

IMPACT OF MEAL PATTERNS

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The usual routine of nutritional sciences assesses dietary patterns as intake of nutrients. Standardized and validated methods are available. Comparisons between countries are possible.

Interest in the amounts of foods consumed is growing since it has been generally accepted that other than nutritive substances of foods may exert protective functions. Methods for the assessment of food consumption may be standardized within certain regions - international comparisons, however, raise considerable difficulties.

Meal patterns in the true sense of the word - a meal defined as a social interaction centered on food (1) - have so far not found the interest of nutritional science. It has been argued that such patterns depend on social, cultural or psychological factors and their description has been left to ethnologists, sociologists and psychologists. This the reason, why until today we have no comparable data on frequencies of food intake, time and duration of meals or combination of courses although there is increasing evidence, that these factors may be of importance for various physiological reactions.

Clinical evidence for impact of meal patterns.

Several authors have suggested that the time of the day at which a meal is ingested plays an important role. It has been described, that 24 h - lipoprotein profiles of healthy individuals show higher HDL cholesterol and lower LDL cholesterol levels, if - in otherwise identical regimes - the evening meal offers only 15% and not 40% of total daily caloric intake (2). Individual weight gain is higher, when a single daily meal is eaten in the evening instead of in the morning (3). Studies in psychiatry have also shown, that high intakes of sweets in the later part of the day predict persistent response to light therapy in winter depression (4).

Circadian rhythms.

While many more experiments should be conducted under constant complete nutrition in order to determine whether rhythms in levels of enzymes or metabolites are responses to nutritional intake or whether such rhythms are genetically controlled by the biological clock mechanism (5), it has been clearly shown, that plasma glucose and insulin values exhibit circadian rhythms in healthy young adults under constant glucose infusion (6). These rhythms would indicate that the body is ready for nutritional load not before the middle of the morning. A maximal capacity for food ingestion would seem to exist in the middle of the day which gradually decreases towards the evening.

Pharmacologists have long accepted that the time of the day is crucial for the application of medicaments. Diabetology considers the time of the day to be an important criteria for the diabetic regimen. Nutritionists have so far not been interested in these problems, but it has recently been suggested the specific meal pattern of the Mediterranean countries may be one of the protective factors of the classical Mediterranean diet (7).

Epidemiological data

Not many comparable data on energy intake during the day have been published. Some data are available from the SENECA study on the Nutrition of the elderly (8). Randomly sampled elderly subjects of 70 to 75 years of age were studied in small towns in different European countries.

The percentage of total daily energy contributed by the midday meal ranged between 24% in the Danish study town and 51% in a Greek study town. Analogously the percentage of energy consumed in the afternoon and the evening exceeded 50% of the daily intake in the northern study towns where the main meal

is eaten in the evening but was as low as 30% in the Greek centers (9). These differences are greater than any differences found in food consumption or nutrient intake. Not yet published results of the second SENECA field study suggest that more vegetables are consumed in those centers, where the main meal is eaten in the middle of the day, and that less time is spent for the preparation of meals in towns where the main meal is eaten in the evening.

The problem of the breakfast.

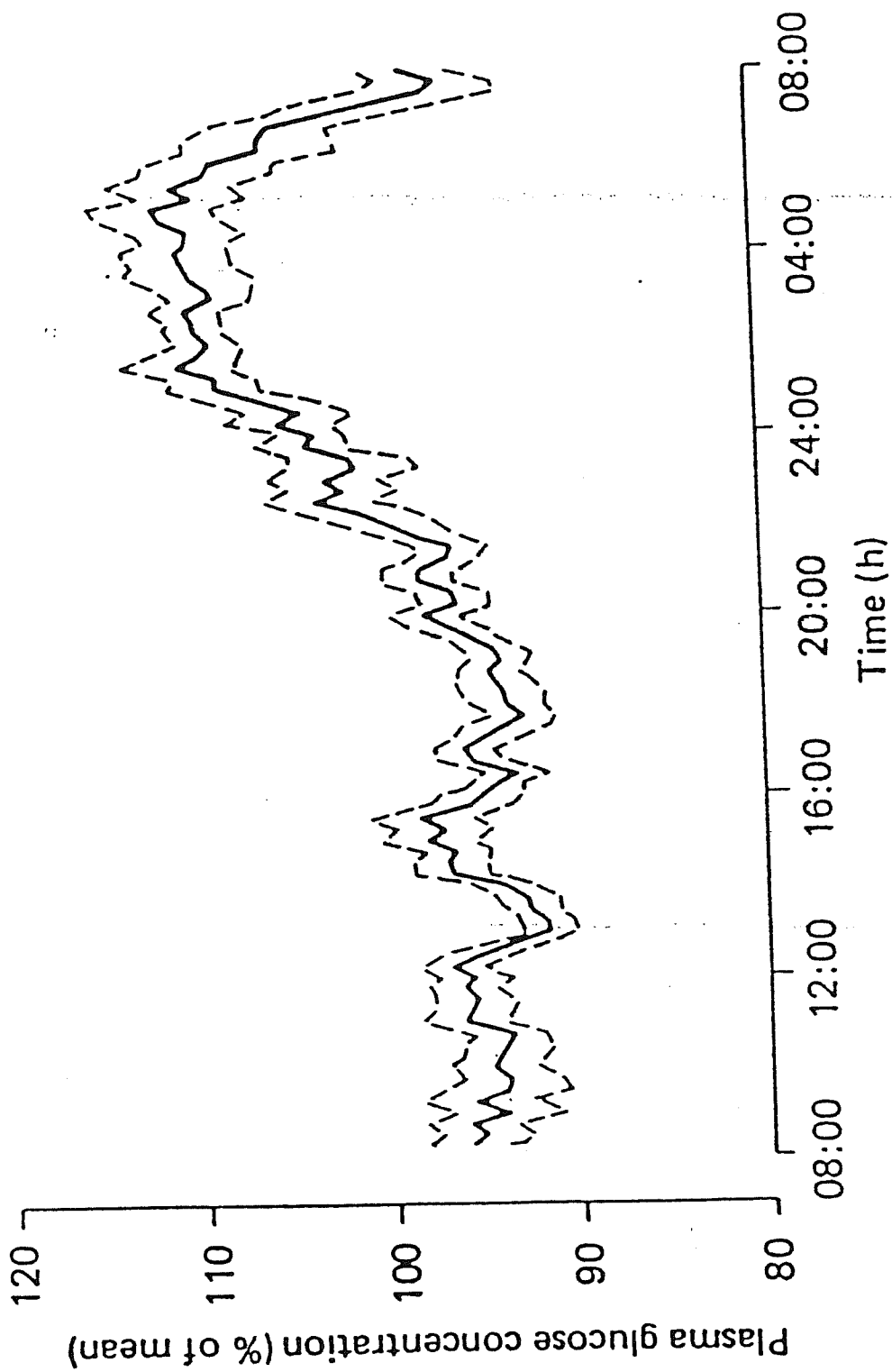
Where ever the main meal of the day is consumed in the middle of the day, breakfast is considered to be an unimportant event. This is the case for instance in the mediterranean countries (9). In all those regions on the other hand, where the main meal is eaten in the evening and the day is filled with one or more snacks the crucial importance of breakfast is stressed by dietitians although varying percentages of these populations eat no or only a small breakfast (10). Until the end of the last century, two main meals - one in the morning and one in the afternoon - were the rule throughout Europe (11). Why meal patterns developed such differences within relatively small geographical distances is not yet really understood. Differences in life concept and performance orientation have been discussed (10) and the question has been raised, whether nutritional patterns can be influenced more easily in certain regions than in others (7, 12). There is also no doubt that market strategies of the breakfast cereal industry play an important role in most studies on the nutritive value of breakfast consumption. Dietetic strategies try to introduce the big anglo-american breakfast in southern countries, before we even know whether the slow start of nutritional ingestion guaranteed by the small mediterranean breakfast exerted a protective mechanism on health.

Conclusion.

In the view of these findings on endogenous rhythms of glucose tolerance the relation between meal patterns and health has to be studied more intensively. The discussion about which aspects of food choice are guided by genotype has only started (13). Little is known about which factors are strong enough to make individuals change their meal patterns and which other factors consolidate eating habits.

But we will be able to learn more about these problems only if assessment of meal patterns is included routinely in every dietary survey.

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Mean 24-h glucose profile

v. Cauter E et al 1989 (6)

DISTRIBUTION OF ENERGY INTAKE %

	Midday meal	Afternoon and evening meals
Seneca R /DK (9)	24%	54%
Monica S.Germ. (14)	29%	46%
Seneca C /NL (9)	31%	50%
Seneca P / I (9)	41%	45%
Seneca Bu/CH (9)	41%	36%
Seneca Y /CH (9)	42%	35%
Seneca Be/CH (9)	43%	38%
Seneca M /PL (9)	43%	27%
Seneca M / H (9)	43%	31%
Seneca AA/GR (9)	45%	35%
Seneca M /GR (9)	51%	32%