Around Europe

German science in six days

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This must be Heidelberg because it's Thursday: the perennial aside from the package tourist had more than a ring of truth about it for six science journalists taken from Munich via Würzburg and Nuremberg to Heidelberg and on to Bonn in a week. The tour had been arranged by the German Embassy in London to show the British visitors some aspects of biomedical research in the Federal Republic. The topics ranged from molecular biology to solar generators with medicine somewhere in the middle. Add to the cocktail an unexpected and sustained heatwave and an equally unexpected political crisis in Bonn and my overall assessment became largely impressionistic.

Schadenfreude

First off, there was comfort in finding that Germany shares some of the problems we tend to believe are unique to Britain—or if not unique worse here than elsewhere. Government-funded research establishments have been told to cut their staff by 7.5% over the next five years, and with labour-protection laws that virtually rule out dismissals that means a loss of 7.5% by natural wastage. Like their British university colleagues, Germans fear that such policies will result in the best young scientists leaving and not being replaced, but in contrast to the sudden descent of the British axe the German science establishment has been given time to plan an orderly contraction and rearrangement of its resources.

Despite the high public expenditure on health (10% of the gross domestic product compared with less than 6% in Britain) German hospitals still have to struggle with financial constraints on the service they can offer. The big new 1500 bedded teaching hospital on the outskirts of Munich (by no means the largest in Germany) still lacks departments of ophthalmology, dermatology, psychiatry, and paediatrics; the site has space and the plans have been made, but the money is no longer available now that the economic boom years have come to an end. Its intensive care unit, which should have been dealing with acute postoperative problems in patients having major surgery, had beds blocked by patients with paraplegia or post-traumatic brain damage—waiting for vacancies to occur in the inadequate numbers of beds in rehabilitation units. In Germany, as in Britain, the acute services have been given priority over the care of the chronic sick. Yet with all these problems the hospital gave an overall impression of space, good equipment, and cleanliness impressive to the visitor from Britain.

Research funding

German biomedical research has been sustained by 20 years of economic growth and this prosperity is evident in its buildings and equipment. The organisation is complex. In terms of academic prestige the dominant body is the Max-Planck-Gesellschaft, founded in 1911 as the Kaiser-Wilhelm-Gesellschaft and reconstituted in 1958. On its annual budget of 900 million DM the Max Planck Society supports 51 institutes in topics not easily covered by university research; but only three of these deal with medical problems—reproductive medicine, transfusion/blood coagulation, and multiple sclerosis. Though 90% of its income comes from the Federal Government and the State (Land) governments, the society insists on its right to make independent judgments on the way the money is spent.

The Deutsche Forschungsgemeinschaft, the German Research Society, has a budget of the same size as the Max Planck Society. Its multiple functions include the financing of research projects, advising parliaments and authorities, and maintaining international contacts. Among the medical research projects supported are programmes on tumour immunology, diabetes, and liver disease.

The Federal and the State Governments also support directly 13 Grossforschungseinrichtungen (big science establishments) with a total budget approaching 2000 million DM. These include the Cancer Research Institute at Heidelberg, the Institute for Biotechnological Research at Braunschweig-Stockheim, and the Radiation and Environmental Research Corporation at Neuherberg. Surprisingly (for visitors from Britain) a fourth big science establishment, the Aerospace Research and Testing Institute, supports a wide range of medical research from aids for the blind and bioengineering projects to clinical trials of treatment for cancer. A fifth, the nuclear research establishment at Jülich, has an active programme in positron emission tomography and other medical applications of radioisotopes.

So aspirant research workers have many sources of government finance besides conventional funding through the universities. They can also approach a whole range of private non-profit foundations, of which the best known is the Volkswagen Foundation.

In contrast to Britain and the United States, however, Western Germany has no large medical research charities financed by public donation (such as the Imperial Cancer Research Fund or the British Heart Foundation).

Research attitudes

Early in the week the president of the Max Planck Society explained that its philosophy was to support individual excellence. The crucial factor for the society in deciding whether to finance a new institute was whether it could find someone of proved eminence to head the proposed unit. Conversely,

when a director died or retired an institute would be closed if no one of sufficient eminence could be found to replace him—and in practice the society did, on average, close one institute a year.

This same attitude was repeated on many occasions during the tour; grant-giving bodies seemed to prefer to support people rather than projects. Administrators and research workers were agreed that this policy could be justified by retrospective analysis not only in Germany but elsewhere—most of the big advances in the sciences had come, they claimed, from programmes in basic research rather than project-orientated programmes. Not surprisingly, therefore, the medical visitor's impression is that the basic research programmes are flourishing while clinical research lags behind. At the Cancer Research Institute, for example, much of the effort is still in laboratory research on animal tumours (see fig 1). Its clinical studies (on the treatment of brain tumours by stereotactic implantation of radionuclides, for example) are also hampered by the separation of the institute from the university hospital in Heidelberg and even more so from other clinical centres.

The imaging revolution

Applied research may have little academic prestige but—as the world knows all too well—industrial research in Germany is well financed and highly productive. Wherever we went, we saw immense interest in new imaging techniques, many of which were being developed and marketed by mammoth industrial organisations such as Siemens. Computed tomography scanners are now being assembled on production lines, but the current focuses of interest are new techniques—nuclear magnetic resonance (see fig 2), digital radiography, and various forms of tomography using radionuclides. These give better pictures, less radiation, and fewer discomforts and side effects for the patient, but at substantial costs in capital investment in equipment, since the images are created by computers rather than by simple transmission of radiation on to a screen. No one seems certain how advances in these subjects—and in improved ultrasound imaging—will develop. At present clinicians seem to be adding the newer methods to their existing investigatory techniques and deferring the decisions on choice. For the foreseeable future, however, clinicians and research workers seem sure to continue to insist that they must keep up with the recent sudden acceleration in the development of imaging techniques, which shows no sign of slowing down.

FIG 1—Scanning electron micrograph showing a highly malignant lymphoma cell passing through the endothelium of a blood vessel. The figure comes from one of the research studies on metastasis at the German Cancer Research Centre.

FIG 2—The nuclear magnetic resonance scanner being developed by Siemens AG.

Similar technical advances are being made in the basic sciences, with cryogenics improving the resolution of both scanning and transmission electronmicroscopy—techniques being pioneered at the multinational European Molecular Biology Laboratory at Heidelberg. Indeed, many laboratories seem eager to co-operate with industry; no one questions the policy of government-funded laboratories looking for industrial outlets for any devices or techniques they develop that have commercial potential.

Costs and priorities

Viewed from Bonn, the overall picture is one of medical and research communities using technical advances to ask for more investment in an era of economic stagnation. The three ministries responsible—for labour and social affairs, for youth, family affairs, and health, and for research and technology—have a joint programme for promoting research and development in the service of health. This has several related aims: to give greater emphasis to preventive medicine and epidemiological research; to identify diseases and disabilities of substantial importance to the public health and to encourage research on those topics; and to examine the structure of the health service with particular reference to rising costs, regional inequalities, and a “trend towards excessive use of technology in the health service.”

This policy package, introduced in 1978, is beginning to give results—in the opinion of the senior civil servants in the ministries concerned. Certainly closer attention is being given to cost containment by methods such as the development of “in-house” servicing units for technical equipment in hospitals. The creation of any substantial body of research in the broad field of preventive medicine is, however, likely to take rather longer.

Nevertheless, the policy makers are convinced that German medical research workers have now recognised the two deficiencies that seem most obvious to the outsider—epidemiological and clinical research.

No more than two or three universities have departments of epidemiological research. The explanations offered include a long-standing distrust of the social sciences by medical faculties and the strict laws in Germany on data protection. Whatever the historical reasons, research workers find that few data are available on the prevalence and incidence of diseases throughout the country and even mortality figures have not been analysed in any detail on a geographical basis. Some efforts are now being made to improve data collection and analysis, to mount

more observational studies, and to plan research on topics such as public education and screening in the prevention of cardiovascular disease.

The second recognised defect is the reluctance of German clinicians to set up or participate in formal clinical trials. Again, there are historical reasons: the powerful clinical professors have a tradition of laying down treatment policies by dictat, and many of them have substantial private practices. But a wind of change is blowing, with more trials being organised, especially in oncology and cardiology, though no national field

trials have yet been established in any branch of clinical medicine.

In both cases—epidemiology and clinical trials—the government ministries are encouraging the trends they want to see via the grant-giving bodies. But West Germany shares many of Britain's economic problems, and with cuts and contractions dominating the scene new initiatives are difficult to stimulate. Nevertheless, the stage is set for a rapid expansion of clinical and epidemiological research; whether it materialises will depend on the attitudes of the individuals concerned.

Lesson of the Week

Idiopathic hypoparathyroidism presenting as urinary and faecal incontinence

SANDRA L BAKER

Idiopathic hypoparathyroidism is a rare endocrine disorder and results in hypocalcaemia and hyperphosphataemia. These cause neuromuscular excitability and mental change, which may be the presenting feature. A patient presented with urinary and faecal incontinence which was reversed when his hypoparathyroidism was treated.

Case report

A 72-year-old man was admitted in November 1981 complaining only of slight numbness of fingers and toes. His daughter said that for six weeks he had had urinary incontinence, at first only at night and then day and night, and faecal incontinence. The patient could not control this and had hidden soiled bedding several times. His personality had changed over the preceding two to three months and he showed emotional lability. He was a non-smoker, took little alcohol, and had no dietary idiosyncrasies. On examination he was unkempt and doubly incontinent. He was orientated in time and space, but his emotional responses were inappropriate. He was pale, his nails were dry and brittle, his skin was flaky, but he had no cataracts or cutaneous moniliasis. The abdomen was soft and the bladder palpable; the rectum was empty, and the prostate was a normal size on digital assessment. Chvostek's and Trousseau's signs were strongly positive.

The results of biochemical investigations showed normal concentrations of sodium and potassium; urea 5.1 mmol/l (30 mg/100 ml); creatinine 104 μ mol/l (normal 45-110 μ mol/l; 0.45-1.1 mg/100 ml); urate 0.31 mmol/l (normal 0.25-0.50 mmol/l; 4.2-8.4 mg/100 ml); and normal concentrations of serum proteins, including protein electrophoresis; liver function tests; and cardiac enzymes. The serum calcium concentration was 1.19 mmol/l (normal 2.30-2.7 mmol/l; 9.1-10.7 mg/100 ml); serum phosphate 1.93 mmol/l (normal 0.80-1.40 mmol/l; 2.5-4.3

Since changes in calcium homeostasis affect gastrointestinal motility all patients with urinary and faecal incontinence of recent onset should be investigated

mg/100 ml), with a serum albumin concentration of 38 g/l; alkaline phosphatase 10 KA units/l (normal 7-14 KA units/l); the serum magnesium concentration was low at 0.56 mmol/l (0.7-0.95 mmol/l; 1.65-2.36 mg/100 ml).

The results of hormonal assays showed that parathormone was undetectable on two occasions, calcitonin concentrations were normal at <0.08 μ g/l, and thyroid function tests were normal. Thyroid and parathyroid autoantibodies were not detected in the serum; and a skeletal survey showed normal bone

Response to treatment with cholecalciferol.

Conversion: SI to traditional units—Serum calcium: 1 mmol/l $\approx$ 4 mg/100 ml.

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