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**Physical activity in young Japanese children**

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The prevalence of obesity in Japanese children remains higher than that reported in the 1980's, although it has not increased dramatically in recent years. The preschool years are regarded as especially critical for the programming of energy balance. Children who undergo early adiposity rebound are at increased risk of later obesity (Reilly, 2008). There is also evidence that physical activity (PA), regular participation in sports activity, inactivity and physical fitness may track from childhood to adolescence and adulthood (Janz, 2000; Malina, 2001). However, there is evidence that step counts measured in Japanese elementary school children between 2005-2010 (Tanaka, 2010) were not so high according to the category for 6-12 yr (Tudor-Locke, 2007), and that the physical fitness of Japanese preschool children in recent years is lower than that in the 1980's (Sugihara, 2006). Interestingly, it has also been reported that the physical fitness of Japanese preschool children enrolled in physical education programs at kindergartens is lower than in children who did not participate in these programs (Sugihara, 2008). This finding indicates free play by

children is recommended, and also suggests that accurate evaluation of daily PA in young children is important. Several studies on the validation of accelerometers have been performed in preschool children (Pate, 2006; Pfeiffer, 2006; Reilly, 2003; Sirard, 2005; Tanaka 2007a, 2007b). These studies show that preschoolers participate in activities that require less vertical movement and more omnidirectional movement (Oliver, 2007). We have developed an algorithm using triaxial accelerometry which records not only locomotive activities, but also nonlocomotive activities (Tanaka, 2007a). In order to develop better and effective intervention strategies, it is necessary to obtain an understanding of the environmental factors associated with PA in young children using evidence obtained by objective and accurate methods. Although many papers on the environmental factors of PA have been published in North America, Europe and Oceania, research on Japanese children is limited. Moreover, while PA guidelines are recommended for youth in America, Canada, Europe and Oceania, the national PA guidelines in Japan are

only for adults (Exercise and physical activity Guide for Health Promotion 2006). Therefore, it is important to improve the accuracy of evaluation methods of PA in children and to

collect PA data in Japanese children that can be used to examine the various factors associated with PA.

## **Sports Shokuiku for elementary and junior high-school students**

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There have been various health problems, which are related to nutrition and food, such as the increase of nutritionally unbalanced diets, irregular meals, increase in obesity and lifestyle-related disease, people without correct knowledge of proper meals in Japan. Food and nutrition education, which is called “SHOKUIKU” in Japan, are therefore required to recover healthy and good diet habits. The SHOKUIKU is important especially for children and adolescents, since it exerts great influence on both mental and physical growth, and also on their character formation throughout their lifetime. There is, however, a lack of effective ways to educate children regarding nutrition and food, since they have less interest in the diet habit-related health problems for their own sake. Our research group, which had been supported by Japanese Sports Association, hypothesized that desires to win the games and to be a good athlete would strongly motivate young athletes to learn food and nutrition knowledge as well as sports skills and training, and tried to develop new SPORTS SHOKUIKU program, which is the

way to educate about nutrition and food knowledge in combination with sports and physical activities. First, we conducted a survey of approximately 3,500 parent-child (elementary school students) pairs who engaged in sports activity by using questionnaire on nutrition knowledge and behaviors. The survey results revealed that 1) children who engaged in sports activities had better nutritional knowledge and attitude scores than those who did not, 2) food preference and attitude of parents and family environments affected children’s attitude to food and nutrition (Children, of which parents are picky eater, also tend to have fussy and picky eating behavior.). Our project team also developed new instructional materials such as luncheon mats and DVD in order to enhance both parents’ and children’s understandings and interest in food and nutrition. In this lecture, I will show some examples of nutrition education strategies aiming to improve the performance levels of junior athletes and to raise their awareness nutrition and food.

## **Modern medical problems in Japanese children and their causative factors**

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In Japan, the number of children has decreased over the last 25 years. During the same period, the fitness level has deteriorated and the incidence of fracture increased in school students. Such problems were common in developed nations, such as USA, Canada, western Europe. The causative factors of these problems were investigated in the nations affected. Common observations are that the total hours spent for physical activity (PA) was decreased and the diversity of PA was narrowed, both of which induced a notable reduction in muscle and bone strength and capacity for avoiding injury. In Japan, the reduction in three environmental factors such as hours, space and peers available for PA, was demonstrated to be the primary attributing factor of the problems.

Inadequacy of PA equals inadequacy of energy consumed in daily life, and induces deposition of fat in the body of child. Obesity, life-style related disease and metabolic syndrome occur frequently in children and many of them continue to affect during adolescent and adult period.

On the other hand, it is believed that PA improves mood state and QOL of children. Authors demonstrated that the longer hours of PA that the children spent, the better QOL and wellness they showed. QOL and wellness of obese children were reported as low as those of cancer-bearing children. Thus, encouraging PA is expected to resolve the medical problems among children through preventing early-age obesity and increasing fitness level.