related to mortality for the entire country. It may well be that the trend in fat intake was different for California than elsewhere, but there are insufficient data to examine that. However, both the fat trend data and the mortality data used include California, as well as all other states. As regards trends in the UK, examination of mortality in Scotland shows little change during the 1970s for males or females aged 35–74 years, with a similar lack of change in England and Wales until a consistent downward trend after 1979 (Marmot, 1984). We cannot subdivide our data any further by age and have therefore used mortality for age-groups combined.

If there is, as we suggest, a downward trend in fat consumption in the UK from the mid to late 1970s, this will become clearer as later data are obtained. We will continue to collect this information and update the trends in a few years. Our opinion is that trends in fat derived in the past from food balance figures have been misleading and we sought to provide as accurate a picture as possible. It is clear that the trend in fat intake in the UK is very different from the US, as are the mortality data. Associations of this kind provide support for other types of evidence which show the effect of fat on risk factors for coronary heart disease. Many are convinced of a relationship between the two. However, it appears that in Britain eating habits are not the only characteristics which are resistant to change.

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Bioavailability of nutrients
Conceptual aspects of definition and problems of determination

In nutritional sciences there is some confusion about the term bioavailability. Sometimes it is used as a measure of a nutrient's property which allows the nutrient to be utilized by the organism. This is meant by the expression 'a nutrient has a certain bioavailability'. Using the term in this manner, one should realize that the physical and chemical properties of nutrients are only one factor of the pathway of many biochemical reactions and physico-chemical processes from enzymic digestion in the gut to metabolic utilization. These processes are dependent on each other and controlled by complex feedback and hormonal mechanisms. They also vary with individual requirements, age, sex etc. At any point of this pathway bioavailability may be affected, enhanced or reduced. So bioavailability is not merely a measure for a single nutrient property; it also refers to the ability of man and animals to make a nutrient available. Hence the definition of bioavailability should comprise more than just a single nutrient property; a more comprehensive definition is required.

Sometimes the term bioavailability has also been used for gastro-intestinal digestion or even *in vitro* digestion and intestinal absorption. This, too, is incorrect. Digestion and absorption are only steps on the pathway of processes by which nutrients are made

available. So it is obvious that by measuring only one step of the whole pathway, e.g. intestinal digestion, no reliable information on bioavailability is obtained. Even measuring absorption, by determining the increase in a nutrient's serum concentration, often does not yield reliable information. Metabolism of a nutrient before reaching the central blood circulation, homoeostatic regulation of the serum level, and elimination interfere with the nutrient's increasing serum level after absorption. So the increase in the nutrient's serum concentration need not reflect equivalently the amount of a nutrient absorbed. Therefore, bioavailability should not be confounded with digestion or absorption.

Now, what does bioavailability in fact mean?

To my mind, bioavailability is the measure of the ability of man and animals, or the effectivity, by which nutrients, in a given chemical form, are liberated from food in the presence of certain food components. Bioavailability moreover includes intestinal absorption and transport of nutrients to organs and cells, where they finally fulfil their physiological function.

As the definition of bioavailability is closely linked to its determination, the question arises of how bioavailability is measured. The most reliable way to do this is by measuring the nutrient's physiological effects at some endpoints of the pathway by which a nutrient is made available in relation to the nutrient's intake. This may be done in terms of the nutrient's metabolic rate, its concentration in target organs, cells, characteristic body fluids, or body pools or by determining the activity of enzymes involving special nutrients. So, when studying bioavailability it is advisable to measure not only one but several characteristic bio-markers of the nutrient's bioavailability. The researchers' dilemma is, however, that bio-markers of bioavailability which are easy to determine are frequently not very reliable. So in future bioavailability research it is of primary importance to select more, reliable and easily determinable bio-markers for each nutrient.

It has been shown that there are different aspects of the term bioavailability which are often mixed up and which cause confusion. When studying bioavailability of nutrients we should always realize what bioavailability really means, and whether the variables we measure in fact allow a reliable determination of bioavailability.

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