INTRODUCTION

The *Canadian Pharmacists Association Guide to Drugs in Canada* has been planned and written to provide clear information and practical advice on drugs and medications in a way that can be readily understood by a non-medical reader. The text reflects current drug usage knowledge and standard medical practice in this country. It is intended to complement and reinforce the advice of your physician and pharmacist.

How the book is structured

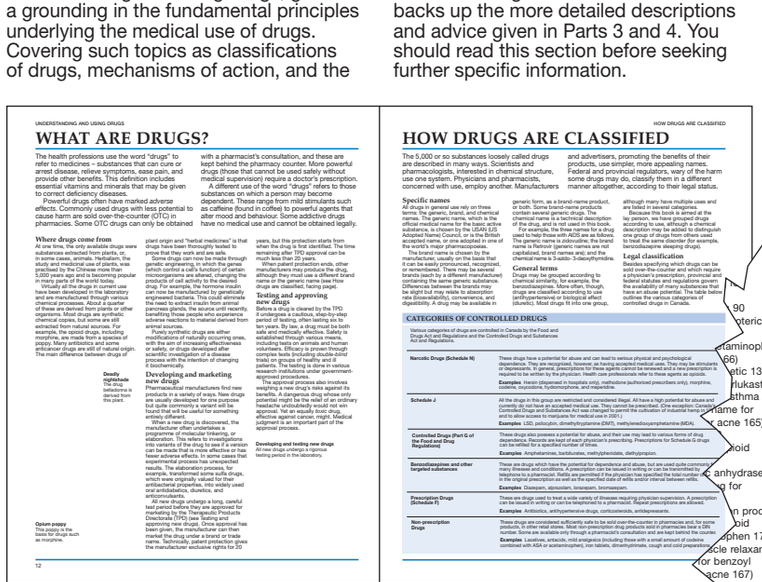
The book is divided into five parts. The first part, Understanding and Using Drugs, provides a general introduction to the effects of drugs and gives general advice on practical questions, such as the administration and storage of drugs. The second part, the Drug Finder Index, provides the means of locating information on specific drugs through an index to over 2,000 generic and brand-name drugs. Part 3, Major Drug Groups, will help you understand the uses and mechanisms of action of the principal classes of drugs. Part 4, the A–Z of Drugs, consists of 260 detailed profiles of commonly prescribed generic drugs, profiles of vitamins, minerals, and drugs of abuse, and information on drugs in sport and travel. Part 5 contains a glossary of drug-related terms (italicized in the text) and a general index.

Finding your way into the book

The information you require, whether on the specific characteristics of an individual drug or on the general effects and uses of a group of drugs, can be easily obtained without prior knowledge of the medical names of drugs or drug classification through one of the two indexes: the Drug Finder or the General Index. The diagram on the facing page shows how you can obtain information throughout the book on the subject concerning you from each of these starting points.

1 UNDERSTANDING AND USING DRUGS

The introductory part of the book, Understanding and Using Drugs, gives a grounding in the fundamental principles underlying the medical use of drugs. Covering such topics as classifications of drugs, mechanisms of action, and the proper use of medicines, it provides valuable background information that backs up the more detailed descriptions and advice given in Parts 3 and 4. You should read this section before seeking further specific information.


UNDERSTANDING AND USING DRUGS

WHAT ARE DRUGS?

The health professions use the word "drugs" to refer to medicines – substances that can cure or arrest disease, relieve symptoms, ease pain, and provide other benefits. This definition includes essential vitamins and minerals that may be given to correct deficiency diseases.

Powerful drugs often have marked adverse effects. Commonly used drugs with less potential to cause harm are sold over-the-counter (OTC) in pharmacies. Some OTC drugs can only be obtained with a pharmacist's consultation, and these are kept behind the pharmacy counter. More powerful drugs (those that cannot be used safely without medical supervision) require a doctor's prescription.

A different use of the word "drugs" refers to those substances on which a person may become dependent. These range from mild stimulants such as caffeine (found in coffee) to powerful agents that alter mood and behaviour. Some addictive drugs have no medical use and cannot be obtained legally.

Where drugs come from

At one time, the only available drugs were those found in plants, animals, and the earth. In some cases, animals, Herbalism, the study and medicinal use of plants, was practised by the Chinese more than 5,000 years ago and is becoming popular in many parts of the world.

Virtually all the drugs in current use have been developed in the laboratory and are manufactured through various chemical processes. About a quarter of them are still derived from plants or other organisms. Most drugs are synthetic chemical copies, but some are still extracted from natural sources. For example, the opioid drugs, including morphine and codeine, are derived from poppy. Many antibiotics and some anticancer drugs are still of natural origin. The main difference between drugs of plant origin and "herbal medicines" is that drugs have been thoroughly tested to prove that they are safe and work.

Some drugs can now be made through genetic engineering, in which the genes (which control a cell's function) of certain microorganisms are altered, changing the way the cells work. Insulin is one of these drugs. For example, the hormone insulin can now be manufactured by genetically engineered bacteria. This could eliminate the need to extract insulin from animal pancreases. Not only is this more efficient, benefiting those people who experience adverse reactions to material derived from animal sources.

Purely synthetic drugs are either modelled on natural substances or, more commonly, with the aim of increasing effectiveness or safety, or drugs developed after scientific investigation of a disease process with the intention of changing it biochemically.

Developing and marketing new drugs

Pharmaceutical manufacturers find new products in a variety of ways. New drugs are usually developed for one purpose but, in the course of testing, may be found that will be useful for something entirely different.

When a new drug is discovered, the manufacturer often undertakes a program of chemical research, tinkering, or elaboration. This refers to investigations into variants of the drug to see if a version can be made that is more effective or has fewer adverse effects. In some cases that research leads to more significant results. The elaboration process, for example, transformed some sulfa drugs, which were originally valued for their antibacterial properties, into widely used diuretics, antidiabetics, diuretics, and anticonvulsants.

All new drugs undergo a long, careful test period before they are approved for marketing by the Therapeutic Products Directorate (TPD) of Health Canada, approving new drugs. Once approval has been given, the manufacturer can then market the drug under a brand or trade name. Technically, patent protection gives the manufacturer exclusive rights for 20 years, but this protection starts from when the drug is first identified. The time between this and TPD approval can be much more than 10 years.

When patent protection ends, other manufacturers may produce the drug, although they must use a different brand name. This is why many brands of the same drugs are classified, facing page).

Testing and approving new drugs

New drugs is cleared by the TPD if undergoes a cautious, step-by-step period of testing, often lasting six to ten years. By law, a drug must be both safe and medically effective. Safety is established by laboratory research, including tests on animals and human volunteers. Efficacy is proven through complex tests (including double-blind trials) on groups of healthy and ill people. The TPD works with various research institutions under government-approved procedures.

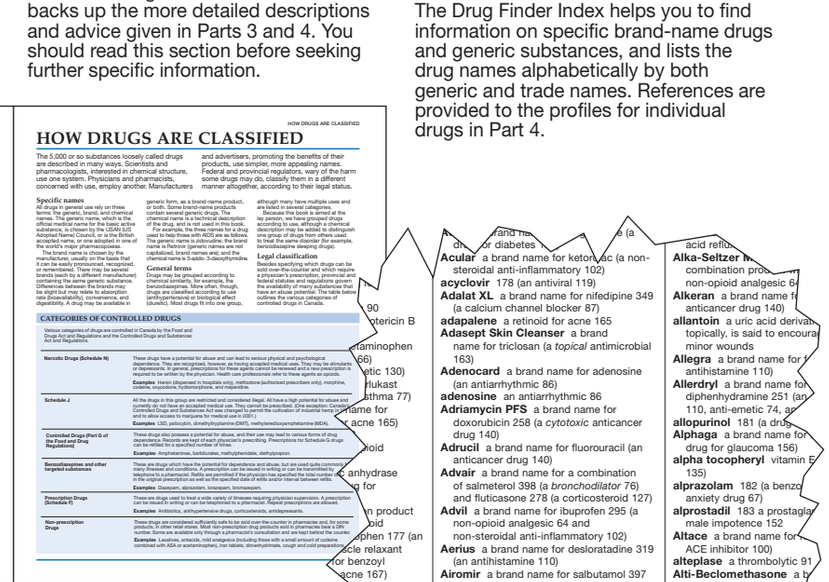
The approval process also involves weighing a new drug's risks against its benefits. A dangerous drug whose only potential might be the relief of an ordinary headache would not receive TPD approval. Yet an equally toxic drug, effective against cancer, might. Medical judgment is an important part of the approval process.

Developing and testing new drugs

All new drugs undergo a rigorous testing period in the laboratory.

Deadly nightshade
The drug belladonna is derived from this plant.

Opium poppy
This poppy is the basis for drugs such as morphine.


HOW DRUGS ARE CLASSIFIED

HOW DRUGS ARE CLASSIFIED

The 5,000 or so substances loosely called drugs are described in many ways. Scientists and pharmacologists, interested in chemical structure, use one system. Physicians and pharmacists, concerned with use, employ another. Manufacturers and advertisers, promoting the benefits of their products, use simpler, more appealing names. Federal and provincial regulators, wary of the harm some drugs may do, classify them in a different manner altogether, according to their legal status.

Specific names

All drugs in general use rely on three terms: the generic, brand, and chemical names. The generic name, which is the nonproprietary name, is the name of the drug substance, is chosen by the USAN (US Adopted Name) Council, or is the British adopted name, or one adopted in one of the world's major pharmacopoeias.

The brand name, which is the name the manufacturer, usually on the basis that it can be easily pronounced, recognized, or remembered. There may be several brands (each by a different manufacturer) of the same drug, each with a different name. Differences between the brands may be slight but may relate to absorption rate (bioavailability), convenience, and digestibility. A drug may be available in generic form, as a brand-name product, or both. Some brand-name products contain several generic drugs. The chemical name is a technical description of the drug's chemical structure. It is rarely used. For example, the three names for a drug used to help those with AIDS are as follows. The generic name is didanosine; the brand name is Rebinyn (generic names are not capitalized, brand names are); and the chemical name is 2-ddIo- 3-deoythridine.

General terms

Drugs may be grouped according to their chemical structure, as with the benzodiazepines. More often, though, drugs are classified according to use (antihypertensive) or biological effect (diuretic). Most drugs fit into one group, although many have multiple uses and are listed in several categories.

Because this book is aimed at the lay person, we have simplified drugs' chemical names. The chemical description may be added to distinguish one group of drugs from others used to treat the same disorder (for example, benzodiazepine sleeping drugs).

Legal classification

Besides specifying which drugs can be sold over the counter and which require a physician's prescription, provincial and federal regulations govern the storage and the availability of many substances that have an abuse potential. The table below outlines the various categories of controlled drugs in Canada.

CATEGORIES OF CONTROLLED DRUGS

Various categories of drugs are controlled in Canada by the Food and Drugs Regulations and the Controlled Drugs and Substances Act and Regulations.

Narcotic Drugs (Schedule N)	These drugs have a potential for abuse and can lead to serious physical and psychological dependence. They are not, however, necessarily banned, as having accepted medical uses. They may be stimulants or depressants. In general, prescriptions for these agents cannot be renewed and a new prescription is required to be written by the physician. Health care professionals refer to these agents as opioids. **Examples** Heroin (dispensed in hospitals only), methadone (authorized prescribers only), morphine, codeine, oxycodone, hydromorphone, and meperidine.
Schedule J	All the drugs in this group are restricted and considered illegal. All have a high potential for abuse and no accepted medical use. Prosecutions under the Narcotic Control Act and Controlled Drugs and Substances Act was changed to permit the cultivation of industrial hemp (Cannabis sativa) and to allow access to marijuana for medical use in 2001.) **Examples** LSD, psilocybin, dimethyltryptamine (DMT), methylenedioxyamphetamine (MDA).
Controlled Drugs (Part G of the Food and Drug Regulations)	These drugs also possess a potential for abuse, and their use may lead to various forms of drug dependence. Records are kept of each physician's prescribing. Prescriptions for Schedule G drugs can be refilled for a specified number of times. **Examples** Amphetamines, barbiturates, methylphenidate, diethylpropion.
Benzodiazepines and other targeted substances	These are drugs which have the potential for dependence and abuse, but are used quite commonly in many illnesses and conditions. A prescription can be issued in writing, or can be transmitted to be telephone to a pharmacist. Refills are permitted if the physician has specified the total number and in the original prescription as well as the specified date of refills and/or interval between refills. **Examples** Diazepam, alprazolam, lorazepam, bromazepam.
Prescription Drugs (Schedule F)	These are drugs used to treat a wide variety of illnesses requiring physician supervision. A prescription, which may be written or telephoned in, is required. Refills and substitutions are allowed. **Examples** Antibiotics, antihypertensive drugs, corticosteroids, antidepressants.
Non-prescription Drugs	These drugs are considered sufficiently safe to be sold over-the-counter in pharmacies and, for some products, in other retail stores. Most non-prescription drug products sold in pharmacies bear a DIN number. Some are available only through a pharmacist's consultation and are kept behind the counter. **Examples** Laxatives, antacids, mild analgesics (including those with a small amount of codeine combined with ASA or acetaminophen), iron tablets, dimenhydrinate, cough and cold preparations.

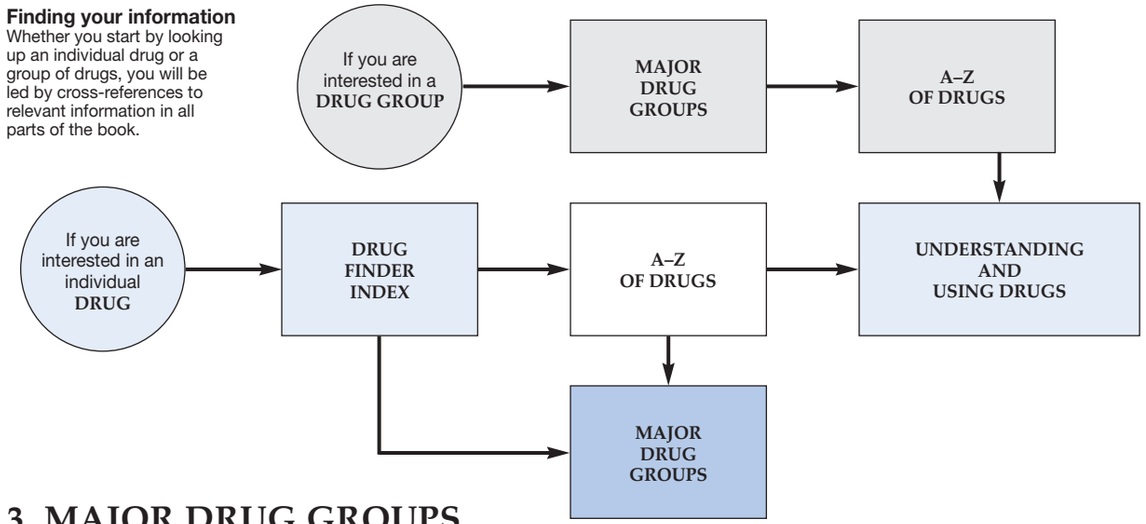
2 DRUG FINDER INDEX

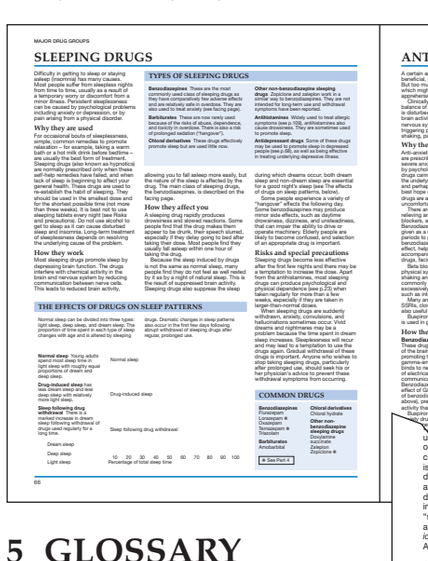
The Drug Finder Index helps you to find information on specific brand-name drugs and generic substances, and lists the drug names alphabetically by both generic and trade names. References are provided to the profiles for individual drugs in Part 4.

Acular a brand name for ketorolac (a non-steroidal anti-inflammatory 102)
acyclovir 178 (an antiviral 119)
Adalat XL a brand name for nifedipine 349 (a calcium channel blocker 87)
adapalene a retinoid for acne 165
Adasept Skin Cleanser a brand name for triclosan (a *topical* antimicrobial 163)
Adenocard a brand name for adenosine (an antiarrhythmic 86)
adenosine an antiarrhythmic 86
Adriamycin PFS a brand name for doxorubicin 258 (a *cytotoxic* anticancer drug 140)
Adrucil a brand name for fluorouracil (an anticancer drug 140)
Advair a brand name for a combination of salmeterol 398 (a *bronchodilator* 76) and fluticasone 278 (a corticosteroid 127)
Advil a brand name for ibuprofen 295 (a non-opioid analgesic 64 and non-steroidal anti-inflammatory 102)
Aerius a brand name for desloratadine 319 (an antihistamine 110)
Airomir a brand name for salbutamol 397 (a *bronchodilator* 76)
Akineton a brand name for biperiden (an *anticholinergic* for *parkinsonism* 71)
Alcomicin a brand name for gentamicin 283 (an *antibiotic* 110)
alendronate 179 (a drug for treatment of bone disorders 108)
Alesse a brand name for levonorgestrel 313 (a female sex hormone 133 and oral contraceptive 149) and ethinyl estradiol 269 (an estrogen 133)
Alka-Seltzer a brand name for a combination product containing a non-opioid analgesic 64
Alkeran a brand name for melphalan (an anticancer drug 140)
allantoin a uric acid derivative used topically, is said to encourage the healing of minor wounds
Allegra a brand name for fexofenadine (an antihistamine 110)
Allerdryl a brand name for diphenhydramine 251 (an antihistamine 110), anti-emetic 74, and
allopurinol 181 (a drug
Alphaga a brand name for brimonidine (a drug for glaucoma 156)
alpha tocopheryl acetate vitamin E 135)
alprazolam 182 (a benzodiazepine anxiety drug 67)
alprostadil 183 a prostaglandin used to treat male impotence 152
Altace a brand name for ramipril (an ACE inhibitor 100)
alteplase a thrombolytic 91
Alti-Beclomethasone a brand name for beclomethasone 199 (a corticosteroid 127)
aluminum acetate an astringent used in the treatment of inflammation of the skin or of the ear canal 165
aluminum hydroxide 184
amantadine 185 (an antiviral drug used for *parkinsonism* 71)
Amaryl a brand name for glimepiride (an oral antidiabetic 166)

3 MAJOR DRUG GROUPS

Subdivided into sections dealing with each body system (for example, heart and circulation) or major disease grouping (for example, malignant and immune disease), this part of the book contains descriptions of the principal classes of drugs. Information is given on the uses, actions, effects, and risks associated with each group of drugs and is backed up by helpful illustrations and diagrams. Individual drugs in each group are listed to allow cross-reference to Part 4.




MAJOR DRUG GROUPS

SLEEPING DRUGS

Difficulty in getting to sleep or staying asleep is a problem that affects many people. Suffer from sleepless nights from time to time, usually as a result of a temporary worry or discomfort from a minor illness. Persistent sleeplessness can be caused by psychological problems including anxiety or depression, or by pain arising from a physical disorder.

Why they are used

For occasional bouts of sleeplessness, simple, common remedies to promote sleep may be tried. These may be natural (such as a hot drink before bedtime) or are usually the best form of treatment. Sleeping tablets (also known as hypnotics) are normally prescribed only when these simple measures have failed or when the lack of sleep is thought to be affecting general health. These drugs are used to re-establish the habit of sleeping. They should be used in the smallest dose and for the shortest time possible. It is better than three weeks. Those treated to use sleeping tablets every night (see Risks and precautions, below) may find it difficult to get to sleep as it can cause disturbed sleep. Sometimes, the underlying problem of sleeplessness needs to be treated by treating the underlying cause of the problem.

How they work

Most sleeping drugs promote sleep by depressing brain function. The drugs interfere with chemical activity in the brain and nervous system by reducing communication between nerve cells. This leads to reduced brain activity,

TYPES OF SLEEPING DRUGS

Benzodiazepines These are the most commonly used class of sleeping drugs as they are relatively safe in overdose. Examples are flurazepam, nitrazepam, and temazepam.

Barbiturates These are now rarely used because of the risks of abuse, dependence, and toxicity in overdose. There is also a risk of prolonged sedation (Hangover).

Chloral derivatives These drugs effectively promote sleep but are used little now.

Other non-benzodiazepine sleeping drugs Zopiclone and zaleplon work in a similar way to benzodiazepines. They are not chemically related to the benzodiazepines.

Antidepressants Widely used to treat allergic symptoms (see p.109), antihistamines also cause drowsiness. They are sometimes used as sleeping drugs.

Antidepressant drugs Some of these drugs may be used to promote sleep in depressed people (see p.68), as well as being effective in treating underlying depressive illness.

allowing you to fall asleep more easily, but they also disrupt the normal pattern of sleep. The main class of sleeping drugs, the benzodiazepines, is described on the facing page.

How they affect you

A sleeping drug rapidly produces drowsiness and slowed reactions. Some people find that the drug makes them sleepy the next day. This is especially true of sleeping drugs that are taken during the day. Most people find they usually fall asleep within one hour of taking the drug.

The effect of the sleep induced by drugs is not the same as normal sleep, many people find they do not feel as well rested by it as by a night of natural sleep. This is the result of suppressed brain activity. Sleeping drugs also suppress the sleep

THE EFFECTS OF DRUGS ON SLEEP PATTERNS

Normal sleep can be divided into three types: light sleep, deep sleep, and dream sleep. The proportion of time spent in each type of sleep changes with age and is altered by sleeping

drugs. Dramatic changes in sleep patterns also occur in the first few days following abrupt withdrawal of sleeping drugs after regular, prolonged use.

during which dreams occur; both dream sleep and non-dream sleep are essential for a good night's sleep (see The effects of drugs on sleep patterns).

Risks and special precautions

Some people experience a variety of side effects from sleeping drugs. Hangover effects, such as drowsiness, are the most common minor side effects, such as daytime drowsiness and slowed reaction times, that can impair the ability to drive or operate machinery. Sleeping drugs are likely to be dangerous if taken with alcohol or an appropriate drug is important.

Risks and special precautions

Some drugs should not be used immediately after the first few nights and there may be a temptation to increase the dose. Apart from the unfortunate risk of overdosing, drugs can produce psychological and physical dependence. Those who have taken regularly for more than a few weeks, especially if they are taken in larger-than-normal doses.

When sleeping drugs are suddenly withdrawn after regular use, rebound insomnia sometimes occur. Vivid dreams and nightmares may be a problem because the time spent in dream sleep increases. Sleeplessness will recur and may lead to a temptation to use the drugs again. Gradual withdrawal of these drugs, by reducing the dose over a few days, stop taking sleeping drugs, particularly after prolonged use, should seek his or her physician's advice to prevent these withdrawal symptoms from occurring.

COMMON DRUGS

Benzodiazepines
Ativan ®
Lorazepam ®
Oxazepam
Temazepam ®
Triazolam

Barbiturates
Amobarbital

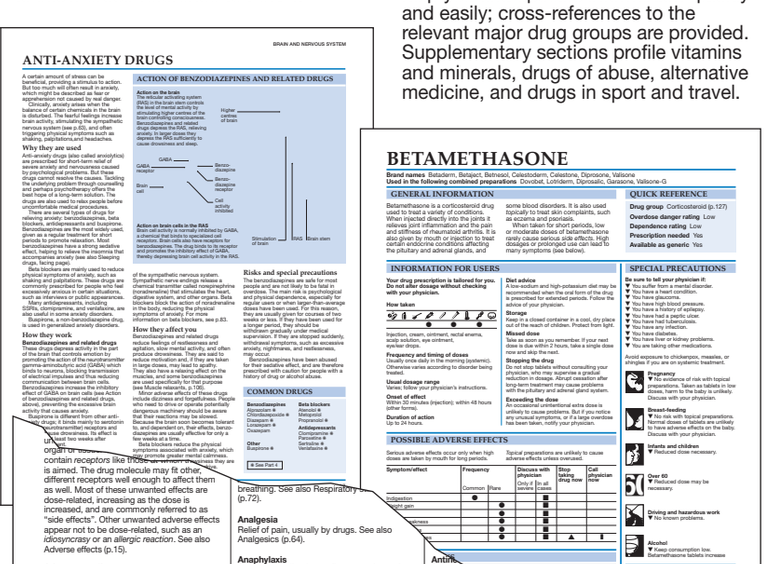
Chloral derivatives
Noctec ®

Other non-benzodiazepine sleeping drugs
Dioxylamine
Imovane
Zaleplon
Zopiclone ®

® See Part 4

4 A–Z OF DRUGS

This part contains profiles of 260 generic drugs, written to a standard format to help you find specific information quickly and easily; cross-references to the relevant major drug groups are provided. Supplementary sections profile vitamins and minerals, drugs of abuse, alternative medicine, and drugs in sport and travel.


BRAIN AND NERVOUS SYSTEM

ANTI-ANXIETY DRUGS

A certain amount of stress can be beneficial, helping us to perform well. But too much will often result in anxiety, which might be described as fear or apprehension not caused by real danger.

Clinically, anxiety arises when the balance of activity in the brain and nervous system is disturbed. The fearful body response, brain activity, stimulating the sympathetic nervous system (see p.63), and often triggering physical symptoms such as shaking, palpitations,and headaches.

Why they are used

Anti-anxiety drugs (also called anxiolytics) are prescribed for short-term relief of severe anxiety and nervousness caused by psychological problems. But these drugs rarely cure anxiety. They help relieve the underlying problem through counselling and perhaps psychotherapy offers the best hope of a long-term solution. The drugs are also used to relax people before they undergo stressful situations.

There are several types of drugs for relieving anxiety: benzodiazepines, beta blockers, antidepressants and buspirone. Benzodiazepines are the most widely used. They are usually taken by mouth for short periods to promote relaxation. Drugs called benzodiazepines have a strong sedative effect, helping to relieve the tension that accompanies anxiety (see also Sleeping drugs, p.66).

Beta blockers are mainly used to reduce physical symptoms of anxiety, such as shaking and palpitations. These drugs are commonly prescribed for people who feel anxious in certain social situations (such as interviews or public appearances).

Many antidepressants, including SSRIs, clomipramine, and venlafaxine, are also useful in some anxiety disorders. They are the main treatment when anxiety is used in generalized anxiety disorders.

How they work

Benzodiazepines and related drugs

These drugs depress activity in the part of the brain that controls emotion by increasing the effect of a chemical called gamma-aminobutyric acid (GABA) which binds to neurons, blocking transmission of electrical impulses and thus reducing communication between brain cells. Benzodiazepines increase the inhibitory effect of GABA on brain cells (see Action on brain cells) by increasing the number of GABA receptors.

Beta blockers

These drugs block the effects of the hormone adrenaline (also called epinephrine) and other anti-anxiety drugs. It does this by preventing neurotransmitter receptors and tissue drug receptors. Its effect is called two weeks after

Drugs that contain receptors like those in adrenaline is aimed. The drug molecule may fit other, different receptors well enough to affect them as well. Most of these unwanted effects are dose-related, increasing as the dose is increased, and are commonly referred to as "side effects". Other unwanted adverse effects appear not to be dose-related, such as an *idiosyncrasy* or an *allergic reaction*. See also Adverse effects (p.15).

Adverse reaction
See *Adverse effect*.

Agonist
A term meaning to have a stimulating effect. An agonist drug (often called an activator) is one that binds to a *receptor*, and triggers or increases a particular activity in that cell.

Allergic reaction
An allergic reaction or allergy is one that appears not on first exposure to a drug but on a subsequent occasion. The causes and symptoms are similar to a reaction caused by other allergens. See Allergy (p.109) and *Anaphylaxis*.

ACTION OF BENZODIAZEPINES AND RELATED DRUGS

of the sympathetic nervous system. Sympathetic nerve endings release a chemical transmitter called norepinephrine (also called noradrenaline) that affects the digestive system, and other organs. Beta blockers block the action of noradrenaline in the body, reducing the physical symptoms of anxiety. For more information on beta blockers, see p.83.

How they affect you

Benzodiazepines and related drugs reduce feelings of restlessness and agitation, slow mental activity, and often produce drowsiness. They are said to have a sedative effect. In fact, in small to large doses, may lead to apathy. They also have a relaxing effect on the muscles, and some benzodiazepines are used specifically for that purpose (see Muscle relaxants, p.112).

Minor adverse effects of these drugs include dizziness and forgetfulness. People who need to drive or operate potentially dangerous machinery should be aware of the risk of these side effects.

Because the brain soon becomes tolerant to, and dependent on, their effects, benzodiazepines are usually effective for only a few weeks at a time.

Beta blockers reduce the physical symptoms associated with anxiety, which may promote greater mental calmness.

Risks and special precautions

The benzodiazepines are safe for most people and are not likely to be fatal in overdose. They can cause drowsiness and physical dependence, especially in regular users or when larger-than-average doses have been used. For this reason, they are usually given for courses of two to four weeks. If they are to be used for a longer period, they should be withdrawn gradually under medical supervision. If they are stopped suddenly, withdrawal symptoms, such as excessive anxiety, nightmares, and restlessness, may occur.

Benzodiazepines have been abused for their sedative effect, and are therefore prescribed with caution for people with a history of drug or alcohol abuse.

COMMON DRUGS

Benzodiazepines
Alprazolam ®
Chlordiazepoxide ®
Diazepam ®
Lorazepam ®
Oxazepam

Other
Buspirone ®

Beta blockers
Atenolol ®
Metoprolol
Propranolol ®

Antidepressants
Clomipramine ®
Fluoxetine ®
Venlafaxine ®

® See Part 4

5 GLOSSARY AND INDEX

A glossary of terms explains technical words italicized in the text. The general index enables you to look up references throughout the book.