

Essentials of Pharmacology for Dentistry

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Preface

With phenomenal growth of information on mechanism of action and clinical application of drugs as well as rapid introduction of new drugs, pharmacology, the science of drugs (medicines), has become increasingly important to all health professionals who prescribe/administer drugs. Practice of dentistry utilizes drugs as primary treatment modality as well as facilitator of dental procedures. Dentists may have to manage a medical emergency arising in their clinic. Moreover, many dental patients could be receiving other medication that may have orodental implications, or may interact with drugs prescribed by the dentist. As such, a broad knowledge of pharmacology with emphasis on certain aspects is needed by the dentist.

This book is divided into three sections. The first describes the general pharmacological principles with which all professionals involved in drug therapy must be conversant. The second on systemic pharmacology presents a brief account of drugs acting on various organ systems and used in the treatment of common disorders. Each chapter is systematically organised. The opening sentence defines the class of drugs, followed by their classification. The 'prototype' approach is followed by describing the representative drug of the class. Wherever applicable, the implications in dentistry are highlighted, such as drugs and diseases affecting postextraction haemostasis, dental procedures in patients on corticosteroid therapy or in diabetics, oral complications of cancer chemotherapy, conscious sedation in dentistry, etc. Management of medical emergencies like anaphylactic shock, seizures, angina, or asthmatic attack during dental treatment is outlined.

The third section mainly elaborates drugs which the dentists prescribe or administer themselves; but for the sake of continuity also includes other antimicrobials that they are unlikely to prescribe. The allocation of topics in sections two and three does not indicate water-tight distinction, which is impossible, but has been done with a view to focus attention on drugs that have greater relevance in dentistry. To mention a few, the application of analgesics and NSAIDs in dental pain, dental anaesthesia, role of each class of antimicrobials in orodental infections, prophylaxis of postextraction infection and endocarditis in patients at special risk, choice of antiseptics and antibiotics for control of dental plaque and periodontal disease are emphasized. A chapter on drug interactions has been included, highlighting those that may be encountered in dentistry. Leading trade names and dosage forms of drugs generally prescribed by dentists are mentioned distinctively. Thus, the book is oriented to provide essential pharmacological knowledge and understanding, and cater to the specific needs of dental students and practitioners.

I am indebted to my colleagues in pharmacology and dentistry for conceptual and clinical inputs that helped in orienting the book. The motivational influence of Shri J.P. Vij, CEO, Jaypee Brothers, was the main impetus for this book. The meticulous preparation of the manuscript and illustrations by Ms Sunita Katla, Mr Manoj Pahuja and Mr KK Raman is highly appreciated. The editorial support and cooperation of my wife is sincerely acknowledged.

5th June, 2005

KD Tripathi

Contents



1. Introduction, Routes of Drug Administration	3
2. Pharmacokinetics	10
3. Pharmacodynamics	31
4. Adverse Drug Effects	56



5. Drugs Acting on Autonomic Nervous System: General Considerations, Cholinergic and Anticholinergic Drugs	67
6. Drugs Acting on Autonomic Nervous System: Adrenergic and Antiadrenergic Drugs	80
7. Autacoids and Related Drugs	97
8. General Anaesthetics and Skeletal Muscle Relaxants	115
9. Drugs Acting on Central Nervous System: Sedative-Hypnotics, Alcohols, Antiepileptics and Antiparkinsonian Drugs	131
10. Drugs Acting on Central Nervous System: Psychopharmacological Agents	152
11. Cardiovascular Drugs: Drugs Affecting Renin-Angiotensin System, Calcium Channel Blockers, Drugs for Hypertension, Angina Pectoris and Myocardial Infarction	167
12. Cardiovascular Drugs: Drugs for Heart Failure and Cardiac Arrhythmia	186
13. Drugs Acting on Kidney	199
14. Hormones and Related Drugs: Anterior Pituitary Hormones, Antidiabetic Drugs, Corticosteroids	211
15. Hormones and Related Drugs: Sex Hormones, Contraceptives, Drugs Acting on Uterus	229

16. Hormones and Related Drugs: Thyroid Hormone and Inhibitors, Hormones Regulating Calcium	239
17. Drugs Affecting Blood	248
18. Gastrointestinal Drugs	265
19. Respiratory Drugs	283
20. Vitamins	291
21. Anticancer and Immunosuppressant Drugs	297
22. Antirheumatoid and Antigout Drugs	307



Section 3
Drugs Important in Dental Therapeutics

23. Nonsteroidal Antiinflammatory Drugs and Antipyretic-Analgesics	315
24. Opioid Analgesics and Antagonists	331
25. Local Anaesthetics	344
26. Antimicrobial Drugs: General Considerations	354
27. Sulfonamides, Cotrimoxazole, Quinolones and Nitroimidazoles	368
28. Beta-Lactam Antibiotics	380
29. Tetracyclines, Chloramphenicol and Aminoglycoside Antibiotics	395
30. Macrolide and Other Antibacterial Antibiotics	410
31. Antitubercular and Antileprotic Drugs	418
32. Antifungal and Antiviral Drugs	428
33. Antiprotozoal and Anthelmintic Drugs	442
34. Antiseptics, Disinfectants and Other Locally Acting Drugs	459
35. Drug Interactions	468
<i>Index</i>	475

List of Abbreviations

A-I/II/III	Angiotensin I/II/III	BW	Body weight
AA	Amino acid	BZD	Benzodiazepine
AB	Antibody		
AC	Adenylyl cyclase	C-10	Decamethonium
ACE	Angiotensin II converting enzyme	CA	Catecholamine
ACh	Acetylcholine	CaBP	Calcium binding protein
AChE	Acetylcholinesterase	CAD	Coronary artery disease
ACTH	Adrenocorticotrophic hormone	CAM	Calmodulin
AD	Alzheimer's disease	cAMP	3', 5' Cyclic adenosine monophosphate
ADH	Antidiuretic hormone	cap	Capsule
ADP	Adenosine diphosphate	CAsE	Carbonic anhydrase
Adr	Adrenaline	CBS	Colloidal bismuth subcitrate
AF	Atrial fibrillation	CCB	Calcium channel blocker
AFI	Atrial flutter	CD	Collecting duct
AG	Antigen	cGMP	3', 5' Cyclic guanosine monophosphate
AIDS	Acquired immunodeficiency syndrome	CGRP	Calcitonin gene-related peptide
AIP	Aldosterone induced protein	CH	Cholesterol
ALA	Alanine	ChE	Cholinesterase
AMA	Antimicrobial agent	CHE	Cholesterol ester
AMB	Amphotericin B	CHF	Congestive heart failure
amp	Ampoule	CI	Cardiac index
AMP	Adenosine monophosphate	CL	Clearance
ANC	Acid neutralizing capacity	CLcr	Creatinine clearance
ANS	Autonomic nervous system	Clo	Clofazimine
AP	Action potential	CMI	Cell-mediated immunity
APD	Action potential duration	CMV	Cytomegalovirus
aPTT	Activated partial thromboplastin time	CNS	Central nervous system
ARC	AIDS related complex	c.o.	Cardiac output
5-ASA	5-Amino salicylic acid	CoEn-A	Coenzyme-A'
Asc LH	Ascending limb of Loop of Henle	COMT	Catechol-O-methyl transferase
AT-III	Antithrombin III	COX	Cyclooxygenase
ATP	Adenosine triphosphate	CPS	Complex partial seizures
ATPase	Adenosine triphosphatase	CPZ	Chlorpromazine
A-V	Atrioventricular	CRF	Corticotropin releasing factor
AVP	Arginine vasopressin	CSF	Cerebrospinal fluid
AZT	Zidovudine	CTZ	Chemoreceptor trigger zone
		CVS	Cardiovascular system
B ₁₂	Vitamin B ₁₂	CWD	Cell wall deficient
BCNU	Bischloroethyl nitrosourea (Carmustine)	CYP450	Cytochrome P450
BD	Twice daily		
BHP	Benign hypertrophy of prostate	DA	Dopamine
BMD	Bone mineral density	DA-B ₁₂	Deoxyadenosyl cobalamin
BMR	Basal metabolic rate	DAG	Diacyl glycerol
BP	Blood pressure	DCI	Dichloroisoproteranol
BPN	Bisphosphonate	dDAVP	Desmopressin
BSA	Body surface area	DDS	Diamino diphenyl sulfone (Dapsone)
BuChE	Butyryl cholinesterase	DHE	Dihydroergotamine

x Abbreviations

DHFA	Dihydro folic acid	H	Isoniazid (Isonicotinic acid hydrazide)
DHFRase	Dihydrofolate reductase	HAART	Highly active antiretroviral therapy
DHP	Dihydropyridine	Hb	Haemoglobin
DI	Diabetes insipidus	HCG	Human chorionic gonadotropin
DIT	Diiodotyrosine	HDL	High density lipoprotein
dl	Decilitre	5-HIAA	5-Hydroxyindole acetic acid
DLE	Disseminated lupus erythematosus	HETE	Hydroxyeicosa tetraenoic acid
DMARD	Disease modifying antirheumatic drug	HIV	Human immunodeficiency virus
DMPA	Depot medroxyprogesterone acetate	HMG-CoA	Hydroxymethyl glutaryl coenzyme A
DMPP	Dimethyl phenyl piperazinium	HPA axis	Hypothalamo-pituitary-adrenal axis
DNA	Deoxyribose nucleic acid	HPETE	Hydroperoxy eicosatetraenoic acid
DOCA	Desoxy corticosterone acetate	hr	Hour
dopa	Dihydroxyphenyl alanine	HR	Heart rate
DOSS	Diocetyl sulfosuccinate	HRT	Hormone replacement therapy
DOTS	Directly observed treatment short course	5-HT	5-Hydroxytryptamine
DRC	Dose-response curve	5-HTP	5-Hydroxytryptophan
DT	Distal tubule	HVA	Homovanillic acid
d-TC	d-Tubocurarine		
		ICSH	Interstitial cell stimulating hormone
E	Ethambutol	IDL	Intermediate density lipoprotein
EACA	Epsilon amino caproic acid	IGF	Insulin-like growth factor
e.c.f.	Extracellular fluid	IL	Interleukin
ECG	Electrocardiogram	ILEU	Isoleucine
EDTA	Ethylene diamine tetraacetic acid	i.m.	Intramuscular
EEG	Electroencephalogram	INH	Isonicotinic acid hydrazide
β-END	β-Endorphin	INR	International normalized ratio
EPEC	Enteropathogenic <i>E. coli</i>	i.o.t.	Intraocular tension
EPO	Erythropoietin	IP ₃	Inositol trisphosphate
ERP	Effective refractory period	IPSP	Inhibitory postsynaptic potential
EPSP	Excitatory postsynaptic potential	Iso	Isoprenaline
ER	Estrogen receptor	IU	International unit
ES	Extrasystole	i.v.	Intravenous
ESR	Erythrocyte sedimentation rate		
ETEC	Enterotoxigenic <i>E. coli</i>	KTZ	Ketoconazole
Etm	Ethionamide		
		LA	Local anaesthetic
FA	Folic acid	LDL	Low density lipoprotein
5-FC	5-Flucytosine	LES	Lower esophageal sphincter
FEV ₁	Forced expiratory volume in 1 second	leu-ENK	Leucine enkephalin
FFA	Free fatty acid	LH	Luteinizing hormone
FQ	Fluoroquinolone	liq	Liquid
FSH	Follicle stimulating hormone	LMW	Low molecular weight
5-FU	5-Fluorouracil	LOX	Lipoxygenase
		LSD	Lysergic acid diethylamide
GABA	Gamma amino butyric acid	LT	Leukotriene
GC	Guanylyl cyclase		
GDP	Guanosine diphosphate	MAC	Minimal alveolar concentration
GERD	Gastroesophageal reflux disease	MAC	<i>Mycobacterium avium</i> complex
g.f.r.	Glomerular filtration rate	MAO	Monoamine oxidase
GH	Growth hormone	MAPKinase	Mitogen activated protein kinase
g.i.t.	Gastrointestinal tract	max	Maximum
GITS	Gastrointestinal therapeutic system	MBC	Minimum bactericidal concentration
GLUT	Glucose transporter	MBL	Multibacillary leprosy
GnRH	Gonadotropin releasing hormone	MDI	Manic depressive illness
G-6-PD	Glucose-6-phosphate dehydrogenase	MDR	Multidrug resistant
GTCS	Generalised tonic-clonic seizures	MDT	Multidrug therapy (of leprosy)
GTN	Glyceryl trinitrate	met-ENK	Methionine enkephalin
GTP	Guanosine triphosphate	mEq	milliequivalent

Mf	Microfilariae	PL _C	Phospholipase C
MHC	Major histocompatibility complex	PnG	Penicillin G
MI	Myocardial infarction	POMC	Pro-opio melanocortin
MIC	Minimal inhibitory concentration	PP	Partial pressure
min	Minimum	PPAR γ	Paroxysme proliferator-activated receptor γ
MIT	Monoiodo tyrosine	PPH	Postpartum haemorrhage
MLCK	Myosin light chain kinase	PPI	Proton pump inhibitor
6-MP	6-Mercaptopurine	ppm	Part per million
MRSA	Methicillin resistant <i>Staphylococcus aureus</i>	PPNG	Penicillinase producing <i>N. gonorrhoeae</i>
Mtx	Methotrexate	Prl	Prolactin
MW	Molecular weight	PSVT	Paroxysmal supra-ventricular tachycardia
		PT	Proximal tubule
NA	Noradrenaline	PTCA	Percutaneous transluminal coronary angioplasty
NABQI	N-acetyl-p-benzoquinoneimine	PTH	Parathyroid hormone
NADP	Nicotinamide adenine dinucleotide phosphate	PTP	Post-tetanic potentiation
NADPH	Reduced nicotinamide adenine dinucleotide phosphate	QID	Four times a day
NAG	N-acetyl glucosamine	R	Rifampin (Rifampicin)
NAM	N-acetyl muramic acid	RAS	Renin-angiotensin system
NANC	Nonadrenergic noncholinergic	RBP	Retinol binding protein
NaSSA	Noradrenergic and specific serotonergic antidepressant	REM	Rapid eye movement (sleep)
NEE	Norethindrone enanthate	RIMA	Reversible inhibitor of MAO-A
NFAT	Nuclear factor of activated T-cell	rINN	Recommended international nonproprietary name
NLEP	National leprosy eradication programme	RMP	Resting membrane potential
NMDA	N-methyl-D-aspartate	RNA	Ribonucleic acid
NNRTI	Nonnucleoside reverse transcriptase inhibitor	RNTCP	Revised National Tuberculosis Control Programme
NPY	Neuropeptide-Y	RP	Refractory period
NR	Nicotinic receptor	RTF	Resistance transfer factor
N-REM	Non rapid eye movement (sleep)	S	Streptomycin
NRTI	Nucleoside reverse transcriptase inhibitor	SA	Sinoatrial (node)
NSAID	Nonsteroidal antiinflammatory drug	SAARD	Slow acting antirheumatic drug
NTS	Nucleus tractus solitarius	SABE	Subacute bacterial endocarditis
		s.c.	Subcutaneous
OC	Oral contraceptive	SCh	Succinylcholine
OCD	Obsessive-compulsive disorder	SERM	Selective estrogen receptor modulator
OD	Once daily	SGA	Second generation antihistaminic
ORS	Oral rehydration salt (solution)	s.l.	Sublingual
ORT	Oral rehydration therapy	SLE	Systemic lupus erythematosus
PABA	Paraamino benzoic acid	SMON	Subacute myelo-optic neuropathy
PAE	Post antibiotic effect	SNRI	Serotonin and noradrenaline reuptake inhibitor
2-PAM	Pralidoxime	s.o.s.	as required
PAF	Platelet activating factor	SPS	Simple partial seizures
PAS	Paraamino salicylic acid	SR	Sustained release
PBP _s	Penicillin binding proteins	SRS-A	Slow reacting substance of anaphylaxis
PBL	Paucibacillary leprosy	SSRIs	Selective serotonin reuptake inhibitors
PD	Parkinsons's disease	susp	Suspension
PF	Purkinje fibre	SWS	Slow wave sleep
PG	Prostaglandin	syr	Syrup
PGI ₂	Prostacyclin	t $\frac{1}{2}$	Half-life
PI	Protease inhibitor	T ₃	Triiodothyronine
PIP ₂	Phosphatidyl inositol-4, 5-bisphosphate		
PKA	Protein kinase: cAMP dependent		
PKC	Protein kinase C		
PL _A	Phospholipase A		

xii Abbreviations

T ₄	Thyroxine	U	Unit
tab	Tablet	UDP	Uridine diphosphate
TB	Tubercle bacilli	UFH	Unfractionated heparin
TCAs	Tricyclic antidepressants		
TDS	Three times a day	V	Volume of distribution
TG	Triglyceride	VAL	Valine
6-TG	6-Thioguanine	VF	Ventricular fibrillation
THC	Tetrahydrocannabinol	Vit	Vitamin
THFA	Tetrahydro folic acid	VLDL	- Very low density lipoprotein
THR	Threonine	VMA	Vanillyl mandelic acid
TIA	Transient ischaemic attacks	VRE	Vancomycin resistant enterococci
TNF- α	Tumour necrosis factor α	VRSA	Vancomycin resistant <i>Staphylococcus aureus</i>
t.p.r.	Total peripheral resistance	VT	Ventricular tachycardia
t-PA	Tissue plasminogen activator		
TRH	Thyrotropin releasing hormone	WPW	Wolff-Parkinson-White syndrome
TSH	Thyroid stimulating hormone		
TTS	Transdermal therapeutic system	Z	Pyrazinamide
TX	Thromboxane	ZE syndrome	Zollinger-Ellison syndrome