

among the established risk factors for cardiometabolic disease. However, the alarming increase in overweight and obesity in children and the trajectory and reach of related comorbidities such as cardiometabolic disease challenge us to identify potential modifiable pathways that will have sufficient impact to turn these around. In this context, this study is a step in the direction of identifying unique individual risk profiles for obesity related cardiometabolic disease. The direction and the findings of the present study should stimulate further prospective research to address the value of RBP4 and other adipokines as “biomarkers.” Interestingly, although RBP4 was originally characterized by DeWitt Goodman et al, it took more than 4 decades and his daughter, Elizabeth Goodman,¹⁸ along with Barbara Kahn’s group, to extend the studies on RBP4, to a critically important clinical population, black adolescents. The novel insights from this report by Goodman et al¹⁸ are very important, but should not be considered as the end of scientific inquiry in this vast field of adipokines and their potential role in insulin resistance related to cardiometabolic disease in children.

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They’re Still Kids

Two articles in this issue of *The Journal* are important reminders that health risk affecting all children may have an even greater impact on children and youth with chronic illnesses. Hofer and the DPV-Weiss Study Group¹ present cross-sectional data on the prevalence of smoking in a large cohort of German and Austrian youth with type 1 diabetes. The authors report that the prevalence of smoking in youth with diabetes was not different from that of the general population, despite their increased risk of cardiovascular and microvascular disease. Although detailed recent data on smoking in youth with diabetes from the US are not available, older data suggest that the prevalence is similar in this country.² In the U.S. general population, 8% of middle school children and 23% of high school youth self-report current cigarette use.^{3,4} In addition,

U.S. middle school and high school students report smoking cigars and using smokeless tobacco products.⁴ Although high school children may perceive these alternative tobacco products as safer than cigarettes, they are known to promote vascular constriction, endothelial dysfunction, and increased

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cardiovascular inflammation. Therefore they likely pose a risk similar to that of cigarettes for the promotion of cardiovascular and microvascular disease in young people with type 1 diabetes mellitus.

Even though cigarette smoking is a health hazard for all children and youth, the long-term consequences for those with diabetes are likely to be more substantial, given the combined effects of diabetes and smoking on cardiovascular function. Therefore the high prevalence of smoking in middle school and high school youth with diabetes reported by Hofer et al should serve as a strong reminder to physicians, nurses, and educators caring for these children of the importance of early and repeated counseling to avoid smoking initiation. The Hofer study and reports from the Centers for Disease Control and Prevention document that advice to children on avoidance of smoking should begin in elementary school and receive increased attention as they enter middle school, with the aim of preventing adolescents from ever initiating tobacco use. Questions regarding current tobacco use and advice to avoid initiation of use is part of the recommended care for all children and should be specifically part of preventive care for youth with diabetes.^{5,6} In addition, parental smoking and peer smoking are major determinants of youth smoking initiation.⁷ Thus a history of parental smoking behavior is pertinent to the care of children of all ages with diabetes. Although counseling parents on the risk parental smoking poses to children is part of general pediatric preventive care, it is especially pertinent to parents of children with diabetes.

For those youth with diabetes who do smoke or use other tobacco products, the provision of counseling on the importance of quitting and referral for effective tobacco cessation programs is a critical component of preventive care. Furthermore, this is an important opportunity for the coordination of intervention efforts between specialty care and primary care providers.

Even though smoking avoidance has been a long-recognized area of adolescent health, Svoren et al⁸ report that 76% of youth with type 1 diabetes are either vitamin D insufficient or deficient. Like smoking, insufficient stores of vitamin D and the consequent risk for decreased bone mineral density (BMD) are of greater concerns for youth with type 1 diabetes mellitus than for the general population because type 1 diabetes mellitus is itself associated with reduced BMD and increased risk of fractures in adults.

Over the past 10 years, studies have shown deficient concentrations of 25-hydroxy- vitamin D (25-OHD), the best measure of vitamin D stores, in otherwise healthy children.^{8,9} However, the definition of vitamin D sufficiency is less certain. Although frank vitamin D deficiency is clearly defined (<20 ng/mL), concentrations of 25-OHD indicating sufficiency are still being clarified; the current consensus is that normal 25-OHD concentrations are >30 ng/mL. However, in adults, studies have found continued increases in BMD with 25-OHD values between 30 and 40 ng/mL with a maximal BMD correlating with a 25-OHD value \geq 40 ng/mL.⁹ This suggests that during adolescence, the time of maximal bone accrual, 25-OHD

concentrations might ideally be >40 ng/mL. Diminished 25-OHD concentrations and decreased calcium intake during this critical period may put youth with type 1 diabetes mellitus at further risk for clinically significant decreased BMD in early adulthood.

Vitamin D insufficiency is an increasing concern to all pediatricians, with reports of vitamin D deficiency in 42-52% of healthy children and adolescents, with children of color more affected than white children.¹⁰⁻¹² The reasons for decreased vitamin D concentrations are likely complex, but decreased fortified milk consumption among adolescents, particularly girls, certainly has contributed. As pointed out by Svoren et al,⁸ carbonated sodas, primarily cola drinks, have replaced fortified milk in the diet, and the phosphoric acid in these beverages may further diminish intestinal calcium uptake. In addition, increased indoor "screen time" has replaced sun exposure during outdoor play, resulting in decreased endogenous 25-OHD synthesis. Even in relatively sunny climates, such as that in Colorado, the mean 25-OHD concentrations in children with type 1 diabetes mellitus was 31.2 ± 7.8 ng/mL, suggesting that almost 50% of these children were vitamin D insufficient.¹³ However, abnormal BMD has not been reported in adolescents with type 1 diabetes mellitus.¹⁴ BMD is decreased in young women >20 years of age with type 1 diabetes mellitus compared with control subjects, and older individuals (31-65 years) with type 1 diabetes mellitus are at increased risk of fracture.^{15,16} The reasons for poor bone strength in type 1 diabetes mellitus are not well understood, but increased calcium excretion associated with glycosuria, increased inflammatory cytokines, and bone microangiopathy have been suggested as mediating pathways. Additionally, if renal function is compromised, activation of vitamin D through 1-hydroxylation may be impaired, further reducing vitamin D action in the gut and bone. Of interest, no association has been found between HbA1c and either 25-OHD concentration or BMD. Further investigation of bone mineral metabolism in patients with type 1 diabetes mellitus is needed to elucidate the relationship between abnormal insulin action and decreased bone strength.

The therapeutic approach to bone health in children and youth with type 1 diabetes mellitus is unclear, although this is clearly another opportunity for collaboration between general and specialty care providers. Certainly, it is important to obtain a thorough history of calcium and vitamin D intake and sun exposure. Furthermore, counseling in adequate nutritional sources of vitamin D and calcium, along with encouragement of outside play, should have increased emphasis in all pediatric patient encounters, particularly in children with chronic illness.

Whether vitamin D supplementation should be broadly recommended is less certain. However, given the data suggesting a high prevalence of vitamin D deficiency and insufficiency in healthy children, and now in children with type 1 diabetes mellitus, supplementation with 400 IU a day seems prudent in most children and youth unless

dietary vitamin D intake or sun exposure is clearly sufficient. In children with chronic illnesses, such as type 1 diabetes mellitus, it may be appropriate to monitor vitamin D sufficiency through laboratory testing after supplementation and, if stores remain inadequate, to consider supplementation with 800 IU/day.⁹ For now, measurement of bone density by dual-energy X-ray absorptiometry or other means should be reserved for children who sustain pathologic fractures or for research protocols.¹⁷ Additional data on vitamin D concentrations, bone mineral density, and the efficacy of supplementation in children with diabetes are urgently needed.

The care of children with chronic diseases, such as type 1 diabetes, is often complex, time-consuming, and multifaceted. There is a risk, however, that in the complexity of caring for these children, attention to common health risks of childhood can be lost. Unfortunately, having a chronic illness does not protect a child from smoking, drug abuse, poor nutrition, injury, and depression. Indeed, the burdens of a chronic illness may increase these risks. These 2 articles serve the salutary purpose of reminding us that in our attention to the special needs of these patients, we must not lose sight of the youth behind the disease.

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