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Predicting obesity in adults from childhood and adolescent weight[1,2]

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The article by Guo et al (1) published in this issue of the Journal is important because it provides guidance in identifying children who may become overweight or obese as adults. The authors reanalyzed the longitudinal follow-up of participants in the Fels Longitudinal Study by using the newly published standards from the Centers for Disease Control and Prevention. The annual heights and weights of 166 males and 181 females were used to calculate the body mass index (BMI; in kg/m^2) from 3 to 20 y of age and from 30 to 39 y of age. For each subject, the average of the annual BMI values between 30 and 39 y of age was used to provide a mean BMI value at 35 y of age. These mean BMI values were used to identify the subjects who were overweight (BMI ≥ 25) or obese (BMI ≥ 30) at 35 y of age. Using logistic regression, the authors then constructed curves for predicting the likelihood of overweight or obesity in children and adolescents between 3 and 20 y of age who were at the 75th, 85th, or 95th BMI percentiles. The risk of adult overweight or obesity increased with higher childhood and adolescent BMI values and with increasing age. At the 95th percentile, for example, the probability of adult obesity for young females was 40–59.9% from 5 to 12 y of age and ≥60% thereafter. For young males, the probability of adult obesity was 20–39.9% from 4 to 12 y of age and ≥60% thereafter. With the increasing epidemic of obesity in the world (2–4), the ability to identify individuals at an early age who are at a high risk of obesity is particularly important because it may allow the implementation of preventive strategies. The article by Guo et al provides one approach to this problem.

However, there are some limitations in their study. The first problem is that the children who participated in the Fels Longitudinal Study grew up in the years around World War II when obesity was not the major epidemic that it is now. Thus, their data may underestimate the risk of becoming obese later in life. The BMI-age relations they calculated may underestimate or overestimate this risk. Only additional data will answer this question. A second problem is that all of the children in the Fels Longitudinal Study were white. However, the current epidemic afflicts ethnic minorities in the United States more than it does whites (4). Thus, the data from this study may not provide us with predictive insights for the groups for whom they are most badly needed.

Although obesity has important genetic and familial components, environmental factors are probably the predominant factors in the current epidemic. If so, the identification of children at high risk of obesity is particularly important. In addition to the approach provided by Guo et al, the weight status of the parents can be used. Children from families in which one or both parents are overweight have a substantially higher risk of becoming obese than do children whose parents are not overweight. Identification of such families can provide an additional tool for predicting the future risk of obesity (5). Identifying the age at which adiposity rebound occurs is another potential tool for identifying children at risk of obesity. In this technique, a child's BMI is tracked over the first years of life. During the years before 5 y of age, BMI values decrease because children grow in length faster than their weight increases. Somewhere between 5 and 7 y of age, this decrease ends and BMI begins to increase. Adiposity rebound is defined as the age at which this inflection or turning point occurs in the BMI-for-age curve. The earlier the age of adiposity rebound, the more likely is the individual to be overweight in early adulthood (6). Infants of mothers who develop gestational diabetes constitute another group with a higher-than-normal risk of developing obesity later in life. In the Pima Indian Study (7) and in the Study of Gestational Diabetics conducted by Northwestern University (8), children whose mothers had gestational diabetes had a higher risk of obesity later in life than did children whose mothers did not have the disease. A final useful technique is to determine whether the mother smoked during pregnancy (9). Although smoking is associated with smaller birth weights, as the years pass into adolescence, the children of women who smoked during pregnancy have a significantly higher odds ratio of becoming overweight. Evaluating children for all of these risk factors may provide a strategy for identifying those at risk and for offering intervention when evidence of early obesity occurs.

Identifiying groups with a high risk of becoming obese is important to prevent the progression of obesity and its attendant health risks, which appear even in children (10). It is occasionally possible to identify persons at birth who have a high risk of becoming obese adults (11). Thus, at birth, most of those who will become overweight as adults can be classified as being preoverweight (ie, those who have a BMI < 25 but who will become overweight or obese) or preobese (ie, those who have a normal weight or are overweight but who will become obese). As the data of Guo et al and those from the other studies noted here show, there is a steady conversion of preoverweight individuals into those who are overweight or obese, with a corresponding reduction in the number remaining who are preoverweight or preobese. Approximately one-third of those who eventually become either overweight or obese do so during the first 20 y of life, whereas the remaining two-thirds do so after 20 y of age. The earlier we can identify

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those at risk of conversion from the preobese state to obesity, the earlier we can implement preventive or early therapeutic strategies to keep the problem from becoming worse. The recent finding that even modest weight reduction can prevent or delay the onset of diabetes in high-risk individuals (12), as well as the rising prevalence of type 2 diabetes among adolescents, suggests that such early identification is most important. Although the findings of Guo et al are limited because of the population studied, we can be grateful to them for providing an update to their predictive equation that can be used as part of the strategy for evaluating the risk of obesity in childhood.

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