

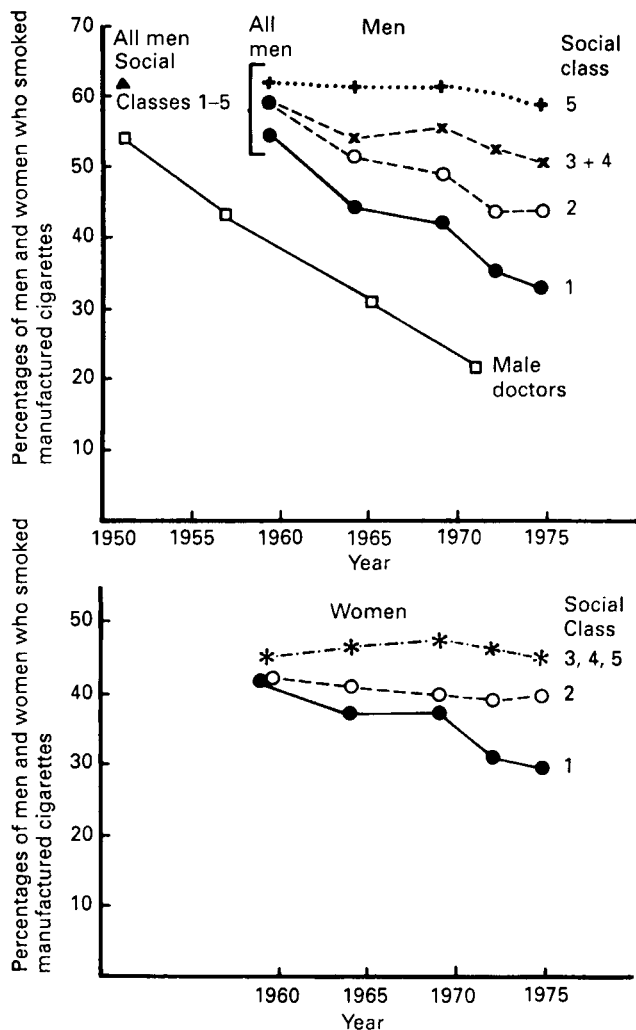
# **Specific applications to medicine**

## Smoking

- The incidence of cigarette smoking has declined dramatically since 1950, when the link with lung cancer was first proposed, although mainly in social classes I, II and III, and particularly in doctors.
- Cigarette smokers are more extravert than non-smokers due to extraverts being more likely to take up smoking.
- Cigarettes do not produce improved performance in smokers, but instead they prevent withdrawal symptoms and return performance to the level found in non-smokers.
- Although nicotine is present in large amounts in cigarette smoke, studies using nicotine injections and chewing gum suggest that it might not be the addictive substance which maintains cigarette smoking.
- Giving up smoking depends both on producing motivation and the reduction of dependence. As yet there are no effective ways of reducing dependence, although drugs acting to reduce craving might have a role to play.
- The advice of a doctor that a patient should give up smoking is cost-effective and would produce a large number of ex-smokers if carried out systematically.

Cigarette smoking is probably the largest single cause of preventable premature death, from diseases such as carcinoma of the bronchus, chronic bronchitis and emphysema, and coronary and cerebrovascular arterial disease. Although the question of causality is not finally settled (and as the geneticist R A Fisher argued, there might be a gene predisposing both to carcinoma of the bronchus *and* to cigarette smoking), it is now indubitable that stopping smoking benefits health. I will take it for granted that cigarette smoking is bad and should be prevented wherever possible. The question is, How? And before answering that, we must ask, Who smokes?, and Why do they smoke?

Since the early 1950s, when a link with lung cancer was first established, the proportion of smokers has fallen steadily. Smoking is now much less common in higher than lower social classes, the rate hardly having changed in social class V since 1950 (Fig. 24.1). Although women smoke less than do men, their rate has also dropped less; in social class I the two sexes now smoke almost equally.



**Fig. 24.1** Proportion of men and women in each social class (and of male doctors) who were regular smokers of cigarettes over the period 1950–1975. From Royal College of Physicians of London (1977), *Smoking or Health*, London, Pitman.

Over 30 years, an average cigarette smoker takes about two million puffs, on each of which many physiologically active substances pass from lungs to brain in about eight seconds. The speed of central action (compared with 20–30 seconds for intravenous heroin), and the rate of administration (100 times per day, compared with half a dozen in a heroin addict) produce ideal circumstances for addiction.

Cigarette smokers are more extraverted than non-smokers, the effect being proportional to the number of cigarettes smoked. But do extraverts become smokers, or does smoking make one more extraverted, perhaps by easing sociability? A prospective study of 16-year-old non-smokers who became smokers by age 25 found that subsequent smokers were *already* more extraverted (and more neurotic) by age 16; extraversion therefore causes smoking, rather than

vice-versa. Smokers who give up are also less extraverted and less neurotic.

Pipe smokers differ from cigarette smokers in being even more *introverted* than non-smokers. Pipe smokers who have never smoked cigarettes also do not inhale smoke into their lungs and absorb little of the smoke, so that pharmacologically they seem to gain little from smoking; in contrast ex-cigarette smokers who smoke pipes *do* inhale, and hence are still at high risk from their smoking. Psychoanalytic theorists have speculated that pipe-smokers in particular (and smokers in general) are orally fixated (see Chapter 11), and receive oral gratification and reassurance from their habit.

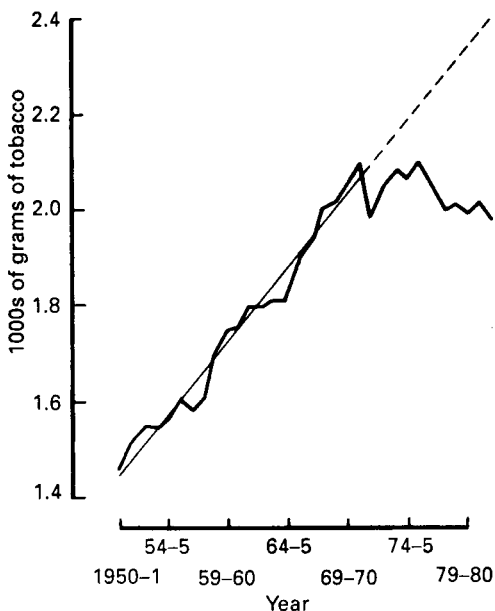
People smoke cigarettes for different reasons, and questionnaire studies have examined the MOTIVES FOR SMOKING. One study found six types of motivation, which could be grouped into two independent dimensions. PHARMACOLOGICAL SMOKERS describe smoking as ADDICTIVE (with a strong desire for more cigarettes and smoking in bed in the morning), AUTOMATIC (forgetting they are smoking or lighting a cigarette while another is still alight), or STIMULANT (smoking when working hard, concentrating, tired, or for cheering up). Subjects scoring high on one factor tend to score high on the others. Uncorrelated with pharmacological motives are NON-PHARMACOLOGICAL MOTIVES, these smokers being INDULGENT (smoking after meals or when relaxed), PSYCHOSOCIAL (feeling confident in company or appearing mature, relaxed or attractive to the opposite sex), or SENSORIMOTOR (enjoying the sensations of the cigarette, the taste, the blowing of smoke, and the rituals of lighting up). Although it was originally hoped that a classification of motives would allow specific therapies for different types of smoker, that hope has yet to be fulfilled.

Like all centrally active drugs, cigarettes modify behaviour. In smokers, concurrent cigarette smoking improves performance in tasks involving rapid reactions, vigilance, or the processing of conflicting or rapid information, and it also alleviates alcohol's depressive effect upon reaction time and mental arithmetic (although exacerbating the body sway and motor incoordination caused by alcohol). Cigarettes also increase heart rate and blood pressure. Although these latter physiological effects occur both in habitual smokers and in non-smokers, the apparently beneficial cognitive effects occur only in regular smokers. Closer examination shows that cigarettes in regular smokers act only to restore performance to the normal level of non-smokers. As Schacter cynically put it, 'The heavy smoker gets nothing out of smoking. He smokes only to prevent withdrawal'. An analogy is with a heroin addict, who indeed performs tasks better on the drug than without, but the drug is not actually beneficial, only acting to prevent withdrawal and thereby produce performance equivalent to that in the non-addict.

Most doctors, most of the lay public, and probably the producers of

the government tar and nicotine tables, tacitly assume that people smoke primarily in order to obtain nicotine. Amongst a myriad of physiologically active substances, nicotine is indeed present in the largest quantities. However, in contrast to alcohol and opiates, it is very difficult to produce nicotine addiction in laboratory animals or to get them to self-administer nicotine. The evidence is also poor that humans smoke specifically to obtain nicotine. Something in cigarettes is indeed addictive, since subjects will increase consumption when given weak cigarettes, and decrease consumption with strong cigarettes, SELF-TITRATION OR AUTO-REGULATION, and smoke dilution by ventilation holes in the cigarette's side produces more frequent and deeper puffs. But these changes alter *all* the smoke's constituents at the same time. In an experiment altering just nicotine intake, smokers were injected intravenously with nicotine or placebo; the nicotine, equivalent to a day's cigarette intake, only decreased average consumption from 24 to 22 cigarettes per day. Nicotine chewing gum has a similarly small effect, which although statistically significant, is of little practical importance. Cigarette smokers also say that nicotine chewing gum alone does not give the same satisfaction as a cigarette. Experimental subjects smoking lettuce-leaf cigarettes (which contain no nicotine) complain they are less good than ordinary cigarettes, but continue to smoke them; more importantly, adding nicotine does not render lettuce-leaf cigarettes more acceptable. Finally, although ordinary smokers alter puff size and depth from puff to puff, following small puffs with larger ones, indicating auto-regulation on a minute-to-minute basis, this control is not affected by injecting nicotine intravenously. Taking these results together it seems very unlikely that the addictive substance in cigarettes is nicotine, although the real addictive substance is not clear. It is unlikely to be carbon monoxide as snuff takers and tobacco chewers also appear to be addicted, and for similar reasons it is unlikely to be any of the pyrolysed products of partial tobacco combustion.

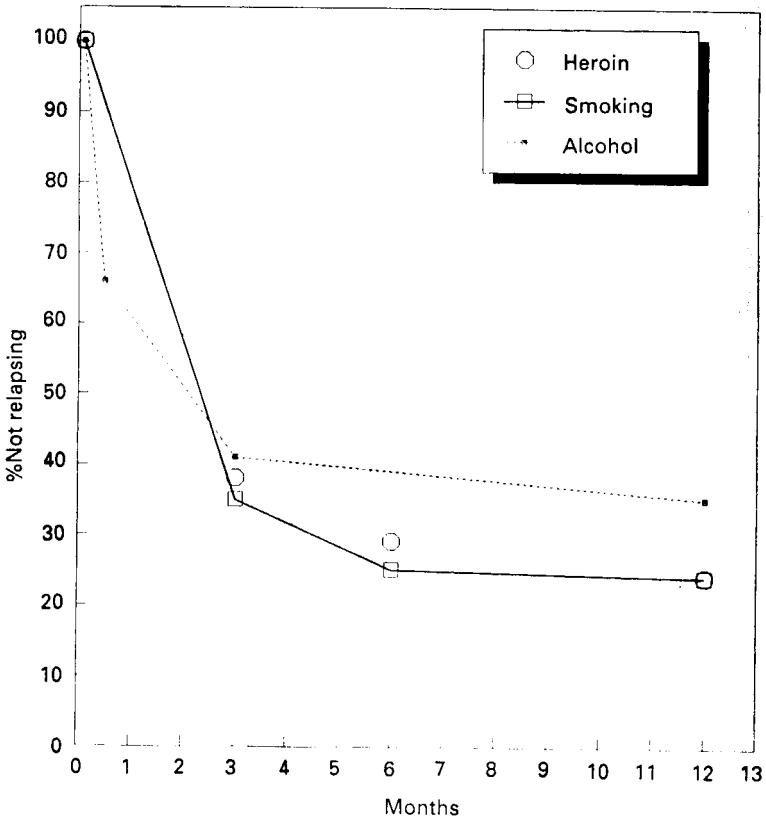
Most people find their first cigarette disgusting and frequently are nauseous or vomit (the side-effects of a large dose of nicotine). Most regular smokers start before the age of 20, and a third or so have started by nine years of age. Although addictive, cigarettes are disgusting to the non-addict. Something must therefore bridge the gap between first cigarette and habit acquisition. The extra motivation is due to social pressure, peer group influence and modelling of relatives and friends. Children who smoke at age 12 are recognized by their non-smoking contemporaries as doing it to show off and to appear grown up. These 12-year-old smokers also tend to have parents or siblings who smoke. Adolescents must gain something from smoking, and measures of lower self-esteem and higher trait anxiety suggest cigarettes are used to manage a sense of personal inadequacy or ineffectiveness. Prevention of childhood smoking is not simple as



**Fig. 24.2** Cigarette consumption per capita per annum in Norway from 1950 to 1980. In 1970, a ban on cigarette advertising was first discussed, and in 1975 all advertising was banned. From Royal College of Physicians (1983), *Health or Smoking?*, London, Pitman.

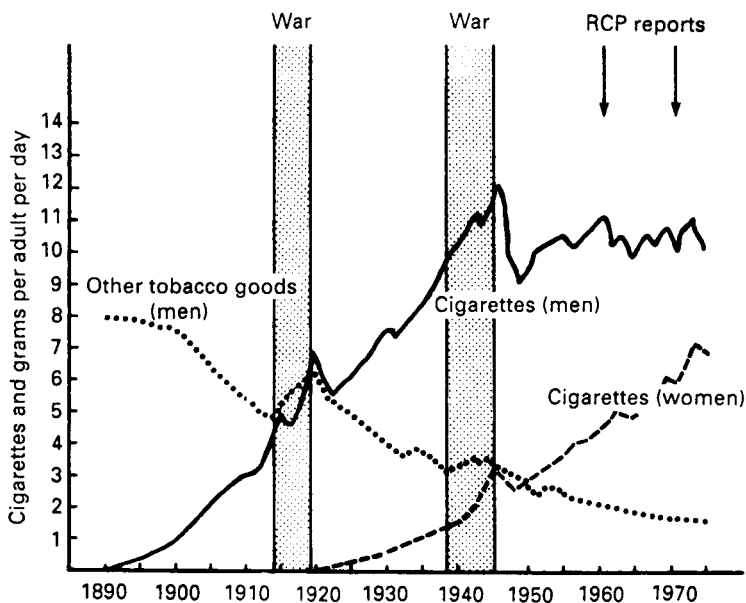
neither anti-smoking teaching at school nor punishment have much influence, although in one study a concerted educational campaign by schools did result in a 50% reduction in childhood smoking. Undoubtedly advertising by cigarette companies increases smoking (see Fig. 24.2), and many advertisers now direct their campaigns directly at young people, by emphasizing links with sports, such as motor racing.

Three quarters of smokers attempt to stop at some time, and 10% of a random sample of smokers at a GP's surgery have tried to stop in the previous month. As with other aspects of smoking there is a paradox: most smokers want to give up and yet few succeed. Most smokers know they want to give up, they know they have chronic coughs and bronchitis, and they know smoking causes lung cancer, heart disease and chronic bronchitis. And for those who are not impressed by such correlations, or discount them as being thirty years in the future, other adverse effects can also be used for propaganda, such as an earlier menopause, premature and excessive facial skin-wrinkling, decreased intelligence of children following smoking in pregnancy, and increased respiratory illness in early childhood from passive smoking. The problem is that while smokers know they *should* stop, they do not know *how to*; it is like a drowning man, who knows his mouth must be kept shut until he breaks the surface of the water but knows no way of fighting the strong reflexes forcing him to inhale. Cigarettes are physiologically addictive (and are as difficult to give up as heroin or alcohol – see Fig. 24.3). Smoking cessation therefore requires both a high motivation *and* a way of reducing dependence.



**Fig. 24.3** Relapse rates in patients giving up smoking, alcohol or heroin. Similar curves also apply to exercise, dietary modification and preventive dental care. Reproduced with permission from Hunt W A, Barnett I W and Ranch I G (1971), Relapse rates in addiction programs, *J Clin Psychol.* **27**, 455-6.

Anti-smoking campaigns are good at producing motivation, and are the first step in cessation. But they do not stop smoking and can be counter-productive if cognitive dissonance ('I should stop smoking; I can't') (see Chapter 12) produces rationalizations which work against the propaganda ('Experts aren't always right'; 'I smoke because I like it, not because I'm addicted'; etc.). The problem is finding ways of reducing dependency. Until the addictive basis of smoking becomes clear there can be no *rational* approach to alleviating dependency, and high dependency smokers are unlikely to be helped much. A possible solution considers the pharmacology of CRAVING, the intense desire for a cigarette in the first 24 hours of cessation. Craving occurs in withdrawal from all addictions, be they cigarettes, alcohol or opiates, and in opiate withdrawal is helped by clonidine, an alpha-2-noradrenergic agonist, whose action (like enkephalins and opiates) probably reduces activity in the LOCUS COERULEUS, which produces most



**Fig. 24.4** Tobacco consumption in the United Kingdom from 1890 to 1981, in terms of average cigarettes per adult per day (both smokers and non-smokers being included in the calculation). Dates of the two previous Royal College of Physicians (RCP) reports on ill-effects of smoking are indicated, and are followed by falls in tobacco consumption. From Royal College of Physicians (1983), *Health or Smoking?*, London, Pitman.

of the cerebral noradrenaline that accentuates craving. Clonidine also reduces craving in cigarette withdrawal and may help treatment in the early stages of cessation. It might also explain the links between smoking and stress, when central noradrenergic levels are raised, thereby increasing craving, and the cross-tolerance between smoking and opiates; opiate addicts find that smoking reduces their opiate craving.

Propaganda in successful anti-smoking campaigns probably increases motivation in low dependency smokers, as shown by the decreases in tobacco consumption after each edition of the Royal College of Physician's reports on smoking (Figure 24.4), the relatively low proportion of smokers amongst doctors in recent years (Fig. 24.1), and the lower incidence of smoking among medical students than other students. However, the high incidence of smoking among nurses, particularly on intensive care and coronary-care units, suggests that propaganda and knowledge are far from completely successful at reducing smoking.

Specific treatments for smoking are numerous and have been extensively studied. Tranquillizers and anti-nicotine drugs; aversive therapy, using either electric shocks or 'rapid smoking' (which induces nausea); self-control involving timers, diaries and other feedback



devices; hypnosis; role-play; psychoanalysis; and sensory deprivation all have been tried and none are convincingly superior to placebo. The poor response in anti-smoking campaigns is easily illustrated by an example: 30 976 questionnaires were distributed to a population of which 21 553 were returned, 11 477 by smokers, of whom 4755 said that they would like to stop smoking and were invited to attend a withdrawal clinic. Only 150 smokers actually attended the clinic, of whom 64 stopped smoking, and only 35 were still not smoking at the end of the year; just 0.3% of the original smokers.

That placebos are effective, in that *any* anti-smoking treatment is beneficial, suggests the placebo effect itself might be exploited in helping patients to give up smoking. A controlled trial of personal advice to stop smoking from a patient's own general practitioner found that by the end of a year nearly 8% of patients were not smoking compared with 3% of controls. Although the effect does not appear large, if every GP in the United Kingdom used the procedure there would be about half a million ex-smokers within a year, which would be the equivalent of setting up 10 000 specialist anti-smoking clinics.