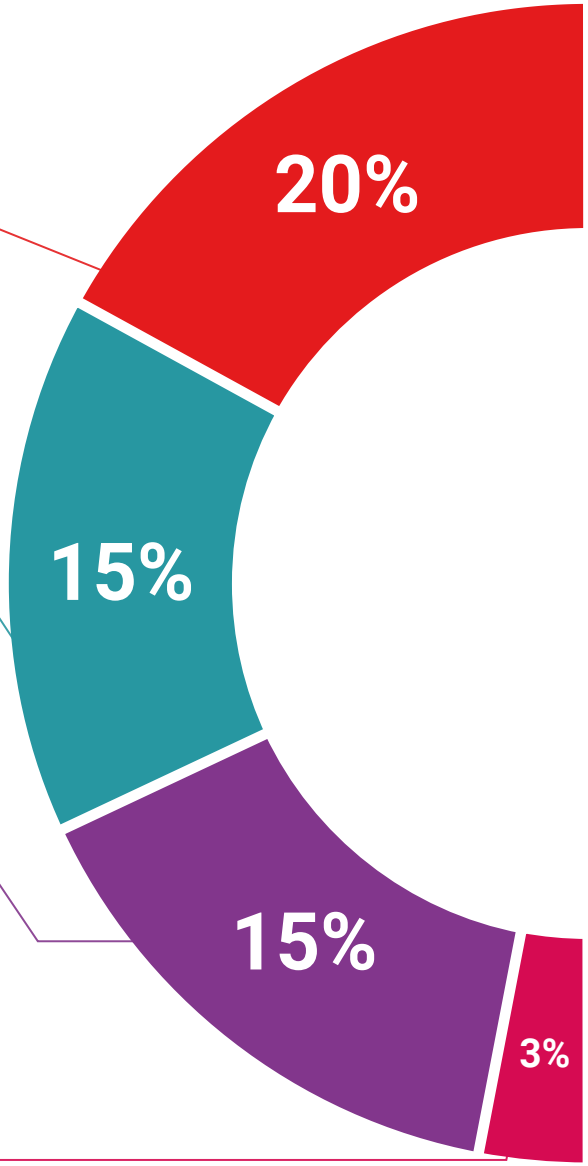
### Interactive Summaries

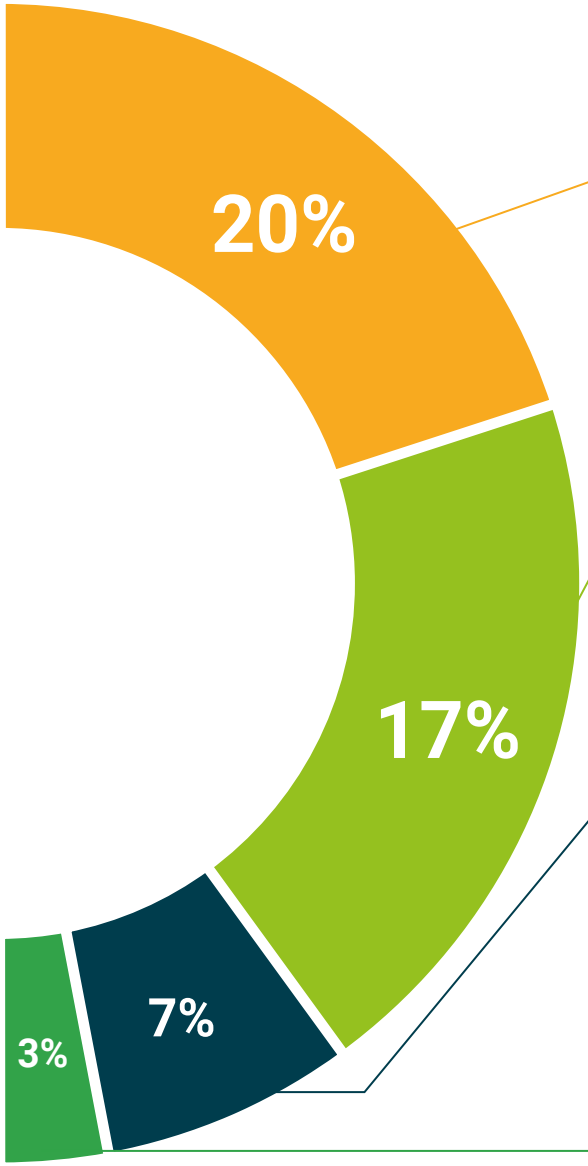
The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

### Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.






### Expert-Led Case Studies and Case Analysis

Effective learning ought to be contextual. Therefore, we will present you with real case developments in which the expert will guide you through focusing on and solving the different situations: a clear and direct way to achieve the highest degree of understanding.

### Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

### Classes

There is scientific evidence on the usefulness of learning by observing experts. The system known as Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

### Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical, and effective way to help students progress in their learning.

06

# Certificate

The Postgraduate Certificate in Update on Veterinary Chemotherapy guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Certificate issued by TECH Technological University.

*Successfully complete this program and receive your university qualification without having to travel or fill out laborious paperwork"*

This **Postgraduate Certificate in Update on Veterinary Chemotherapy** contains the most complete and up-to-date scientific program on the market.

After the student has passed the assessments, they will receive their corresponding **Postgraduate Certificate** issued by **TECH Technological University** via tracked delivery*.

The diploma issued by **TECH Technological University** will reflect the qualification obtained in the Postgraduate Certificate, and meets the requirements commonly demanded by labor exchanges, competitive examinations and professional career evaluation committees.

Title: **Postgraduate Certificate in Update on Veterinary Chemotherapy**

Official Nº of Hours: **300 hours.**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Por haber superado con éxito y acreditado el programa de

DIPLOMADO

en

Actualización en Quimioterapia Veterinaria

Se trata de un título propio de esta Universidad con una duración de 300 horas, con fecha de inicio dd/mm/aaaa y fecha de finalización dd/mm/aaaa.

TECH es una Institución Particular de Educación Superior reconocida por la Secretaría de Educación Pública a partir del 28 de junio de 2018.

A 17 de junio de 2020

Mtra.Tere Guevara Navarro
Rectora

Este título propio se deberá acompañar siempre del título universitario habilitante expedido por la autoridad competente para ejercer profesionalmente en cada país. código único TECH: AFWOR23S techtitute.com/titulos

*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH EDUCATION will make the necessary arrangements to obtain it, at an additional cost.

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