Introduction

Drug use of one sort or another has occurred for a very long time – probably ever since the time that early humans, eating plants that grew around them, found that some plants had medicinal properties and that some made them feel different. Since that time, drug use has been part of the human lifestyle, with different societies using different 'natural' intoxicants depending on the indigenous flora. A few of these drugs have become familiar to many, beyond the confines of their original use. Opium, alcohol and cannabis spring immediately to mind; they have been used for centuries and are still widely used today. So too is coffee, which although it is bought in packets and jars as a food, fits all five definitions of the word 'drug' given in Chapter 1.

Coffee is indigenous to Ethiopia, where it was first consumed by chewing the beans or infusing the leaves. It was certainly known to the Arabs in the sixth century, and its medicinal properties were described by the Persian physicians, Razi (or Rhazes; 850–922) and Ibn-sina (or Avicenna; 980–1037). In the fourteenth century the technique of roasting and grinding coffee beans was developed and only then did coffee drinking become prevalent. By this time, the cultivation and use of coffee had spread to Arabia where its popularity was enhanced because the use of alcohol had been banned by the Qur'an. Coffee was used medicinally as well as for religious purposes, particularly by the Dervishes to keep themselves awake during long religious rituals. With the increasing popularity of coffee, coffee houses were established which soon became meeting places for intellectuals. The use of coffee in its social setting of the coffee house spread through the Arab world and to Turkey, Persia and beyond. There were many attempts, in different countries, to close down the coffee houses, which were seen as centres of sedition and dissent, and to ban the use of coffee altogether. All of these attempts at prohibition eventually failed and coffee was then heavily taxed so that coffee houses became valuable sources of revenue for the authorities. During the seventeenth century, coffee drinking spread to England and other parts of Europe. As in Arabia, it was first used medicinally, and in particular as a cure for drunkenness which was then rife. Coffee houses soon opened and again became important social, political and business centres, attracting opposition, almost from the start, from brewers and others with vested interests in the sale of alcohol. Taxes were imposed and provided considerable revenue, but despite this, attempts were made in England to close the coffee houses that were once again seen as centres of radicalism and political dissent. As in Arabia these attempts failed and heavier taxes were imposed instead. Gradually, in the latter part of the eighteenth century, the clientele of the coffee houses started to join clubs and the heyday of coffee houses was over, this change being accelerated by the importation of tea by the British East India Company and the acceptance of tea (which also contains caffeine) as the national drink.

From this necessarily brief history of coffee it is possible to identify certain themes that crop up repeatedly when modern drugs of abuse and dependence are considered. For example, many of these drugs were first used, like coffee, for medicinal purposes, even though they are now considered to have minimal or no therapeutic value; alcohol, tobacco, cannabis and LSD (lysergic acid diethylamide) all fit into this category. Tobacco, which has been included in this edition for the first time, was believed, in the seventeenth century, shortly after its introduction to England, to be good for 'the megrim, the toothache, obstructions proceeding of cold and for helping the fits of the mother (hysteria)'[1]. Even at that time, however, some had their doubts, interestingly commenting on its harmfulness to youth. Although medical opinion remained divided for centuries about the usefulness or harmfulness of tobacco, its dependence-producing properties gradually came to be acknowledged. In 1857 a *Lancet* editorial referred to 'the weak slave who all day keeps

a pipe or cigar in his mouth who cannot work, read, think, nor even sit half an hour quiet unless he be smoking'[2], and in 1927 a similarity had been noted between acquired tolerance to nicotine and acquired tolerance to morphine[3].

Modern sophisticated research produces many 'wonder drugs', and many have psychoactive properties. Some of these have already repeated the cycle from apparently safe therapeutic agent to drug of misuse or dependence, and undoubtedly more will do so in the future. Apart from their medicinal value, many drugs (e.g. opium, cannabis, cocaine and mescaline) have been used, as coffee was, in religious rituals, and the use of alcohol in this way continues today in two of the world's three monotheistic religions. It is of interest that the third and youngest religion, Islam, bans its use altogether. It appears that tobacco too was used in religious rituals by the shamans of Central American peoples.

A third way in which drugs are used is for social and recreational purposes, and it was this use of coffee that provoked so much controversy and opposition, just as it does today for the other drugs. All of the 'old' drugs (those with a long history, e.g. opium, cannabis and alcohol) were used in this way, and drug use was often the whole reason for a group coming together; the drug became the very substance of communication, the dynamic of the group activity. Alcohol continues in this role today, in public houses, nightclubs, cocktail parties and so on, and for some drugs, notably cannabis and other psychedelic drugs, taken specifically by those interested in mysticism and exploration of the inner world, the setting in which the drug is taken and the shared group experiences remain important. As far as illicit drug use is concerned, the very fact that the drug is forbidden encourages the formation of a group (and often of a whole subculture), concerned, among other things, with obtaining the drug and concealing its use from the authorities. It is interesting that tobacco has been deliberately uprooted from its role in the social dynamic of many groups by the introduction of legislation banning its use in enclosed public spaces – although this in turn has led to the formation of new, albeit smaller, social groups of smokers huddled together on pavements outside shops and offices.

The story of coffee also illustrates the significance of technological innovation in drug use. Only when the techniques of roasting and grinding the coffee beans became prevalent, did the use of coffee become popular and spread widely and become perceived as problematic. Similarly the use of alcohol was profoundly affected by Razi's discovery of the process of distillation, which made it easier to transport alcohol and to become drunk. Later the identification of the active alkaloids of opium and the subsequent development of the process of acetylation by which morphine is converted to heroin changed the whole pattern of opiate use, not only in the West where this discovery was made, but also in the East, where the parent drug originated. The extraction of cocaine from the leaf of the cocoa plant, and more recently, the ability to prepare pure cocaine 'freebase' ('crack') have had equally profound effects, and now the process has gone one stage further, with new 'designer' drugs being manufactured for the sole purpose of abuse. With tobacco, it was the advent of mass production that had a profound effect. The first American cigarette factory opened in 1864, producing 20 million cigarettes annually, and cigarettes were rationed to soldiers during both World Wars. It seems likely that the recent drive by some scientists and the pharmaceutical industry to produce cognitive-enhancing drugs will lead, in time, to their use becoming prevalent and, if unchecked, these psychoactive drugs will, in their turn, follow a similar path to that of their predecessors.

It is often assumed that the spread of drug use from one country to another is a new problem brought about by modern, rapid means of transport. The story of coffee, or indeed of any of the 'old' drugs, suggests that this is not so. For centuries there has been travel not only from one country to another, but also from one continent to another, and humans on their travels have taken drugs with them. There is no doubt, however, that modern methods of travel and communication have had a profound effect on drug use and abuse because the physical transportation of drugs is so much easier and speedier. In addition, the rapid movement of large numbers of people means that many more people are exposed to the drug-taking practices of another culture. This exposure is increased still further by the effect of the media, so that no drug or drug-taking practice can remain localized. They are bound to spread and in so doing there is usually a loss of the traditional constraints upon drug use imposed by the family and society as a whole. This means that new drugs and new ways of taking them gain acceptance much more easily than when drug use was under strict, local, sociocultural control.

Despite traditional methods of control, the drug scene has never been static. Five hundred years ago in Arabia the use of coffee superseded that of alcohol; this was partly because of the prohibition of alcohol by the Qur'an, but also occurred because of the availability of coffee. In England too, coffee drinking in the seventeenth century reduced the popularity of alcohol, but in turn gave way to tea. Similar changes in the pattern and fashions of drug use have occurred in the past and continue today, the availability of the particular drug often playing a crucial role.

Governments have long been concerned in controlling drug availability. Centuries ago, in Arabia, there were attempts at prohibiting coffee, and when these failed, high taxes were imposed, ostensibly to discourage its use. However, this resulted in such high revenues that it then became economically almost impossible to pursue definitive policies to reduce coffee consumption. This cycle of events was repeated when coffee drinking spread to England, and has also occurred with alcohol and tobacco – both of which now occupy entrenched positions within the economy of most countries.

Many other parallels can be drawn between what has happened to coffee in the past and what is happening to many drugs of abuse and dependence today. Recognition of this fact is not a counsel of despair. It is not meant to imply that heroin will ever be available on the shelves of the supermarket, as coffee is today. But the generality of the themes that have emerged over centuries of drug use does suggest that problems of drug abuse and of dependence on different types of drugs have similarities that transcend substance-specific problems. This in turn suggests that it is the nature of drug abuse and dependence that are important rather than the specific drug that is causing concern at that particular time. However threatening, however modern, however unique present problems appear, it is undoubtedly true that their similarities to what has arisen before are more striking than differences which are more likely to be quantitative than qualitative.

Unfortunately, this quantitative difference, the enormous scale of modern drug abuse and drug dependence, has caused particular problems. Nowadays, so many people have drug-related problems that their care can no longer be left to a small band of interested specialists. All healthcare professionals come into contact with drug abusers and drug-dependent individuals, as do probation officers and the police and others involved with the law, as well as those concerned with welfare services. All of these people require a basic understanding of the problems of drug abuse and dependence if their interventions are to be effective, and this book attempts to convey the general knowledge about drug abuse and dependence that is essential for that understanding.

In addition to general knowledge, however, there is a need for clear and practical advice on what to do in particular situations. Despite a wealth of research literature and a plethora of weighty tomes on drug dependence, it is difficult to find such advice. This book attempts to fill that gap, with chapters on how to assess individuals with drug-related problems and how to go about helping them. Although the emphasis is first on general measures of intervention, specific treatment programmes are also described so that the non-specialist, armed with a general understanding of the nature of the problem, is able to make intelligent decisions and to initiate treatment. Here the emphasis is on flexibility, and a variety of treatment options are described and discussed, from acupuncture to intravenous heroin maintenance. Obviously it is not possible to cover every eventuality, but many problems and problematic situations are included, such as the management of an intoxicated, psychotic patient in the accident and emergency department; the care of children of drug-abusing parents; the question of whether drug-dependent individuals are eligible for driving licences; the management of drug-abusing healthcare professionals, and so on.

Although drug-dependent individuals and drug abusers need help and it is essential that there are sufficient trained people to provide it, local responses to particular individual drug problems will never be enough. The final chapters of the book therefore examine the problem from a wider perspective, describing and explaining national and international control measures. Most important of all, perhaps, is the chapter on prevention, which emphasizes the personal responsibility of every individual to develop more thoughtful attitudes towards drug-taking.

In a book of this size it is only possible to cover a small fraction of the topics related to drug abuse and drug dependence. A chapter on alcohol was included in the last edition of this book and a chapter on tobacco has been added to this edition so that both of the common legal recreational drugs are now covered, emphasising the commonalities of all types of substance misuse and dependence. It will be appreciated

however, that the complex issues associated with these drugs cannot be fully explored, in the space of a single chapter. The interested reader should consult one of the many specialist books on these very important aspects of substance misuse.

The choice of topics covered by this book has been influenced by their practical relevance, but sufficient background information has been included to enable understanding of basic principles. It is hoped that it will encourage those who are inexperienced and unfamiliar with the field to become involved. In the past, many professionals have taken avoiding action when faced by a drug-abusing or drug-dependent individual, preferring to shunt the person off to another agency. They often justified their action by the belief that nothing could be done to help the person anyway, but such responses usually concealed underlying anxiety about their own ability to respond effectively. It is hoped that this book, by explaining some of the basic facts and practical approaches in a simple and straightforward way, will demonstrate that many substance-dependent individuals can be helped, and will encourage more professionals to become involved in helping them.

Chapter 1

Drugs, addiction and behaviour

What is a 'drug'?

There are several possible definitions of a drug, as the examples below will show, but all have their limitations.

'A substance which, when injected into a rat, produces a scientific paper.' Facetious, certainly, but probably accurate.

'A substance used as a medicine in the treatment of diagnosed mental or physical illness.' This definition is based on the shifting sands of therapeutic efficacy; coffee, cannabis and tobacco were used in times gone by for their medicinal properties and, accordingly, would then have been classified as drugs. Nowadays, however, all would escape that definition, a decision that would make most people uneasy, certainly as far as cannabis is concerned, and perhaps for tobacco and coffee too.

'Any chemical substance, other than a food, that affects the structure of a living thing.' This too is unsatisfactory because there are a few substances generally considered to be drugs which are also consumed as foods. Alcohol is the obvious example, but there are others: some mushrooms would be 'food' while others would be drugs; caffeine, obtained in coffee jars from the supermarket, is perceived as a food, whereas in tablet form from the chemist, it is considered a drug.

A drug is 'any substance, other than those required for the maintenance of normal health, which, when taken into the living organism, may modify one or more of its functions[1].' This very broad definition was developed by the World Health Organization (WHO), and had the advantage of being used and understood internationally.

Definitions change with time however and, more recently, the WHO has developed a *Lexicon of Alcohol and Drug Terms,* which acknowledges that 'drug' is a term of varied usage[2]. In medicine it refers to any substance with the potential to prevent or cure disease or enhance physical or mental welfare, and in pharmacology to any agent that alters the biochemical or physiological processes of tissues or organisms. Hence a drug is a 'substance that is, or could be, listed in a pharmacopoeia'. In common usage, however, the Lexicon recognizes that 'drug' often refers specifically to psychoactive drugs, which are separately defined as 'substances that, when ingested, affect mental processes, i.e. cognition or affect'. 'Psychotropic drug' is used as an alternative and equivalent term for the whole class of substances, licit and illicit, with which drug policy is concerned. The terms 'psychoactive drug' and 'psychotropic drug' share the advantage of being descriptive and neutral (i.e. non-judgemental).

Most of this book will, in fact, be concerned with psychoactive substances, their effects and the problems related to their use. However, non-psychoactive substances may, on occasion, give rise to very similar problems. This is of theoretical, if not numerical, importance because it emphasizes the point that the drug-related problems, with which this book deals, are not solely due to the particular properties of psychoactive drugs, but are also due to qualities of the individual concerned and of society. It is also worth noting that, nowadays, 'substance' (meaning psychoactive substance) is often used as synonymous with 'drug'.

What is drug misuse?

At first it seems easy to define misuse: 'To use or employ wrongly or improperly', according to the Shorter Oxford English Dictionary. However, when 'misuse' refers to drug misuse, definitions again become elusive. The term carries implications, according to the drug concerned, of social unacceptability, of illegality or of harmfulness. Sometimes it seems to mean that the drug is being used without medical approval, sometimes that it is being used excessively. Because of such ambiguities, and because the term suggests value judgements that say more about the attitudes of the observer than they do about the way in which the drug is taken, it is often avoided altogether. The term 'drug

use' is substituted, qualified by an appropriate adjective, such as illegal drug use, unsanctioned use (when the use of a particular drug is not sanctioned by society or a group within society), hazardous use (probably leading to harmful consequences for the user), dysfunctional use (leading to impaired social or psychological functioning), non-medical drug use (not in accordance with recommended medical practice), etc. Obviously this format begs the question of what constitutes misuse, but it can give a more precise picture of the way in which a particular drug is taken.

The terms 'recreational' use and 'casual' use are comparative newcomers to the vocabulary and reflect new patterns of drug use and new attitudes towards this. Both imply the infrequent use of small amounts of drugs, which the user often claims carries little risk. The former acknowledges a hedonistic motive, with drugs being taken purely for their pleasurable effects; casual drug use emphasizes that use is occasional, rather than regular, and therefore offers a reassurance that the user is not dependent. However, as serious adverse effects may occur even with small doses, taken only occasionally, these terms may lull users into a false sense of security.

Drug abuse; harmful use

Drug abuse is an alternative phrase, although it too is often used imprecisely and is considered by many to be value laden. It has the advantage of an international (WHO) definition, utilized in the international Conventions for drug control: 'Persistent or sporadic excessive use inconsistent with or unrelated to acceptable medical practice[1].' This is an uncomfortable definition for those who smoke tobacco and for many of those who drink alcohol, forcing them to face up to the nature of their own drug-taking behaviour. It also emphasizes the close relationship between socially acceptable drug-taking behaviour and the range of drug-related problems with which this book is largely concerned. For this reason, it is used widely throughout this book; where the term drug 'misuse' has been employed, it can be considered as interchangeable with 'abuse'.

More recently, the WHO Expert Committee on Drug Dependence introduced the term 'harmful use': a pattern of psychoactive drug use that causes damage to health, either mental or physical. The Committee also noted that the harmful use of a drug by an individual often has adverse effects on the drug user's family, the community and society in general[3].

Drug dependence

The difficulties of defining the essential characteristics of drug dependence are illustrated by the changes that have taken place in the last 30 years. At one time, drug addiction and drug habituation were recognized as separate entities, with the former being more severe than the latter and distinguished on such grounds as the intensity of desire to take the drug, the tendency to increase the dose and the detrimental effect on the individual and/or society. Thus some drugs were described as habituating and others as addictive, and one individual might be considered addicted to a drug whereas another was merely habituated to the same drug. Such terms were impractical, particularly for international application, and a new term, drug dependence, was introduced: 'a state, psychic and sometimes also physical, resulting from the interaction between a living organism and a drug, characterized by behavioural and other responses that always include a compulsion to take the drug on a continuous or periodic basis in order to experience psychic effects, and sometimes to avoid the discomfort of its absence. Tolerance may or may not be present'[1].

Within this definition are two components of very different importance: *psychological dependence*, without which the state of dependence cannot be said to exist, and *physical dependence* which may or may not be present. Thus an individual may be dependent on a drug without manifesting any physical dependence and, conversely, an individual taking drugs that cause physical but not psychological dependence, is correctly described as physically dependent, but not as drug dependent. However, in practice, physical and psychological dependence are often so closely linked that it can be difficult to make the distinction. Therefore, in line with the approach adopted in *The ICD-10 Classification of Mental and Behavioural Disorders*[4] (see Chapter 6), the WHO's Expert Committee developed the following, more modern definition for drug dependence:

> A cluster of physiological, behavioural and cognitive phenomena of variable intensity in which the use of a psychoactive drug (or drugs) takes on a high priority. The necessary descriptive characteristics are preoccupation with a desire to obtain and take the drug and persistent drug-taking behaviour. Determinants and the problematic consequences of drug dependence may be biological, psychological or social, and usually interact[3].

It can now be appreciated that drug abuse or harmful use may occur without causing physical or psychological dependence. LSD, for example, is a common

and dangerous drug of abuse, but does not induce physical or psychological dependence; indeed the sporadic abuse of most drugs is not likely to cause dependence.

Psychological dependence

It will be perceived that at the core of the definition of drug dependence lies psychic or psychological dependence upon the drug. This is a 'feeling of satisfaction and a psychic drive that requires periodic or continuous administration of the drug to produce pleasure or to avoid discomfort'[5]. This precise but dry definition conveys nothing of what it is like to be severely psychologically dependent upon a drug. Eloquently described by those experiencing it as 'the drug calling to them' or as 'always a little geyser in there, hammering away at you to take it', the psychic drive to obtain and to take the drug is often dismissed by those who have not experienced it as a manifestation of 'weak will' or as evidence of a lack of motivation to stop. Nothing could be further from the truth; psychological dependence is an overriding compulsion to take the drug even in the certain knowledge that it is harmful, and whatever the consequences of the method of obtaining it.

Craving and drug-seeking behaviour

Craving is a fundamental component of psychological dependence and implies a constant preoccupation with the drug with intrusive thoughts and obsessive thinking about everything to do with it – particularly its desired effects and the need to obtain it. This in turn may be translated into action in the form of drug-seeking behaviour, which may involve literally searching for drugs, different activities, both legal and illegal, to obtain money to buy them, identifying the source of supply, purchasing, etc. When craving is severe, drug-seeking behaviour dominates daily activity.

Physical dependence and the withdrawal syndrome

Physical dependence is 'an adaptive state manifested by intense physical disturbances when the drug is withdrawn'[5]. Many, but not all, drugs cause physical dependence and of those that do, not all are drugs of abuse. Chlorpromazine, for example, causes physical dependence but is not usually abused. The development of physical dependence depends on the drug being administered regularly, in sufficient dosage over a period of time; the necessary dose and duration of administration depend on the particular drug and may also vary from person to person.

In the condition of physical dependence, the body becomes so 'used' or accustomed or adapted to the drug that there is little, if any, evidence that the person concerned is taking it. However, sudden drug withdrawal is followed by a specific array of symptoms and signs collectively known as the withdrawal or abstinence syndrome. The nature of the withdrawal syndrome is characteristic of each drug type, and the symptoms and signs tend to be opposite in nature to the effects of the drug when it is acutely administered. Thus, physical dependence on a stimulant drug such as amphetamine is manifested by drowsiness, apathy and depression when drug administration ceases, whereas physical dependence on a sedative drug such as a barbiturate leads to a very different type of withdrawal syndrome with hallucinations and convulsions as evidence of stimulation in certain parts of the brain. However, as sudden drug withdrawal is intensely stressful for a physically dependent individual, all the body's responses to stress are called into play and the clinical picture becomes blurred by the activity of the autonomic (involuntary) nervous system.

Although partial symptomatic relief of some of the manifestations of the withdrawal syndrome is possible using a variety of measures, the condition can be treated effectively only by administration of the drug concerned, or one of similar type. Thus, the symptoms of the opiate withdrawal syndrome are relieved only by opiates, of the amphetamine withdrawal syndrome only by amphetamines and so on. Many of the common drugs of abuse cause physical dependence and it can be readily understood that the unpleasant nature of the withdrawal syndrome – or fear of it – can increase the intensity of drug-seeking behaviour because of the need to avoid or relieve withdrawal discomfort. Sometimes, the physiological changes may be of sufficient severity to require medical treatment.

Because physical dependence is sometimes confused with the more general term of drug dependence, the WHO Expert Committee decided to focus on the phenomenon of abstinence and to use the term 'withdrawal syndrome', which is described in terms of its consequences:

> After the repeated administration of certain dependence-producing drugs, e.g. opioids, barbiturates and alcohol,

abstinence can increase the intensity of drug-seeking behaviour because of the need to avoid or relieve withdrawal discomfort and/or produce physiological changes of sufficient severity to require medical treatment [3].

The withdrawal syndromes associated with particular drug types are described in Chapter 3.

Tolerance

Tolerance is 'a reduction in the sensitivity to a drug following its repeated administration in which increased doses are required to produce the same magnitude of effect previously produced by a smaller dose'[3]. Many drugs, including some that are abused, induce tolerance, and therefore those who take them regularly can consume, without intoxication, far larger doses than can be tolerated by those without prior exposure. For tolerance to develop and to be maintained, the drug must be taken regularly and in sufficient dosage. If drug administration is interrupted for any reason, tolerance is lost and the high dose that was previously tolerated without adverse effect becomes as toxic as it is for the drug-naive individual. This situation arises not infrequently when a drug-dependent individual resumes drug-taking after a period of abstinence – in hospital or in prison for example – and the high dose of drug that he or she had previously been taking regularly and safely may then have fatal consequences.

Tolerance does not necessarily develop equally or at the same rate for all the effects of a drug. For example, a very high degree of tolerance develops to the actions of opiates that cause analgesia, mental clouding and respiratory depression (slow and shallow breathing), so that these effects of opiates are not apparent even when the individual is consuming a very high daily dose – as long as that dose level has been reached gradually. However, little or no tolerance develops to the action of opiates on the pupil of the eye or on the bowel so that the same individual usually displays a typically constricted pupil and suffers from constipation.

Although tolerance to most of the effects of opiates is apparently open ended (the dose can be gradually increased to any level), this is not true for all drugs. A barbiturate-tolerant individual, for example, can take a dose of barbiturate that would render a non-tolerant individual comatose; there comes a point, however, when a further increase of dose will lead to severe toxicity or death even for someone who is barbiturate tolerant. In this case tolerance can be said to have reached a 'ceiling'. Tolerance is not completely drug specific. If an individual has become tolerant to the effects of heroin, for example, he or she can take large doses of any other opiate (but not of other classes of drugs). If heroin is withdrawn, the resulting abstinence syndrome can be relieved by the administration of any opiate (but not by any other type of drug). This phenomenon is known as cross-tolerance.

Mechanisms of tolerance

Tolerance can develop in different ways. Pharmacokinetic tolerance arises when changes in the metabolism or distribution of the drug following repeated administration affect its concentration in the blood and consequently its effect upon target cells. For example, tolerance to barbiturates is partly due to the induction (switching on) of special enzymes in the liver (hepatic microsomal enzymes) by the barbiturates themselves. These enzymes then metabolize (break down) the barbiturates, which can therefore be said to speed their own destruction. An increased dose is then needed to maintain the original effect.

Tolerance that is due to changes in specific receptors reflects either a change in receptor density, or an altered response to neurotransmitters, or a change in the availability of the neurotransmitters themselves.

Tolerance can also be 'learned'; that is, the individual learns to cope with the effects of the drug, so that they are less apparent. The most obvious example is the way in which an alcoholic learns to recognize the motor impairment associated with intoxication and how best to overcome it and disguise it by altered behaviour (e.g. walking or driving more slowly). This sort of learned behavioural tolerance only has limited effectiveness[6].

Relationship between tolerance and physical dependence

The nature of the relationship between tolerance and physical dependence is not clear. Some of the drugs to which tolerance develops also cause physical dependence, and the drugs of abuse and dependence with which this book is mostly concerned are in this group. For these drugs, physical dependence, with unpleasant symptoms on drug withdrawal, leads to the need to take the drug regularly. This is, of course, a necessary condition for tolerance to develop, which in turn leads to escalating doses, greater physical dependence and so on. Because of this parallel development it has been suggested that a common

mechanism is responsible for both phenomena. This hypothesis probably emerged because the drugs which have been studied the longest and most intensively are the opiates, drugs to which open-ended tolerance develops rapidly and on which physical dependence is severe and easily recognizable. Similarly, tolerance develops to some of the effects of alcohol, barbiturates, benzodiazepines and other sedatives, and physical dependence on these drugs is again well known. From observations such as these grew the belief that tolerance and physical dependence are both manifestations of a single, as-yet-unknown neural mechanism. However, tolerance is a very general phenomenon, observed with many drugs. It is, after all, very common in medical practice to start with a small dose of a drug and to increase it gradually as the patient becomes tolerant of the side effects, and physical dependence does not develop in every situation in which tolerance develops.

Perhaps the best way to understand the relationship between tolerance and physical dependence is to say that the existence of tolerance, by permitting the administration of large doses of the drug, enables or enhances the development of severe physical dependence, if the drug has a dependence-producing liability as well. Undoubtedly, the two conditions, of tolerance and physical dependence, occur after chronic administration of a wide range of drugs (including tricyclic antidepressants, phenothiazines and anticholinergics) that are not self-administered by animals or usually abused by humans. This serves to emphasize the point that neither tolerance nor physical dependence, separately or together, are sufficient to cause a true state of dependence on a drug. For that, the psychological element, the inner compulsion, must always be present[5].

Types of drug dependence

The definition of drug dependence used in this chapter is broad based and embraces dependence on a very wide range of drugs, some of which are used medically (e.g. opiates, sedative hypnotics), while others (khat, hallucinogens, cannabis) are not. It is perhaps not surprising that the characteristics of the dependent state vary according to the type of drug. Some drugs cause marked physical dependence with a correspondingly severe withdrawal syndrome; others cause less physical dependence but profound psychological dependence. The extent to which tolerance develops also varies with different classes of drugs. Caffeine, consumed as it is by most people in tea or coffee, produces a limited degree of psychological dependence sometimes manifested as 'I can't get going in the morning without my cup of tea', and a mild state of physical dependence with headaches on drug withdrawal. This degree of dependence is not particularly harmful either to the individual or to society, although it should be noted that a more severe degree of dependence on caffeine (often in cola-type drinks) may sometimes arise.

However, several classes of dependence-producing drugs affect the central nervous system profoundly, producing stimulation or depression and disturbances in perception, mood, thinking, behaviour or motor function. The use of these drugs may produce individual, public health and social problems and is, therefore, a justifiable cause for concern.

There is no wholly satisfactory way of classifying drugs of abuse and dependence because drugs with similar pharmacological effects may produce quite different types of dependence. Cannabis, for example, has both sedative and hallucinogenic effects, but the pattern of its abuse, by millions of people worldwide, is quite different to the abuse of barbiturates or benzodiazepines which are sedatives, and LSD which is a hallucinogen.

The Tenth Revision of the International Classification of Diseases (ICD-10)[4] recognizes the psychoactive drugs or drug classes listed in Table 1.1, the self-administration of which may produce mental and behavioural disorders, including dependence (see Chapter 6).

Abuse and dependence on a wide range of other drugs also occurs. For example, abuse of minor analgesics, such as aspirin and compound analgesics, is so widespread that it has been estimated that there may be as many as a quarter of a million analgesic abusers in the UK alone. This problem is frequently ignored in studies of drug abuse and dependence, firstly because it involves drugs over which there are no legal controls (or only very limited ones) and which may be easily obtained from outlets such as newsagents, supermarkets and even slot-machines, as well as from pharmacists. Secondly, it is easy to dismiss it as uninformed self-medication by a group ignorant of the dangers of excessive use of these drugs. In many ways, however, those who abuse minor analgesics (and other drugs not included on the above list) resemble those who abuse illicit or restricted drugs: they often deny their drug-taking

Table 1.1 Drugs recognized by the Tenth Revision of the International Classification of Diseases (ICD-10)[4]

Alcohol
Opioids: including naturally occurring opiates (e.g. opium, morphine, codeine), synthetic or semisynthetic opiates (e.g. methadone, pethidine, dipipanone, dextromoramide) and opiate agonist-antagonists (e.g. pentazocine, buprenorphine)
Cannabinoids: preparations of *Cannabis sativa* (e.g. marijuana, ganja, hashish)
Sedative hypnotics: including barbiturates, non-barbiturate sedatives (e.g. chloral hydrate, methaqualone, glutethimide, meprobamate) and benzodiazepines
Cocaine
Other stimulants: including amphetamines and similar stimulants (e.g. methylphenidate, phenmetrazine), anorectic agents (e.g. amfepramone (diethylpropion), phentermine), khat (preparations of *Catha edulis*) and hallucinogenic stimulants (e.g. MDMA (ecstasy), MDA (methylenedioxyamphetamine), MDE (3,4-methylenedioxyethamphetamine, or 'Eve'))
Hallucinogens: including LSD, mescaline, psilocybine
Tobacco
Volatile solvents: including substances such as toluene, acetone, carbon tetrachloride
Multiple drug use and other psychoactive substances

and may go to considerable lengths to conceal it; they often admit that they take the drugs for the feeling of well-being that they induce and, in the case of aspirin, specifically to experience the dangerous state of salicylism (aspirin intoxication) that they find pleasurable. Above all, they are psychologically dependent on these drugs: showing craving, drug-seeking behaviour and an inability to stop taking them[7].

In addition to the drugs already discussed, there are many other drugs, each of which is abused by a few people who may then become dependent on them. Some, such as the antiparkinsonian anticholinergic drugs, may be taken for their psychic effects. Others, such as purgatives or anticoagulants may be taken to produce fictitious disease, those who abuse them often concealing this fact, and seeking and apparently enjoying repeated, intensive medical investigation and care. Finally, some drugs prescribed for somatic disease may be taken excessively, primarily to avoid unpleasant withdrawal symptoms, although eventually a true dependent state may develop. For example, increasing doses of ergotamine, prescribed for migraine, may be consumed to avoid withdrawal headaches, and increasing doses of steroids may be taken to avoid unpleasant psychological effects on drug withdrawal. The family, friends and colleagues of doctors, as well as doctors themselves, may be vulnerable to this type of drug abuse if their powers of persuasion overcome normal professional prescribing practices.

These, much less-common types of drug dependence have been introduced into the discussion because their existence illustrates and emphasizes a very important point: that abuse and dependence do not only occur with 'dangerous' psychoactive drugs. In other words, dependence is not just a manifestation of a specific drug effect, but is a behaviour profoundly influenced by the individual personality and the environment, as well as by the specific drugs that are available. As a behaviour, drug dependence is similar to compulsive gambling and compulsive eating, and what all these have in common is an overwhelming psychic drive to behave in a certain way. A better understanding of this compulsion and of the nature of intrusive thought will enable us to reach out towards a better understanding of drug dependence and a whole range of similar human behaviours.

Causes of drug dependence

The cause or causes of drug dependence are not known. More specifically, it is not known why some people but not others in the same situation start experimenting with drugs, or why some, but not others, then continue to take them and, finally, why some but not all become dependent on drugs.

When seeking causes it is easy to limit the scenario to that of the local problems which receive so much publicity: poverty, unemployment, break-up of local communities, drug pushers, organized crime and breakdown of parental authority. These often-repeated phrases spring to mind and they may well be contributory factors, as far as the European and North American drug scene is involved, in the