Introduction

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Administration of fluid to surgical patients was the subject of one of my first scientific papers published in 1939 on the day war was declared. It drew attention to the considerable surgical hazard at that time from the extensive postoperative use of physiological saline. After gastric surgery this would lead to oedema at the suture line and later a vicious circle with severe vomiting. The use of one fifth physiological saline with glucose was recommended, which has since been widely adopted.

Throughout my professional life at this hospital the surgical patients remained in my medical ward and my firm undertook many studies on postoperative problems, particularly those concerned with fluid and electrolyte balance. Because of wartime problems, much use was then made of a simple technique hardly ever used today—the administration of rectal tap water. Early on we studied the special problems of fluid balance with intestinal fistulae, with particular use being made of one sixth normal sodium lactate, which had been introduced by Wynn et al. for high intestinal fluid loss for cases in which the sodium losses exceeded those of chloride.

This conference has brought together medical scientists and clinicians who are primarily concerned with a specific therapeutic aspect of nutrition in which great progress has been made but about which finality has not been reached. It is appropriate, therefore, to put enteral nutrition in context with the wider field of nutrition.

By the end of World War II it was widely felt that the problems of healthy eating had been solved with the concept of the “balanced diet”. The appropriate proportions of carbohydrates, fat, protein, vitamins and other accessory food factors were all worked out in relation to age, work, and state of health. It was all set out neatly in the report of the British Medical Association’s nutrition committee written in the years immediately after the war. This committee was chaired by Lord Horder, and I had the privilege of being a member. Lord Horder had also chaired a British Medical Association nutrition committee in the 30s, which set out the best way for the unemployed at the time of the depression to use their little money to get the best nutritional value, and I remember that herrings at one penny a pound came to the rescue! During the war the best use of our available resources was achieved thanks to the Ministry of Food under the splendid guidance of Lord Woolton and Sir Jack Drummond. In spite of all the restrictions the country has never subsequently had better health statistics.

The public, still longing for the old white bread and greater variety, happily said goodbye to the Ministry of Food, and gradually affluence and all its extra nutritional problems returned. There was no anxiety because the “balanced diet” would keep the nation and individuals fit and healthy. Interest in human nutrition waned, and the Journal of Nutrition predominantly reported advances and research in animal feeding. After nearly two decades of inactivity new concepts began to emerge. One of the early advances were the water soluble, clinically designed diets devised for the American space programme. Although not subsequently used on a wide scale in space, these were the forerunners of today’s chemically defined elemental diets, which have been widely used clinically. The clinical experience of these diets has contributed greatly to our current concept of total nutritional support, which enables many alimentary cripples to return to normal, or near normal, life styles.

At the same time as new concepts emerged, doubts were also being expressed about certain key dogma. The first related to the composition of the fat component of the western diet, particularly the balance between saturated and polyunsaturated fat, as well as the role of essential fatty acids. Although the debate continues, scientific evidence supports most strongly a reduction in saturated fats. Most of the attention has been directed towards the highly polyunsaturated vegetable oils, such as corn and safflower oil, which contain large amounts of the ω-6 fatty acid linoleic acid. Recently, however, fish oils, which are rich in ω-3 fatty acids, have been reported to reduce plasma lipid values in hyperlipidaemic subjects, as well as in patients with hypertriglyceridaemia.

The second doubt concerned thinking about carbohydrates and the realisation that the “total” was not enough but that there must be a balance...
between simple and coupled carbohydrates. Thus emerged the concept that dietary fibre is positively beneficial and cereal refinement positively harmful.

Historical aspects of the dietary fibre hypothesis have been reviewed recently, and the contributions made by Cleave given much prominence. Surgeon Captain T.L. Cleave was a naval surgeon and a great naturalist. Having successfully introduced bran to the Navy to treat troublesome constipation due to shortage of fruit and greens for sailors at sea, he thought hard about the health implications of refining cereals. He pointed out that in nature birds and animals have adapted to their natural food source and invariably suffer if this is changed, and he postulated that perhaps man may be no exception in the animal world. The introduction of steel rolling mills in the latter part of the nineteenth century brought about the widespread use of high extraction white flour and of sugar from cane, and he argued that the refining process had two possible harmful effects. First, it produces food and drink, which are artifically quick and easy to swallow and absorb, as well as being more attractive in appearance. Such foods are most likely to be over-consumed, causing overnutrition, which will result in obesity and its many related diseases. The increased stimulus of insulin secretion from an excess of soluble carbohydrates could lead to mature onset diabetes. Surgeon Captain Cleave saw unwitting overnutrition as the key to the so called diseases of affluence. More recently, Heaton suggested that the tendency of refined carbohydrates to cause overnutrition could also be explained by the lack of dietary fibre with its physical effect on food texture, affecting mastication, and produced evidence for this. The second part of the hypothesis is that refining depletes the diet of indigestible residues and upsets the function of the intestine, particularly the colon. The consequent small hard stools are associated with increased pressure within the colon that can lead to diverticular changes. It is this second part of the Cleave hypothesis which has become widely accepted – largely due to the work and zeal of Painter and Burkitt and Trowell. Of particular subsequent importance has been the realisation that dietary fibre is not just an inert bulking and irritant substance, but has very considerable physicochemical effects, and is highly active metabolically. The absorption of toxins and bile acids, the influence on cholesterol metabolism, the stimulation of bacterial growth in the colon, water retention properties, and the production of volatile fatty acids with its partial digestion combine to make dietary fibre a valuable component of the diet. We have, indeed, gone a long way forward from the concept of the earlier "balanced diet."

This meeting deals with controversies, and they still abound. There are still unanswered questions about the effects of injury, disease, and malnutrition on protein metabolism in man. The universal response of the body to injury by a catabolic reaction is likely to serve a purpose beneficial to the healing process and to recovery, and inappropriate intervention could well be counterproductive. Evidence is building up on the benefits and timing of intervention, and no doubt, more facts will emerge from this meeting. There are still aspects of the original studies by Cuthbertson, which need further illumination. The subtle balance between synthesis and breakdown in relation to the protein contents of tissue still needs further clarification, particularly in response to nutritional and hormonal intervention. More evidence may be needed on the role of patient immobility and remobilisation of nitrogen loss. Are there prospects for more precise and sensitive methods to assess the size and rate of change of muscle mass? Are there new concepts to be explored? On the technical rather than the physiological level there will be much exchange of experience in relation to techniques of administration.

My special interest in the catabolic response of the body to injury began with some early studies on the then unexplained rise in blood urea concentration after alimentary bleeding. The combination of the catabolic response to injury with the simultaneous large nitrogen load arising from the digestion of blood in the gut was enough to cause a modest two or three-fold rise in blood urea concentration. This became dangerous in the presence of fluid restriction, which was so common in the days of early research. The introduction of liberal feeding for gastroduodenal bleeding greatly reduced mortality. Invariably, a gastric ulcer that could be easily followed with the semiflexible gastroscope, introduced fifty years ago, showed that the ulcer rapidly healed, and this was attributed to the beneficial effect of the tissue breakdown response. Admittedly, the factors entailed in the healing of an ulcer are complex, but in the end the truth is always simple, and I expect the same will prove true for nutritional support.

In nutrition the gap between knowledge and practice remains far too large, and scientists and clinicians in this field must accept some responsibility for this. We really must get the rising generation of medical students and doctors interested in and enthused about this subject. The British Nutrition Foundation made a useful start recently, with their report on the training of medical students in nutrition in medical schools. The steps needed to improve the present inadequate scene are remark-
ably simple. Firstly, coordinating preclinical and clinical teaching is essential, and secondly, each major academic centre should have at least one academic department stimulating research and coordinating clinical teaching. I hope this is a challenge, which all of you in academic centres will accept.

References

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