Attracting and training more chemical pathologists in the United Kingdom

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SYNOPSIS I have attempted to define the function of the medical graduate in the clinical biochemistry laboratory and have examined data on recruitment in the United Kingdom into clinical biochemistry. If trainee pathologists were encouraged to become proficient in both a branch of clinical medicine and in research techniques, the resulting chemical pathologists should be able to improve the consultative and investigative functions of the laboratory. To this end I have suggested some changes in the training regulations and in the role of the chemical pathologist.

In Britain it is often said that too few medical graduates are taking up clinical biochemistry as a career. Statistical support for this widely accepted statement is difficult to obtain. About 18% (or 266) of the United Kingdom members of the Association of Clinical Biochemists (ACB 1975 Membership List) are medical graduates. Of these, most graduated MB before 1960 (see table I) and would now be aged 40 or older. If the membership list is representative of the profession, table I shows that the steep increase in workload generally recognized since the early 1960s has not been matched by an increase in medical recruitment. The data in table II suggest that the proportion of graduates entering clinical biochemistry who are medically trained is lower since 1965 than in the previous 11 years (assuming that the ACB Membership List reflects the composition of the specialty and that the date of joining the ACB is a rough indication of the date of entry into the specialty). This apparent fall may be due in part to a recent overabundance of young science graduates entering clinical biochemistry. Since 1965 the proportion of medical graduates entering has remained constant, about 16%. Many others (eg, Carter *et al*, 1974; Alberti *et al*, 1975; Astrup, 1975; Lancet, 1975; Jarrett, 1975) have drawn attention to problems arising from the changing nature of clinical biochemistry and have proposed solutions which involve an increase in interaction between the laboratory and clinicians, and a necessary role for medical graduates in the

Date graduating	No. graduating	MRCP or equivalent	Present age
1915-1919	1	1	
1920-1924	0	0	
1925-1929	1	1	
1930-1934	4	3	
1935-1939	7	2	60+
1940-1944	21	6	55+
1945-1949	31	13	50+
1950-1954	42	13	45+
1955-1959	36	6	40+
1960-1964	35	4	35+
1965-1969	28	1	30+
1970-	(15)	0	25+

Table I *Years when medical graduates who are UK residents and in the 1975 List of Members of the Association of Clinical Biochemists obtained their first medical qualification (MB, LRCP, etc), whether they have the MRCP or equivalent, and their present ages*

Data from the 1974 and 1975 Medical Directories and the 1973 and 1975 Medical Registers. Eight graduates were not registered as medical practitioners; all joined the ACB in 1970 or later.

The MC Path qualification (now MRC Path) was first given in 1963.

specialty. It seems likely, therefore, that dissatisfaction with the number of medical graduates entering clinical biochemistry reflects not a fall in the proportion of medically qualified staff, but increased awareness of the need for the skills these graduates can bring to clinical biochemistry. The laboratory should try to produce information rather than data, which means it should concern itself not only with the figures it produces but also with the clinician's understanding of these figures. In this essay I propose optional changes in training which may produce medical graduates fitted to carry out this interpretative role.

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Year	Total new Members (UK)	% new Members with medical qualification
1953	95	16
1954	11	36
1955	10	10
1956	13	15
1957	28	32
1958	29	21
1959	26	23
1960	30	37
1961	34	35
1962	34	35
1963	36	25
1964	38	24
1965	39	13
1966	50	26
1967	42	17
1968	69	15
1969	63	19
1970	70	16
1971	71	11
1972	98	15
1973	124	15
1974	124	15
1975	96	16

Table II Data from ACB Membership List (1975)

The ACB gained its first Members in 1953. The succeeding 22 years have been considered as two 11-year periods for analysis.

By a chemical pathologist I mean a medical graduate whose area of special knowledge is in clinical biochemistry and who is responsible for a clinical biochemistry service. A top grade hospital biochemist has many similar skills and similar responsibilities but is not a medical graduate. It is not relevant to this paper to attempt further to differentiate their roles, which must depend partly on individual skills and experience. The chemical pathologist may take direct clinical responsibility; the clinical chemist may hold a post which, 'although not involving direct clinical responsibilities, [involves] professional responsibility for the interpretation of scientific work' (Department of Health and Social Security, 1971). The distinction may be a fine one, though I recognize that some others hold contrary views.

Clinical biochemistry is rather more difficult to define. The American Association of Clinical Chemists' definition, quoted in an editorial footnote to an article by Astrup (1975), is apposite: 'Clinical chemistry is the distinct discipline which develops and utilizes chemical concepts, procedures, and techniques in investigations which pertain to the understanding, diagnosis and therapy of disease and the assessment of health'. Chemical pathology, as defined by Baron (1973) (... 'the study of the changes that occur in diseases in the chemical constitution and biochemical mechanisms of the body'), is less concerned with techniques than is clinical chemistry, and more with disease processes. In this paper clinical biochemistry broadly covers the wider concepts.

The chemical pathologist may be interested in aspects of epidemiology, diagnosis, treatment, in fundamental biochemistry or chemistry, in diagnostic means or ends. Peptides, proteins, steroids, amines, lipids, ions, drugs, pigments, and enzymes compete for his attention. He is expected to know something about the biochemical indices of renal transplant rejection, of small bowel disease, of salicylate overdose, of the function of the hypothalamo-pituitary-adrenal axis, of the metabolic response to trauma, of fetal prematurity, and of the monitoring of a child with diabetic ketoacidosis. His potential interests cover the whole of medicine.

Can he, or should he, be a specialist? Have not many of his functions, like those of other generalists, been supplanted by specialist clinicians? What does his job entail?

The chemical pathologist must develop skills to enable him to run a good service laboratory, for this is the main justification for his existence. (He may share this task with a top grade clinical chemist, but this does not diminish the argument.) He must be a manager who can organize his laboratory to provide prompt, accurate, and precise biochemical tests. He acts as an advocate in order to obtain funds for staff and equipment. He must be able to plan for the future; to do this he must, therefore, be in close contact both with physicians and with his laboratory colleagues and read widely. He must know his laboratory staff, and share with senior colleagues the roles of personnel manager, adviser, aptitude tester, and work planner; an efficient laboratory is also a happy one.

He should also be an educator. With his dual medical and chemical training he is well placed to provide medical background to many biochemical problems. Outside the laboratory he has a major responsibility to his medical colleagues, educating or re-educating them in the use and limitations of biochemical tests and the proper use of the laboratory. To be an effective apostle of scientific method he must also be a diplomat.

His appointment is as a consultant, and he should frequently be consulted from within and outside the laboratory—ideally, that is. Biochemical problems abound, but many are minor and can be answered by members of his staff. The chemical pathologist may also find that many problems are being referred to other specialists if such are available. After all, the renal physician may know more about renal disease than he does, the endocrinologist more about thyroid disease, and the gastroenterologist more about diseases of the small bowel. The chemical pathologist may be most likely to function as a generalist, in this sense, when the specialist medical expertise in the hospital is scanty,

but the nature of his job is such that he is unlikely to be found in such environments. One usually finds a chemical pathologist in a teaching hospital, where there are so many associated specialists that his general medical abilities are not often needed. The role in which he is perhaps most likely to find fulfilment is as an administrator and educator, and this is the picture of him commonly held.

Do we therefore need chemical pathologists? The individual laboratory can function quite well without one. The top-grade hospital biochemist is accepted as a consultant of equal standing to others employed in the hospital. The essential functions of the chemical pathologist outlined above may be fulfilled by the clinical chemist, who should be equally capable of administering a laboratory, keeping in touch with his medical colleagues, and teaching them and his laboratory staff (though his competence in clinical liaison may be more specialized). In addition, the background of a clinical chemist is such that he is more likely to find the investigation of chemical, technical or methodological problems in the laboratory satisfying as a lifetime interest. I think the strongest case for the chemical pathologist is that he is necessary for the specialty as a whole. Clinical biochemistry is a specialty of enormous scope which should include technicians, chemists, biochemists, engineers, computer experts, and medical graduates, each with something to contribute. The special function of the medical graduate is to act as a link between the patient and the specialty, acting to some extent as both physician and biochemist.

The environment in which the chemical pathologist works has changed remarkably in the past 15 years. Now, departments are to a large extent small factories producing measurements which are demanded by doctors. Much of the effort within laboratories is necessarily concerned with efficiency, accuracy, and precision, with little true consultation with clinicians and often (because of limited time and staff) little effort to assess the uses to which their measurements are put. There is, I believe, a need for some tests to be available on demand, but also, to my mind, there is a need for the extension of consultative and investigative services to the wards and to general practice. For this we need chemical pathologists who are trained to be useful and to feel at ease in the wards.

What then can be done to attract more trainees to chemical pathology? I suggest that the nascent medical graduate, relieved at last to be in contact with patients, is not attracted to clinical biochemistry if he can see only a job as administrator and educator ahead, especially if he realizes that until he becomes a consultant he must spend seven to 10 years in

positions in which he can perform neither of these functions very satisfactorily. To retreat thus from direct involvement with patients, some biochemically orientated medical graduates perhaps feel, is to discard an ability with which the state has equipped him at a present cost of £28 000 or so. For these reasons I feel that the problem of recruitment can best be approached by adding to the roles discussed above. There should be greater emphasis on the function of the chemical pathologist as a research worker and as a physician.

First-class research workers may be born not made. But research is not an esoteric activity. It is simply the ability to appreciate problems, formulate experiments designed to yield a positive answer, carry them out, and report the results. The components of this process can be taught, and they are fundamental to clinical biochemistry. Science graduates with a PhD, and, to some extent, those with other degrees such as the MSc in clinical biochemistry, have had an introduction to research techniques. But few medical graduates are in situations where they are strongly guided towards an MSc or MD. (In the United Kingdom the MD is a higher research degree similar to the PhD.) I feel that research experience is very desirable for the chemical pathologist, for then he can direct research in his department, and he may have developed desirable habits of scepticism and attention to detail and a respect for the difficulties of good research.

There is no fundamental reason why the primary laboratory worker should not also be a practising physician; the reverse is sometimes true, and much good biochemistry is done in Departments of Medicine. With the skills of a scientist and a clinician the chemical pathologist may develop a special area of expertise in which he acts as a consultant. Without clinical skills this is difficult to do. Because the pathologist has only limited time in which to learn and practise, this area of expertise must be smaller than that of someone who devotes his whole time to clinical medicine. It should be an area with a major biochemical component, as is appropriate to a chemical pathologist. The laboratory can benefit from this, partly because it therefore has a close association with a practising clinician, and partly because it makes the development of an area of associated biochemical research much easier.

Having done basic training as a physician, can the graduate be attracted to chemical pathology? The data in table I show that few younger graduates who are ACB members have obtained the MRCP diploma; in all probability, few therefore act as physicians and pathologists. Perhaps the greatest barrier to a physician coming into the clinical

biochemistry laboratory is the magnitude of the changes he must take in almost all aspects of his work. He regarded himself as a skilled man; now he finds himself in a position where he can at first use very few of those skills. Previously the medical graduate dealt with the whole patient, now with just one aspect of his illness, and in most cases the patient is completely unknown to him. As well as missing personal contact with patients, and the emotional rewards this brings, he misses the necessity to make decisions and take responsibility, knowing that the aim of those who design laboratories is to eliminate as many decisions as possible, or to limit decision-taking to certain well qualified people.

How then could an alternative training programme for chemical pathologists be provided to attract more into the specialty?

The trainee should have enough clinical medicine to make him competent to look after patients, which, in practice, means that he should pass the examination for MRCP. To do this he needs at least two full years on the wards after graduation, followed by a continuing part-time commitment to some area of direct patient contact. This must involve him in direct responsibility for both diagnosis and treatment.

Each training programme would be adjusted to the needs of the individual. A possible prescription, involving cooperation between the Royal Colleges of Physicians and Pathologists, could be as follows:

The candidate for the dual postgraduate qualification MRCP, MRCPath should submit his training programme to the Royal College of Pathologists for approval before training begins. A course supervisor should be appointed. Allowance may be made for training already undertaken towards either qualification.

The minimum training period is five years after the preregistration year. The candidate should spend substantially the whole of the first two years in the wards. About half this time should ideally be in general medicine, and half in areas with a strong metabolic component. During these two years the trainee should begin to attain familiarity with laboratory procedures. During this time he will be expected to take the MRCP, in which questions will be slanted towards metabolic medicine.

For the last three years of this training period, having taken the MRCP, the candidate will be expected to spend most of his time at the bench. He will be encouraged to carry out some research project in an area of laboratory medicine. His findings (description of work, published papers, thesis or other documentation) should be submitted to the Royal College of Pathologists at the end of

his training period and will be taken into account when the award of the MRCPath is considered.

During this time at the bench the candidate will be expected to maintain clinical contacts through attendance on ward rounds, teaching sessions, and perhaps a research project. In addition, he should have direct responsibility for patients, for example, in an outpatient clinic or in a metabolic unit, as well as the more usual and generally accepted responsibilities of a registrar or senior registrar in the laboratory. These latter should include liaison and advisory duties with clinical staff, and, at some time, responsibility for an area of the routine laboratory at senior biochemist level.

At the end of the training period a report from the supervisor will be assessed by the Royal College of Pathologists. The assessment will be taken into account when the award of the MRCPath is considered. In this way it is hoped that suitable candidates will be encouraged to attain some competence in clinical medicine and research in addition to the basic skills required of a chemical pathologist.

If this scheme is to be successful it must be made clear that there is not an excessive examination burden on the candidate, and that credit for appropriate clinical and research training will be given. For these reasons I have suggested a course supervisor who will advise the candidate throughout the training period. The course supervisor's report on the candidate (including reports from the heads of other departments involved in training), and a report from the candidate on his own research work, should carry considerable weight at the College of Pathologists' assessment for the MRCPath. The earlier examination for MRCP should be constructed to test the capabilities of a clinically orientated chemical pathologist, and the emphasis should therefore be on the diagnosis and treatment of diseases with a metabolic component rather than, for instance, a detailed knowledge of peripheral nerve distribution or congenital heart disease.

The other reason for introducing a course supervisor is to ensure that the trainee chemical pathologist does in fact receive appropriate training. Too often training in chemical pathology is confined to an introduction to routine laboratory techniques, without guided opportunity either to develop clinical and research skills or to take much clinical and laboratory responsibility. A more positive approach to training can have only a beneficial effect on the candidate.

I have not attempted to make a Procrustean bed; the above scheme should be only one of the possible training schemes open to the medical graduate. Changes and effort would be necessary, but my contention is that they are necessary if clinical

biochemistry is to be made a more interesting, challenging, and useful discipline.

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