for four hours out of the 24. It is a treatment which is rarely given except for this purpose and because of this recommendation by the American Heart Association. It seems unfortunate that these extensive studies have not included groups of patients treated with an acid-resistant penicillin, whether penicillin V or one of those more recently introduced, which, being more regularly absorbed, may be depended on to attain an adequate blood level. It is also doubtful whether a single daily dose should be considered adequate. The time taken by streptococci to recover from exposure to penicillin has been fully investigated,[4] and to allow them at least 18 hours' freedom out of the 24 is too much.

The British official recommendation[1] is two daily doses of either 200,000 units of penicillin G or 125 mg. penicillin V. If the patients in the Irvington House study had been given penicillin V twice a day instead of penicillin G once would the frequency of streptococcal infection have been the same as in the placebo group? Almost certainly not. It would be interesting to review all these results in the light of an assumption that a single daily oral dose of penicillin G has not in fact the protective effect with which it has been credited.

Future of Clinical Pharmacology

Recently it was suggested in these columns[1] that the relationship of pharmacology to clinical medicine needs reviewing and that pharmacologists too often find that work in hospital does not provide a satisfactory career.[2 3] Certainly much of the research they carry out contains little of direct interest to a practising doctor. Yet he may be daily prescribing drugs discovered in the last ten years and so need to understand their properties. Pharmacologists are apt to be seen mainly as laboratory scientists, investigating drugs in experimental circumstances remote from the practical problems of therapeutics. How many drugs of therapeutic value have been excluded from testing in man—and probably rightly—because they injured animals of one or another species is of course unknown. Public opinion, when not falling into anti-vivisectionist extremes, is all in favour of thorough testing of drugs in animals, and to this extent pharmacologists are swimming with the political tide.[4]

The need for more clinical pharmacologists is generally acknowledged among practising physicians as much as among clinical pharmacologists themselves, but appointments with this title are rarely created, and indeed there is much dispute about exactly what a clinical pharmacologist ought to do. The problem is complicated by the distinction maintained between consultants with "direct clinical responsibility" and other doctors. So long as the first question asked about a clinical pharmacologist is, Will he have beds? confusion will follow. If the answer is yes, then clinical pharmacology is restricted to those doctors who have followed the correct sequence of hospital appointments and higher diplomas and not made the error of diverting their career for more than a year or two to obtain some basic training in scientific method in general and experimental pharmacology in particular. If the answer is no, then the appointment is, under present conditions, unlikely to have consultant status and reward. No scientist of sufficient ability to study the complex problems of the actions and uses of drugs in man is keen to accept such a position in preference to a university chair or a senior appointment in industry. The innovation of a diploma course in clinical pharmacology at Manchester University[5] is a step in the right direction, but it remains to be seen what status will be achieved by virtue of holding the diploma. The first question ought to be: Is expert guidance in the use of drugs in patients necessary? Evidence from hospital[6 7] and general practice[8] and the incidence of illness caused by drugs[9 10] all suggest that it is.

Many aspects of the use of drugs in hospital need further study.[11] Research is needed on the absorption and fate of drugs in man as well as on their therapeutic and toxic properties. Clinical trials must be designed, carried out, and analysed. Operational research on the everyday use of drugs is also important, because the detailed care which is part of a good clinical trial is not always practicable, and the success (or failure) of a drug under special test conditions may not be a fair indication of its potential in ordinary service. Information about new drugs ought to be disseminated throughout medical staff generally—particularly knowledge about the interactions of drugs and special contraindications. The time is long past when any of these duties can devolve on the understaffed, overpressed hospital pharmacist. They should be a matter for the clinical pharmacologist.

It is surely helpful too for hospitals to keep full records of the use of recently introduced drugs and of untoward effects of all kinds observed in patients under treatment. Without such recording another tragedy like that of thalidomide remains a haunting possibility, for new hazards may arise which cannot be prevented by any amount of initial testing on animals. If a drug has an observable effect it has a recordable effect, and to direct more clinical observation towards the study of these effects could only make for safer, more effectual, and more economical therapy. Thus the creation of a hospital pharmacological service might be considered, comparable in standing with the clinical pathological service and with a consultant clinical pharmacologist at its head. Professor K. Naess,[12] of Oslo, has recently emphasized many of these points in the *World Medical Journal*, and states: "The object must be to create a clinical pharmacological environment such that the different branches of pharmacology including its practical application do not split up into separate disciplines, a trend now very much in evidence."

At present pharmacologists are leaving the universities and moving to industry.[2] The drift is not surprising. The facilities and the rewards are attractive, and the discovery of new drugs is more exciting than the appraisal of remedies already in use. If the movement between universities and industry were really two-way it would be commendable, but the attraction of the universities to industrial pharmacologists is evidently insufficient to promote much return flow. Yet the study of drugs in man should be no less thorough than their study in animals, and many doctors in hospitals and in general practice would welcome more guidance on prescribing.

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