

below and remains there for half an hour or so. At these low pH levels enamel is attacked and caries develops.

The practical implications of this work were investigated in the now classical Vipeholm Study in Sweden.⁴ One group of subjects was given a nutritionally adequate diet low in sugar, while other groups were given the same diet with various supplements of carbohydrate and sugar. It was found that the total quantity of sugar consumed did not have a great effect on the incidence of dental caries. What was important was the frequency of consumption. Subjects who consumed sugar between meals, especially in the form of sticky toffees, had vastly more caries than those who consumed an equivalent amount of sugar at meal times. Further work⁵ has shown that children who are not given snacks between meals have far less caries than similar children who eat between meals. Snacks are usually of carbohydrate with low nutritional value and tend to spoil the appetite for the more nutritious foods consumed at meal times. Thus from every point of view eating between meals is to be condemned.

Periodontal disease is closely related to diet and its refinement. Here too the consistency of the diet and its tendency to stick around the teeth is important, although the production

of acid is not. Periodontal disease is caused by toxins from bacteria in the plaque seeping down into the crevice between the gum and the tooth and thence through the epithelium to the underlying connective tissues. The toxins are of low grade but they lead to the progressive destruction of the collagen fibres and alveolar bone supporting the teeth. The crevice between gum and tooth becomes deepened to form a pocket in which more bacteria can proliferate to accelerate the process.

Our modern diet tends to be overcooked, soft, and sticky, designed as a cynic has said for "a nation with ill-fitting dentures." Much periodontal disease can be prevented by prevailing upon our patients to eat foods which need chewing. These, of course, are largely fresh fruit and vegetables and certain protein foods. Thus a large proportion of dental disease can be prevented by a diet which needs chewing and is eaten only at meal times.

¹ *Brit. med. J.*, 1964, 2, 964.

² *The Conduct of the Fluoridation Studies in the United Kingdom and the Results Achieved after Five Years.* H.M.S.O., London, 1962.

³ *Brit. med. J.*, 1962, 2, 34.

⁴ Gustafsson, B. E., *et al.*, *Acta odont. scand.*, 1954, 11, 232.

⁵ Bradford, E. W., and Crabb, H. S. M., *Brit. dent. J.*, 1961, 111, 273.

Discrimination in Breast Cancer

The course of cancer of the breast varies greatly between one patient and another for reasons that are ill-understood, though important among them are the histological characteristics of the tumour.^{1,2} In 1960 R. D. Bulbrook, F. C. Greenwood, and J. L. Hayward³ reported that it might be possible to predict which patients with advanced cancer of the breast would subsequently benefit from adrenalectomy or hypophysectomy. Their method of prediction was based on estimating levels of steroids in the urine, and they showed that the pre-operative levels of the 17-hydroxycorticosteroids and the 11-deoxy-17-oxosteroids varied with subsequent response to operation. Unfortunately, although the levels of these hormones differed on the average between those patients who responded to operation and those who did not, variation was so great that little reliance could be placed on individual estimations. Prediction became more accurate when they used a discriminant function. This is a statistical device that had found favour in agricultural research but not often in medicine. Briefly, it is a mathematical function of the available measurements (in this case the urinary steroid estimations) that will give the least possible frequency of misclassification. The equation used to predict response in cases of advanced breast cancer was calculated by C. C. Spicer⁴ so that when the pre-operative urinary levels of the 17-hydroxycorticosteroids and actiocholanolone (a component of the 11-deoxy-17-oxosteroid fraction) were substituted in the formula and the answer was a positive number the patient was likely to have a successful response to surgery and was said to have a positive discriminant. When the answer was a negative number the patient was likely to have a poor response and was said to have a negative discriminant.

This jargon, though it adds to the burden of a sorely tried profession, is at least descriptive. The function discriminates between those patients who will benefit and those patients who will not, and it does so more exactly than pre-operative clinical evaluation. However, the physiological meaning of

the discriminant in any patient is unknown; it is merely a device by which patients can be allotted to one of two groups in terms of response to treatment.

Further work has now shown that negative discriminants do not occur in normal women as often as in patients with advanced breast cancer⁴; in fact they are rarely found in women under the age of 65. Moreover, approximately 50% of a series of patients with early breast cancer had negative discriminants, and thus were similar to those with the advanced disease but dissimilar to normal women.⁵ Then R. D. Bulbrook, J. L. Hayward, and B. S. Thomas reported on a series of patients with early breast cancer who had been divided into two groups—or discriminated—by means of the formula.⁶ They showed that the recurrence and survival rate during the first three years after mastectomy was different in each. Among patients with a negative discriminant the cancer had recurred in over 50% in three years, while among those with a positive discriminant the recurrence rate was less than 20%. It now seemed possible that there were two types of patient with breast cancer. In one type—similar to the normal population and with a positive discriminant—the disease runs a relatively benign course and if it recurs it responds well to endocrine ablation. In the other type—with a negative discriminant—the disease recurs early and is not then amenable to palliative therapy.

The finding that a group of patients with breast cancer at an early clinical stage showed abnormal excretion of steroids suggested the interesting possibility that the steroid abnormality might have preceded the disease. If this were so it might be possible to identify among the normal population, by means of urinary steroid estimations, a group of women

¹ Bloom, H. J. G., Richardson, W. W., and Harries, E. J., *Brit. med. J.*, 1962, 2, 213.

² *Ibid.*, 1962, 2, 247.

³ Bulbrook, R. D., Greenwood, F. C., and Hayward, J. L., *Lancet*, 1960, 1, 1154.

⁴ ——— Hayward, J. L., Spicer, C. C., Thomas, B. S., *ibid.*, 1962, 2, 1235.

⁵ ——— ——— ——— *ibid.*, 1962, 2, 1238.

⁶ ——— ——— Thomas, B. S., *ibid.*, 1964, 1, 945.

with a high risk of developing breast cancer. The only way of investigating such a hypothesis is by a prospective trial, but even with a disease as common as breast cancer this is a formidable undertaking, since nearly 97% of women will never develop the disease. Nevertheless a study of this nature is now being conducted on Guernsey—an island chosen because of its compact and relatively static population and the small number of doctors and hospitals with which contact would have to be maintained. The aim is to collect specimens of urine from 5,000 normal women between the ages of 35 and 55. In this number approximately 150 may be expected to develop breast cancer during their lifetime, and when they do it should be possible to prove whether or not a high-risk group can be identified by means of the discriminant. If it can, then there is at least the possibility of attempting preventive measures.

This field trial is still in its infancy and it seems unlikely, even if 5,000 take part, that a result will be available for some years. But possibly the clinical significance of the discriminant will prove to be greater than was at first thought, and we may not have heard the last of this ugly word.

Hypochondriasis

Hypochondriasis used to be known as "the English malady."¹ To-day, when few hospital departments and general practices are without their quota of hypochondriacal patients, it might more appropriately be known as the Health Service handicap. Exhaustively, often repetitively investigated, referred for numerous specialists' opinions, treated by a variety of medical and surgical means, the hypochondriac, like Old Father Thames, keeps rolling along, his sufferings rarely relieved. All this is expensive, time-consuming, and frustrating for the medical profession (not to mention the hypochondriac's family). There is clearly a need to recognize these patients at an early stage and to understand more about them. Some recent studies of the condition are therefore particularly welcome.¹⁻³

Like most psychiatric syndromes, the concept of hypochondriasis is far from clear. F. E. Kenyon,² in a study of 512 patients with a diagnosis of hypochondriasis seen at a mental hospital, concludes that it is always part of another syndrome, most commonly an anxiety or depressive state, and is not a condition with a single cause. In his series it was most common between the ages of 30 and 39 years and was equally so in the two sexes. This study thus fails to confirm the long-held belief that it is predominantly a condition of old men. He also failed to find an association between social class and hypochondriasis, although it is widely held that neurotic patients in the two lowest social classes tend to express their complaints as bodily symptoms more than patients of other classes. On the other hand, N. Kreitman and colleagues,³ in a much smaller survey of hypochondriacs attending a general hospital, did find an association. In both these investigations the commonest sites for hypochondriacal concern were the head, neck, and

abdomen, and the commonest symptoms were pain, anxiety, and depression. Pain may be the presenting feature of several psychiatric syndromes, and unless this is remembered atypical and masked depressions will be misdiagnosed.³

In about half the cases investigated no obvious precipitating factor could be found, and there was no physical abnormality to form a basis for the hypochondriasis. Nor were these patients marked out by any abnormality of their personalities before they became hypochondriacal. Why some patients with depressive illnesses should develop somatic symptoms while others do not is unknown. Kreitman and colleagues noted that their hypochondriacal patients often appeared to be reproducing symptoms formerly experienced by their mothers, and that they were particularly liable to have had psychosomatic illnesses in their childhood and adolescence. They also found that hypochondriacal patients tended to have less satisfactory marital and sexual relationships than a non-hypochondriacal group of depressed patients.

In the causation of hypochondriasis social factors frequently play an important part. Advertising is often aimed at arousing hypochondriacal concern, linking bad breath, body odour, constipation, and so on with social and sexual failure, and then offering remedies of one sort or another. In some instances hypochondriasis may be initiated or perpetuated by doctors. One study,⁴ for instance, has estimated that doctors were responsible for hypochondriasis in 13% of cases. Kreitman and colleagues believe that, while physical investigations of psychogenic symptoms may reinforce a patient's fears and beliefs, in general it is not the actual procedures which do the psychological harm so much as the way in which they are explained—or not explained—to the patient and his family.

Hypochondriasis has a poor prognosis, and many patients in these investigations had suffered from it for more than ten years. It is important, however, to recognize that it does cause the patient real suffering. It is an admission of the doctor's sense of failure when, after months of negative investigations, he finally dismisses the hypochondriac's symptoms as "all due to imagination." Simple explanations that symptoms are due to increased muscle tension or impaired motility may be helpful, but usually treatment must be directed against underlying depression or anxiety. Depression with hypochondriasis is more difficult to treat than uncomplicated depression. None the less some patients will respond dramatically to electro-shock therapy or antidepressant drugs, though symptoms will subsequently return within a short time to affect some of them. Occasionally leucotomy may be effective. Hypochondriacal symptoms remain for a variable time post-operatively, but the patient ceases to feel concern over them and they gradually fade.

Hepatitis and Renal Dialysis

Recent reports in the press¹ about infectious hepatitis among persons dealing with patients being treated by the artificial kidney at Manchester Royal Infirmary suggest that the disease must be reckoned with in this field of therapeutics. Patients with infectious hepatitis are admitted to the Manchester Royal Infirmary from time to time, as they are to other hospitals, and since the Infirmary has a large staff members of the

¹ Kenyon, F. E., *Brit. J. med. Psychol.*, 1965, 38, 117.

² ———, *Brit. J. Psychol.*, 1964, 110, 478.

³ Kreitman, N., Sainsbury, P., Pearce, K., and Costain, W. R., *ibid.*, 1965, 111, 607.

⁴ Ruesch, J., *Chronic Disease and Psychological Invalidism. A Psychosomatic Study*, 1951. Berkeley and Los Angeles.

¹ *The Times*, 4 November 1965.

² *Brit. med. J.*, 1964, 2, 69.