Understanding the obesity epidemic: what does the lab need to know?

Body

CONTINUING EDUCATION

[ILLUSTRATION OMITTED]

To earn CEUs, see test on page 18.

LEARNING OBJECTIVES

1. Describe the prevalence of obesity and overweight in the United States.

2. List a number of diseases associated with excess body weight, and indicate the age groups most affected.

3. Describe effective interventions used to maintain a healthy body weight or to treat obesity.

4. Describe public health strategies to treat the obesity epidemic.

Obesity is a significant public health concern in the United States its prevalence, sequelae, and costs will soon exceed that for cigarette smoking. Development and implementation of a multidimensional, interdisciplinary approach to treat this epidemic is critical. Healthy People 2010, a program operated out of the Office of Disease Prevention and Health Promotion under the auspices of the U.S. Department of Health and Human Services, has set a goal for the year 2010 of 60% of adults achieving and maintaining a healthy weight yet, currently, only 33% of the U.S. population is classified at a healthy weight.

The obesity epidemic will significantly affect the clinical laboratory in terms of increased testing for associated chronic diseases. Glucose tests, lipid evaluations, cardiac evaluations, and other routine procedures performed to evaluate health status and specific disease treatment for these individuals will increase without changing the disease screening protocol due to the current prevalence of obesity in adults and children. The incidence of obesity-related chronic diseases will increase over the next 10 to 20 years when they are diagnosed among the "baby boomers" reaching middle and old age.

Obesity can be diagnosed easily using body mass index (BMI), calculated as weight in kilograms divided by the square of height in meters. Classifications range from underweight (BMI <18.5) and normal (BMI 18.5 to 25) to overweight (BMI 25.1 to 29.9) and obese BMI[greater than or equal to]30. The latter category has been subdivided by some researchers into obesity (BMI 30 to 40) and extreme obesity (BMI >40). Others have classified obesity into Class 1 (BMI 30 to 34.9), Class 2 (BMI 35 to 39.9), and Class 3 (BMI[greater than or equal to]40).

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While BMI is an effective assessment of excess weight, measurements such as waist circumference, hip circumference, and waist-to-hip ratios are also important in identifying fat distribution because the location of excess fat has been linked to increased risk for heart disease and diabetes.

Risk factor for chronic disease

Obesity is a risk factor for type 2 diabetes, hypertension, gallbladder disease, and osteoarthritis--all of which lead to increases in the overall burden of disease in the population, consume more healthcare dollars, decrease productivity in the workplace, reduce quality of life, and increase mortality. High blood pressure is the most common overweight- and obesity-related condition. The risk of these various conditions increases as weight increases. For type 2 diabetes, gallbladder disease, and high blood pressure, the increase in prevalence is more substantial for individuals younger than 55. (1)

It is almost inevitable that an individual who is severely obesewill develop a significant chronic disease. Those with BMIs of[greater than or equal to]40--when compared to normal-weight individuals--are:

* 7.37 times more likely to develop type 2 diabetes

* 6.38 times more likely to develop high blood pressure

* 1.88 times more likely to develop high cholesterol levels

* 2.72 times more likely to develop asthma,

* 4.41 times more likely to develop arthritis, and

* 4.19 times more likely to make a self-report/perception of fair or poor general health. (2)

Measuring quality of life

Instruments for measuring health-related quality of life--such as the SF-36 (short form health survey) and the HSQ-12 (health status questionnaire) for overall general health and for specific medical conditions like diabetes and arthritis--are valuable tools for evaluating patients' perspectives of their health as it affects components of their lives. Both the SF-36 and the HSQ-12 evaluate eight domains with respect to health: health perception, physical functioning, role limitations due to physical health, bodily pain, energy/fatigue, social functioning, role limitations due to emotional problems, and mental health.

BMI in middle age is related to specific aspects of quality-of-life measures for individuals after reaching 65 years of age. In a study of 6,766 men and women who were followed for 26 years and who completed the HSQ-12, normal-weight individuals had better scores scores worsened as BMIs increased. These inverse associations were stronger for physical functioning than for mental health or social well-being. Higher proportions of men and women who had BMIs <25 in middle age reported their health to be excellent or good when they reached 65 compared to those who were overweight or obese in middle age. (3)

Mortality

Obesity-related causes of mortality are second to those of tobacco use, which caused 435,000 (18.2%) deaths in the United States in 2000. (4) At their current rates of increase, obesity and overweight soon may overtake tobacco usage as the leading cause of death in this country. The Centers for Disease Control and Prevention estimated annual deaths due to poor diet and physical activity (i.e., obesity) to be 365,000 (15.2%) in 2000 using published prevalence estimates and relative risks. (4) This represents a significant increase over the 1990 estimate of 280,000 annual deaths due to obesity. (5)

* In the Physician's Health Study -- following a cohort of 85,000 male physicians for five years--men with a BMI of[greater than or equal to]30 had a 70% higher risk of death compared to men of normal BMI (defined in this study as 22.5 to 24.9). (6)

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* Results of the Health Professions Follow-Up Study -- following 51,529 male health professionals for 10 years-- demonstrated that BMI and waist circumference were strongly related to death from cardiovascular disease and coronary heart disease in men younger than 65. In men over 65, waist circumference was strongly related to death due to cardiovascular and coronary heart disease. (7)

* In the Nurses' Health study -- following a cohort of 115,195 female nurses for 15 years--women with a BMI[greater than or equal to]29 were more than twice as likely to die as women with a BMI of[greater than or equal to]19. (8) As BMI increased, mortality due to coronary heart disease (CHD), cardiovascular disease (CVD), and cancer was evident for mildly overweight women--with a stronger association between increasing weight and mortality due to CHD and CVD than to cancer.

Cost of medical care

The United States spends more on healthcare than any other industrialized country, with obesity-related costs a significant component. In 1998, 9% of medical spending was attributable to obesity (5.3%) and overweight (3.7%). (9) The public sector--Medicare and Medicaid--covers almost half of this. Medical spending attributable to obesity increased 27% between 1987 and 2001 22% of the increase was due to diabetes, hyperlipidemia, and heart disease. (10) Considering the cost to treat hypertension, hypercholesterolemia, type 2 diabetes, CHD, and stroke, overweight increases expected lifetime medical costs by 20%, Class 1 obesity increases these costs by 50%, and Class 2 obesity nearly doubles them. (11)

Prevalence in adults

The prevalence of overweight and obesity has increased significantly over the last 45 years. From 1999 to 2002, the obesity rate was 30.4% compared to 13.4% from 1960 to 1962. (12, 13) A recent study from 1999 to 2002 identified a combined prevalence of 65.1% for overweight and obese, 30.4% for obese, and 4.9% for extremely obese.

Obesity was more prevalent in women of color for all age groups. In the adult population, non-Hispanic black women had the highest level of extreme obesity (13.5%) compared to Mexican-American women (5.7%) and non-Hispanic white women (5.5%).

Of particular concern is the increase in prevalence of extreme or Class 3 obesity. Between 1990 and 2000, Class 3 obesity increased from 0.78% to 2.2%. (14) It was highest among black women (6%) and individuals who had not completed high school (3.4%), and the prevalence was twice as high among short individuals. The prevalence of Class 3 obesity is increasing twice as fast as that of obesity.

From 1986 to 2000, the number of adults with a BMI of[greater than or equal to]30 increased from one in 10 to one in five. During that same time period, the number of adults with a BMI of[greater than or equal to]40 increased from one in 200 to one in 50, and the number of adults with a BMI of[greater than or equal to]50 increased from one in 2,000 to one in 400. (15)

Epidemic among children

The obesity epidemic exploded in the 1990s for children, and children of color were particularly affected. Beginning at age 6, non-Hispanic blacks have a higher prevalence of obesity compared to non-Hispanic whites. The prevalence of overweight 12- to 19-year-olds increased from 10.5% in a 1988 to 1994 study to 15.5% in a 1999 to 2000 study (16) 11.2% of 12- to 19-year-olds would be classified as obese (BMI[greater than or equal to]30) using the adult definition. In the same time period, the prevalence of overweight almost doubled from 13.4% to 23.6% for non-Hispanic blacks, and from 13.8% to 23.4% for Mexican-Americans. Using the adult definition of obesity (BMI[greater than or equal to]30), 10% of non-Hispanic white females, 20% of non-Hispanic black females, and 16% of Mexican-Americans would be classified as obese. From 1988 to 1994, the prevalence was 7.4%, 13.2%, and 9.2% respectively.

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In 2002, 31% of children between 6 and 19 years old were overweight or at risk for overweight, and 16% were overweight. (12) Overweight in children is described as at or above the 95th percentile of BMI for age at risk for overweight is defined as at or above the 85th percentile, but less then the 95th percentile. From birth to 23 months, 11.4% of all children were overweight, with 10.1% of non-Hispanic whites and 18.5% of non-Hispanic blacks being overweight. (16)

The prevalence of overweight increased as children's ages increased, with percentages of 10.4% for 2- to 5-year-olds, 15.3% for 6- to 11-year-olds, and 15.5% for12- to 19-year-olds. Among 12- to 19-year-olds, 23.6% of non-Hispanic blacks and 23.4% of Mexican-Americans were overweight, compared to 12.7% of non-Hispanic whites.

Prevention

Treatment for overweight and obesity requires those individuals identified in these categories to expend more calories than they consume. While it is a recognizably difficult task to lose weight, and equally difficult to maintain weight loss, Americans do not routinely follow preventive recommendations of reducing calories and increasing physical activity sufficiently to lose weight. From a study in 2000, using self-reported height, weight, and diabetes diagnosis, in which 19.8% of participants were obese, 7.3% were diabetic, and 2.9% were both obese and diabetic, (17) 20.1% of overweight participants and 13.5% of obese participants were not trying to lose or maintain weight.

Among those who were trying to lose or maintain weight, only 17.5% were reducing caloric intake and increasing physical activity. For all participants surveyed, 27% of adults did not engage in any physical activity, and 28.2% were not regularly active. Only 24.4% of participants reported they ate fruits and vegetables at least five times per day.

These data demonstrate that treatment of obesity depends in large part on the individual's willing participation in his own healthcare program and highlights the need for a different emphasis to improve the effectiveness of the treatment protocol.

Therapy: changing childhood behavior

The data for overweight and obese children is troubling since childhood behaviors are difficult to change in adulthood. Preventing childhood obesity and early-onset adult chronic diseases, such as type 2 diabetes, is critical. The public education system provides an opportunity to encourage children to decrease their risk of obesity. One study incorporated lessons into the grade-school curriculum, beginning with student self-reporting of time spent watching television and videos and playing videogames. After abstaining from these activities for 10 days, the students were then advised about selecting seven hours of programming for their weekly television-viewing budget. No replacement activity was introduced for the time without media use.

This intervention group reduced their media viewing by 33% and had statistically significant reductions in BMI, waist circumference, and waist-to-hip ratio, as adjusted for the growth and weight expected in children of this age. (18) This type of program, combined with lessons on nutrition and physical activity--and reinforced with physical fitness opportunities and healthy food choices in the school cafeteria--has the potential to decrease the prevalence of childhood obesity.

Therapy: adult physical activity

Adding an exercise program improves the clinical effects of obesity-related chronic diseases. For any age group, physical fitness is a key component to reducing the sequelae of excess body fat and to reaching and maintaining a healthy weight. Significantly, reduced physical fitness levels are associated with increased coronary artery risk factors, more angiographic coronary artery disease, and increased risk for cardiovascular events in women undergoing coronary angiography. (19)

One recommendation for maintaining healthy weight is participation in 30 minutes of daily exercise (equivalent to brisk walking) in one session or in increments throughout the day. (20) Weight loss for obese women in an 18-month randomized trial was greater for those who had access to home exercise equipment and exercised in short

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incrementsthese women exercised an average of 120 minutes weekly compared to 80 minutes weekly for those without equipment. Significant weight loss was achieved among those exercising more than 200 minutes weekly. Although weight gains generally occur in mid-life, women who increase their activity levels, either through sports, exercise, or daily routine, gain less excess weight. (21) Sustaining weight loss is imperative for treatment success, and positive outcomes are best realized through daily exercise with easily accessible equipment.

Therapy: diet

Increased consumption of dietary fiber is associated with higher HDL (high-density lipoprotein), lower LDL (low-density lipoprotein), and lower fibrinogen, (22) as well as decreases in weight gain, insulin levels, central adiposity, blood pressure, and hypertriglyceridemia. Consumption of specific nutrients appears to facilitate weight loss. For example, calcium, particularly that derived from dairy products, decreases the incidence of insulin resistance syndrome and obesity. (23) In a study of 32 obese individuals who consumed a 500-calorie deficit diet with specified varying amounts of calcium, weight reduction and abdominal fat loss were proportional to the amount of calcium ingested and were greatest (10.9% weight loss and 14% abdominal fat loss) for those individuals who consumed calcium in dairy form. (24)

To be absorbed in appropriate quantities, however, calcium requires vitamin D without adequate vitamin D, the small intestine absorbs only 10% to 15% of dietary calcium. With adequate vitamin D, 30% of calcium is absorbed. Obesity is often associated with a vitamin D deficiency, (25) and obese individuals are considered to be chronically deficient since vitamin D is found in large fat deposits and, consequently, is not readily bioavailable. (26)

A number of popular diets, including Atkins, Ornish, Weight Watchers, and Zone, provide a structured plan for weight loss. In a control trial following 160 obese adults (mean BMI of 35) randomized to one of these four diets for one year, each diet only produced a modest weight loss (mean of 2.1 to 3.3 kg). (27) Sustaining the diet was difficult 67 of the participants (42%) did not complete the one-year study.

The role of the laboratory

Currently, laboratory testing plays a limited role in diagnosing and treating obesity however, because clinical laboratory test results identify the clinical consequences of obesity, hyperglycemia in diabetes, hyperlipidemia, and elevated hs-C-reactive protein in heart disease risk assessment, incorporating these types of tests into protocols based upon an individual's BMI may identify individuals at risk for these diseases at an earlier stage. This epidemic provides the clinical laboratory an opportunity to work with clinicians to develop protocols to identify sequelae of obesity and monitor treatment outcomes.

Instead of following the current recommendations of performing lipid profiles and glucose analyses every five years, physicians could use the BMI score to decide whether to perform more frequent chronic disease testing and to determine whether testing improves the health of these individuals. For example, using a reflexive type of testing protocol, glucose and lipid profiles could be performed biannually for individuals with BMI >25, and annually for those with BMIs of >30. Further testing would be based upon initial test results. No studies have examined the benefit of performing more testing based upon BMI score however, staff or group model types of HMOs (health maintenance organizations) with their self-contained provider and patient populations provide an ideal environment to perform such an evaluation. As part of this evaluation, including cost-benefit analyses is necessary to determine if increased testing improves both identification and, more importantly, treatment outcomes for those at risk for obesity-related chronic diseases.

Identification and understanding of the biochemical manifestations of obesity are in their infancy. As the details of endocrine regulation of energy metabolism are better understood, assessment of hormones such as leptin, ghrelin, adiponectin, and resisting may become more prevalent for identifying individuals with genetic causes of obesity and monitoring weight loss treatments using new drugs developed from this understanding. (28, 29) As technology becomes available, genetic testing for obesity and its sequelae will be added to the clinical laboratory's test menu.

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Although the involvement of other components of society are required to contain the obesity epidemic, clinical laboratories, as providers of objective health data, are in a unique position to participate in its resolution. This is an opportunity to play an important part in this urgent public health concern.

CE test on UNDERSTANDING THE OBESITY EPIDEMIC: WHAT THE LAB NEEDS TO KNOW.

MLO and Northern Illinois University (NIU), DeKalb, IL, are co-sponsors in offering continuing education units (CEUs) for this issue's article on UNDERSTANDING THE OBESITY EPIDEMIC: WHAT THE LAB NEEDS TO KNOW. CEUs or contact hours are granted by the College of Health and Human Sciences at NIU, which has been approved as a provider of continuing education programs in the clinical laboratory sciences by the ASCLS P.A.C.E.[R]program (Provider No. 0001) and by the American Medical Technologists Institute for Education (Provider No. 121019 Registry No. 0061). Approval as a provider of continuing education programs has been granted by the state of Florida (Provider No. JP0000496), and for licensed clinical laboratory scientists and personnel in the state of California (Provider No. 351). Continuing education credits awarded for successful completion of this test are acceptable for the ASCP Board of Registry Continuing Competence Recognition Program. After reading the article on page 12 answer the following test questions and send your completed test form to NIU along with the nominal fee of $20. Readers who pass the test successfully (scoring 70% or higher) will receive a certificate for 1 contact hour of P.A.C.E.[R]credit. Participants should allow four to six weeks for receipt of certificates.

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Learning objectives and CE questions were prepared by Dianne M. Cearlock, PhD, CLS(NCA), MT(ASCP), professor and coordinator, Program in Clinical Laboratory Sciences, College of Health and Human Sciences, Northern Illinois University, DeKalb, IL.

1. Healthy People 2010 targets a goal of % of adults at a healthy weight.

a. 100

b. 70

c. 60

d. 40

2. A Body Mass Index (score) value of indicates obesity.

a. <18.5

b. 18.5 to 25

c. 25.1 to 29.9

d.[greater than or equal to]30

3. The BMI is calculated by

a. multiplying weight (kilograms) by height (meters).

b. dividing weight (pounds) by height (inches).

c. dividing weight (kilograms) by the square of height (meters).

d. dividing the square of weight (kilograms) by height (meters).

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4. Using data collected in 2002, approximately % of all children in the United States between the ages of 6 and 19 years were overweight or at risk for overweight.

a. 5

b. 10

c. 20

d. 30

5. In the United States, extreme obesity (BMI >40) is most prevalent in

a. non-Hispanic white men.

b. non-Hispanic black women.

c. Mexican-American women.

d. non-Hispanic white women.

6. Obesity is a risk factor for

a. type 2 diabetes.

b. hypertension.

c. osteoarthritis.

d. All of the above.

7. The HSQ-12, an instrument used to measure health-related quality of life, evaluates eight domains. Which of the following is NOT evaluated?

a. Health perception

b. Mental health

c. Energy/fatigue

d. Income level

8. In a large study, men and women who completed the HSQ-12 were followed for 26 years. The data indicated that was inversely proportional to BMI.

a. physical functioning

b. mental health

c. social well-being

d. All of the above.

9. Currently, obesity lags somewhat behind as the leading cause of death in the United States.

a. infectious disease

b. accidents

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c. tobacco usage

d. alcoholism

10. Class 1 obesity increases expected lifetime medical costs by

a. 5%.

b. 20%.

c. 50%.

d. 100%.

11. Which of these recommendations for the prevention of obesity was followed by a majority of overweight or obese people who were trying to lose weight?

a. Reduction in daily calorie consumption.

b. Daily consumption of at least five servings of fruits and vegetables.

c. Increase in physical activity through exercise.

d. None of the above.

12. In an obesity intervention study of grade-school-aged children, indicators that the interventions were effective included all but

a. increases in television viewing time.

b. reductions in BMI values.

c. decreased waist circumference.

d. decreased waist-to-hip ratios.

13. Recommendations for maintaining a healthy weight include engaging in a minimum of minutes of exercise on most days.

a. 10

b. 30

c. 60

d. 120

14. In a study of obese women over an 18-month trial, greater weight loss was associated with

a. exercise broken into several time increments.

b. exercise equipment located in the homes of study participants.

c. more minutes of exercise per week.

d. All of the above.

15. Increased consumption of fiber is associated with

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a. increases in weight gain.

b. decreases in insulin levels.

c. increases in blood pressure.

d. decreases in triglyceride levels.

16. A mineral that appears to facilitate weight loss is

a. calcium.

b. potassium.

c. sodium.

d. magnesium.

17. Obesity is frequently associated with deficiencies of

a. vitamin C.

b. niacin.

c. vitamin K.

d. vitamin D.

18. In a trial of 160 obese adults following a structured diet plan for weight loss, % of the participants did NOT complete the one-year study.

a. 7

b. 23

c. 42

d. 6

19. In the future, the role of the clinical laboratory in diagnosing and treating obesity may include

a. routine testing for biomarkers of chronic diseases (e.g., type 2 diabetes).

b. reflex testing based upon BMI status.

c. assessment of genetically inherited risk of obesity.

d. All of the above.

20. Body-weight-related hormones postulated to be markers for the predilection to obesity include all but

a. estrogen.

b. leptin.

c. resistin.

d. ghrelin.

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[GRAPHIC OMITTED]

References:

1. Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity. JAMA. 1999282:1523-1529.

2. Mokdad AH, Ford ES, Bowman BA, et al. Prevalence of obesity, diabetes, and obesity-related health risk factors, 2001. JAMA. 2003289:76-79.

3. Daviglus ML, Liu K, Yan LL, et al. Body mass index in middle age and health-related quality of life in older age: the Chicago Heart Association detection project in industry study. Arch Intern Med. 2003163:2448-2455.

4. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. JAMA. 2004291:1238-1245. and Correction: Actual causes of death in the United States, 2000. JAMA. 2005293:293-294.

5. Allison DB, Fontaine KR, Manson JE, Stevens J, VanItallie TB. Annual deaths attributable to obesity in the United States. JAMA. 1999282:1530-1538.

6. Ajani UA, Lotufo PA, Gaziano JM, et al. Body mass index and mortality among US male physicians. Ann Epidemiol. 200414:731-739.

7. Baik I, Ascherio A, Rimm EB, et al. Adiposity and mortality in men. Am J Epidemiol. 2000152:264-271.

8. Manson JE, Willett WC, Stampfer MJ, et al. Body weight and mortality among women. NEJM. 1995333:677-685.

9. Finkelstein EA, Fiebelkorn IC, Wang G. National medical spending attributable to overweight and obesity: how much, and who's paying? Health Affairs. 14 May 2003W3:219-226.

10. Thorpe KE, Florence CS, Howard DH, Joski P. The impact of obesity on rising medical spending. Health Affairs. 20 October 2004W4:480-486.

11. Thompson D, Edelsberg J, Colditz GA, Bird AP, Oster G. Lifetime health and economic consequences of obesity. Arch Intern Med. 1999159:2177-2183.

12. Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. JAMA. 2004291:2847-2850.

13. Flegal KM, Carroll MD, Ogden CL, Johnson CL. Prevalence and trends in obesity among US adults, 1999-2000. JAMA. 2002288:1723-1727.

14. Freedman DS, Khan LK, Serdula MK, Galuska DA, Dietz WH. Trends and correlates of class 3 obesity in the United States from 1990 through 2000. JAMA. 2002288:1758-1761.

15. Sturm R. Increases in clinically severe obesity in the United States, 1986-2000. Arch Intern Med. 2003163:2146-2148.

16. Ogden CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among US children and adolescents, 1999-2000. JAMA. 2002288:1728-1732.

17. Mokdad AH, Bowman BA, Ford ES, Vinicor F, Marks JS, Koplan JP. The continuing epidemics of obesity and diabetes in the United States. JAMA. 2001286:1195-1200.

18. Robinson TN. Reducing children's television viewing to prevent obesity. A randomized controlled trial. JAMA. 1999282:1561-1567.

19. Wessel TR, Arant CB, Olson MB, et al. Relationship of physical fitness vs body mass index with coronary Artery disease and cardiovascular events in women. JAMA. 2004292:1179-1187.

20. Jakicic JM, Winters C, Lang W, Wing RR. Effects of intermittent exercise and use of home exercise equipment on adherence, weight loss, and fitness in overweight women. A randomized trial. JAMA. 1999282:1554-1560.

21. Sternfeld B, Wang H, Quesenberry CP Jr, et al. Physical activity and changes in weight and waist circumference in midlife women: findings from the study of women's health across the nation. Am J Epidemiol. 2004160:912-922.

22. Ludwig DS, Pereira MA, Kroenke CH, et al. Dietary fiber, weight gain, and cardiovascular disease risk factors in young adults. JAMA. 1999282:1539-1546.

23. Pereira MA, Jacobs DR, Van Horn L, Slattery ML, Kartoshov AI, Ludwig DS. Dairy consumption, obesity, and the insulin resistance syndrome in young adults: the **_CARDIA study_**. JAMA. 2002287:2081-2089.

24. Zemel MB, Miller SL. Dietary calcium and dairy modulation of adiposity and obesity risk. Nutr Rev. 200462:125-131.

25. Parikh SJ, Edelman M, Uwaifo GI, et al. The relationship between obesity and serum 1,25-dihydroxy vitamin D concentrations in healthy adults. J Clin Endocrinol Metab. 200489:1196-1199.

26. Holick MF. Vitamin D: importance in the prevention of cancers, type 1 diabetes, heart disease, and osteoporosis. Am J Clin Nutr. 200479:362-371.

27. Dansinger ML, Gleason JA, Griffith JL, Selker HP, Schaefer EJ. Comparison of the Atkins, Ornish, Weight Watchers, and Zone Diets for weight loss and heart disease risk reduction. A randomized trial. JAMA. 2005293:43-53.

28. Meier U, Gressner AM. Endocrine regulation of energy metabolism: review of pathobiochemical and clinical chemical aspects of leptin, ghrelin, adiponectin, and resistin. Clin Chem. 200450:1511-1525.

29. Bays HE. Current and investigational antiobesity agents and obesity therapeutic treatment targets. Obes Res. 200412:1197-1211.

RELATED ARTICLE

Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel, or ATP III).

The ATP III definition of metabolic syndrome indicates that it is present if the patient has three or more of the following symptoms:

* Waist measuring at least 40 inches (102 cm) for men, 35 inches (88 cm) for women

* Serum triglyceride levels of at least 150 mg/dL (1.69 mmol/L)

* HDL cholesterol levels of less than 40 mg/dL (1.04 mmol/L) in men, less than 50 mg/dL (1.29 mmol/L) in women

* Blood pressure of at least 130/80 mmHg and

* Blood sugar (serum glucose) of at least 110 mg/dL (6.1 mmol/L).

Source: _www.nhlbi.nih.gov/guidelines/cholesterol/atp3rpt.htm_

By Catherine N. Otto, PhD, MBA, CLS(NCA)

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