The DONALD Study

History, current status and future perspectives

Summary Nutrition during childhood and adolescence is an important determinant of development and health, both for the child and the later adult. In industrialised countries as well as in many countries of economic transition, emphasis has moved from combating nutrient deficiencies to research on the effects of overnutrition and food selection. Prevention of chronic diseases including obesity have become a major focus in research. However, the complex relation between infant growth and its related endocrine and metabolic changes on the one hand and the influence of nutrition and nutritional status on the other hand still need to be understood in detail. Studies aiming to elucidate this have to follow children and adolescents during their growth period. The following pages display the features of the German DONALD Study (DOrtmund Nutritional and Anthropometric Longitudinally Designed Study) which was specifically designed to address these complex research questions. Finally, comparisons to other studies are made and the specific strength and weaknesses of this study are discussed. As the DONALD study offers unique research opportunities and due to its long follow-up an abundance of data, collaborative research is encouraged.

Key words children – nutrition – cohort study – anthropometry – endocrinology

Introduction

The importance of an adequate nutrition for a healthy development of children, both physically and mentally, has long been recognised. In recent years it has additionally become evident that nutrition during childhood and adolescence is related to adult disease occurrence [1–3]. These findings have underlined the importance of nutritional quality early in life and have changed the type of research in that field. Nowadays, in wealthy societies more emphasis is placed on issues related to chronic disease development rather than combating nutrient deficiencies. This is highlighted by the statement that today the most prominent and frequent nutrition-related disease among children is obesity [4]. However, with respect to children, little is known so far about the physiological changes of the related endocrine and metabolic parameters on the one hand, and on the pathophysiological alterations associated with the development of obesity on the other hand. Correspondingly, data on the influence of dietary behaviour and nutrition on the metabolism and endocrinum of children are scarce.

One difficulty in studying these factors in children are the ongoing changes of the body and its functions associated with growth and development. To take this into account and to obtain insight into the characteristics of these changes, studies are required with repeated assessment of the variables of interest during childhood and adolescence. In the following, a study of that kind, the DOrtmund Nutritional and Anthropometric Longi-
Aims of the study

When the study was initially planned, five major research needs were identified which formed the rationale to start a longitudinal study in children focussing on diet, nutrition and development:
- Description of intra-individual and inter-individual trends in dietary intake and nutritional behaviour,
- Analyses of interaction between nutrition and growth,
- Determination of nutritional needs in children and adolescents,
- Metabolic reference data from healthy children,
- Dietary intake data to support the evaluation of the environmental burden.

During the progress of the study its focus has been widened to the complex interrelations between nutritional behaviour, food consumption, growth, development, nutritional and endocrine status, individuality, metabolism and health in children from infancy to adolescence and early adulthood.

Design and methods

The DONALD Study is a longitudinal (open cohort) study collecting detailed data on diet, growth, development and metabolism between infancy and adulthood. Per annum, about 40 infants are recruited and first examined at the age of three months and are then followed until the age of 20 years (girls) and 23 years (boys). During the first year of life, three further visits at the Research Institute of Child Nutrition in Dortmund, Germany, are planned, two in the second year and one thereafter. During puberty, two annual assessments are attempted. The regular assessments include records of dietary intake and behaviour, anthropometry, urine sampling, interviews on life-style and health-related issues and a medical examination. According to the age of the child different additional measurements are performed. At certain points in time data from the parents on socio-demographic issues, life-style, health status and anthropometry are obtained as well (Fig. 1).

Recruitment for the study started in 1985 and is planned to continue. The starting study sample included children and adolescents between age 2 and 18 years with annual anthropometric measurements recruited from earlier cross-sectional studies in schools and kindergartens.

The study which is exclusively observational and non-invasive, has been approved by the Scientific Committee of the Research Institute of Child Nutrition. All examinations and assessments are performed with parental consent and later on with the children’s consent.

Study population

Study participants are recruited in the city of Dortmund and surrounding communities via personal contacts, maternity wards or paediatric practices. Eligible are healthy (no prevalent diseases affecting growth and/or diet) German babies (age 3–6 month) whose mothers and/or fathers are willing to participate in a long-term study and of whom at least one parent has sufficient knowledge of the German language. These criteria were and are followed throughout the study, with the only ex-