was maintained primarily by the pharmacological effects of nicotine. An advisory panel to the Food and Drug Administration subsequently concluded that nicotine was addictive and that all cigarettes available in the United States can provide addicting levels of nicotine.

Recent biomedical research on the nature and mechanisms of nicotine addiction supports the consideration of regulatory reform. For example, nicotine has certain effects and mechanisms in common with cocaine, including the involvement of dopaminergic transmitters. Research is unravelling the specific mechanisms by which nicotine influences behaviour.⁵ Exposure to nicotine produces lasting changes in the body's structure, which include increased expression and reduced turnover of nicotine receptors in the brain; these seem to be important in the development of tolerance and dependence.⁶⁻⁸ Nicotine also has potentially beneficial effects on performance, which are reportedly sought by many tobacco users and could facilitate the development and maintenance of addiction.^{9,10}

Possible strategies to be overseen by the Food and Drug Administration could include new systems of evaluating cigarettes' dosing characteristics,³ restrictions on the amount of nicotine in tobacco products,¹¹ and new restrictions on advertising and marketing.² Prohibition is unlikely. The Food and Drug Administration is clearly committed to examining the range of options available and developing solutions with the long term potential of substantially reducing tobacco use and death and disease caused by tobacco.⁴ The clock may be slowed by any number of events, but to turn it back will be difficult given the extensive findings that commercial tobacco products are systems that deliver an addictive drug and confer a high risk of disability and death.

The views expressed in this paper are those of the authors and do not reflect an official position of the US federal government or its agencies.

JACK E HENNINGFIELD
Chief

Clinical Pharmacology Branch,
NIDA Addiction Research Center,
PO Box 5180,
Baltimore, MD 21224,
USA

NEAL L BENOWITZ
Professor of medicine

Division of Clinical Pharmacology and
Experimental Therapeutics,
University of California,
San Francisco, CA 94941,
USA

- 1 Peto R, Lopez AD, Boreham J, Thun M, Heath C Jr. *Mortality from smoking in developed countries 1950-2000*. Oxford: Oxford University Press, 1994.
- 2 Ballin SD. *Statement of Scott D Ballin. Hearing before the subcommittee on health and the environment, July 29, 1988*. Washington, DC: US Government Printing Office, 1988:122-32. (Serial No 100-68.)
- 3 Henningfield JE, Kozlowski LT, Benowitz NL. A proposal to develop meaningful labelling for cigarettes. *JAMA* 1994;272:312-4.
- 4 Kessler DA. Statement on nicotine-containing cigarettes. *Tobacco Control* 1994;3:148-58.
- 5 Corrigan WA, Coen KM, Adamson KL. Self-administered nicotine activates the mesolimbic dopamine system through the ventral tegmental area. *Brain Res* 1994;653:278-84.
- 6 Collins AC, Robinson SF, Marks M. Individual differences in tobacco use may be related to genetically-determined differences in responses to nicotine. In: Clarke PBS, Quik M, Adlkofer FX, Thurau K, eds. *The effects of nicotine on biological systems II*. Basle: Birkhauser Verlag (in press).
- 7 Davila-Garcia MI, Xiao Y, Houghtling RA, Oasba SS, Fiore CM, Kellar KJ. Regulation of neuronal nicotinic receptors in primary culture. In: Clarke PBS, Quik M, Adlkofer FX, Thurau K, eds. *The effects of nicotine on biological systems II*. Basle: Birkhauser Verlag (in press).
- 8 Peng X, Gerzanich V, Anand R, Whiting PJ, Lindstrom J. Nicotine-induced increase in neuronal nicotinic receptors results from a decrease in the rate of receptor turnover. *Mol Pharmacol* 1994;46:523-30.
- 9 Heishman SJ, Taylor RC, Henningfield JE. Nicotine and smoking: a review of effects on human performance. *Experimental and Clinical Psychopharmacology* 1994;2:1-51.
- 10 Henningfield JE. Comments on West's editorial "Beneficial effects of nicotine: fact or fiction?" *Addiction* 1994;89:135-46.
- 11 Benowitz NL, Henningfield JE. Establishing a nicotine threshold for addiction. *N Engl J Med* 1994;331:123-4.

Health checks in general practice

Time to review their role

The NHS has changed a lot since the late Denis Burkitt (who linked high fibre diets with preventing bowel disease) compared illness to an overflowing bath and suggested that doctors and nurses might be better employed turning off taps than mopping the floor. Increasingly, general practice has been considered to be the right place for turning off taps,^{1,2} and in 1990 health promotion was made a contractual requirement for general practitioners.³ Does prevention of illness in primary care work? Three papers in this week's journal consider different aspects of that question.⁴⁻⁶ Unsurprisingly, the answer is not straightforward.

One group based in Oxford, testing strategies to reduce the risks of cardiovascular disease and cancer in general practice populations, has greatly influenced British health policy. It is to the OXCHECK researchers' credit, therefore, that evangelistic fervour has not clouded their evaluative judgment. In their latest report they conclude that health checks for unselected middle aged people achieve little or no reduction in smoking and excessive drinking (p 1099).⁴ The most encouraging results were change in lifestyle—better diets, increased exercise—and falls in serum cholesterol concentrations. These changes were sustained over three years.

Crucial issues in health promotion are knowing how best to intervene and whom to target. Lindholm and colleagues, reporting from Sweden on middle aged people with at least two cardiovascular risk factors, found intensive group

education about the risks of cardiovascular disease to be more effective than standard advice in reducing total serum cholesterol concentrations (p 1105).⁵ The differences, however, are small, and many trends do not reach significance. This underlines the need to enrol large numbers of patients if such studies are to give unequivocal results.

Perhaps most interesting for British general practice is Field and colleagues' modelling of the cost effectiveness of different strategies (p 1109),⁶ using data from the OXCHECK trial.⁴ They predict that the most cost effective way to reduce the risk of coronary heart disease in general practice populations would be to target high risk groups.

One must beware of reading too much into these results. The cost effectiveness study had to make several assumptions, not necessarily all valid. In addition, the success of skilled procedures often varies considerably among operators. This may be as true for the interpersonal skills used in promoting behavioural change as for manual skills in surgery. Reluctant practices doing checks solely to receive payments for health promotion or to fulfil their terms of service may do far worse than the highly motivated and specially trained practices in Bedford that took part in the OXCHECK study. Populations also vary considerably. Prevention is a low priority in some groups, often for very good reasons.⁷ Generalising from Sweden to Britain, or even from Bedford to Hackney, may not be possible.

Despite these caveats the papers have some important

See pp 1099, 1105, 1109

messages. They reinforce doubts about the current system of payments for health promotion in British general practice, which requires doctors to record risk factors but places little emphasis on effective intervention or on targeting. Policy on health promotion should be based not only on the recognition of risk factors but also on evidence that they can be changed and that changing them improves health.

Better health promotion will depend on more research to determine which targeting and intervention strategies work best. To yield clear results, studies will have to be large, not least because the unit of analysis for intervention methods is the doctor or nurse, not the patient. Enough doctors and nurses have to see enough patients if researchers are to distinguish variation among techniques from variation among individuals. This will be expensive but much less costly than pursuing a flawed strategy.

We also need to reconsider the role of targeting intervention at individuals. Other strategies may deserve more attention. These could include group education in schools and workplaces and through the media; and government action such as changing fiscal and agricultural policy, introducing stricter rules on tobacco advertising and food labelling, and tackling the social factors often associated with unhealthy lifestyles. Research techniques that allow us to compare these different approaches need developing.

The most important aspect of this debate, however, is not research but priorities. The key tasks of general practice are helping patients to understand and cope with illness, relieving symptoms, and offering the occasional cure. They have been

overshadowed recently by prevention and purchasing—activities that may improve or complement care for those who are or believe themselves to be ill⁸ but must never be allowed to displace it. This is important for patients as well as doctors. Failure of policymakers to recognise these priorities is an important cause of the present low state of morale among general practitioners.

A prevention strategy that encourages interventions of proved efficacy among those most likely to benefit will be much more compatible with the core role of general practice than massive indiscriminate collection of data of no proved value. Without this focused approach prevention may lose credibility. The NHS may conclude that Burkitt's taps are stuck open irrevocably and again become preoccupied with developing better mops.

PETER D TOON
General practitioner

London E8 3NB

1 Royal College of General Practitioners. *Promoting prevention*. London: RCGP, 1983.

2 Tudor Hart J. *A new kind of doctor*. London: Merlin Press, 1988.

3 *Terms and conditions of service for general medical practitioners in the National Health Service*. London: HMSO, 1990.

4 Imperial Cancer Research Fund OXCHECK Study Group. The effectiveness of health checks conducted by nurses in primary care: final results from the OXCHECK study. *BMJ* 1995;310:1099-104.

5 Lindholm LH, Ekblom T, Dash C, Ericsson M, Tibblin G, Schersten B. The impact of health care given in primary care on cardiovascular risk. *BMJ* 1995;310:1105-9.

6 Field K, Thorogood M, Silgay C, Normand C, O'Neil C, Muir J. Strategies for coronary risk factor prevention in primary care: which is most effective. *BMJ* 1995;310:1109-12.

7 Griffiths C, Cooke S, Toon PD. Registration health checks: inverse care in the inner city? *Br J Gen Pract* 1994;44:201-5.

8 Chisholm J. *Core general medical services and the classification of general medical activity*. London: GMS, 1994. (Discussion paper.)

Patients' demands for prescriptions in primary care

Patients cannot take all the blame for overprescribing

The Audit Commission's recent report on prescribing in general practice in England and Wales estimated that up to £275m could be saved from the NHS drugs bill if overprescribing was reduced.¹ The report lists several overprescribed drugs, including antibiotics and non-steroidal anti-inflammatory drugs. The authors clearly believe that patients' expectations of treatment are partly responsible for the problem, as do many general practitioners.² Perhaps the most memorable view came from Marinker, who said, "We may see the doctor as helpless in the face of a population of patients who have an overwhelming need to alter chemically their experiences of the world in which they live."³ He compared a general practitioner in a consulting room to a barmaid in a gin shop, implying that not only do patients know exactly what they want but that they usually get it. But what evidence is there that patients' demands for prescriptions have any effect on doctors' prescribing habits other than prompting repeat prescribing?

Much of the evidence is equivocal because researchers have not directly defined or measured demand for prescriptions. Instead, studies have focused on doctors' perceptions of patients' demands and doctors' statements that patients' expectations influenced real or hypothetical decisions about prescribing. Little attempt has been made to measure either patients' overt requests for prescriptions in the consultation or their expectations beforehand. About 5-7% of prescriptions, however, are not dispensed,⁴ and many drugs are dispensed but not consumed. This suggests that prescribing levels actually exceed patients' expectations. It seems that demand (either real or perceived) is greater than need.

When general practitioners are surveyed they describe high levels of demand,⁵ but objective evidence consistently suggests that doctors overestimate patients' expectations.⁶ Reanalysis of published data shows that about a fifth of patients leave general practice consultations with prescriptions they did not expect.⁷

In contrast, studies that have considered whether demand from patients influences prescribing habits have yielded inconsistent results. Two studies showed that demand had no influence on prescribing,^{8,9} one that perceived demand resulted in lower prescribing,¹⁰ and five that demand was associated with higher rates of prescribing.^{7,11-14} None, however, was able to look directly or reliably at the effect of such demand. The two studies that showed demand to have no influence were based on hypothetical consultations and may not accurately have reflected real prescribing behaviour: they were also based in North America and may not apply to general practice in Britain. The studies with negative findings covered a limited range of drugs. Finally, four of the five studies with positive results looked at the whole range of prescribing behaviour and found that severity of disease, type of drug, and whether the patient had an appointment also influenced prescribing. On balance, demand from patients is probably only one of many factors that lead to overprescribing by general practitioners.

Less superficial evidence about the complex reasons for overprescribing will probably come only from qualitative research. Qualitative interview techniques could find out what patients and doctors really think about prescribing. Firstly, detailed and patient-centred investigation should