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REVIEW ARTICLE

# Is dietary intake able to explain differences in body fatness in children and adolescents?

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**Abstract** Obesity is the result of an imbalance between energy intake and energy expenditure. Controversial information exists about what are the strongest energy balance aspects influencing body fatness. This article is focused on food consumption facts that could be related to the risk of being obese in children and adolescents. It reviews whether energy intake, macronutrient composition of diet, eating patterns or other dietary intake factors are able to explain differences in body composition when obesity has been already developed or even in subjects at risk to become obese. There is not enough evidence to clarify the importance of diet on overweight children and adolescents, and conclusions derived are somewhat controversial. Cross-sectional and longitudinal studies do not show clear relationships between energy intake or food composition and body fatness. To find relations between dietary factors and childhood obesity perhaps eating patterns or different types of foods must be considered: meal patterns and meal frequency, snacking and beverage consumption, fast food intake, portion sizes, etc. There is no clear association between different aspects of dietary intake and the development of obesity in children and adolescents. Longitudinal and experimental studies are needed in the future.


## Introduction

Obesity is the most frequent type of malnutrition in developed countries. Excess body fat prevalence has increased enormously over the last few years both in children and in adults. This dramatic rise has reached the grade of 'epidemic phenomenon' in almost all regions of Europe, North America and Australia. Depending on the demographic origin, population characteristics and criteria definition, epidemiological data show that the prevalence of overweight/obesity in children and adolescents ranges between 15% and 25%. Furthermore, the

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risk of becoming obese seems to be on the increase nowadays [1,2].

Obesity is more than an excessive deposition of fat in the body. Even in children and adolescents, excess body fat is associated with adverse metabolic complications, as well as with significant short- and long-term physical and psychosocial problems, that must all be included in the same concept [3,4]. Therefore, to prevent undesirable human health effects and excessive economic costs, a good knowledge of obesity etiology and its underlying factors is needed.

Childhood and adolescence are decisive periods in human life. Body composition and psychosociological changes determine nutritional requirements as well as eating and physical activity behavior variability [5]. Sometimes characteristic behavior patterns that originate during these periods produce energy balance and nutritional status disturbances. Obesity and its related metabolic abnormalities (dyslipidemia, hypertension, insulin resistance, hyperinsulinemia and impaired glucose tolerance) commonly appear during adolescence and persist frequently into adulthood, increasing the risk of cardiovascular diseases [6—8] (Fig. 1).

It is obvious that energy imbalance is the cause of overweight in susceptible children and adolescents. Although both genetic and environmental factors determine the risk of overweight in a subject, the latter are more important in relation to the increase of population obesity prevalence. Excessive energy intake, food composition, eating habits and/or low energy expenditure may be the main determinants of this phenomenon because the human genotype has not changed over the last decades. Obese phenotype, as a final disease expression in predisposed subjects, is the result of gene—environmental interactions throughout life (Fig. 1).

Nowadays, controversial information exists regarding the strongest energy balance aspects influencing body fatness. This article is focused on food consumption facts that could be related to the risk of children and adolescents becoming obese. We review whether energy intake, macronutrient composition of diet, eating patterns or other dietary intake factors are able to explain differences in body composition when obesity has already developed or, on the other hand, in children and adolescents at risk of becoming obese. Existing cross-sectional and retrospective studies have been reviewed in the former case and longitudinal studies in the latter.

## Energy intake and macronutrient composition of diet in obese children and adolescents

First of all, this section of the article must answer the question: 'Is there any difference in the amount of energy intake between non-obese and obese children and adolescents?' It is often assumed that overweight subjects eat more than

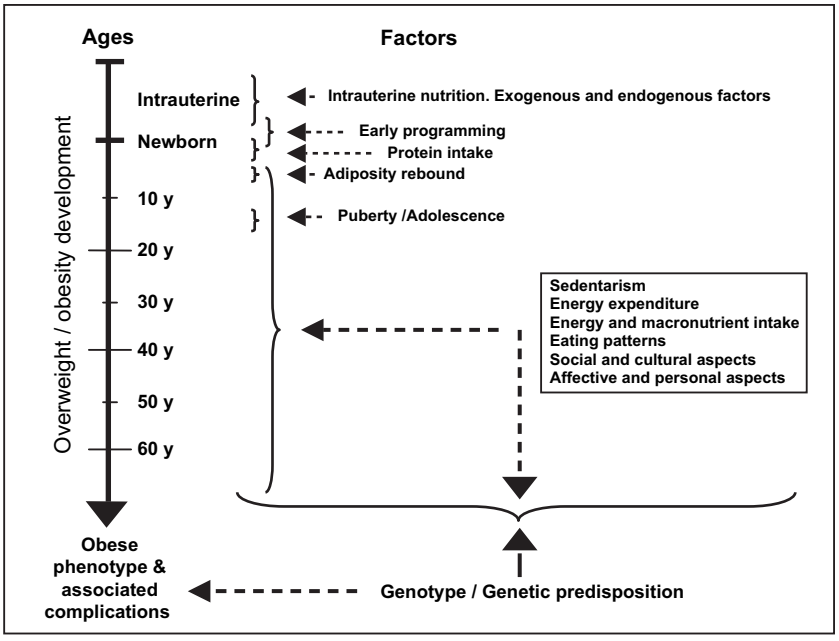


**Figure 1** Factors influencing obesity development along different periods of life.