

# KATZUNG's BASIC & CLINICAL PHARMACOLOGY

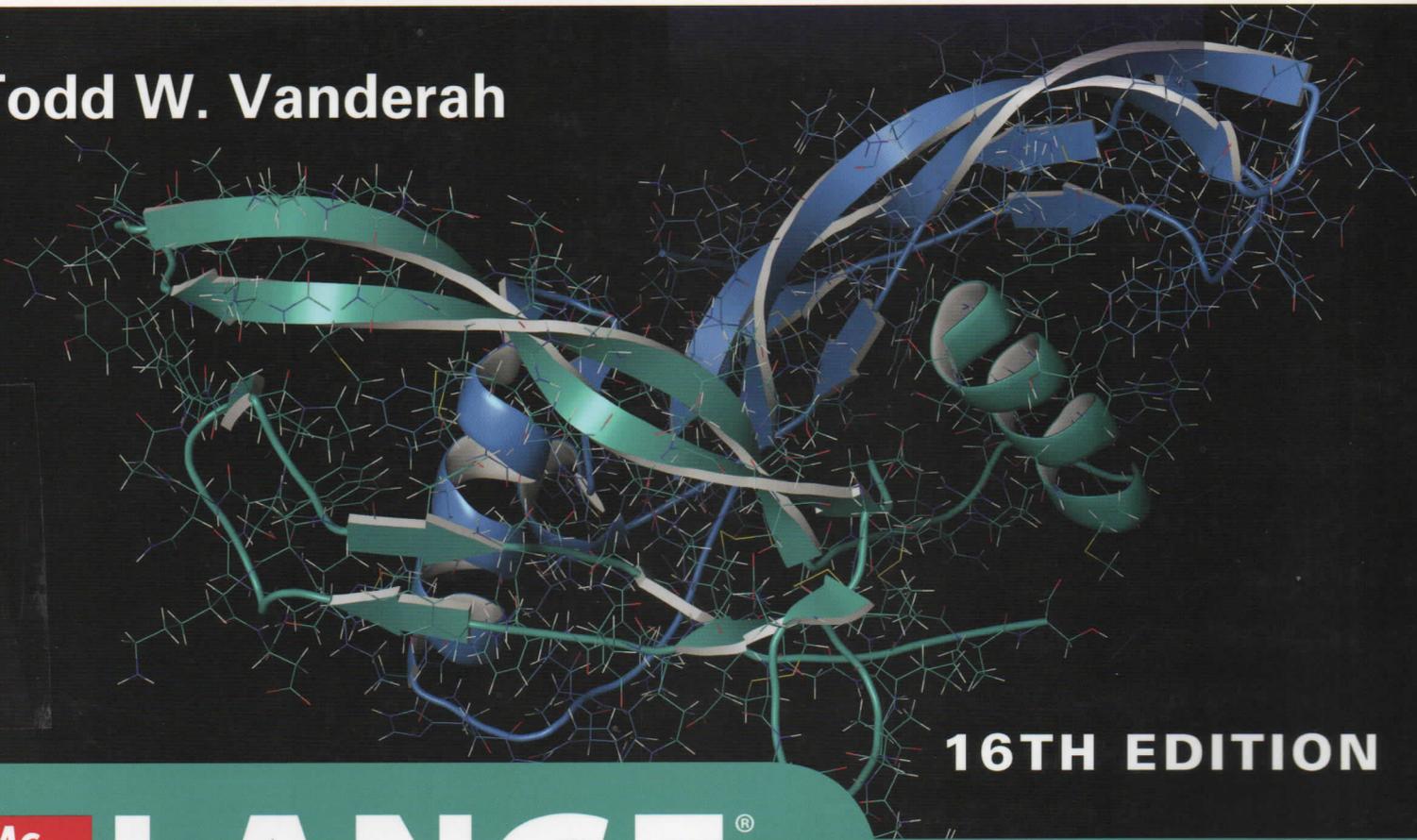
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**INTERNATIONAL EDITION**

**Todd W. Vanderah**



**16TH EDITION**

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Hill**

**LANGE<sup>®</sup>**

**SCHEDULE I**

(All nonresearch use illegal under federal law.)

**Flunitrazepam (Rohypnol)****Narcotics:**

Heroin and many nonmarketed synthetic narcotics

**Hallucinogens:**

LSD

MDA, STP, DMT, DET, mescaline, peyote, bufotenine, ibogaine, psilocybin, phencyclidine (PCP; veterinary drug only)

**Marijuana****Methaqualone****SCHEDULE II**(No telephone prescriptions, no refills.)<sup>2</sup>**Opioids:**

Opium: Opium alkaloids and derived phenanthrene alkaloids: codeine, morphine (Avinza, Kadian, MSContin, Roxanol), hydrocodone and hydrocodone combinations (Zohydro ER, Hycodan, Vicodin, Lortab), hydromorphone (Dilaudid), oxycodone (Exalgo), oxycodone (dihydrocodeinone, a component of Oxycontin, Percodan, Percocet, Roxicodone, Tylox)

Designated synthetic drugs: meperidine (Demerol), methadone, levorphanol (Levo-Dromoran), fentanyl (Duragesic, Actiq, Fentora), alfentanil (Alfenta), sufentanil (Sufenta), remifentanil (Ultiva), tapentadol (Nycynta)

**Stimulants:**

Coca leaves and cocaine

Amphetamines: Amphetamine complex (Biphetamine), Amphetamine salts (Adderall), Dextroamphetamine (Dexedrine, Procentra), Lisdexamfetamine (Vyvanse), Methamphetamine (Desoxyn), Methylphenidate (Ritalin, Concerta, Methylin, Daytrana, Medadate), Above in mixtures with other controlled or uncontrolled drugs

**Cannabinoids:**

Nabilone (Cesamet)

**Depressants:**Amobarbital (Amytal)  
Pentobarbital (Nembutal)  
Secobarbital (Seconal)**SCHEDULE III**

(Prescription must be rewritten after 6 months or five refills.)

**Opioids:**

Buprenorphine (Buprenex, Subutex)

Mixture of above Buprenorphine and Naloxone (Suboxone)

The following opioids in combination with one or more active nonopioid ingredients, provided the amount does not exceed that shown:

Codeine and dihydrocodeine: not to exceed 1800 mg/dL or 90 mg/tablet or other dosage unit

Opium: 500 mg/dL or 25 mg/5 mL or other dosage unit (paregoric)

**Stimulants:**Benzphetamine (Regimex)  
Phendimetrazine**Depressants:**Schedule II barbiturates in mixtures with noncontrolled drugs or in suppository dosage form  
Barbiturates (butabarbital [Butisol], butalbital [Fiorinal])  
Ketamine (Ketalar)  
Perampanel (Fycompa)**Cannabinoids:**

Dronabinol (Marinol)

**Anabolic Steroids:**

Fluoxymesterone (Androxy), Methyltestosterone (Android, Testred), Oxandrolone (Oxandrin), Oxymetholone (Androl-50), Testosterone and its esters (AndroGel)

**SCHEDULE IV**

(Prescription must be rewritten after 6 months or five refills; differs from Schedule III in penalties for illegal possession.)

**Opioids:**Butorphanol (Stadol)  
Difenoxin 1 mg + atropine 25 mcg (Motofen)  
Pentazocine (Talwin)**Stimulants:**Armodafinil (Nuvigil)  
Diethylpropion (Tenuate) not in USA  
Modafinil (Provigil)  
Phentermine (Adipex-P)**Depressants:**Benzodiazepines: Alprazolam (Xanax), Chlordiazepoxide (Librium), Clobazam (Onfi), Clonazepam (Klonopin), Clorazepate (Tranxene), Diazepam (Valium), Estazolam, Flurazepam (Dalmene), Lorazepam (Ativan), Midazolam (Versed), Oxazepam, Quazepam (Doral), Temazepam (Restoril), Triazolam (Halcion)  
Carisoprodol (Soma)  
Chloral hydrate  
Eszopiclone (Lunesta)  
Lacosamide (Vimpat)  
Meprobamate  
Methohexital (Brevital)  
Paraldehyde not in USA  
Phenobarbital  
Suvorexant (Belsomra)  
Tramadol (Ultram)  
Zaleplon (Sonata)  
Zolpidem (Ambien)**SCHEDULE V**

(As any other nonopioid prescription drug)

Brivaracetam (Briviact)  
Codeine: 200 mg/100 mL  
Cannabidiol (Epidiolex)  
Difenoxin preparations: 0.5 mg + 25 mcg atropine  
Dihydrocodeine preparations: 10 mg/100 mL  
Diphenoxylate (not more than 2.5 mg and not less than 0.025 mg of atropine per dosage unit, as in Lomotil)  
Lacosamide (Vimpat)  
Opium preparations: 100 mg/100 mL  
Pregabalin (Lyrica)<sup>1</sup>See <https://www.deadiversion.usdoj.gov/schedules>.<sup>2</sup>Emergency prescriptions may be telephoned if followed within 7 days by a valid written prescription annotated to indicate that it was previously placed by telephone. CMEA (Combat Methamphetamine Epidemic Act of 2005) establishes regulations for ephedrine, pseudoephedrine, and phenylpropanolamine over-the-counter sales and purchases.

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# Katzung's Basic & Clinical Pharmacology

Sixteenth Edition

Edited by  
**Todd W. Vanderah, PhD**  
*Regents Professor and Chair*  
*Department of Pharmacology*  
*University of Arizona College of Medicine, Tucson*



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Neal L. Benowitz, MD

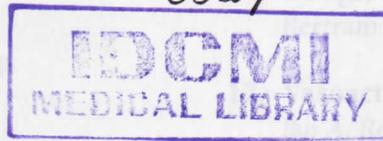
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## SECTION I BASIC PRINCIPLES

### CHAPTER

# 1

# Introduction: The Nature of Drugs & Drug Development & Regulation

Todd W. Vanderah, PhD, & Bertram G. Katzung, MD, PhD

### CASE STUDY

A 78-year-old woman is brought to the hospital because of suspected aspirin overdose. She has taken aspirin for joint pain for many years without incident, but during the past year, she has exhibited signs of cognitive decline. Her caregiver finds her confused, hyperventilating, and vomiting. The caregiver finds an empty bottle of aspirin tablets and calls 9-1-1. In the

emergency department, samples of venous and arterial blood are obtained while the airway, breathing, and circulation are evaluated. An intravenous (IV) drip is started, and gastrointestinal decontamination is started. After blood gas results are reported, sodium bicarbonate is administered via the IV. What is the purpose of the sodium bicarbonate?

**Pharmacology** can be defined as the study of substances that interact with living systems through chemical processes. These interactions usually occur by binding of the substance to regulatory molecules and activating or inhibiting normal body processes. These substances may be chemicals administered to achieve a beneficial therapeutic effect on some process within the patient or for their toxic effects on regulatory processes in parasites infecting the patient. Such deliberate therapeutic applications may be

considered the proper role of **medical pharmacology**, which is often defined as the science of substances used to prevent, diagnose, and treat disease. **Toxicology** is the branch of pharmacology that deals with the undesirable effects of chemicals on living systems, from individual cells to humans to complex ecosystems (Figure 1–1). The nature of drugs—their physical properties and their interactions with biological systems—is discussed in part I of this chapter.