

Assessment, Prevention and Treatment of Childhood Obesity

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Learning Objectives

After reading this *CME Bulletin*, you should be able to:

- Place patients ages 2 to 19 years into appropriate diagnostic categories based on body mass index percentile.
- Recognize obesity-risk behaviors and potential consequences of overweight and obesity among children.
- Discuss weight management and obesity prevention strategies with patients and their families; connect patients and their families to community resources for managing their weight; and motivate patients to make healthy lifestyle choices.
- Implement a practical, stepwise approach to treating childhood overweight and obesity in a busy primary care setting.

Introduction

Childhood obesity is increasingly common in the United States. Obesity rates among children and adolescents have more than doubled in the past 25 years. Data from the National Health and Nutrition Examination Survey (NHANES) indicate the overall prevalence of obesity among those 2 to 19 years of age was 13.9 percent in 1999-2000, 15.4 percent in 2001-2002, and 17.1 percent in 2003-2004.^{1,2} The most recent NHANES study reports an overall obesity prevalence of 15.5 percent among those 2 to 19 years of age in 2005-2006,³ which indicates that rates may be stabilizing rather than decreasing.

Untreated overweight and obesity in childhood is likely to persist into adulthood,^{4,5} and obesity carries well-documented physical and psychological consequences in both the short and long term.⁵ Family physicians are well positioned to help young patients and their families achieve and maintain a healthy weight. Successful prevention and treatment of childhood obesity is essential for good health throughout life.

Definitions

Overweight and obesity are generally defined by an individual's weight in relation to height. Absolute body mass index (BMI) alone is not a good measure of weight status for children because it does not account for changes in growth and adiposity related to normal maturation. Instead, age- and gender-adjusted BMI percentiles, which are based on representative samples collected over a 30-year period, are used.

BMI in children is calculated as follows: $BMI = \text{weight (lb)}/\text{height (in)}^2 \times 703$.⁶ BMI percentile can be calculated by plotting a patient's BMI on age- and gender-specific growth charts developed by the Centers for Disease Control and Prevention (CDC), (<http://www.cdc.gov/growthcharts>), or by using an online BMI percentile calculator (<http://apps.nccd.cdc.gov/dnpabmi/calculator.aspx>). Patients are then classified as underweight, healthy weight, overweight or obese.

Until recently, use of the term *obese* to describe children was discouraged to prevent stigmatization. In 2005, to highlight the urgency and severity of childhood obesity, the Institute of Medicine changed its definition of children whose BMI is at or above the 95th percentile from *overweight* to *obese*.⁵ In 2007, an American Medical Association (AMA)-led expert committee proposed revising the terminology as shown in *Table 1*. The committee recommended that physicians offset negative connotations of the term *obese* through supportive demeanor and language during office visits.⁴

BMI is an indirect measurement of adiposity, therefore, it is important that physicians maintain clinical judgment when classifying patients according to BMI percentile.⁴ For example, a child who is very athletic may have a high BMI because of increased muscle mass. Other methods for estimating body composition in children, such as measuring waist circumference and triceps fatfold thickness, are being researched but are not yet recommended.⁵

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Causes and Consequences

Although genetics play a role in predisposing children to obesity, the recent increase in prevalence of childhood obesity is too rapid to suggest a significant genetic shift. Instead, the increase is believed to result from changes in behavior and environment.⁴ Factors such as increased sedentary time, decreased physical activity and an

Table 1. Child BMI Percentile Classifications

| BMI Category | CDC Classification | Recommended Classification |
|------------------------|-----------------------|----------------------------|
| <5th percentile | Underweight | Underweight |
| 5th - 84th percentile | Healthy weight | Healthy weight |
| 85th - 94th percentile | At risk of overweight | Overweight |
| ≥95th percentile | Overweight | Obese |

BMI = Body mass index

CDC = Centers for Disease Control and Prevention

Information from Barlow SE. Expert Committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*. 2007;120(4):S164-92.



Assessment, Prevention and Treatment of Childhood Obesity (Continued from front page)

abundance of energy-dense, low-quality food are thought to encourage weight gain in children.^{4,6}

Obesity during adolescence is a particularly strong predictor of adult obesity, with up to 80 percent of obese adolescents becoming obese adults.⁷ Longitudinal studies have also noted a higher rate of several disorders, including diabetes and heart disease, among adults who were obese in adolescence.^{5,7}

Childhood obesity can have both physical and psychological effects, some long-lasting. The medical consequences are well known and include potential pulmonary, endocrine, gastrointestinal, hepatic, reproductive and cardiovascular disorders.⁴ The psychosocial effects of childhood overweight and obesity can be harder to recognize and discuss but can be just as serious⁴ and may play a role in decreased activity and unhealthy eating, thus perpetuating obesity.

Assessment

The AMA expert committee recommends that physicians perform a yearly assessment of weight status for all of their child patients. The assessment should include calculation of height, weight and BMI percentile, as well as an evaluation of medical and behavioral risks for obesity. Adding BMI percentile growth charts and percentile classification to patient charts can help to ensure that all patients are screened annually.⁴ A pediatric weight-management flowchart that can be used to assess weight in the primary care setting is available online at <http://www.aafp.org/cmebulletin/childhoodobesity>.

A thorough review of systems and a physical exam may reveal signs and symptoms of obesity-related illnesses such as disordered sleep, shortness of breath, vague abdominal discomfort, joint pain, and menstrual irregularities in teenage girls.⁵

Patients who have obese parents are at increased risk for obesity that persists into adulthood; a family history of obesity-related medical conditions, such as type 2 diabetes, cardiovascular disease and insulin resistance, can also be predictive.⁴ Obesity affects certain racial and ethnic groups disproportionately. For example, obesity rates are higher among black girls, Mexican American boys, and Native American and Asian American youths.⁴

Fat distribution and proportion of lean and fat body mass change as an individual grows. Abnormal growth patterns during certain developmental periods may affect BMI later in life. Both low birth weight and rapid weight gain during infancy may be associated with obesity in adulthood.⁷ Paying attention to changes in patients' growth patterns over time can help to identify normal-weight patients who begin to gain weight faster than they gain height.

Laboratory assessment may be appropriate for some pediatric patients. A fasting lipid profile is recommended for overweight patients who have no additional risk factors. For patients who are overweight and have additional risk factors, assessment of aspartate aminotransferase (AFT), alanine aminotransferase (ALT) and fasting glucose levels is recommended in addition to a fasting lipid profile. Assessment of fasting lipid levels, AFT, ALT and fasting glucose levels is also recommended for all obese patients,⁵ as is assessment of blood urea nitrogen (BUN) and creatinine levels, which can help to detect impaired renal function resulting from long-standing diabetes or hypertension.⁸

Assessment of a patient's dietary and physical activity habits can provide insight into behaviors that promote weight gain and are modifiable. *Table 2* lists several tools that may help trigger discussion among patients, families and physicians and provide a clear picture of a patient's lifestyle and habits.

Prevention and Treatment

Physicians should offer counseling to all children about behaviors that can prevent excessive weight gain. The earlier that efforts to prevent or manage obesity are initiated, the easier the task is for physicians, parents and patients.⁴ For a child who has a BMI percentile in the healthy weight range, the goal is to stay in the same BMI percentile throughout life. For an overweight or obese child, treatment goals include achievement and maintenance of a lower BMI percentile through healthy lifestyle habits, as well as improvement of emotional health.⁴

Educating parents is the first step to help young patients achieve these goals; studies have shown that parents influence their children's dietary preferences and attitudes toward physical activity and are strong role models for children. Children tend to like the foods they see their parents enjoying and to emulate their parents' general eating habits. Further, a child whose parents are sedentary will tend to be sedentary as well, whereas active parents have been observed to have active children.^{6,9} Parents may inadvertently use food as a reward or punishment, to assuage their guilt for being absent, as an expression of love, or as a substitute for other goods or activities, all of which may influence their children's attitudes toward food. Ideal body images vary between cultures, and lifestyle habits can be influenced by these values as well.⁴

Preventive interventions based on educating patients and their parents may be effective both for patients without any apparent risk factors and for those who are overweight or obese.¹⁰ In most cases, randomized, controlled, intervention studies have not yet been conducted to determine the effects of particular behaviors on weight management in obese children. The AMA expert committee issued healthy lifestyle recommendations to prevent and treat childhood obesity based on a review of the available evidence and clinical experience.⁴ *Table 3* provides a summary of the expert committee's recommendations and strategies to help families follow these recommendations, which physicians can share with children and their parents.

Staged Treatment Approach

For overweight and obese patients, the AMA expert committee proposes a multidisciplinary, stepwise approach that divides treatment into four stages, each of which involves more members of the health care team, more extreme measures, and more frequent monitoring.

Table 2. Obesity Assessment Tools

Tools already in use:

The Rapid Eating and Activity Assessment for Patients (REAP) is available online at <http://bms.brown.edu/nutrition/acrobat/REAP%206.pdf>. An accompanying physician interpretation tool is available online at <http://bms.brown.edu/nutrition/acrobat/rapmdkey.pdf>.

The Weight, Activity, Variety and Excess (WAVE) assessment is available online at <http://bms.brown.edu/nutrition/acrobat/wave.pdf>.

Tools in development:

The Lifestyle Log, in pilot-testing at the Venice Family Clinic Simms/Mann Health and Wellness Center in California, is available online at http://www.venicefamilyclinic.org/pdf/lifestyle_log_9_13_07.pdf.

The Big Five, in pilot-testing at several clinics in Pennsylvania, is available online at <http://www.aafp.org/aafp/20080701/56.html> (AAFP membership or journal subscription ID required to access).

Information from Barlow SE. Expert Committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*. 2007;120(4):S164-92; Gans KM, Ross E, Barner CW, et al. REAP and WAVE: new tools to rapidly assess/discuss nutrition with patients. *J Nutr*. 2003;133:556S-62S; Slusser WM. Commentary: family physicians and the childhood obesity epidemic. *Am Fam Physician*. 2008;78:34-5.

Table 3. Healthy Lifestyle Recommendations and Strategies for Success**Eat a nutritious breakfast every day.** (CE)

Eating breakfast may reduce snacking and fat intake during the rest of the day. Get up a little earlier so that you will have time to prepare and eat breakfast. Offer fruits first, then whole grains. Don't buy cereals that have added sugar (it's okay to add fruit or a little sugar to cereal).

Eat fewer foods that are high in fat and calories. (S)

Give overweight and obese children lowfat milk after age 1 and nonfat milk after age 2. Lowfat and nonfat milk have a little more calcium per cup than does whole milk.

Foods with high water content, such as soups, fruits and vegetables, tend to have fewer calories per unit and can make children feel satisfied without adding unnecessary calories and fat to the diet.

Drink less 100-percent fruit juice. While fruit juice contains many important nutrients, it is also high in calories. Drinking too much fruit juice may contribute to weight gain.

Plan healthy snacks and meals. (CE)

Eating regular, healthy meals and snacks is key to a healthy lifestyle. Plan ahead and make fruit or raw mixed nuts available for snacking (but do not give nuts to children under 4 years of age because they may choke). Eat meals as a family, and don't eat while watching television.

Minimize sugar-sweetened beverages. (CE)

Drinking too many sugar-sweetened beverages, such as soda or juice drinks, can contribute to weight gain. For example, drinking one soda each day adds enough extra calories to result in a 10-pound weight gain each year.

Water is the most important nutrient. Pack water instead of juice boxes for lunches, sports or travel.

Limit meals away from home. (CE)

The more meals you eat at home, the more fruits and vegetables (and the less soda) you will consume. Eating out at fast food restaurants has been linked to obesity in children. Plan ahead. Prepare meals over the weekend that can be reheated during the week when you have less time.

Learn how to prepare your favorite foods with more healthful ingredients.*

Cook with your children and have them help clean up after meals.

Don't eat in front of the television. To make mealtimes fun, have a collection of conversation-starting questions on hand.

Serve appropriate portion sizes. (CE)

Portion sizes are different for people of different genders and sizes. See <http://www.mypyramid.gov> for portion sizes adjusted for age, gender, weight and height.

Your fist is approximately the size of one portion of vegetables, fruit or pasta for you.

Your palm is about the right size portion of protein for you.

Limit screen time (combined time spent watching television, playing video games and using the computer) to less than 2 hours a day for children over age 2, and to none for children under age 2. (CE)

Time spent watching television, playing video games and using the computer can decrease the amount of time spent on physical activity.

Remove television sets from children's bedrooms.

Set a timer to sound when your child's screen time is up.

Choose what shows to watch as a family, and shut the television off when your show is over.

Increase active time for children and families to at least 60 minutes each day. (ME)

Incorporate exercise into your daily routine by walking to school, taking the stairs or finding ways to move for fun (dancing, jumping rope, playing active games).

Advocate for quality physical education in your school.

Organize active play dates with friends.

* Physicians should recognize that families from different cultures may need help learning to prepare traditional foods in a more healthful way and direct them to appropriate resources.

The recommendations above were based on a review of current evidence and clinical experience. Many of the studies reviewed were correlational, rather than interventional, and evidence is stronger in some areas than in others. The evidence rating is as follows:

CE = Consistent evidence; multiple studies generally show consistent association between this behavior and either obesity risk or energy balance.

ME = Mixed evidence; some studies demonstrated evidence for weight or energy balance benefit while others did not show significant associations, or studies were either few in number or small in size.

S = Suggested based on available data and expertise; the American Medical Association (AMA)-led expert committee suggests this behavior could support the achievement or maintenance of a healthy weight.

Information from Barlow, SE. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*. 2007;120(4):S164-92.

The stages should be attempted in order and with desired weight-management goals, as summarized in *Table 4*, in mind. If goals for a stage are not reached after three to six months, the patient can be moved to the next stage.^{4,11} The specifics of the approach should be individualized for each patient, as what works for one patient and family may be ineffective for another.

Stage 1: Prevention Plus: In the first stage, the family physician focuses on counseling patients about healthy eating and physical activity to reduce BMI for overweight or obesity, and to maintain BMI for those at normal weight. Follow-up visits should be scheduled according to each family's needs.

Stage 2: Structured Weight Management: In the second stage, the family physician prepares a more structured diet and physical activity plan for patients. Targeted behavioral interventions instituted in the first stage may remain unchanged, but the level of support increases. Logs may be used to monitor patient adherence to the plan. More frequent monitoring of weight-management goals, such as in a monthly follow-up assessment, is important to ensure that goals are met. The family physician may enlist support, such as the expertise of a dietitian, in this stage of treatment.

Stage 3: Comprehensive Multidisciplinary Intervention and Stage 4: Tertiary Care Intervention: The final two recommended stages of obesity treatment are delivered by multidisciplinary teams with expertise in childhood obesity, including a behavioral counselor, a registered dietician and/or an exercise specialist. Some primary care offices may offer such interventions, but a pediatric weight-management center is more likely to offer them. These more intensive stages are appropriate for patients who have failed to achieve desired weight-management goals in stages 1 and 2. Stage 3 includes strong parental involvement and a structured behavior-modification program. Stage 4 may include very-low-calorie diets and the use of medications or bariatric surgery in adolescent patients.⁴ When referring patients for stage 3 and stage 4 treatment, family physicians should continue to be involved in the effort to monitor success or failure, to monitor obesity-related diseases, and to provide support in the form of encouragement and reinforcement of behaviors taught in the weight-management program.

Counseling: The Key Component of Management

Counseling is the primary component of any weight-management program. The physician should adopt an approach that focuses on

Table 4. Weight-management Goals by Age and BMI Category

| Age | BMI Category | Weight-management Goal |
|----------------|--|---|
| 2 to 5 years | 85 th – 94 th percentile | Weight maintenance or slowing of weight gain |
| | >95 th percentile | Weight maintenance until BMI <85 th percentile; if weight loss occurs, not to exceed 1 pound/month |
| 6 to 11 years | 85 th – 94 th percentile | Weight maintenance or slowing of weight gain |
| | 95 th – 99 th percentile | Weight maintenance until BMI <85 th percentile or gradual weight loss, not to exceed 1 pound/month |
| | >99 th percentile | Weight loss not to exceed 2 pounds/week |
| 12 to 18 years | 85 th – 94 th percentile | Weight maintenance until BMI <85 th percentile or slowing of weight gain |
| | 95 th – 99 th percentile | Weight loss until BMI <85 th percentile, not to exceed 2 pounds/week |
| | >99 th percentile | Weight loss not to exceed 2 pounds/week |

Information from Barlow SE. Expert Committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. *Pediatrics*. 2007;120(4):S164-92.

achieving and maintaining overall good health and well-being, rather than on weight issues alone.⁹ The first step is to identify and overcome barriers to change. Parents may be reluctant to admit there is a problem (e.g., “This is just baby fat; it will go away as she gets older”). Alternatively, they may acknowledge a problem but not yet be ready to institute changes. It is important to ascertain at what phase of the “readiness to change” continuum patients and their families are (for a brief review of this continuum, see <http://www.aafp.org/afp/20000301/1409.html>).⁵

Motivational interviewing is a technique that physicians can use to elicit patients’ and parents’ readiness to change their lifestyle habits to prevent or correct overweight and obesity. It is a patient-centered, nonjudgmental style of questioning and listening that can reveal patients’ and parents’ beliefs and concerns and help the physician formulate an approach that will be congruent with those values.^{4,12} Motivational interviewing is useful for uncovering potential barriers to change (e.g., does a mother feel

that a child who rejects excess food is rejecting her, or that withholding excess food will appear to be punishing her child?) and potential motivators for change, such as a child’s desire to play on a sports team at school.⁵ To begin a motivational interview, a physician might ask the patient and/or parent:

- How do you feel about your health? About nutrition? About exercise?
- What do you think you could do to improve your health?

Some patients and families who are struggling to make healthy lifestyle changes may benefit from talking to a counselor about parenting skills, resolving family conflicts, or providing motivation related to weight-management.⁴

Fostering Change

Involving the patient’s entire household in the effort to prevent or correct overweight and obesity is essential for success.⁷ Although education and information are the cornerstone of any intervention, the physician also should provide tools and strategies to help families incorporate healthy lifestyle habits, such as those listed in *Table 3*.¹³ The motivation to make and sustain changes will be stronger if the focus is on actions that are considered “doable” for parents and enjoyable for children, with weight loss as a salutary side effect.⁵


A healthful diet consists primarily of fruits and vegetables, whole grains, low- and nonfat dairy products, legumes, fish, and lean poultry and meat, with vegetable oil as the main source of fat. Following such a diet naturally displaces unhealthy foods, thereby reducing intake of saturated and trans fats, excess cholesterol, and excess sugar and salt.¹⁴ Increasing a child’s consumption of fruits and vegetables, which have low energy density and are high in fiber, may reduce the child’s intake of other foods that are more likely to cause weight gain.¹⁵ Parents should persist in offering fruits and vegetables to their children, as it may take several attempts before a child accepts a food that he or she initially rejects, especially vegetables. Parents should also keep in mind that portion sizes should be age appropriate. For example, a “fist-sized” portion of food for a child should be the size of the child’s fist, not the parent’s fist.

Increasing physical activity and decreasing sedentary behavior are important interventions for reducing the prevalence of overweight and obesity in children. Teaching children enjoyable ways to be active and helping them incorporate physical activity into daily routines may be a more successful motivation technique than simply teaching them why it is important to be physically active.¹⁶ Family physicians can provide programs to promote physical activity and help connect patients to already existing programs in the community. Providing enjoyable and useful tools can empower physicians to discuss change with patients and their families, and the tools provided can be shared by children with their families and friends.

Excess sedentary time, particularly television viewing, has been identified as an independent risk factor for obesity regardless of the amount of vigorous physical activity. During a child’s formative period, he or she is at risk of developing strong television-viewing habits and not developing similarly strong physical activity routines.

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Encouraging reduced television watching can help prevent obesity, not only by reducing sedentary time, but also by encouraging devotion of more time to physical activity.^{11,15}

When All Else Fails

More extreme interventions should be considered only for patients who have tried to lose weight and have been unsuccessful with behavioral modification. In addition, they should be used to augment rather than to replace diet and physical activity interventions.

Two drugs are approved for use in pediatric obesity. Sibutramine (Meridia) is a nonselective reuptake inhibitor that blocks serotonin, norepinephrine and dopamine. It is an appetite suppressant approved in the United States for use in patients at least 16 years of age for a treatment period of up to 2 years. The most significant adverse effect of sibutramine is vasoconstriction, which can elevate blood pressure level and heart rate even after weight loss and limits its use in obese patients who have hypertension. Two short-term, small studies showed sibutramine plus behavioral therapy to be more effective than behavioral therapy alone, but investigators in both studies called for more research into the long-term safety and efficacy of sibutramine in adolescents.¹¹ Orlistat (Alli, Xenical), approved for patients at least 12 years of age, inhibits lipase, which prevents fatty-acid absorption. Its primary adverse effects are flatulence and cramping, as well as oily feces. It has been shown to have some effect on BMI, but its adverse effects and dosing restrictions (it must be taken with every meal) limit its utility for children.^{4, 11}

Data are limited regarding bariatric surgery (bypass or gastric banding) for obese pediatric patients, but some centers have begun to offer these surgeries to adolescents based on success with adult patients.¹¹

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Disclosure Statements: Dr. Slusser, Dr. Rao, Ms. Stendardo and Ms. Watkins have returned disclosure forms indicating that they have no financial interest in or affiliation with any commercial supporter or providers of any commercial services discussed in this educational material.

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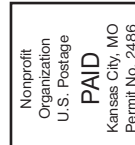
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Self-Assessment Quiz

- Which one of the following statements regarding childhood obesity is true?
 - It has increased steadily from 1999 to 2006.
 - Genetics alone causes obesity in children and adolescents.
 - Children who have obese parents are at increased risk for obesity that persists into adulthood.
 - Preventive interventions based on educating parents have not been shown to be effective in the prevention of childhood obesity.
- True or false: Up to 80 percent of obese adolescents become obese adults.
 - True
 - False
- Which one of the following is a preventive lifestyle recommendation for pediatric patients?
 - Limit meals away from home.
 - Drink more 100-percent juice.
 - Limit screen time (combined time spent watching television, playing video games and using the computer) to less than 2 hours a day for children younger than 2 years of age.
 - Increase active time for children and families to at least 30 minutes each day.
- Which one of the following statements is an accurate description of motivational interviewing?
 - It is intended to convince patients and their parents to embark on a weight-loss program.
 - Although it helps physicians to evaluate patients' and families' readiness to change, it is not useful for uncovering the potential barriers to lifestyle changes to prevent or correct overweight or obesity.
 - It can reveal patients' and families' beliefs and concerns, and help the physician to formulate an approach that will be congruent with those values.
 - It is a type of counseling intended to improve parenting skills and resolve family conflicts that may be a factor in childhood and adolescence obesity.
- Which one of the following statements regarding the Structured Weight Management stage of childhood obesity treatment is true?
 - Family physicians manage it alone.
 - Family physicians may choose to use the support and expertise of a specialist, such as a dietitian, to manage it.
 - It is managed in a dedicated weight management center.
 - It involves such measures as bariatric surgery or very-low-calorie diets.

Answers: 1. C; 2. A; 3. A; 4. C; 5. B

CME Bulletin Self-Assessment Quiz Answer Sheet

Answers (Please circle one):

- A B C D
- A B
- A B C D
- A B C D
- A B C D

Note: On this scale, 5 is the highest rating, 1 is the lowest.

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|------------------------------------|---|---|---|---|---|
| Relevance of topic to my practice | 5 | 4 | 3 | 2 | 1 |
| Currency of clinical information | 5 | 4 | 3 | 2 | 1 |
| Usefulness of clinical information | 5 | 4 | 3 | 2 | 1 |
| Overall rating | 5 | 4 | 3 | 2 | 1 |

AAFP Member ID# (Please Print)

Name

Address

City, State, Zip

Signature

Specialty

Date

Directions for Obtaining CME Credit Online (AAFP Members only):

Log on to the AAFP Web site at <http://www.aafp.org/cmebulletin>. Follow the online instructions to complete the quiz and evaluation, and indicate the credit you are reporting. Your credit will be posted automatically to your CME record.

Directions for Obtaining CME Credit by Mail or Fax:

Nonmembers wishing to claim CME credit for this activity should follow the directions above and return the Answer Sheet to the AAFP.

Please retain a photocopy of this *CME Bulletin*/Self-Assessment Quiz Answer Sheet as proof of participation in this activity.