

PHARMACOLOGY INTRODUCTION

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One of the most important jobs of a veterinary technician is to administer drugs as per the order of the DVM. This involves understanding the reasons for using the drugs, reasons for NOT using drugs, what happens when drugs enter the body, how the drugs exert their effect, and how adverse drug reactions manifest. This also involves understanding the importance of a valid veterinarian-client-patient relationship, labelling, law, and client education. This is meant to be an introduction to drugs, how they work in our patients, how they interact with each other, routes and techniques in administration, an introduction to medical math, and a quick look at some of our most commonly prescribed medications in the hospital.

VOCABULARY:

Drug: A substance used to diagnose, prevent or treat disease

Indications: reasons to use a drug

Contra-indications: reasons not to use a drug

Pharmacokinetics: what happens to drugs once they enter the body, ie what the body does to the drug

Pharmacodynamics: how drugs exert their effects, what the drug does to the body

Toxicity: how drug reactions manifest themselves

Valid Veterinary Client Patient Relationship: The set of circumstances that must exist between the veterinarian, the client, and the patient before the dispensing of prescription drugs is appropriate

Regimen: A program for administration of a drug that includes the route, the dose, the frequency and the duration of administration

Prescription Drug: A drug that is limited to use under the supervision of a veterinarian because of potential danger, difficulty of administration, or other considerations. Generally, these drugs either have potential toxic effects or must be administered in a way that requires the services of trained personnel

Extralabel Use: Use of a drug in a way not specified by the the US FDA label.

Over the Counter drugs: do not have enough potential to be toxic or do not require supervision of a veterinarian

Controlled Substances: Have the potential for abuse or dependance and are regulated by the DEA

Efficacy: The extent to which a drug causes the intended effects in a patient.

FDA / EPA / USDA / DEA: If you decide to go for your LVT, look into how these agencies regulate the development and use of veterinary drugs.

Compounding: in veterinary medicine, a drug can be compounded or diluted from the act of manufacturing to a concentration that is usable for the patient

All drugs have a chemical name, that we rarely see, describing their chemical composition.

The **trade name** is the name of a drug given by the manufacturer and owned by the manufacturer, for example, Rimadyl.

The **generic name** is the common name chosen by a manufacturer/company but not owned by the company, available as a patent expires, for example, Carprofen.

Pharmacokinetics:

This is the complex sequence of events that occurs after a drug is administered to a patient. Once a drug has been given, it is available for absorption into the bloodstream and delivery to the site where it will exert its action. After a drug is absorbed, it is distributed to various fluids and tissues in the body. A drug must reach the desired area at the required concentration to be effective. The body begins to immediately break down and excrete a drug, so it must be administered repeatedly. A **loading dose** can be a high initial dose until an appropriate blood level is reached. The dose is then reduced to replace the amount lost to elimination, **maintenance dose**. The point at which drug accumulation equals drug elimination is the **steady state**.

Pharmacodynamics: The study of the mechanisms by which drugs produce changes in the body. Drugs may enhance or depress cellular activity. Drugs can alter cell function. Drugs can combine with receptors on or in a cell like a lock and key.

When drugs bind to receptors, the geometric match must be exact for the desired effect to take place. The tendency for a drug to bind to a receptor is called **affinity**. A drug with a high level of affinity and efficacy binds a receptor and is called an **agonist**. A drug with less affinity and efficacy is called a **partial agonist**. A drug that blocks another chemical from combining with a receptor is called an **antagonist**. The **potency** of a drug is described as the amount of a drug needed to produce a desired response.

The **efficacy** of a drug represents the degree to which a drug produces its desired effect in a patient. The **therapeutic index** is the relationship between a drug's ability to achieve the desired effect and its tendency to produce toxic effects.

LD₅₀ the dose of a drug that is lethal to 50% of animals in a dose related trial

ED₅₀: the dose of a drug that produces the desired effect in 50% of animals in a dose related trial

Therapeutic index = LD_{50} / ED_{50}

The larger the value of the therapeutic index the greater the level of safety of the drug. Drugs with a narrow margin of safety must be administered with caution

Half-Life: the amount of time (in hours usually) that it takes for the quantity of the drug in the body to be reduced to 50%

Drug Absorption: before drugs reach their site of action they must pass across a series of cellular membranes making up the absorptive surfaces of the sites of administration. How well a drug is absorbed and reaches general circulation is called its bioavailability. Some drugs pass

through cell membranes very easily simply by diffusion. Some drugs move with fluid, or are affected by pH. Some drugs bind to fat.

Drug distribution: the process by which a drug is carried from the site of absorption to the site of action

Biotransformation = metabolism: the body's ability to change a drug chemically from the form in which it was administered to a form that can be eliminated. Most biotransformation is in the liver.

Drug excretion: Most drugs are metabolized by the liver and excreted by the kidneys.

ROUTES OF ADMINISTRATION:

PO	IA
IV	IC
IM	topical
SQ	IT
ID	inhalant
IP	

THE SEVEN RIGHTS:

- 1) right drug
- 2) right route
- 3) right time
- 4) right patient
- 5) right DVM
- 6) right dose
- 7) right documentation

Questions????

Reference: Applied Pharmacology for Veterinary Technicians 4th Edition, Wannamaker and Massey

MEDICAL MATH: An introduction.

- 1) **Dr. Wallace wants to send home Clavamox 250 mg tabs, 1 tab PO BID x 14 days. How many tabs is this? What warning labels?**
- 2) **Dr. Wilson wants to send home Clavamox 375 mg tablets, 1.5 tab PO BID x 14 days. How many tabs is this?**
- 3) **Dr. Wilson is sending home for a different patient, cephalexin 500 mg, 3 tabs PO BID x 14 days. How many tabs is this?**
- 4) **Dr. Clinton is sending home prednisone 10 mg: 1 tab PO BID x 3 d, then 1 tab SID x 3 d, then 1 tab eod x 7 d til recheck exam. How many tabs is that?**
- 5) **Dr. Sean McPeck is sending home tramadol, 50 mg, 1-2 tab PO q 8 -12 hours x 2 wks. How many tabs is that? Where is that drug kept? Can we just fill if the O calls it in? What warning labels?**
- 6) **Dr. Wallace is sending home meloxicam, 1.5 mg/ml, 0.34 mL PO SID x 7 d. What is the total volume for the script?**
- 7) ******BONUS****Your DVM wants to send home 400 mg of clavamox, PO BID x 14 days. Which would you choose? *****