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Preface

An epidemic of obesity already at a young age is being observed in most societies around the world. The level of fatness of a child or an adolescent at which morbidity acutely and/or later in life increases is determined on an individual basis. However, overall obesity substantially increases the risk of subsequent morbidity. The definition and diagnosis of obesity in children and adolescents are difficult and controversial. In children and adolescents the degree of body fat mass depends upon ethnic background, gender, developmental stage and age. Waist circumference, skinfold thickness and body mass index are the most useful noninvasive clinical measures to define obesity. Waist circumference and waist-to-hip ratio are helpful to assess upper body fat deposition but do not provide for measuring visceral = intra-abdominal fat accumulation. Direct measurements of body fat content, e.g. hydrodensitometry, bioimpedance, or DEXA are useful tools in scientific studies. However, body mass index (BMI) (weight in kilograms divided by the square of the height in meters) is easy to calculate and is correlated sufficiently with direct measures of fatness. Recently, it has been proposed that the adult body mass index (BMI) cut-off points (25 and 30 kg/m²) should be related to BMI percentiles in children and adolescents to provide for cut-off points at younger ages. Accordingly, age and gender specific BMI values for 2–18 years corresponding to BMI values of 25 and 30 kg/m² at 18 years of age have been published.

Projected obesity rates for obesity (BMI \geq 30 kg/m²) in the adult population of the United States are 30% for the year 2015 and over 40% for the year 2025. The Bogalusa heart study found that 22% of the children surveyed in 1990 had

a body mass index greater than the 85th percentile established in a similar survey conducted in 1980. There was little change in the cohorts of children with a BMI less than the 50th percentile. In contrast, there was a large increase in BMI in the cohorts with a BMI greater than the 50th percentile. In summary, over time, obese children have a tendency towards even more excessive weight. It has become clear that childhood obesity has reached epidemic proportions in all industrialized countries around the world. The current age-adjusted prevalence may be as high as 20–30% in some populations. For example, data from a nationally representative sample of 2,630 English children in 1999 show that the frequency of overweight ranged from 22% at age 6 years to 31% at age 15 years and that of obesity ranged from 10% at age 6 years and 17% at age 15 years.

The genetic basis of obesity has been elucidated to some extent through the discovery of leptin, the *ob* gene product, and the increasing knowledge on the role of neuropeptides such as for example proopiomelanocorticotropin (POMC), the orexins, neuropeptide Y (NPY) and the melanocyte concentrating hormone and its receptors (MSH and MCR). Environmental/exogenous factors largely contribute to the development of a high degree of body fatness early in life. Twin studies suggest that approximately 50% of the tendency towards obesity is inherited. Exogenous factors such as overconsumption of fat-rich diets, the excessive use of modern media and in particular television viewing and lack of physical activity (sedentary life style) heavily contribute to the development of obesity particularly in childhood and adolescence. In fact, four cross-sectional studies from national samples in the United States demonstrated a statistically significant correlation between adiposity and television viewing among children. 8- to 18-year-old children and adolescents spend an average of about 4.5 h per day watching television and videotapes and playing video games. Those demographic groups at highest risk for obesity, such as African-Americans and Latinos and children from families with low income, tend to watch even more television than other US children. In addition, socioeconomic factors as such may heavily contribute to the development of obesity of children and adolescents: in one recent study, teenagers in families with low income were significantly more likely to be overweight than children and adolescents in families with high income. Nutrition and diet early in infancy is thought to influence growth rate and body fatness beyond infancy. Whether obesity is mainly caused by excess energy intake or a reduction in energy expenditure or physical activity is unclear. Some authors have suggested that intrauterine growth retardation actually predisposes for the development of obesity and syndrome X later in life. However, the evidence for fat patterning resulting from differences in fetal or early postnatal nutrition is still open to question.

There are numerous disorders including a number of endocrine disorders (Cushing's syndrome, hypothyroidism etc.) and genetic syndromes (Prader-Labhard-Willi syndrome, Bardet-Biedl syndrome, Cohen syndrome, etc.) that can present with obesity at a very young age. A simple diagnostic algorithm allows for the differentiation between primary or secondary obesity. Among the most common sequelae of obesity in the adolescent are hypertension, dyslipidemia, back pain and psychosocial problems. The definition of obesity in childhood and adolescence is not easy. However, BMI is now generally accepted to be used to define obesity in children and adolescents clinically. Only in preadolescent boys does BMI relate to muscle mass as well and has to be used for the definition of fat mass with great caution. An increased risk of death from cardiovascular disease in adults has been found in subjects whose BMI had been greater than the 75th percentile as adolescents. Therapeutic strategies include psychological and family therapy, lifestyle/behavior modification and nutrition education. The role of regular exercise and exercise programs is emphasized. Surgical procedures and drugs used in adult obesity are still not generally recommended for obese adolescents.

Obesity is the most common chronic disorder in the industrialized societies. Its impact on individual lives as well as on health economics has to be recognized by physicians and the public alike: Obesity at a young age is a major burden for the economy. The annual economic costs due to medical expenses and lost income as a result of complications of adult obesity is estimated to be as high as approximately 70 billion dollars in the USA. At least another 30 billion dollars are thought to be spent on diet foods, products and programs to lose weight. If one is to calculate the prospective costs of obesity forms that have started at an early age, the prospective financial costs are even higher. On the other hand, sales and profits of the obesity treatment industry have already reached an enormous sum. Therefore, obesity in childhood and adolescence has already become a major factor in health care planning systems and within the health care industry as such. However, in addition to the prospect of diminished health, obese people are often stigmatized both socially and in the workplace. This fact also contributes to the economic cost of obesity albeit in an unknown and almost incalculable way.

This book aims to increase physicians' knowledge and understanding of obesity in childhood and adolescence as well as to further public awareness of the health burden and economic dimension of obesity at a young age. Several chapters deliver insight into the basic understanding of which factors contribute or prevent the development of overweight and obesity in young people. Other contributions provide tools for the clinician to manage the care of the child and adolescent with overweight/obesity. In addition, knowledge from the latest scientific studies on the molecular biology of obesity is also presented.

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