

# Postgraduate Certificate

Update on Veterinary  
Pharmacokinetics and  
Pharmacodynamics



## Postgraduate Certificate

### Update on Veterinary Pharmacokinetics and Pharmacodynamics

- » Modality: online
- » Duration: 6 weeks
- » Certificate: TECH Technological University
- » Dedication: 16h/week
- » Schedule: at your own pace
- » Exams: online

Website: [www.techtute.com/us/pharmacy/postgraduate-certificate/update-veterinary-pharmacokinetics-pharmacodynamics](http://www.techtute.com/us/pharmacy/postgraduate-certificate/update-veterinary-pharmacokinetics-pharmacodynamics)

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# 01

# Introduction

This high-level program offers specialized knowledge on the Veterinary Pharmacology of each animal species system. It studies in depth how medicines act in different animal species, covering Pharmacokinetics, Pharmacodynamics, Adverse Reactions and Interactions. The content of each topic provides the student with comprehensive training in the theoretical and practical aspects of Veterinary Pharmacokinetics and Pharmacodynamics. The practices that are proposed make the program unique by applying different simulated situations that will allow the student to develop skills for their performance in the real clinical environment. This specialization contains the most complete and up-to-date program, designed by course in Pharmacology, constituting a great tool for pharmacists who wish to specialize in the sector.



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

This Postgraduate Certificate addresses the concept and evolution of pharmacology and the objectives of Veterinary Pharmacology, to give way to the concepts of Pharmacokinetics and Pharmacodynamics. A high-quality training, which offers the most advanced resources in online training, to guarantee the student an effective, real and practical learning that boosts their skills to the highest level in this area of work.

Pharmacokinetics will cover topics of drug transport across membranes, as well as the concepts of drug release, absorption, distribution, metabolism and excretion, addressing the variability of response in different species.

The program also develops applied pharmacokinetics. It studies pharmacokinetic models, obtaining and evaluating pharmacokinetic parameters by means of practical applied problems and dosing to determine the calculation of prescribed dosing guidelines for each animal patient.

In Pharmacodynamics the student will become familiar with the mechanisms of action and the molecular aspects of the different pathways, as well as with the quantitative aspects in terms of Dose-Response curves, which will allow him/her to calculate the therapeutic index and the toxic index of the drugs.

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 in Update on Veterinary Pharmacokinetics and Pharmacodynamics** contains the most complete and up-to-date scientific program on the market. The most important features of the program include:

- ♦ Practical cases presented by experts in Veterinary Pharmacology
- ♦ The graphic, schematic, and eminently 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



*Acquire the most comprehensive knowledge in Veterinary Pharmacokinetics and Pharmacodynamics and the skills and attitudes for its practical application in a training created for excellence"*

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*Revolutionary training for its ability to reconcile the highest quality of learning with the most complete online training”*

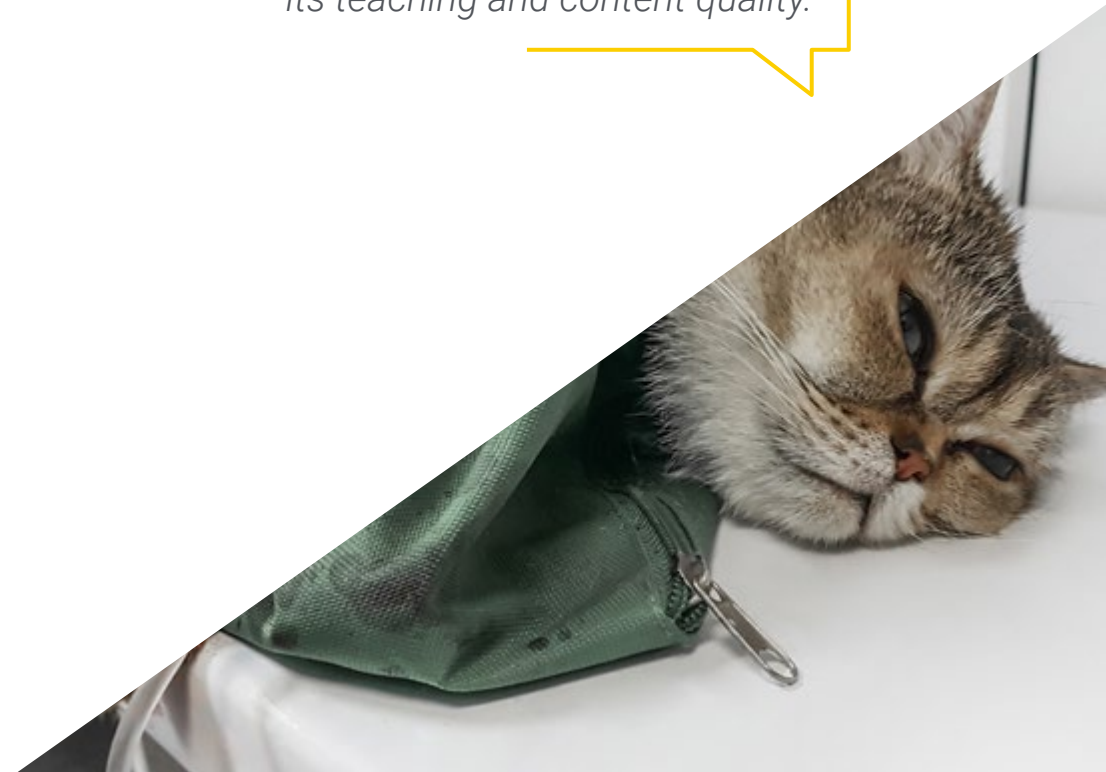
*A unique opportunity to learn with internationally renowned professors, with teaching, clinical and research experience.*

*Specialize in Veterinary Pharmacokinetics and Pharmacodynamics with the advantages of a revolutionary training for its teaching and content quality.*

The program's teaching staff includes professionals from sector who contribute their work experience to this training program, as well as renowned specialists from leading societies and prestigious 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 training programmed to train 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 during the academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.



# 02 Objectives

The program design of this program will allow the student to acquire the necessary competencies to update in the profession after studying in depth the key aspects of Veterinary Pharmacology. Its objective is to provide the student 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 he/she can better incorporate into the professional field. The knowledge poured in the development of the points of the study plan will drive the professional from a global perspective, with full training for the achievement of the proposed objectives.







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*A comprehensive course on new developments in pharmacokinetics and pharmacodynamics, of enormous importance for the prevention and treatment of diseases affecting animal health"*



## General Objectives

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- ♦ Examine the general concepts of pharmacology at the veterinary level
- ♦ Determine the mechanisms of action of drugs
- ♦ Analyze Pharmacokinetics and Pharmacodynamics



*Learn from leading professionals  
the latest advances in Update  
on Veterinary Pharmacokinetics  
and Pharmacodynamics”*





## Specific Objectives

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- ♦ Develop all those processes that affect a drug molecule when administered to an animal species
- ♦ Establish the different biological barriers and their significance in therapeutic effectiveness
- ♦ Examine the factors that will influence drug absorption, distribution and elimination processes
- ♦ Analyze how to manipulate the renal excretion process and its importance in the treatment of intoxications
- ♦ Establish, based on the pharmacodynamics and pharmacokinetics of a drug, its possible drug-drug interactions
- ♦ Identify and characterize at the molecular level the different types of pharmacological receptors
- ♦ Determine which second messengers and biochemical pathways are coupled to each of the pharmacological receptor types
- ♦ Present the relationship between the molecular phenomenon and the pharmacological effect
- ♦ Analyze all the phenomena involved in drug-receptor interaction
- ♦ Examine the different types of pharmacological agonism and antagonism
- ♦ Correctly establish the differences between the different species that are important for the administration of drugs or their therapeutic efficacy
- ♦ Develop the concepts of side, adverse and toxic effects

03

# 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 both nationally and internationally in high impact journals, books and conferences.



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*A complete educational program that will lead you to the exhaustive training necessary to intervene as a specialist in the theoretical and practical aspects of Veterinary Pharmacokinetics and Pharmacodynamics"*

## 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
- ♦ Evaluation professor in objective structured clinical evaluation of the medical degree



## Professors

### Dr. Luesma Bartolomé, María José

- ♦ Study group on prion diseases, vector-borne diseases and emerging zoonoses. University of Zaragoza
- ♦ Degree in Veterinary Medicine. University of Zaragoza
- ♦ Doctor of Veterinary Medicine. University of Zaragoza
- ♦ Study group of the University Research Institute. Research Institute
- ♦ Film and anatomy teacher. University Degree: Complementary Academic Activities. University of Zaragoza
- ♦ Master's Degree in Quality Systems Audits (Project: "Implementation of a quality system in a testing laboratory"). Diputación General de Aragón
- ♦ Professor of Anatomy and Histology. University degree: Graduate in Optics and Optometry. University of Zaragoza
- ♦ Professor of the Final Degree Project for University Degrees: Degree in Medicine. University of Zaragoza
- ♦ Professor of Morphology, Development and Biology. University degree: Professional Master's Degree in Initiation to Research in Medicine. University of Zaragoza
- ♦ Certificate B for the use of animals for experimental purposes
- ♦ Recognition of a six-year research period by the University Quality and Prospective Agency of Aragón (Government of Aragón)

# 04

# Structure and Content

The structure of this Postgraduate Certificate has been designed in such a way that the professional to whom it is addressed will be able to identify and solve problems related to veterinary pharmacology, thanks to a unique methodology and the support of the experts who have developed it. This program offers the student a realistic learning opportunity in the context of Veterinary Pharmacology, which makes it an extremely useful tool for the professional pharmacist. Through clinical simulations at a practical level, you will be able to face real situations and provide a broader and more effective response to them.







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*A great opportunity for the professional to advance in their competences and get up to date in all the novelties of pharmacological approach”*

## Module 1. General Pharmacology

- 1.1. Concept and Evolution of Pharmacology. Objectives of Veterinary Pharmacology
  - 1.1.1. Origin
  - 1.1.2. Evolution of Pharmacology as a Science
  - 1.1.3. Veterinary Pharmacology: Objectives
  - 1.1.4. General concepts
    - 1.1.4.1. Pharmaceuticals
    - 1.1.4.2. Medication
    - 1.1.4.3. Pharmaceutical Forms
    - 1.1.4.4. Others
- 1.2. Pharmacokinetics I: Drug Transport Systems across Biological Membranes.
  - 1.2.1. General Principles
  - 1.2.2. General Transportation Mechanisms
    - 1.2.2.1. Transport Across Cell Membranes
    - 1.2.2.2. Transport Through Intercellular Clefts
- 1.3. Pharmacokinetics II: Routes of Drug Administration. Concept of Absorption.
  - 1.3.1. General Principles
  - 1.3.2. Routes of Administrating Medication
    - 1.3.2.1. Enteral Routes
      - 1.3.2.1.1. Oral
      - 1.3.2.1.2. Rectal
      - 1.3.2.1.3. Sublingual
      - 1.3.2.1.4. Others: Inhalation, Otic, Conjunctival, Dermal or Topical
    - 1.3.2.2. Parenteral Routes
      - 1.3.2.2.1. Intravenous
      - 1.3.2.2.2. Intramuscular
      - 1.3.2.2.3. Subcutaneous
      - 1.3.2.2.4. Intrathecal
      - 1.3.2.2.5. Epidural
  - 1.3.3. Absorption Mechanisms
  - 1.3.4. Concept of Bioavailability
  - 1.3.5. Factors that Modify Absorption



- 1.4. Pharmacokinetics III Drug Distribution I
  - 1.4.1. Distribution Mechanisms
    - 1.4.1.1. Binding to Plasma Proteins
    - 1.4.1.2. Hematoencephalic Barrier
    - 1.4.1.3. Placental Barrier
  - 1.4.2. Factors that Modify the Distribution
  - 1.4.3. Distribution Volume
- 1.5. Pharmacokinetics IV: Drug Distribution ii. Pharmacokinetic Compartments.
  - 1.5.1. Pharmacokinetic Models
  - 1.5.2. Concepts of the Most Characteristic Parameters
    - 1.5.2.1. Apparent Volume of Distribution
    - 1.5.2.2. Aqueous Compartments
  - 1.5.3. Variability of the Response
- 1.6. Pharmacokinetics V: Drug Elimination: Metabolism.
  - 1.6.1. Concept of Metabolism
  - 1.6.2. Phase I and II Metabolic Reactions
  - 1.6.3. Hepatic Microsomal System: Cytochromes. Polymorphisms.
  - 1.6.4. Factors Influencing Biotransformation Processes
    - 1.6.4.1. Physiological Factors
    - 1.6.4.2. Pathological Factors
    - 1.6.4.3. Pharmacological Factors (Induction/Inhibition)
- 1.7. Pharmacokinetics VI: Drug Elimination: Excretion
  - 1.7.1. General Mechanisms
  - 1.7.2. Renal Excretion
  - 1.7.3. Biliary Excretion
  - 1.7.4. Other Excretion Routes
    - 1.7.4.1. Saliva
    - 1.7.4.2. Milk
    - 1.7.4.3. Sweat
  - 1.7.5. Elimination Kinetics
    - 1.7.5.1. Elimination Constant and Half-Life
    - 1.7.5.2. Metabolic and Excretion Clearance
  - 1.7.6. Factors that Modify the Excretion
- 1.8. Pharmacodynamics: Drug Action Mechanisms Molecular Aspects
  - 1.8.1. General Concepts Receptor
  - 1.8.2. Types of Receivers
    - 1.8.2.1. Ion Channel Associated Receptors
    - 1.8.2.2. Enzyme Receptors
    - 1.8.2.3. Receptors Associated with Prot. g
    - 1.8.2.4. Intracellular Receptors
  - 1.8.3. Drug- Receptor Interactions
- 1.9. Adverse Reactions to Medications. Toxicity
  - 1.9.1. Classification of Adverse Reactions According to their Origin
  - 1.9.2. Mechanisms of Production of Adverse Reactions
  - 1.9.3. General Aspects of Drug Toxicity
- 1.10. Pharmacological Intervention
  - 1.10.1. Concept of Pharmacological Interaction
  - 1.10.2. Modifications Induced by Pharmacological Interactions
    - 1.10.2.1. Synergy
    - 1.10.2.2. Agonism
    - 1.10.2.3. Antagonism
  - 1.10.3. Pharmacokinetic and Pharmacodynamic Interactions
    - 1.10.3.1. Variability in Response Due to Pharmacokinetic Causes
    - 1.10.3.2. Variability in Response due to Pharmacodynamic Causes



*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 considered 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. Gervas, 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.

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*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

At TECH we enhance the Harvard case method with the best 100% online teaching methodology available: Relearning.

Our University is the first in the world to combine the study of clinical cases with a 100% online learning system based on repetition, combining a minimum of 8 different elements in each lesson, which represent a real revolution with respect to simply studying and analyzing cases.

*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 the didactic development is highly specific and accurate.

These contents are then applied to the 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, you can watch them as many times as you 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 unique multimedia content presentation training system 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 Pharmacokinetics and Pharmacodynamics guarantees you, in addition to the most rigorous and updated training, access to a Postgraduate Certificate issued by TECH Technological University.





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*Successfully complete this training  
and receive your university degree  
without travel or laborious paperwork”*

This **Postgraduate Certificate in Update on Veterinary Pharmacokinetics and Pharmacodynamics** contains the most complete and updated scientific program on the market.

After the student has passed the evaluations, 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 Pharmacokinetics and Pharmacodynamics**

Official N° of hours: **150 h.**



\*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.

future  
health confidence people  
education information tutors  
guarantee accreditation teaching  
institutions technology learning  
community commitment  
personalized service innovation  
knowledge present  
development languages  
virtual classroom



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