

**UNIVERSITY OF SPLIT
SCHOOL OF MEDICINE
PHARMACOLOGY**

LITERATURE:

Katzung BG, Masters S, Trevor AJ. *Basic and Clinical Pharmacology, 14th edition*. New York: McGraw-Hill Medical; 2018

EXAM MATERIAL FROM THE TEXTBOOK

The purpose of this material is to assist students in preparing for the exam in pharmacology. Entire chapters or their sections that are not part of the exam curricula are marked, as well as the parts needing particular attention. The listed generic names are typical representatives of a particular drug group and they represent a majority of the drugs to be memorized for the final exam. The summary Tables at the end of each chapter may be helpful for review purposes as they provide condensed key information about characteristic drugs from different drug groups.

Chapter 1.

Introduction: The Nature of Drugs & Drug Development & Regulation

Completely. Only Tables 1-2 and 1-4 should be studied. The framed text „Drug studies – the types of evidence“ can be exam material.

Chapter 2.

Drug Receptors & Pharmacodynamics

Completely. It is not necessary to remember table data. Table 2-1 only informatively.

Chapter 3.

Pharmacokinetics & Pharmacodynamics: Rational Dosing & the Time Course of Drug Action

Completely. It is not necessary to remember numerical data in the Tables.

The framed texts can be exam material. Pay attention to Table 3-3.

Chapter 4.

Drug Biotransformation

It is not necessary to remember the examples from Tables 4-1, 4-3, 4-4, and 4-7. Pay attention to CYP3A4, 1A2, 2C9, 2C19, 2D6 from Table 4-2; study the enzymes that metabolize most drugs, in the context of major interactions and genetic factors influencing their enzymatic activity. Pay attention to Tables 4-5 and 4-6 as well; study the examples of the most important inhibitors and inducers of drug metabolism in humans.

Chapter 5.

Pharmacogenomics

It is not necessary to remember the examples from Tables 5-1, 5-2, 5-3, 5-4. It is not necessary to remember the allele variants for enzymes and transporters highlighted in the text.

Chapter 6.

Introduction to Autonomic Pharmacology

Completely.

Chapter 7.

Cholinoceptor-Activating & Cholinesterase-Inhibiting Drugs

Completely. The mechanism of action, effects on organ systems, basic pharmacokinetics, and main representatives should be known.

- Direct-acting cholinoreceptor stimulants: pilocarpine and bethanechol
- Indirect-acting cholinomimetics: neostigmine, edrophonium, physostigmine, organophosphates

Clinical pharmacology of cholinomimetics: main indication and basic information on adverse effects.

Chapter 8.

Cholinoceptor-Blocking Drugs

The subtitle „Basic and clinical pharmacology of the ganglion-blocking drugs” is not exam material. Concentrations from Table 8-2 and the usual drug dosage from Table 8-3 do not have to be memorized.

Basic pharmacology of the muscarinic receptor-blocking drugs: mechanism of action, effects on organ systems, basic pharmacokinetic, main representatives, main indications, and adverse effects.

- Pay special attention: atropine, ipratropium, tiotropium, umeclidinium, tropicamide, scopolamine, butylscopolamine, tropium, and solifenacin.

Chapter 9.

Adrenoceptor Agonists & Sympathomimetic Drugs

Completely.

It is not necessary to memorize the chromosome of the receptor from Table 9-1 and the quantity of tyramine from Table 9.5.

Therapeutic use of sympathomimetic drugs: focus on indications (shortly!) and rational basis for administration. The text in the frame „An application of basic pharmacology to a clinical problem” can be exam material.

- Pay special attention: phenylephrine, oxymetazoline; salbutamol, salmeterol, vilanterol (see also Chapter 20), fenoldopam (see also Chapter 11), dobutamine, methyldopa, clonidine
- Sympathomimetics with mixed effects: ephedrine, amphetamine

Basic data on sympathomimetic ADRs.

Chapter 10.

Adrenoceptor Antagonist Drugs

Completely. In subtitles „Clinical pharmacology of the alpha-receptor-blocking drugs” and „Clinical pharmacology of the beta-receptor-blocking drugs” focus on the indications (shortly), rational basis for administration, and important adverse effects (toxicity)

The text in the frame „The treatment of glaucoma” can be exam material.

- Special attention to adreno-receptor antagonists: phentolamine, doxazosin, tamsulosin; atenolol, metoprolol, propranolol, bisoprolol, carvedilol, timolol, nebivolol, sotalol, esmolol, pindolol

Chapter 11.

Antihypertensive Agents

The subtitle „Clinical pharmacology of antihypertensive agents” is not exam material. It is not required to memorize drug dosage from Table 11-2.

- Drugs influencing sodium, potassium, and water balance (see also Chapter 15)
- Drugs modifying sympathetic nerve system function: sympathoplegic drugs with central activity (particularly methyldopa, clonidine, moxonidine, urapidil); adrenoceptor antagonists (see Chapter 10.)
- Vasodilators: hydralazine, minoxidil, sodium nitroprusside, diazoxide, fenoldopam (basic pharmacodynamic characteristics and indications)
- Calcium channel blockers: basic pharmacodynamics, pharmacokinetics, main therapeutic indications and adverse drug reactions (ADRs), particularly: verapamil, diltiazem, amlodipine, nimodipine (see also Chapters 12 and 14)
- Renin-angiotensin-aldosterone system inhibitors:
 - ACE inhibitors: haemodynamic and other effects of this drug group, main clinical indications and ADRs (particularly captopril, enalapril, lisinopril, ramipril) (see also Chapter 13)
 - Angiotensin receptor-blocking agents: haemodynamic and other effects of angiotensin receptor blockade, clinical indications and ADRs, (i.e. losartan and valsartan); (see also Chapter 13.)
 - Renine inhibitors: aliskiren (see p. 304-305 in Chapter 17)
 - Aldosterone antagonists (see also Chapter 15: potassium-sparing diuretics- spironolactone, eplerenone)

Chapter 12.

Vasodilators & the Treatment of Angina Pectoris

It is not necessary to memorize drug dosage from Tables 12-3 and 12-5. The framed text „Drugs used in the treatment of erectile dysfunction” and „Special coronary vasodilators“ can be exam material. Pay special attention to:

- nitrates and nitrites (nitroglycerin, isosorbide mononitrate, isosorbide dinitrate), mechanism of action, effects on organ systems, main indications for administration and ADRs (see also Chapter 13)
- drugs used in the treatment of erectile dysfunction (sildenafil and alprostadil), interactions with nitrites

- calcium channel blockers (like in Chapter 11)
- beta-blockers: see also Chapters 10 and 11
- newer antianginal drugs: ranolazine, trimetazidine, ivabradine

Clinical pharmacology of drugs used to treat angina: explanation of Table 12-7.

Treatment of peripheral artery disease and intermittent claudication: only informatively.

Chapter 13.

Drugs Used in Heart Failure

Subtitles „Control of normal cardiac contractility“ and „Pathophysiology of heart failure“ are not exam material. However, it is recommended to read, for a better understanding of the pharmacology of the heart failure treatment.

Basic pharmacology of drugs used in heart failure:

- digitalis (digoxin), mechanism of action, cardiac and extracardial effects, indications and ADRs.
- other positive inotropic drugs used in heart failure: i.e. milrinone, dobutamine (see also Chapter 9), levosimendan
- drugs without positive inotropic effects used in heart failure:
 - especially loop diuretics and aldosterone antagonists (see also Chapter 15)
 - ACE inhibitors, angiotensin receptor blockers, and related agents (see also Chapters 11 and 12)
 - vasodilators: nesiritide; ularitide, bosentan (see also subtitles „Natriuretic peptides“ and „Endothelins“, Chapter 17)
 - beta-adrenoceptor blockers (see also Chapter 10)

Within the subtitle „Clinical pharmacology of drugs used in heart failure“ focus on specific drugs/groups used in acute and chronic heart failure, rather than on the principles and concepts of pharmacotherapy. Data from Table 13-4 should not be memorized, and Table 13-3 should be studied only at an informative level.

Chapter 14.

Agents Used in Cardiac Arrhythmias

The subtitles “Electrophysiology of normal cardiac rhythm” and „Mechanisms of arrhythmias” are not exam material, but the reading is recommended for a better understanding of the antiarrhythmic agents’ pharmacology. The subtitle “Principles in the clinical use of antiarrhythmic agents” is not exam material as well.

Data from Table 14-1 is not exam material. The framed text “The nonpharmacologic therapy of cardiac arrhythmias” and „Antiarrhythmic drug-use principles applied to atrial fibrillation” are not exam material.

Pay special attention to the following antiarrhythmic drugs:

- sodium channel-blocking drugs (class 1): disopyramide (1A), lidocaine and mexiletine (1B), propafenone and flecainide (1C)
- beta adrenoreceptor-blocking drugs (class 2): propranolol, sotalol (see also Chapters 10, 11 and 12)
- drugs that prolong the action potential (class 3): amiodarone, dronedarone (sotalol)
- calcium channel-blocking drugs (class 4): verapamil

- miscellaneous antiarrhythmic agents: digoxin (see also Chapter 13.), ivabradine, ranolazine, adenosine, potassium, magnesium

Chapter 15.

Diuretic Agents

Not necessary to memorize data from Tables 15-3, 15-4, 15-5, 15-6, and 15-7.

Basic pharmacology of diuretic agents – mechanism of action, indications and ADRs

- carbonic anhydrase inhibitors: acetazolamide, dorzolamide
- SGL2T inhibitors (see also Chapter 41): dapagliflozin, canagliflozin
- loop diuretics: furosemide, torasemide, ethacrynic acid
- thiazides (see also Chapter 11): hydrochlorothiazide, chlortalidone, indapamide
- potassium-sparing diuretics: amiloride, triamterene, spironolactone, eplerenone
- agents that alter water excretion:
 - osmotic diuretics: mannitol
 - ADH antagonists: conivaptan

Within the subtitle “Clinical pharmacology of diuretic agents” focus on the main indications.

Chapter 16.

Histamine, Serotonin, & the Ergot Alkaloids

Drug dosages from Tables 16-2, 16-5, and 16-6 do not need to be memorized. Table 16-3 should be studied only informatively. Pay special attention:

- histamine receptor antagonists: diphenhydramine, dimenhydrinate, cetirizine, loratadine, fexofenadine
- in the subchapter „Serotonin” focus on the following content:
 - “Serotonin agonists”: lorcaserin (a 5-HT_{2C} agonist) and buspirone (see also Chapter 22)
 - “5-HT_{1D/1B} agonists and migraine headache”: sumatriptan and zolmitriptan
 - other agents in migraine treatment: erenumab
 - “Serotonin antagonists”: ondansetron (see also Chapter 62)
- subchapter „Ergot alkaloids”: ergotamine, ergometrine (ergonovine), bromocriptine, cabergoline
 - subtitle „Clinical pharmacology of ergot alkaloids” focus on main indications (shortly) and ADRs (toxicity)

The framed texts “Melatonin pharmacology (ramelteon)”, “Serotonin syndrome and similar syndromes” and “Treatment of obesity” only informatively.

Chapter 17.

Vasoactive Peptides

Subtitles „Angiotensin“ (special attention to the Figure 17–3), „Kinins“ (special attention to the Figure 17-4), Natriuretic peptides“ and „Endothelins“. The remaining text only informatively (not exam material.).

Chapter 18.

The Eicosanoids: Prostaglandins, Thromboxanes, Leukotrienes, & Related Compounds

Although this chapter is a useful reminder on the physiology and biochemistry of eicosanoids which may be helpful for a better understanding of NSAID and drugs used in the treatment of asthma, most of the Chapter content is not exam material. The basic physiology of eicosanoid synthesis and pharmacological inhibitors of eicosanoid synthesis (p. 332) should be known.

You should also be able to explain their main indications for use regarding the clinical pharmacology of eicosanoids.

Pay attention to the products of the arachidonic acid pathway important in clinical practice: alprostadil, misoprostol, latanoprost, iloprost.

Chapter 19.

Nitric Oxide

Not exam material; a useful reminder of nitric oxide physiology.

Chapter 20.

Drugs Used in Asthma

Table 20-1 is not exam material. Pay special attention to:

- sympathomimetics: adrenaline (epinephrine), salbutamol, salmeterol, formoterol, indacaterol, vilanterol
- methylxanthines: theophylline, aminophylline
- antimuscarinic agents: ipratropium bromide, tiotropium, umeclidinium
- corticosteroids: fluticasone, mometasone, budesonide, beclometasone
- cromolyn, nedocromil
- leukotriene inhibitors: montelukast, zafirlukast, zileuton
- anti-IgE antibody: omalizumab
- anti-IL-5 antibodies: only informatively

The subtitle “Clinical pharmacology of drugs used in the treatment of asthma” is not exam material.

Chapter 21.

Introduction to the Pharmacology of CNS Drugs

Not exam material.

Chapter 22.

Sedative-Hypnotic Drugs

The usual drug dosage from Table 22-1 and 22-3 should not be memorized. Pay special attention to:

- benzodiazepines: diazepam, alprazolam, triazolam, oxazepam, lorazepam, midazolam (see also Chapter 25), clonazepam (see also Chapter 24); antagonist flumazenil
- barbiturates: phenobarbital (see Chapter 24), thiopental (see Chapter 25)
- newer hypnotics: zolpidem
- 5-HT-receptor agonist: buspirone (see Chapter 16)
- orexin antagonist: only informatively
- melatonin receptor agonists: ramelteon

Subtitle “Clinical pharmacology of sedative-hypnotics”: focus on main indications (shortly) and ADRs (toxicity).

Chapter 23.

The Alcohols

Not exam material.

Chapter 24.

Antiseizure Drugs

The subtitles „Drug development for epilepsy“, „Classification of seizures“, „Treatment of epilepsy“ only informatively. Tables 24-1 and 24-2 should be learned as a prerequisite for understanding medications for particular types of convulsions. Subtitles “Mechanisms of action”, “Pharmacokinetics” and Figure 24-1 are exam material. Table 24-3 is not exam material.

Pay special attention to:

- subchapter "Drugs used for focal (partial-onset) seizures": carbamazepine, phenytoin, gabapentin, tiagabine
- subchapter "Drugs effective for focal seizures and certain generalized onset seizure types": lamotrigine, levetiracetam, phenobarbital
- subchapter "Drugs effective for generalized onset seizures": valproate, topiramate
- subchapter "Drugs effective for generalized absence seizures": ethosuximide
- subchapter "Drugs effective for infantile spasms (West’s syndrome)": vigabatrin
- subchapter "Other drugs used in management of seizures and epilepsy": diazepam, lorazepam, midazolam, clonazepam

Other drugs noted within the chapter are not exam material. Subchapters „Additional topics“ with the following subtitles: „Status epilepticus“, „Teratogenicity“, „Breastfeeding“ i „Suicidality“ only informatively.

Chapter 25.

General Anesthetics

Completely. The framed text “Sedation and monitored anesthesia care” is not exam material. The other framed text “What does anesthesia represent and where does it work?” is exam material. Table 25-1 should be studied only informatively, and Table 25-2 is not exam material.

- Inhaled anesthetics: nitrous oxide, halothane, sevoflurane (pharmacokinetics and ADRs)
- Intravenous anesthetics: barbiturates (thiopental (see Chapters 22 and 24), benzodiazepines (see also Chapter 22), propofol, ketamine, dexmedetomidine (mechanism of action, indications, side effects)).

Chapter 26.

Local Anesthetics

Completely. The data from Tables 26-1 (just understand the differences between ester and amide anesthetics), 26-2, and 26-3 should not be memorized. The framed text "Historical development of local anesthesia" and "Lipid resuscitation" are not exam material.

Basic pharmacology of local anesthetics: cocaine, tetracaine, lidocaine (see also Chapter 14), bupivacaine, benzocaine.

In the subchapter “Clinical pharmacology of local anesthetics” focus on the section “Toxicity”.

Chapter 27.

Skeletal Muscle Relaxants

Basic pharmacology of neuromuscular blocking drugs (mechanism of action, indications, ADRs, antidotes):

- nondepolarizing relaxant drugs: pancuronium, tubocurarine
- depolarizing relaxant drugs: succinylcholine
- spasmolytics: diazepam (also see Chapter 22), dantrolene, botulinum toxin (see Chapter 6), baclofen.

Chapter 28.

Pharmacologic Management of Parkinsonism & Other Movement Disorders

Introduction and subtitle “Parkinsonism” are not exam material but are recommended for a better understanding of the drugs described in this chapter. Focus on the pharmacology of the drugs used for Parkinsonism.

Likewise, drugs in the subtitle “Other movement disorders” are not exam material. The text in the frame “MPTP and parkinsonism” is not exam material as well.

Pay special attention to:

- levodopa + carbidopa (mechanism of action, ADRs)
 - dopamine receptor agonists: bromocriptine, pramipexole, ropinirole
 - MAO inhibitors: selegiline, rasagiline
 - COMT inhibitors: entacapone
 - amantadine
 - anticholinergic drugs: biperiden, benztropine
- (basic mechanisms of action of listed drugs)

Chapter 29.

Antipsychotic Agents & Lithium

The subtitle “Nature of psychosis and schizophrenia” and the hypotheses of schizophrenia are not exam material, but they are recommended for a better understanding of antipsychotic agents and their mechanism of action.

In the subtitle “Basic pharmacology of antipsychotic agents” pay special attention to:

- classic antipsychotics: chlorpromazine, thiothixene, haloperidol
- atypical - newer: clozapine, olanzapine, quetiapine, risperidone

In the subtitle “Clinical pharmacology of antipsychotic agents” focus only on indications and ADRs. Choice, dosage, regimens and maintenance treatment are not exam material, including Tables 29-3 and 29-4.

In the paragraph “Lithium, mood-stabilizing drugs and other treatment for bipolar disorder” focus on the text in “Basic pharmacology of lithium”. In the text “Clinical pharmacology of

lithium” focus on indications, interactions and ADRs related to lithium. Among other drugs, pay attention to valproic acid and carbamazepine (also see Chapter 24)

Chapter 30.

Antidepressant Agents

Hypotheses of the depression pathophysiology are not exam material but advised for better understanding of antidepressants’ mechanism of action.

„Basic pharmacology of antidepressants” completely. Pay special attention to:

- selective serotonin reuptake inhibitors: fluoxetine, sertraline, escitalopram
- selective serotonin-norepinephrine reuptake inhibitors: venlafaxine, duloxetine
- tricyclic: imipramine, desipramine, amitriptyline
- 5-HT₂ antagonists: trazodone
- tetracyclic and monocyclic: mirtazapine, bupropion
- MAOIs: selegiline (see also Chapter 28), moclobemide

In the subtitle “Clinical pharmacology of antidepressants” focus on “Clinical indications”, “Adverse effects”, “Overdose”, and “Drug interactions”.

Chapter 31.

Opioid Agonists & Antagonists

Pharmacodynamics: mechanism of action of opioids (Figures 31-1 to 31-4). Table 31-2 only in principle, others in more detail (exam material). The framed text " Ion channels and novel analgesic targets" only informatively. The subtitles “Clinical use of opioid analgesics" and "Toxicity and undesired effects" need to be learned.

Specific drugs:

- strong agonists: morphine, heroin, methadone, fentanyl (see also Chapter 25)
- partial agonists: codeine, oxycodone, loperamide (see also Chapter 62)
- mixed agonists/antagonists: buprenorphine, pentazocine
- other: tramadol
- antitussives: codeine, dextromethorphan, pholcodine
- antagonists: naloxone, naltrexone

Chapter 32.

Drugs of Abuse

The subtitle “Basic neurobiology of drug abuse” is not exam material, but it is recommended for better understanding. The same goes for the text in the frames “Animal models in addiction research”, “The dopamine hypothesis of addiction” and “Synaptic plasticity, altered circuit function, and addiction”.

Basic pharmacology of drugs of abuse:

- opioids (see also Chapter 31)
- cannabinoids
- LSD
- gamma-hydroxybutyric acid (GHB)
- barbiturates, alcohol, benzodiazepines
- cocaine

- amphetamines
- ecstasy

Basic mechanisms of action and effects of listed drugs.

Chapter 33.

Agents Used in Cytopenias; Hematopoietic Growth Factors

The data in Tables 33-1, 33-2, 33-3 do not have to be memorized. The framed text "Sickle cell disease and hydroxyurea" and "Folic acid supplementation: a public health dilemma" are not exam material. All figures are included in the test material.

Agents used in anemias:

- iron: oral and parenteral preparations, pharmacokinetics and ADRs
- vitamin B12 and folic acid, basic biochemical role in purine and DNA synthesis (related to the mechanism of action of antimetabolites in Chapter 54 and to the action of sulphonamides and trimethoprim in Chapter 46)

Hematopoietic growth factors:

- erythrocyte-stimulating agents: erythropoietin
- myeloid growth factors: filgrastim, pegfilgrastim
- megakaryocyte growth factors: IL-11, romiplostim, eltrombopag

Chapter 34.

Drugs Used in Disorders of Coagulation

The subtitles "Mechanism of blood coagulation" and "Blood coagulation cascade" are not exam material, but they are recommended for reading in order to better understand the drugs described in this chapter.

Tables 34-1 and 34-3 just at an informative level.

Basic pharmacology of the anticoagulant drugs:

- indirect thrombin inhibitors: heparin, LMW heparins, fondaparinux (mechanism of action, indications, ADRs, and antidote)
- direct thrombin inhibitors: hirudin, lepirudin, dabigatran, idarucizumab (antidote)
- oral direct Xa inhibitors: rivaroxaban, apixabane
- warfarin & other coumarin anticoagulants: warfarin (mechanism of action, administration, important interactions, ADRs, and antidote)

Basic pharmacology of the fibrinolytic drugs:

- streptokinase, alteplase (mechanism of action, indications, ADRs)

Drugs used in bleeding disorders:

- vitamin K; the rest is not exam material

Antiplatelet agents: completely!

- acetylsalicylic acid (see also Chapter 36), abciximab (see also p. 995 in Chapter 55), eptifibatide, cilostazol, dipyridamole, ticlopidine, clopidogrel, prasugrel, ticagrelor (mechanism of action, indications, ADRs).

Chapter 35.

Agents Used in Dyslipidemia

The subtitle “Pathophysiology of hyperlipoproteinemia” is not exam material, but it is recommended for reading in order to better understand the pharmacology of the drugs described in this chapter. The subtitle “Dietary management of hyperlipoproteinemia” is not exam material.

“Basic and clinical pharmacology of drugs used in hyperlipidemia”: focus on the mechanism of action, indications and adverse effects of drugs; the data from Table 35-1 and 35-2 should not be memorized.

Pay special attention to:

- statins: lovastatin, atorvastatin, simvastatin, rosuvastatin
- fibrates: fenofibrate, gemfibrozil
- niacin
- bile acid-binding resins: colestipol, cholestyramine
- inhibitors of intestinal sterol absorption: ezetimibe

Subtitle “Treatment with drug combinations” only informatively.

Chapter 36.

Nonsteroidal Anti-Inflammatory Drugs, Disease-Modifying Antirheumatic Drugs, Nonopioid Analgesics, & Drugs Used in Gout

The subtitles “The immune response” and “Therapeutic strategies” are not exam material.

Nonsteroidal anti-inflammatory drugs (NSAID): completely! The dosage from Table 36-1 is not necessary.

For each NSAID it is important to know: the mechanism of action, pharmacokinetics, indications, ADRs

NSAIDs:

- aspirin
- selective COX-2 inhibitors: celecoxib
- nonselective COX inhibitors: ibuprofen, ketoprofen, diclofenac, naproxen, indomethacin, piroxicam

Disease-modifying antirheumatic drugs (DMARDs):

- azathioprine (see also Chapter 55)
- cyclophosphamide and methotrexate (see also Chapter 54)
- chloroquine (see also Chapter 52)
- mycophenolate mofetil (see also Chapter 55)
- antilymphocyte agents: abatacept, rituximab (see also Chapters 54 and 55)
- TNF-alpha blocking agents (see also Chapter 55): infliximab, adalimumab, etanercept
- sulfasalazine (see also Chapter 62)
- IL-1 inhibitors: anakinra

Glucocorticoids (see also Chapter 39)

Other analgesics:

- acetaminophen (paracetamol) (see also Chapter 58, p. 1040)
- tramadol (see also Chapter 31)
- metamizole

Drugs used in gout:

- colchicine
- sulfapyrazone
- allopurinol
- febuxostat
- pegloticase

Chapter 37.

Hypothalamic & Pituitary Hormones

The physiology of hypothalamic and pituitary hormones is not exam material, along with Table 37-1 and 37-2, but it is recommended for reading in order to better understand the pharmacology of the drugs described in this chapter.

- growth hormone and antagonist octreotide
- gonadotropin-releasing hormone analog: leuprolide
- prolactin
- dopamine agonists: bromocriptine, cabergoline
- oxytocin
- vasopressin, desmopressin, antagonist conivaptan

Chapter 38.

Thyroid & Antithyroid Drugs

Thyroid physiology at the beginning of the Chapter is not exam material, but the reading is recommended in order to better understand the pharmacology of described drugs. Subchapter “Clinical pharmacology of thyroid & antithyroid drugs” is not exam material. Data in Tables 38-1, 38-2, and 38-5 need not be memorized. Tables 38-3 and 38-4 only conceptually. “Basic pharmacology of thyroid & antithyroid drugs” (mechanism of action, indications, and ADRs):

- thyroid hormones: levothyroxine
- antithyroid agents:
 - thioamides: methimazole (thiamazole), propylthiouracil
 - anion inhibitors: thiocyanate
 - iodides
 - radioactive iodine
 - beta-blockers (see also Chapter 10)

Chapter 39.

Adrenocorticosteroids & Adrenocortical Antagonists

Tables 39-1 and 39-2 can be exam material.

- Cortisol (hydrocortisone): pharmacokinetic and pharmacodynamic properties, physiologic effects
- Synthetic corticosteroids: methylprednisolone, prednisone, betamethasone, dexamethasone (indications, effects and ADRs)
- Mineralocorticoids: fludrocortisone
- Antagonists of adrenocortical agents: ketoconazole (see also Chapter 48), mifepristone (see also Chapter 40)
- Mineralocorticoid antagonists: spironolactone, eplerenone (see also Chapter 15)

Chapter 40.

The Gonadal Hormones & Inhibitors

The usual drug dosage from Table 40-1 not necessary to be memorized; study Table 40-2 and 40-3 for information only; Table 40-4 is not exam material.

- Estrogens: ethinyl estradiol (mechanism of action, physiologic effects, clinical uses)
- Progestins: progesterone, norgestrel (physiologic effects, clinical uses)
- Hormonal contraception: types, other effects besides contraception, ADRs and contraindications; postcoital contraceptives – mifepristone, ulipristal
- Inhibitors and antagonists of estrogen and progesterone: tamoxifen, raloxifene (see also Chapter 42), clomiphene, mifepristone (see also Chapter 39), anastrozole, fulvestrant
- Ovulation-inducing agents: clomiphene
- Androgens and anabolic steroids: testosterone, nandrolone
- Antiandrogens: finasteride, flutamide

Chapter 41.

Pancreatic Hormones & Antidiabetic Drugs

Completely. Subchapter „Diabetes mellitus“ is not exam material, but the reading is recommended to better understand the pharmacology of the drugs described in this chapter.

Text in the frame “Benefits of tight glycemic control in diabetes” is not exam material.

In Table 41-6 it is not necessary to memorize the concentrations of insulin preparations.

- Insulin preparations: mechanism of action, pharmacokinetics (particularly onset of action, extent and duration of various types), administration and delivery systems, ADRs and complications with insulin therapy.
- Medications for the treatment of type 2 diabetes: completely.

Pay special attention to:

- sulfonylureas: glibenclamide, glipizide, glimepiride
- meglitinide: repaglinide
- D-phenylalanine derivative: nateglinide
- biguanides: metformin
- thiazolidinediones: pioglitazone, rosiglitazone
- alpha-glucosidase inhibitors: acarbose, miglitol
- glucagon-like peptide-1 (GLP-1) receptor agonists: exenatide, liraglutide
- dipeptidyl peptidase-4 inhibitors: sitagliptin, vildagliptin
- sodium-glucose co-transporter-2 (SGLT2) inhibitors: dapagliflozin, empagliflozin
- amylin analog: pramlintide

Subchapter “Management of the patient with diabetes” is not exam material.

Chapter 42.

Agents That Affect Bone Mineral Homeostasis

Data from Table 42-2 and framed text ”Newer therapies for osteoporosis” can be exam material. Within the subchapter “Basic pharmacology”, special attention should be paid to:

- parathyroid hormone (teriparatide), fibroblast growth factor 23, and vitamin D
- secondary hormonal regulators of bone mineral homeostasis:
 - calcitonin, estrogens, raloxifene (see also Chapter 40)
- nonhormonal agents, affecting bone mineral homeostasis:
 - bisphosphonates: alendronate, zoledronate
 - RANKL inhibitor: denosumab (see also page 995 in Chapter 55)
 - strontium ranelate

The subchapter “Clinical pharmacology” is not exam material, but it is recommended for reading in order to better understand the indications for the drugs described in this chapter.

Chapter 43.

Beta-Lactam & Other Cell Wall- & Membrane-Active Antibiotics

Beta-lactam compounds:

Penicillins: basic mechanism of action, the chemical structure of the basic penicillin molecule

- penicillin G
 - penicillin V (phenoxymethylpenicillin)
 - benzathine penicillin
 - antistaphylococcal penicillins (meticillin, cloxacillin)
 - extended-spectrum penicillins (aminopenicillins; amoxicillin)
 - carboxypenicillins and ureidopenicillins (piperacillin, ticarcillin)
- (spectrum of activity and ADRs, data in Table 43-1 not required)

Cephalosporins and cephamycins:

1. generation: cephalexin (per os), cefazolin (iv.)
2. generation: cefuroxime (iv.), Cefuroxime axetil (per os)
3. generation: ceftazidime, ceftriaxone (iv.), Cefixime, ceftibuten (per os)
4. generation: cefepime (iv.)
5. generation: ceftaroline (iv.)

(the main characteristics of each generation with regard to the spectrum of action and pharmacokinetic properties; the data from Table 43-2 should not be remembered)

Other beta-lactam antibiotics:

- monobactams: aztreonam
 - beta-lactamase inhibitors: clavulanic acid, tazobactam
 - carbapenems: imipenem, meropenem
- (antibacterial spectrum of activity and ADRs)

Glycopeptide antibiotics:

- vancomycin
 - teicoplanin
- (spectrum of activity, route of administration, and ADRs)

Subtitle “Other cell wall or membrane-active agents”:

daptomycin, fosfomycin, bacitracin (route of administration)

All drugs: mechanism of action, antibacterial spectrum of activity, indications, ADRs, way of administration; dosage is not required.

Chapter 44.

Tetracyclines, Macrolides, Clindamycin, Chloramphenicol, Streptogramins, & Oxazolidinones

- Tetracyclines: doxycycline, tigecycline
 - Macrolides: erythromycin, clarithromycin, azithromycin, fidaxomicin (see also Chapter 50)
 - Clindamycin
 - Chloramphenicol
 - Streptogramins: quinupristin & dalfopristin
 - Linezolid
- (antibacterial spectrum of activity, mechanism of action, way of administration, ADRs)

Chapter 45.

Aminoglycosides & Spectinomycin

Aminoglycosides: streptomycin (see also Chapter 47), gentamicin, spectinomycin, tobramycin
(antibacterial spectrum of activity, mechanism of action, way of administration, ADRs)

Chapter 46.

Sulfonamides, Trimethoprim, & Quinolones

Sulfonamides:

- trimethoprim-sulfamethoxazole (TPM-SMZ)
 - sulfadiazine
 - sulfasalazine (see also Chapter 62)
- (spectrum of activity, route of administration, ADRs, indications)

Fluoroquinolones:

- ciprofloxacin
 - norfloxacin
 - moxifloxacin
- (spectrum of activity, mechanism of action, ADRs)
Data from Table 46-1 do not have to be memorized.

Chapter 47.

Antimycobacterial Drugs

About drugs belonging to the first line antimycobacterial, the following should be memorized: mechanism of action and basics of resistance, pharmacokinetics, ADRs and other indications/administrations besides tuberculosis. Data in Tables 47-1 and 47-2 are not required.

Pay attention to:

- isoniazid
- rifampin (rifamycin)
- ethambutol
- streptomycin
- pyrazinamide

Chapter 48.

Antifungal Agents

The following should be memorized regarding systemic antifungals: mechanism of action, pharmacokinetics, basic antifungal spectrum of activity, clinical uses, ADRs and toxicity.

Table 48-1, framed texts “Liposomal amphotericin B” and “Iatrogenic fungal meningitis” are not exam material. Table 48-2 only informatively.

- Drugs from the subgroup of systemic drugs for the treatment of systemic fungal infections: amphotericin B, flucytosine, fluconazole, itraconazole, voriconazole, posaconazole, echinocandins (caspofungin).
- Drugs from the subgroup of systemic antifungals for the treatment of local fungal infections: terbinafine.
- Drugs from the subgroup for the local treatment of local fungal infections: terbinafine, clotrimazole, nystatin, amorolfine, ketoconazole.

For a text complementary to Chapter 48, see pages 1072-1074 in Chapter 61.

Chapter 49.

Antiviral Agents

The usual drug dosage noted in all listed Tables does not have to be memorized.

Agents to treat Herpes simplex and Varicella zoster virus infections:

- acyclovir

Agents to treat Cytomegalovirus infections:

- ganciclovir, foscarnet

Antiretroviral agents:

- nucleoside and nucleotide reverse transcriptase inhibitors: abacavir, lamivudine, zidovudine
- nonnucleoside reverse transcriptase inhibitors: nevirapine
- protease inhibitors: indinavir, ritonavir
- infusion inhibitor: enfuvirtide
- entry inhibitor: maraviroc
- integrase strand transfer inhibitors: raltegravir

Antihepatitis agents:

- Hepatitis B: nucleoside/nucleotide analogs (lamivudine), (pegylated) interferon alfa-2b
- Hepatitis C:
 - ribavirin, pegylated interferon alfa-2a, and 2b
 - NS5A inhibitors (elbasvir), NS5B polymerase inhibitors (sofosbuvir), NS3/4A protease inhibitors (grazoprevir)

Anti-influenza agents:

- amantadine (see also Chapter 28), oseltamivir, zanamivir

Chapter 50.

Miscellaneous Antimicrobial Agents; Disinfectants, Antiseptics, & Sterilants

Only pages 895-897: metronidazole, nitrofurantoin, mupirocin, fidaxomicin. The rest is not exam material.

Chapter 51.

Clinical Use of Antimicrobial Agents

Not exam material.

Chapter 52.

Antiprotozoal Drugs

Treatment of amebiasis: metronidazole, tinidazole

Treatment of leishmaniasis: sodium stibogluconate

Chapter 53.

Clinical Pharmacology of the Antihelminthic Drugs

Albendazole, mebendazole, and praziquantel; the rest is not exam material. Table 53-1 only informatively.

Chapter 54.

Cancer Chemotherapy

The subtitles “Causes of cancer” and “Cancer treatment modalities” are not exam material, but the reading is recommended in order to better understand the pharmacology of drugs described in this chapter.

Pay special attention to drug classes:

- alkylating agents: nitrosoureas (carmustine), cyclophosphamide, cisplatin
- antimetabolites: methotrexate (leucovorin), 5-fluorouracil
- vinca alkaloids: vincristine, vinblastine
- taxanes: paclitaxel, docetaxel
- camptothecins: irinotecan
- antitumor antibiotics: doxorubicin

Other drugs for the treatment of cancer:

- imatinib, cetuximab, bevacizumab

Subchapter “Clinical pharmacology of cancer chemotherapeutic drugs” is not exam material.

Chapter 55.

Immunopharmacology

Subchapter „Elements of the immune system” is not exam material, but the reading is recommended in order to better understand the pharmacology of drugs described in this chapter. Figures 55-2 and 55-3 should be particularly understood.

- glucocorticoids: clinical application, see text and Table 55-1; mechanism of action and other pharmacological characteristics (see also Chapter 39)
- calcineurin inhibitors: cyclosporine, tacrolimus (see also Table 55-1)
- proliferation signal inhibitors: sirolimus (see also Table 55-1)
- thalidomide, mycophenolate mofetil (see also Table 55-1 and Chapter 36 for mycophenolate mofetil).
- cytotoxic drugs: azathioprine (see also Table 55-1)
- monoclonal antibodies and fusion proteins (muromonab CD3/Okt3, alemtuzumab, basiliximab, abatacept, adalimumab, infliximab, etanercept, ipilimumab (see also p. 974-75 in Chapter 54), pembrolizumab (see also pp. 974-75 in Chapter 54), atezolizumab, bevacizumab, denosumab (see also Table 55-1, see also Chapter 36 for abatacept, azathioprine, adalimumab, infliximab and etanercept, Chapter 42 for denosumab, and Chapter 54 for ipilimumab, pembrolizumab, and bevacizumab).

Subchapter “Clinical uses of immunosuppressive drugs” is not exam material.

Subchapter “Immunomodulation” and subtitle “Cytokines” are exam material.

Subchapter “Immunologic reactions to drugs & drug allergy” is not exam material, except subtitle “Drug treatment of immediate allergy”, which is.

Chapter 56.

Introduction to Toxicology: Occupational & Environmental

Not exam material.

Chapter 57.

Heavy Metal Intoxication & Chelators

Not exam material.

Chapter 58.

Management of the Poisoned Patient

Not exam material.

Chapter 59.

Special Aspects of Perinatal & Pediatric Pharmacology

Not exam material (some aspects will be discussed during the course).

Chapter 60.

Special Aspects of Geriatric Pharmacology

Not exam material (some aspects will be discussed during the course).

Chapter 61.

Dermatologic Pharmacology

Antibacterial preparations for topical application: bacitracin, mupirocin, neomycin / gentamicin, topical antibiotics for the treatment of acne (clindamycin, erythromycin)

Chapter 62.

Drugs Used in the Treatment of Gastrointestinal Diseases

Drugs used in acid-peptic diseases:

- antacids: sodium bicarbonate, magnesium and aluminum hydroxide
- H₂ receptor antagonists: cimetidine, ranitidine, famotidine (data from Table 62-1 not required)
- proton pump inhibitors: omeprazole, pantoprazole (pharmacokinetics only informatively from Table 62-2)
- mucosal protective agents: sucralfate, misoprostol

Drugs stimulating gastrointestinal motility: metoclopramide, domperidone

Laxatives:

- bulk-forming: methylcellulose
- stool surfactant agents – softeners: glycerin suppository
- osmotic: lavage solutions containing polyethylene glycol, magnesium hydroxide, lactulose
- stimulant: anthraquinone (senna), bisacodyl

- chloride channel activators: lubiprostone

Antidiarrheal agents: loperamide

Drugs used in the treatment of irritable bowel syndrome (IBS): alosetron, lubiprostone

Antiemetic agents:

- 5-HT₃ antagonists: ondansetron, palonosetron
- NK1 receptor antagonists: aprepitant
- phenothiazines (see also Chapter 29)
- metoclopramide and domperidone (see also p. 1097)
- antihistaminics: diphenhydramine (see also Chapter 16)
- anticholinergic drugs: scopolamine (see also Chapter 8)
- corticosteroids: dexamethasone
- cannabinoids: dronabinol

Inflammatory bowel disease drugs:

- sulfasalazine, mesalamine
- glucocorticoids: budesonide
- azathioprine (see also Chapters 36 and 55)
- methotrexate (see also Chapters 36, 54 and 55)
- TNF- α antagonists (see also Chapters 36 and 55): infliximab, adalimumab

Bile and therapy for gallstones: ursodiol

Drugs used to treat variceal hemorrhage: octreotide, vasopressin and propranolol

Chapter 63.

Therapeutic & Toxic Potential of Over-the-Counter Agents

Not exam material.

Chapter 64.

Dietary Supplements & Herbal Medications

Not exam material.

Chapter 65.

Rational Prescribing & Prescription Writing

Not exam material.

Chapter 66.

Important Drug Interactions & Their Mechanisms

Not exam material (Table 66-1 should be used as a reminder on major drug interactions emphasized during the course).