Appendix Some important pharmacological agents

Students may feel overwhelmed by the number of drugs described in pharmacology textbooks. We would emphasise that it is more important to understand general pharmacological principles, and to appreciate the pharmacology of the main classes of drug, than to attempt to memorise details of individual agents. Specific drugs are best learned about when they are encountered in the setting of particular topics (e.g. noradrenergic transmission), during practical classes or (for therapeutic drugs) near a patient's bedside. We provide a list (www.studentconsult.com) of examples of some of the most important pharmacological agents. It is not intended as a starting point to learning pharmacology, and we would caution against attempting to memorise lists of names and properties. The important agents we list here were selected subjectively; they include (but are not limited to) the 100 drugs most likely to be prescribed by newly qualified doctors in the UK (Baker et al., 2011) and are divided into agents of primary and secondary importance. For students of some subjects, and in different geographical areas, one or another class of drug will have more or less importance (e.g. anthelmintics are very important for veterinarians and for all clinicians in regions where helminthiasis is common), so these categories are meant only as a broad guide. The list includes not only drugs used therapeutically, but also endogenous mediators/transmitters (med/trnsm) and certain important drugs used mainly as experimental tools (exp.tool) especially important for students studying basic or applied pharmacology as a science subject - and drugs used for recreational (recreat) rather than therapeutic purposes. Some endogenous mediators (e.g. adrenaline [epinephrine]) are also important therapeutic drugs.

The General Medical Council's 'Tomorrow's Doctors' (2009) specifies that students should be able to demonstrate knowledge of drug actions; therapeutics and pharmacokinetics; drug side effects and interactions, including for multiple treatments, long-term conditions and nonprescribed medication; and also including effects of drugs on the population, such as the spread of antibiotic resistance. A working knowledge of drugs in the 'primary importance' category should be built up gradually as they are encountered during training. For drugs in the second category, it is usually sufficient to be aware of the mechanism of action, supplemented by understanding how they differ from those in the primary category when relevant.

The choice of drugs in clinical use is somewhat arbitrary. Hospital formulary committees (on which

pharmacists play a crucial role) grapple with choosing which individual drugs to stock in the pharmacy. There is a play-off between stocking several individual drugs of one category, for each of which there is good evidence of efficacy for distinct indications, and stocking a more restricted choice based on indirect evidence that efficacy is likely to be a common feature of different members of a class of drugs. Local variations will be encountered (e.g. as to which angiotensin-converting enzyme inhibitor or non-steroidal anti-inflammatory drugs are stocked in the hospital pharmacy). If the student or clinician (e.g. doctor, dentist, veterinarian or nurse) comes to these (e.g. when changing to a job in a new hospital) with a sound appreciation of the general principles of pharmacology and of the specifics of the various classes of agent involved, he or she will be able to look up and understand the details of agents favoured locally and use them sensibly. Drugs are grouped broadly as in the chapters of the text, and some appear more than once in the lists.

REFERENCES

Baker, E.H., Pryce Roberts, A., Wilde, K., et al., 2011. Development of a core drug list towards improving prescribing education and reducing errors in the UK. Br. J. Clin. Pharmacol. 71, 190–198.

GMC (General Medical Council), 2009. Tomorrow's Doctors: Outcomes and standards for undergraduate medical education. Online: <www.gmc-uk.org/education/undergraduate/tomorrows_ doctors_2009.asp> (accessed July 2014).

KEY

(Note: designation does not exclude a separate therapeutic role – for example, nicotine and cocaine are used therapeutically as well as recreationally, adrenaline is used therapeutically as well as being a mediator; conversely, some primarily therapeutic drugs such as morphine or other opioid analgesics are used recreationally by some individuals.)

med/trnsm = mediator/transmitter

exp.tool = experimental tool

recreat = drug used especially for recreational purposes antag = antagonist

This appendix was originally adapted from that in Dale, M.M., Dickenson, A.H., Haylett, D.G. 1996. Companion to Pharmacology, second ed. Churchill Livingstone, Edinburgh, with permission.

Primary

Secondary

carbachol

pilocarpine

Cholinergic transmission (see Ch. 13)

Agonists

acetylcholine (med/trnsm) suxamethonium nicotine (recreat)

Antagonists

edrophonium

donepezil

atropine tubocurarine (exp.tool) hexamethonium (exp.tool) vecuronium oxybutinin botulinum toxin (presynaptic action) tropicamide pancuronium atracurium α-bungarotoxin (exp.tool) tolterodine

Anticholinesterases and related drugs neostigmine pyridostigmine

pralidoxime (cholinesterase reactivator)

Noradrenergic transmission (Ch. 14)

Agonists	
adrenaline (epinephrine)	clonidine
(med/trnsm)	
noradrenaline (norepinephrine)	phenylephrine
(med/trnsm)	
isoprenaline (isoproterenol)	dopamine (med/trnsm)
(exp.tool)	,
salbutamol	dobutamine
Antononiata	
Antagonists	
propranolol	prazosin
atenolol	doxazosin
metoprolol	tamsulosin
bisoprolol	
Drugs affecting noradrenergic neurons	
cocaine (recreat) (Ch 48)	quanethidine (exp tool)

cocaine (recreat) (Ch. 48) tyramine (exp.tool) methyldopa (Ch. 22) amphetamine (recreat) (Ch. 48) guanethidine (exp.tool) reserpine (exp.tool) amitryptyline (Ch. 46) α-methyltyrosine (exp.tool) phenelzine (Ch. 46)

5-Hydroxytryptamine (serotonin) (Ch. 15)

Drugs acting on 5-HT receptors (see Ch. 46 for 5-HT reuptake inhibitors)	
5-HT (serotonin) (med/trnsm)	ergotamine/ dihydroergotamine
LSD (recreat)	metoclopramide
ondansetron	granisetron
methysergide	pizotifen
triptans (e.g. sumatriptan)	ketotifen
5-HT, 5-hydroxytryptamine; LSD, lysergic acid diethylamide.	

Primary	Secondary
Purines (Ch. 16)	
Drugs/mediators acting on puri	noceptors or purine uptake
adenosine (med/trnsm) (+ therapeutic: Ch. 21)	dipyridamole
theophylline, aminophylline	prasugrel (Chs 24 and 28)
caffeine (recreat)	
ATP (med/trnsm)	
ADP (med/trnsm)	
clopidogrel	

Local hormones (Chs 17 and 18)	
Cytokines (all: med/trnsm) (Ch. 18 interleukins chemokines tumour necrosis factor)
Tumour necrosis factor antagonis etanercept, infliximab interferons (med/trnsm) colony-stimulating factors (Ch. 26) (med/trnsm)	ts:
Histamine and H ₁ and H ₂ antagon histamine (med/trnsm) cetirizine promethazine ranitidine cimetidine	ists (Ch. 17) fexofenadine cyclizine
Lipid-derived mediators (Ch. 18) prostaglandins E and F (med/trnsm) prostaglandin I ₂ (med/trnsm) thromboxane A ₂ (med/trnsm) leukotrienes (med/trnsm)	Platelet-activating factor (med/trnsm) latanoprost lipoxins (med/trnsm)
Inflammatory peptides (Ch. 18) bradykinin	icatibant (bradykinin antagonist) substance P calcitonin-gene-related peptide (CGRP) neurokinin A

APPENDIX

Primary	Secondary
Cannabinoids and related drugs (Ch. 19)	
Δ^9 -tetrahydrocannabinol (recreat)	nabilone
anandamide (med/trnsm)	

Nitric oxide (Ch. 20)

nitric oxide (med/trnsm)

L-N^G-monomethyl arginine (L-NMMA) (exp.tool)

Heart (Ch. 21)

 Antidysrhythmic
 drugs
 (Vaughan
 Williams
 classification)

 Class I
 lidocaine
 flecainide

 Class II
 metoprolol
 sotalol

 Class III
 amiodarone

 Class IV
 verapamil

 Unclassified
 adenosine

 digoxin
 digoxin

Antianginal drugs

Nitrates glyceryl trinitrate isosorbide mononitrate nicorandil (combined with K⁺-channel activation)

β Blockers metoprolol

Calcium antagonists diltiazem

Primary Secondary Vascular system (Ch. 22) Antihypertensive drugs (A, B, C and D) A: ANGIOTENSIN-CONVERTING ENZYME INHIBITORS AND ANGIOTENSIN II (AT1 RECEPTOR) ANTAGONISTS captopril lisinopril ramipril trandolapril . losartan irbesartan candesartan **Β:** β-ADRENOCEPTOR ANTAGONISTS metoprolol **C:** CALCIUM ANTAGONISTS amlodipine nifedipine **D:** THIAZIDES AND RELATED DIURETICS bendroflumethiazide hydrochlorothiazide indapamide chlortalidone α1-adrenoceptor antagonists doxazosin Other vasodilators hydralazine minoxidil nitroprusside aliskiren (renin inhibitor) Centrally acting drugs methyldopa moxonidine Drugs used in heart failure and shock **DIURETICS (SEE ALSO Ch. 29)** furosemide amiloride spironolactone eplerenone ANGIOTENSIN-CONVERTING ENZYME INHIBITORS AND AT1 ANTAGONISTS Cardiac glycoside digoxin Drugs acting on adrenoceptors carvedilol dobutamine bisoprolol dopamine metoprolol Vasodilators hydralazine K⁺-channel activators isosorbide mononitrate Pulmonary hypertension epoprostenol iloprost sildenafil

Atherosclerosis and dyslipidaemia (Ch. 23)

simvastatin atorvastatin

bosentan

ezetimibe pravastatin fibrates (gemfibrozil, fenofibrate) nicotinic acid derivatives resins (colestyramine, colesevelam) fish oil

Primary

Secondary

Haemostasis and thrombosis (Ch. 24)

Oral anticoagulants and related drugs	
warfarin	rivaroxiban
vitamin K (antag)	
dabigatran etexilate	
Heparin-related drugs and related drugs	

heparin enoxaparin

Antiplatelet drugs aspirin clopidogrel abciximab protamine (antag) fondaparinux

dipyridamole epoprostenol prasugrel

Fibrinolytic drugs and inhibitors of fibrinolysis streptokinase tissue plasminogen activator tranexamic acid (inhibitor)

Haematinics and related drugs (Ch. 25)		
ferrous sulfate	filgrastim	
desferrioxamine (iron chelator)	hydroxycarbamide (hydroxyurea)	
folic acid	eculizumab	
hydroxocobalamin		
epoietin		

Anti-inflammatory and immunosuppressant drugs (Ch. 26)

Cyclo-oxygenase inhibitors (NSAII aspirin (see also Ch. 24) paracetamol (acetaminophen) ibuprofen naproxen	Ds) indometacin diclofenac coxibs (e.g. celecoxib)
Disease-modifying anti-rheumatic methotrexate tumour necrosis factor antagonists: etanercept, infliximab glucocorticoids (e.g. prednisolone)	drugs (DMARDs) gold complexes (e.g. auranofin) hydroxychloroquine penicillamine sulfasalazine
Immunosuppressant drugs azathioprine ciclosporin tacrolimus methotrexate prednisolone	anakinra (interleukin-1 antagonist)
Drugs used in gout NSAIDs (see above) allopurinol (prophylaxis)	colchicine probenecid (prophylaxis) sulfinpyrazone

NSAID, non-steroidal anti-inflammatory drug.

Primary	Secondary
Skin (Ch. 27)	
Topical glucocorticoids hydrocortisone clobetasone butyrate beclomethasone dipropionate clobetasol propionate	Biologicals (specialist use) adalimumab infliximab
Topical calcineurin inhibitors ciclosporin	Topical vitamin D derivatives calcitriol
Topical retinoids tretinoin	

Respiratory system (Ch. 28)	
β ₂ -adrenoceptor agonists salbuterol salmeterol	terbutaline formeterol
Inhaled glucocorticoids beclometasone mometasone	
Inhaled muscarinic antagonists ipratropium	tiotropium
Xanthine alkaloids theophylline	
Leukotriene antagonists and 5-lipoxygenase inhibitors montelukast zileutin	
Anti-immunoglobulin E omalizumab	
Antitussive drug codeine	

Primary	Secondary
Kidney and urinary system (Ch.	29)
Thiazides and related diuretics bendroflumethiazide	
Loop diuretics furosemide	bumetanide
K ⁺ -sparing diuretics spironolactone amiloride	triamterene eplerenone
Osmotic diuretics mannitol	
Carbonic anhydrase inhibitors acetazolamide	
Antidiuretic hormone (vasopressi antagonists	n) V ₂ agonists and
desmopressin	demeclocycline (antag)
Anion exchange resin	
	sevelamer

Gastrointestinal system (Ch. 30)

Antacids and ulcer-healing drugs magnesium or aluminium salts alginates	sucralfate (aluminium complex)
H ₂ -receptor antagonists ranitidine	cimetidine
Proton pump inhibitors omeprazole lansoprazole	
Antibiotics for Helicobacter pylori amoxicillin clarithromycin metronidazole	
Prostaglandin analogues	misoprostol
Laxatives lactulose senna bulk-forming (e.g. ispaghula husk)	sodium picosulfate
Antiemetics phenothiazines antihistamines domperidone metoclopramide ondansetron	granisetron nabilone aprepitant
Antidiarrhoeal drugs codeine loperamide	
Drugs for inflammatory bowel dise prednisolone sulfasalazine	e ase mesalazine
Antispasmodics hyoscine cyclizine	
Gastric secretagogues	pentagastrin

Primary	Secondary		
Endocrine pancreas and related drugs (Ch. 31)			
Hormones insulin insulin glargine insulin lispro glucagon incretins (GIP, GLP1)	amylin (med/trnsm) somatostatin (med/trnsm)		
Drugs that act on the sulfony tolbutamide gliclazide	lurea receptor nateglinide gliburide		
Biguanide metformin			
α-Glucosidase inhibitor acarbose			
Thiazolidinediones rosiglitazone pioglitazone			
Incretin-mimetics and related exenatide sitagliptin	l drugs vildagliptin		

Obesity (Ch. 32)	
leptin (med/trnsm)	neuropeptide Y (med/trnsm) orlistat
Pituitary and adrenal cortex (Ch.	33)
Glucocorticoids and related drugs hydrocortisone (med/trnsm) prednisolone dexamethasone	metyrapone (blocks synthesis)
Mineralocorticoids (and their anta aldosterone (med/trnsm) fludrocortisone spironolactone (antag)	gonists) eplerenone (antag)
corticotropin (adrenocorticotrophic	ugs
growth hormone (med/trnsm)	sermorelin (growth hormone-releasing hormone analogue)
somatostatin (med/trnsm) octreotide	lanreotide
vasopressin (med/trnsm) oxytocin (med/trnsm) prolactin (med/trnsm) gonadorelin bromocriptine	desmopressin
	leptin (med/trnsm) Pituitary and adrenal cortex (Ch. Glucocorticoids and related drugs hydrocortisone (med/trnsm) prednisolone dexamethasone Mineralocorticoids (and their antag aldosterone (med/trnsm) fludrocortisone spironolactone (antag) Pituitary hormones and related dru corticotropin (adrenocorticotrophic hormone) (med/trnsm) growth hormone (med/trnsm) somatostatin (med/trnsm) octreotide vasopressin (med/trnsm) oxytocin (med/trnsm) prolactin (med/trnsm)

Gastric secretagogu gastrin (med/trnsm)

pentagastrin

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Primarv Secondary **Primarv** Secondary Thyroid (Ch. 34) CNS mediators (Ch 37-39) Hormones and precursors Neurotransmitters and related drugs thyroxine (med/trnsm) amino acids liothyronine (med/trnsm) glutamate (med/trnsm) calcitonin (med/trnsm) NMDA (exp.tool) ketamine (NMDA-channel iodine/iodide blocker) strychnine (exp.tool) glycine (med/trnsm) Antithyroid drugs (glycine antag) carbimazole GABA (med/trnsm) baclofen (GABA_B agonist) propylthiouracil bicuculline (GABA_A antag) radioiodine (131) Other transmitters noradrenaline (norepinephrine) melatonin (med/trnsm) (med/trnsm) nitric oxide (med/trnsm) dopamine (med/trnsm) Reproductive system (Ch. 35) 5-hydroxytryptamine (med/trnsm) Oestrogens acetylcholine (med/trnsm) oestradiol (med/trnsm) histamine (med/trnsm) ethinvlestradiol adenosine triphosphate (ATP) Antioestrogen (med/trnsm) tamoxifen clomiphene Progestin progesterone (med/trnsm) norethisterone Neurodegenerative diseases (Ch. 40) Antiprogestogen mifepristone Parkinson's disease Androgen levodopa selegiline testosterone (med/trnsm) carbidopa trihexyphenidyl bromocriptine hydrochloride Antiandrogens and related drugs orphenadrine cyproterone bicalutamide pramipexole flutamide finasteride (5-α-reductase amantadine inhibitor) apomorphine Gonadotrophin-releasing hormone analogues MPTP (exp.tool) buserelin Amyotrophic lateral sclerosis goserelin riluzole Drugs acting on the uterus Alzheimer's disease ergometrine atosiban donepezil memantine oxytocin rivastigmine galantamine dinoprostone (prostaglandin E₂) **Erectile dysfunction** sildenafil tadalafil General anaesthetics (Ch. 41)

Bone (Ch. 36)

parathyroid hormone (med/trnsm)	calcitonin
vitamin D	teriparatide
calcium salts	cinacalcet
oestrogen (med/trnsm)	
raloxifene	
alendronate	etidronate
risedronate	strontium ranelate

Inhalationalfluranes (isoflurane, desflurane,
sevoflurane)ether, chloroform,
halothane (historical
interest)nitrous oxideinterest)Intravenousmidazolam
etomidate
thiopentalketamine

Primary	Secondary
Analgesics and related substan	nces (Ch. 42)
Opioids and related drugs morphine codeine fentanyl pethidine naloxone (antag)	oxycodone buprenorphine remifentanyl (anaesthesia) methadone diamorphine (heroin) (recreat) naltrexone (antag)
Mild analgesics aspirin and other NSAIDs paracetamol	
Other analgesic drugs tramadol (and tapentadol) carbamazepine gabapentin (and pregabalin) amitriptyline duloxetine	ketamine
Others related to nociception enkephalins and endorphins (med/trnsm) dynorphin (med/trnsm) capsaicin (exp.tool)	

Local anaesthetics and other drugs that affect sodium channels (Ch. 43)

Local anaesthetics (Ch. 43) lidocaine bupivacaine (and levobupivacaine)

tetracaine (amethocaine) ropivacaine mepivacaine articaine (dentistry)

Selective sodium channel blocker (Ch. 43) tetrodotoxin (exp.tool)

Anxiolytic and hypnotic drugs (Ch. 44)

Antidepressants used as anxiolytic drugs (see also Ch. 47) fluoxetine paroxetine

sertraline

Benzodiazepines and related drugs

Other	
	zopiclone
midazolam	flumazenil (antag)
diazepam	lorazepam
temazepam	nitrazepam

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buspirone (5-HT<sub>1A</sub> receptor propranolol
agonist) antiepileptic drugs, e.g.
gabapentin, valproate
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Primary

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Secondary

Antiepileptic drugs and centrally acting muscle relaxants (Ch. 45)

carbamazepine	phenobarbital
valproate	diazepam
vigabatrin	clonazepam
gabapentin (and pregabalin)	ethosuximide
lamotrigine	leveteracetam
baclofen	
phenytoin	

Antipsychotic drugs (Ch. 46)		
Classic chlorpromazine haloperidol	fluphenazine flupentixol thioridazine	
Atypical clozapine olanzapine	risperidone sulpiride aripiprazole quetiapine	

Drugs used in affective disorders (Ch. 47)		
Tricyclic antidepressants amitriptyline	imipramine	
Selective serotonin (5-HT) reupta fluoxetine sertraline	ke inhibitors fluvoxamine escitalopram	
Monoamine oxidase inhibitors moclobemide ('RIMA')	phenelzine tranylcypromine	
Miscellaneous antidepressants venlafaxine duloxetine atomoxetine	trazodone bupropion	
Mood stabilisers lithium carbamazepine	atypical antipsychotic drugs (e.g. olanzapine)	

ad in offective discussor (Ch. 47

Primary

Secondary

Central nervous system stimulants and psychotomimetics (Ch. 48)

amphetamine (recreat)	LSD (recreat)
cocaine (recreat)	ketamine (recreat)
caffeine (recreat)	mephedrone (recreat)
methylphenidate	
MDMA ('ecstasy')	
modafinil	

Deres		and distant		(Oh - 40 -	(0) 1
Drug	dependence	and drug	abuse	(UNS 49 a	and 19)

opiates (morphine, diamorphine [heroin]) (recreat)	Δ^9 -tetrahydrocannabinol (recreat)
nicotine (recreat)	amphetamine (recreat)
ethanol (recreat)	solvents (recreat)
cocaine (recreat)	benzodiazepines (recreat)
methadone	
buprenorphine	
naltrexone	
acamprosat	
bupropion	

Antibacterial agents (Ch. 51)

Bacterial cell wall inhibitor benzylpenicillin piperacillin amoxicillin flucloxacillin cephalosporins (cefadroxil, cefotaxime, ceftriaxone) vancomycin

Topoisomerase inhibitor ciprofloxacin

Folate inhibitors trimethoprim

Bacterial protein synthesis inhibitors

gentamicin amikacin tetracycline chloramphenicol erythromycin clarithromycin

Antianaerobe drug

metronidazole Antimycobacterial agents

isoniazid rifampicin pyrazinamide dapsone clofazimine ethambutol streptomycin

benzyl penicillin

sulfonamides

Primary Secondary Antiviral agents (Ch. 52) DNA polymerase inhibitors aciclovir foscarnet ganciclovir tribavirin (ribavirin) Reverse transcriptase inhibitors zidovudine (AZT) didanosine lamivudine efavirenz (non-nucleoside inhibitor) Protease inhibitor saquinavir indinavir Immunomodulators interferons (med/trnsm) Neuraminidase inhibitor zanamivir Inhibitor of HIV fusion with host cells enfurvitide Inhibitor of viral entry maraviroc

Antifungal drugs (Ch. 53)	
Polyene antibiotics amphotericin B	nystatin
Azoles fluconazole	miconazole
Antimetabolite	flucytosine
Others	terbinafine echinocandin B

Antiprotozoal drugs (Ch. 54)	
Antimalarials chloroquine quinine artemisinin primaquine	pyrimethamine plus sulfadoxine
For Pneumocystis pneumoniae co-trimoxazole (high dose)	pentamidine
Amoebicidal drug metronidazole	
Leishmanicidal drugs antimonials (e.g. stibogluconate) pentamidine	
Trypanosomicidal drugs suramin	pentamidine
Toxoplasmicidal drug pyrimethamine–sulfadiazine	

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APPENDIX

Primary	Secondary	
Anthelmintic drugs (Ch. 55)		
Broad spectrum mebendazole		
Roundworm, threadworm piperazine levamisole (roundworm)		
Schistosomes praziquantel		
River blindness ivermectin		

Primary	Secondary
Treatment of poisoning (Ch. 57)	
acetylcysteine	
naloxone (Ch. 42)	

Anticancer drugs (Ch. 56)

Alkylating agents and related co	mpounds
cyclophosphamide	lomustine
melphalan	busulfan
cisplatin	chlorambucil
Antimetabolites	
	flue second all
cytarabine methotrexate	fluorouracil
in on on and	mercaptopurine
thioguanine	
pentostatin	gemcitabine
Cytotoxic antibiotics	
doxorubicin	
bleomycin	dactinomycin
Plant derivatives	
	atapaaida
vinca alkaloids (vincristine,	etoposide
vinblastine) taxanes (paclitaxel, docetaxel)	
irinotecan	
Hormones and related drugs	
prednisolone	
dexamethasone	
flutamide	
buserelin	anastrozole
tamoxifen	
Monoclonal antibodies	
rituximab	erlotinib
trastuzumab	serafinib
panitumumab	Scraitlind
bevacizumab	
Devacizuman	