Obesity is one of the leading causes of premature death and disease worldwide. Obesity and obesity-related cardiovascular risks track from childhood into adulthood, suggesting that the precursors of cardiovascular diseases are already present early in life.1,2

Figure 1 shows the overweight/obesity prevalence among 11-year-old boys in 2006 and among 20–69-year-old men in 2006–2010 in Japan.3,4 Although the prevalence of obesity varies across regions in Japan, the regions of high prevalence in children roughly correspond with the regions of high prevalence in adults. As shown, the northeastern area had the highest prevalence of obesity, followed by the southwest, while the middle of Japan had lower prevalence. Regional agreement of obesity prevalence among children and adults suggests sharing and inheritance of similar psychosocial, economical, or familial environment, which strongly influences lifestyles that result in or prevent obesity in both adults and children. Figure 2 shows the childhood overweight/obesity rates over time for 11-year-old boys and girls.4 From 1975 to 2000, the rates grew from 6% to 12% among boys and from 6% to 10% among girls. Although it nearly doubled, the increases are less than in other countries such as the USA where the prevalence of childhood obesity has tripled over that period. Furthermore, since 2000, the frequency of overweight/obese children has declined slightly for both boys and girls. The reason why the rates seem to stay very low in Japan is of great interest to other countries who see their children becoming less and less healthy. It is speculatively attributed to Japan’s “revolutionary school lunches”5 or to the “walking to school” policy.6

The prevalence of overweight/obesity in these statistics has been determined by weight-based indices such as body mass index (BMI) or percent overweight (POW; determined on the basis of the Japanese standard body weights for height by age and sex: POW=(actual body weight–standard weight)/standard weight×100 (%)). When adiposity levels were categorized by...
BMI in children, cardiometabolic variables were higher with greater severity of obesity.\textsuperscript{7,8} Thus, as markers of total body fat mass, body weight-based obesity indices are a useful tool for screening cardiometabolic risks in children as well as in adults (Figure 2).

Although BMI is the most commonly used adiposity measure in all ages, it does not provide information on body fat distribution, which also strongly relates to future health risks. It seems that, even without overweight or obesity, higher body mass is associated with cardiometabolic risk factors in childhood. In fact, the presence of a metabolically obese, normal-weight phenotype is suggested also in childhood.\textsuperscript{9} In addition, in Asia, the health complications associated with overweight/obesity begin with a lower BMI than in Western countries. Therefore, the public health burden of adiposity is underestimated especially in Asia and, to fully assess the future cardiovascular risk among children, it is important to study additional risk markers related to adiposity.

In the adult population, a strong correlation between visceral fat accumulation and cardiovascular disease is demonstrated\textsuperscript{10} and measures for central adiposity, such as waist circumference or waist-to-height ratio, have been suggested for predicting the clustering of cardiometabolic risk factors.\textsuperscript{11} These abdominal fat indices have been shown to be associated with risk factor clustering among children and adolescents as well, but differences in adiposity among age, sex and ethnic groups should be considered in risk assessment and stratification.

In White and African-American children/adolescents, Staiano et al\textsuperscript{12} examined associations between insulin resistance and the proportion of fat (trunk, leg, or arm fat divided by whole-body fat) and found that insulin resistance was associated positively with % trunk fat and negatively with % leg fat, but no association was demonstrated with % arm fat as schematically shown in Figure 2. These associations were independent of whole-body fat, age, sex, race, sexual maturity status, and self-reported physical activity. Furthermore, in 401 5th-grade Japanese children, Kouda et al determined regional fat by dual-energy X-ray absorptiometry (DEXA) and showed that the ratio of trunk to appendicular fat (TAR; trunk fat mass divided by appendicular (arms and legs) fat mass) was significantly related to systolic blood pressure in boys.\textsuperscript{13}

Although these cross-sectional studies have suggested the importance of fat distribution measures as early markers, no cohort study regarding the relationships among regional adiposity and cardiometabolic risks has been reported in a pediatric population. In this issue of the Journal, Kouda et al\textsuperscript{14} extend their previous study with a 3-year follow-up to examine whether childhood fat distribution measured by DEXA predicts blood pressure levels in subsequent years. Baseline (at age 11) and follow-up (at age 14) surveys of 258 5th-graders revealed that systolic blood pressure at follow-up was significantly associated with both TAR and the trunk-to-leg fat ratio (TLR; trunk fat mass divided by leg fat mass) at baseline, independent of other covariates. Interestingly, clearer associations were observed in children who had relatively low body fat. Therefore, especially in children and adolescents, it is important to consider body fat distribution in addition to body fat mass, and TLR/TAR could be as useful for screening childhood adiposity as body composition-based measures (Figure 2).

Although the preliminary data seem hopeful, whether TLR (or TAR) is a valuable early marker for cardiometabolic risks in childhood awaits further studies focusing on comparisons with other obesity-related markers, applicability to general screening, effects on future cardiovascular/metabolic diseases, etc.

### Disclosure

The author declares no conflict of interest.

### References

3. The Ministry of Health, Labour and Welfare. The National Health and
Trunk-to-Leg Fat Ratio in Childhood