

ability to absorb nutrients from the intestine has important practical applications. All may be well in time of plenty, when there is an ample supply of good food and money to buy it, but in times of food shortage and famine the person with the high energy requirement and the one who is a poor absorber must come off badly, and rations which are quite adequate for some may be completely inadequate for others. It is well known that deficiency diseases often appear in some members of the population long before they do in others. In the old days, for example, some children (but never all of them) in a community got rickets. Some people get hunger oedema when food is short, and others do not. Some people get beriberi when rations are low in thiamine, while others show no signs of deficiency. Sir Rudolph Peters has drawn my attention to the fact that in his experiments published in 1928 (on the production of beriberi in pigeons by feeding them a diet of polished rice) each bird had its own characteristic way of reacting to this diet. Whereas one bird regularly developed symptoms of beriberi after 14 days on the diet, another showed no symptoms until after it had lived on the diet for 27 or 28 days, so man is not the only animal that shows these individual variations. Finally, this wide variation from one person to another in energy intake and expenditure, and in the ability to absorb nutrients from the intestine, makes it futile to give one single figure for requirement. The only reasonable way of setting out dietary requirements is to give a range, and the range must be wide. We do not all need the same amount of food, and we must face up to it. It has been faced before, for when the manna appeared the children of Israel were instructed: "gather of it every man according to his eating".

DISCUSSION

Question: I have been very impressed over the years by the amount of clothes, especially bedclothes, used by people, and I have often thought that it may have something to do with their calorie requirement, and also their obesity. I wonder if Dr Widdowson has done any work on this, and whether she thinks it worth while working on in the future?

Dr Widdowson: Someone raised the same question at one of our postgraduate courses, saying that he and his wife couldn't agree

about the amount of bedclothes they liked. It is an interesting point but as far as I know nobody has ever done any work on it.

Dr McInnes: Could you tell us what happens to the excess calories of those who take in 5,000 calories a day and over, apart from going to fat?

Dr Widdowson: That is of course the whole question. I don't think that we can call it an excess, because if a person habitually takes 5,000 calories a day (although I think you have chosen a rather excessive figure) and does not gain weight, then he must expend that number of calories, either in physical work or else in the fidgeting movements that I have been speaking of. Somehow his metabolism is geared at a higher level than the man who only needs 2,000 calories. Some people think that losses by the bowel can vary enough to explain it, but the amounts involved are far too small. We absorb the calorific constituents of our diet almost completely, whether we have high energy requirements or not, so that is not the explanation.

Question: Do the drugs for depressing appetite in fact depress the appetite or increase the rate of metabolism?

Dr Widdowson: There are drugs that do both.

Question: Is there a relationship between the calorie demands of a person and his susceptibility to disease?

Dr Widdowson: I do not know of any relationship at all.

Question: Does calcium absorption depend on the form in which it is presented to the bowel?

Dr Widdowson: It depends on a great many things, vitamin D intake being one, but the point I was making was that, if you give two people the same amount of calcium in the same form one will absorb calcium more readily than the other.

Question: Does Professor McCance spend his calories wisely by not fidgeting and so on?

Prof. McCance: I think I could keep my weight constant on 1,200 Calories a day if I took very little exercise.

Question: Can you indicate any advance which is being made in the solution of the problem of individual variation?

Dr Widdowson: No, but people are working on it; we thought that we had the answer when we discovered that people's basal

metabolic rate while sitting is so variable, and I think that that is part of the explanation and not the whole explanation. I think that there are a whole lot of different things which integrate to make up total calorie requirements.

Chairman: Rather like individual personalities.

FOOD ADDITIVES

A. C. Frazer, C.B.E., M.D., D.Sc., Ph.D., F.R.C.P.

(Professor of Medical Biochemistry and Pharmacology, University of Birmingham)

I have been asked to talk about a subject which is somewhat outside the usual field of nutrition, namely, the subject of food additives. The extraneous chemicals which get into food have caused, and up to a point still cause, a certain amount of anxiety in people's minds, so I think it may be quite a good idea to tell you something about the food additive problem from a toxicological point of view and about some of the difficulties which exist in this field, because the doctor may be asked about some of these problems by anxious patients who wonder if they are being poisoned.

The occurrence of extraneous chemicals in food is related, as everyone knows, to the absolute necessity for making the best use of the world's food supplies. This is done in a great number of different ways; all sorts of devices are employed to produce more food, to prevent wastage, to get better distribution of food, and also to get more suitable foods for individual needs which are palatable. They often involve technological processes or the use of chemical substances, which now and then give rise to the question whether their use is accompanied by some risk to the health of the consumer.

If we take for the moment the broader issue of the extraneous chemicals in food, we can divide them fairly arbitrarily into three groups: the first two are straightforward contaminants of ordinary foodstuffs. You can divide these contaminants into two groups, one of which may be called "primary", since it involves raw materials (e.g., pesticide residues, hormones used in the treatment of animals, and other substances of this description which may remain in food) and a second group of "secondary" contaminants, which get into manufactured food materials in technological processes of one sort