

SOME REFLECTIONS ON MEDICAL RESEARCH AND ACADEMIC ORGANIZATION*

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In the light of contemporary progress in the medical sciences one feels the need to reflect more deeply upon the scope and aims of modern research. The individualistic or narrow approach which we have adopted in the past to the study of clinical problems was largely sterile in that it was confined to the parts thereof as though they were isolated from, and independent of, one another. The emergence of the integralistic approach which took cognizance of the interdependence of factors and of the dynamic interaction between them was thus inevitable. This approach is, happily, dominating medical thought today.

The two approaches do not cancel one another out, for both are necessary for an exhaustive evaluation of the total or holistic clinical reality. In effect, research possesses a dual nature: it must take the abstract form of evaluating the data of purely clinical studies, whether conducted by general practitioner or specialist, and it must take the strictly empirical form of experimental laboratory investigations. The final process of evaluation consists in the correlation of the data established by the two approaches. The wisdom of Claude Bernard's dictum in this regard has lost nothing of its old force: 'Entertain theories, but be not entertained by them; wear the cloak of imagination, but remove it in the laboratory.' Medicine owes a lasting debt to the philosophical approach for its correct conception of a broader understanding of aetiology and I was aware of this debt when in 1956 I was awarded the honour and the privilege of being made the Eli Lilly Research and Clinical Fellow. This senior South African Fellowship provided me with the golden opportunity of spending 11 months in the United States and of working in the surgical clinics of Boston, during most of 1957.

Boston

This New England city is the modern Mecca of medicine, and I was privileged to be stationed in the Massachusetts General Hospital, where the greatest traditions of American medicine have been developed and maintained for the past 140 years.

Under the inspiring leadership of Professors Edward D. Churchill, Francis D. Moore and J. E. Dunphy surgical training has donned a new character. The calibre of senior residents completing their training in the Massachusetts General Hospital, for example, is such that many are occupying the more important posts throughout the United States.

The research activities of the Massachusetts General Hospital, one of the affiliated hospitals of the Harvard Medical School, are

staggering by South African standards. It is difficult to appreciate that over 2½ million dollars (£800,000) are spent every year on research projects, and that with the new Warren Building there are probably over 200 research laboratories in a 900-bedded private hospital. Important researches are being conducted in allergy, arthritis, cancer, cardiac biochemistry, infectious disease, and cardiac, endocrine, metabolic, gastro-intestinal, haematological, neurological, dermatological and peripheral vascular disorders; neurosurgical, orthopaedic and gynaecological pathology; adult and child psychiatry; surgical metabolism; intravenous fat administration; wound and tissue healing; anaesthesia and radiology. This is a formidable list for any single institution and it is by no means complete.

In the Surgical Division research is not a *sine qua non* for the progress of a resident or registrar, but the opportunities are such that nearly every young trainee and even mature surgeon feels inspired to participate in the investigation of current problems. Richard Varco¹ of Minneapolis said: 'the prime objective to strive for in the training of a surgeon is the cultivation of a flexible mind. The prevailing tendency of some training programmes is to destroy malleability of intellect. A young surgeon's reason becomes a captive dogma, aphorisms, arbitrary precepts, and the unthinking invocation of tradition—riddled and antiquated practices. He is deformed into conformity. This emphasis on conformity is inevitably purchased at the price of stereotyping the man's thinking. The spark of creativity is rarely kindled within the conformist. Therefore, those who insist on utter conventionality in their men, without regard to the individual's latent talents, waste a creative mind. Those places where these techniques are obligatory then become citadels of mediocrity inhabited by hypnotized incense-swingers . . . We need more enthusiastic, capable, deeply motivated young men in research. They weave the threads of evidence into the warp of reason and the woof of truth to create knowledge as a fabric. In those institutions where research laboratories remain empty, or largely deserted, the training programme also will have a hollow ring. Those in command who are responsible for this development have lost faith in the great research opportunity available to surgeons . . . If new appointments or promotions are unavailable to a non-conformist and enthusiastic worker and he is therewith in effect rejected, we surely add one more link to the chain of events shackling man's progress. In arriving at this decision to advance or to by-pass this man, it should be recalled that great expectations are rarely realized by anybody comfortably settled on the cushions of conformity.'

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At the Massachusetts General Hospital, Boston, where I arrived in December 1956, Prof. Edward D. Churchill, Head of the Department of Surgery, who advised various lines of approach in arranging a research programme, and I joined forces with Dr. William R. Waddell, a surgeon on the staff of Harvard and the Massachusetts General Hospital. Dr. Waddell had a variety of absorbing interests and he had made noteworthy contributions in surgical physiology, particularly in the fields of fat metabolism, intravenous fat administration, atherosclerosis, gastric secretions, and the scientific evaluation of various operative procedures for duodenal ulceration. The programme finally chosen was to investigate the diverse factors related to the production of hydrochloric acid in the stomach, in which I had the facilities of a biochemical laboratory and chemist, animal operating and clinical patients.

Gastric Research

In this I had the advantage of over 2 years' previous experience in gastric and duodenal pouch work and investigation. My programme involved a great amount of study of some small part of the past literature on the subject of gastric physiology—I found that over ten thousand articles had been written. A wide field of research had to be covered and re-evaluation of past data had to be made in the light of the work of Selye *et al*² on stress and the interrelationships of the hypothalamic-pituitary-adrenal-gastric axis. The experiments on gastric pouches in dogs were illuminating in this respect, particularly on certain aspects of the effect of the adrenal glands on post-operative gastric acid secretions. I hope to continue the experiments in Johannesburg. Simultaneously with the animal experiments, gastric analyses were almost daily carried out on duodenal ulcer patients, mostly Dr. Waddell's.

Of the meticulous routine pre- and post-operative evaluation of gastric function employed by Dr. Waddell the most interesting operation was the Waddell procedure, viz. antral exclusion, partial sleeve resection of the stomach, and vagotomy. Up to date the results have been very encouraging when compared with the former three-quarter gastrectomy either ante-colic or retro-colic-gastrojejunostomy.

The next phase in our researches consisted in tests on normal volunteer subjects with intravenous administration of norepinephrine and its effect on gastric secretions. This work occupied about 4 months; its results, in epitome, were that under the influence of norepinephrine the resultant vasoconstriction inhibited gastric secretion during basal states and after stimulation by peptone broth, histamine, and insulin hypoglycemia. The principal effect of this treatment was reduction of the volume of gastric juice. To my knowledge, this was the first occasion when such trials were conducted on human subjects.

Other Investigations

Besides my work in this and other gastro-enterological problems, I had the opportunity of attending vascular clinics at the Massachusetts General Hospital and the Peter Bent Brigham Hospital, Boston, and assisting for a time in cardio-vascular research with special reference to artificial heart-pump oxygenators. A third and old interest was the treatment of acute renal insufficiency by means of the artificial kidney. Dr. John Merrill, an authority on renal insufficiency, was at the Peter Bent Brigham Hospital, Boston, likewise Professor Francis Moore, a well-known surgical physiologist.

In two 3-week surgical tours undertaken to observe different research projects and to exchange ideas on the gastric physiology research we were engaged in in Boston, I visited the Johns Hopkins Hospital, Baltimore, where the emphasis was on heart-lung machines, and external pace-makers; and also Houston, where arterial graft surgery is of a very high standard. In Cleveland I spent a few days in Prof. Claude Beck's laboratory, where I participated in some experiments on coronary flow. I also had the opportunity of seeing Dr. Kolff and observing several artificial kidney dialyses; and discussing with Drs. Crile and Turnbull problems connected with gastro-intestinal carcinomata and inflammatory conditions.

Other places I subsequently visited included (1) Prof. Dragstedt's Department in Chicago, probably the most prolific gastric physiology laboratory in America; (2) Professor Wangenstein's Department in Minneapolis, where considerable gastric and cardiac research (under Dr. Lillehei) has been going on for many years; (3) the Mayo Clinic, Rochester, where I met Dr. John Kirklin, famous for his open heart operations; (4) Professor Collier's Department in Ann Arbor, Michigan, where Dr. Iob and Dr. Streeten are engaged in important metabolic researches with

particular reference to the adrenal glands and gastric secretions; and (5) the Cancer Memorial Hospital, New York, where many interesting gastro-intestinal metabolic problems were being investigated under the directorship of Drs. Randall, Pack and Roberts.

My impressions were that, though a great deal of excellent laboratory and technical work on gastric problems which had been so intensively carried out over a period of years was being inadequately coordinated, yet in the light of our present more integrated knowledge of the hypothalamic-pituitary-adrenal axis, it is nevertheless assuming greater significance.

APPLICATION TO SOUTH AFRICA

It is only in recent years that surgery departments in our South African medical schools have become aware of the importance of progressive research and of the need of incorporating it in their training programmes.

In the United States, when mature and experienced professional men and women are granted funds for research work, they are also granted a basic personal allowance of about £1,000 (\$3,000) a year, in addition, that is, to their ordinary academic or private earnings. In South Africa the Council for Scientific and Industrial Research do not permit a personal stipend to the person organizing and directing research. I consider this a serious defect in our research organization; too many of our research workers develop a certain cynicism in regard to the poverty of their prospects. Sooner or later they are lost to the universities, and the loss is always an irreparable one. The greatness and progress of a country can be judged today by the funds the Government devotes to scientific research. The USSR, the UK, and Germany are forging ahead and are becoming serious competitors to the USA, for that very reason. In the USA medical research is being subsidized at the rate of £1,000,000 per working day! The Union of South Africa, partly because of its meagre resources, and partly because of its lack of vision, is staggering along with an occasional discovery. It may be said that in South Africa "full many" a research worker "is born to blush unseen and waste his sweetness on the desert air". The frustrations are due not only to lack of finance but also to lack of departmental heads experienced in research in basic science and free from old-fashioned concepts of training. I could name scores of young medical research workers who have been forced out of academic life because of lack of opportunities and financial means, or because just promotions are not made and the total qualities of a candidate not evaluated. In some American universities great stress is laid by selection committees on the number of publications made, and not on quality; which is probably why hundreds of contributions to modern medical literature are so unrewarding to a discriminating student. The true hall-marks of success include leadership, imagination, fearlessness in the face of pseudo-sanctimoniousness, and practical contributions to departmental administration and research.

I would say, further, that clinical acumen, however cunning, and clinical experience, however hoary, do not signify a knowledge of modern scientific methodology, and are not sufficient for leadership in the contemporary world of medical thought. Scientific methodology implies not only the identification of factors in a causal continuum and the recognition of their interdependence, as Dr. Louis Freed³ would say, but also that the individual research worker should accept the necessity of serving as a member of an integrated research group. Any other approach must lead to corporate chaos, to personal suffering, and to inter-personal conflict.

Thus, in the light of the principles of scientific methodology, it ought not to be possible for a head of a senior clinical department to make important public statements without prior consultation with senior staff members. Staff consultations should be regularly held to discuss important matters; and when once a decision is made by the majority, it should be implemented without the possibility of its being rescinded through the caprice of a head of a department, or the dean of a faculty when a report is made to the senate. Such an approach makes for harmonious cooperation on the part of the members of a staff, for it removes the grounds of suspicion and distrust. A good leader is one who stimulates in his subordinates an enthusiasm for creative endeavour, and sustains the enthusiasm by constantly indicating the direction which progressive research should take. A good leader, too, will espouse the cause of research with convincing dignity. Such leaders are needed at the present hour.

It is impossible to conduct sound surgical research without adequate facilities for the accommodation of research animals. A modern surgical department should possess adequate facilities for the short-term and long-term housing of at least 80-100 large animals. In the United States many teaching hospitals have animal 'farms' or colonies in their basements or roofs which are large enough to house 100 dogs comfortably. Failure to appreciate this basic need has held back open cardiac surgery in South Africa by at least 5 years, and it seems that we are destined to struggle on in this way for years to come, to the detriment of the South African public. In Johannesburg we are desperately short of facilities. We need technical staff; we need biochemists; we need machinery; and we need more clinical buildings and laboratory accommodation. In the departments of medicine I visited in the United States, I found that separate and independent authority was vested in the sub-departments of Gastro-enterology, Dermatology, Endocrinology, and Metabolism and Cardiology, all with their own experimental facilities. It is this emancipation from an over-all medical dictatorship that spelt great progress in these fields in the past.

Where the employment of senior full-time personnel is the rule, there can be no place for professorial dictatorship on the Prussian model, with its apotheosis of tyranny and reaction. This system, ever ready to apply its constricting coils in a department staffed by weak or very junior personalities, is to be guarded against.

Even our senior teaching hospitals and universities refuse to improve the lot of full-time academic trained men for fear of hurting the feelings of local medical associations, who should have no say in their administration. Recently a large hospital sought the

opinion of a Branch of the Medical Association of South Africa regarding a request made for permission for full-time professors to engage in private consultative practice. This permission was refused. It is extremely arguable whether the provincial authorities or the universities should, in this particular instance, have yielded to the guidance of a body which hardly represents the senior full-time academic staff of our medical schools. In nearly all progressive overseas teaching hospitals all senior full-time medical staff—and not only professors—are permitted a limited amount of private work in order to augment their shockingly inadequate salaries. This system is not abused overseas, and there is no reason to suppose that it would be abused in South Africa, where the standard of honour among medical men is not less. The advancement of our university clinical departments depends upon the self-sacrificing labours of full-time research workers and clinicians who have spent long years in hospital wards as well as in the fields of pedagogy and administration. To force men with such mature knowledge and ripe experience out of the academic cloisters of our medical schools and teaching hospitals is virtually to invite mediocrity, retrogression or disaster for the students who are to be the doctors of tomorrow. The assurance to the full-time members of the medical staff of our medical schools of relief from the spectre of economic insecurity is the only way of averting this disaster.

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