

Prediabetes: The importance of early diagnosis and intervention

Case Study Series with
Commentary by:

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Case: 50-Year-old male with morbid obesity

Overview

Excess adiposity is epidemic in this country. The Centers for Disease Control and Prevention reported that in 2003-2004, the age-adjusted prevalence of overweight or obese individuals (body mass index [BMI] ≥ 25 kg/m²) was 66.3%.¹ Contributing factors to this healthcare problem include a sedentary lifestyle and poor dietary habits. Low levels of physical activity begin in childhood—the 2007 Youth Risk Behavior Survey found that in 2007, 32% of females and 18% of males in grades 9-12 did not meet recommended physical activity levels—and the proportion only increases with age.¹ In addition, numerous surveys have documented unhealthy dietary habits nationwide.¹ Consequently, the prevalence of this condition is growing (Figure 1). By 2030, an estimated 86% of all US adults will be overweight or obese.¹

Accumulation of excess adipose tissue is now understood to affect multiple metabolic pathways and organ systems, placing individuals at increased risk of developing numerous life-threatening, chronic, and debilitating illnesses. These include cardiovascular disease, type 2 diabetes, hypertension, cancer, and sleep apnea.²

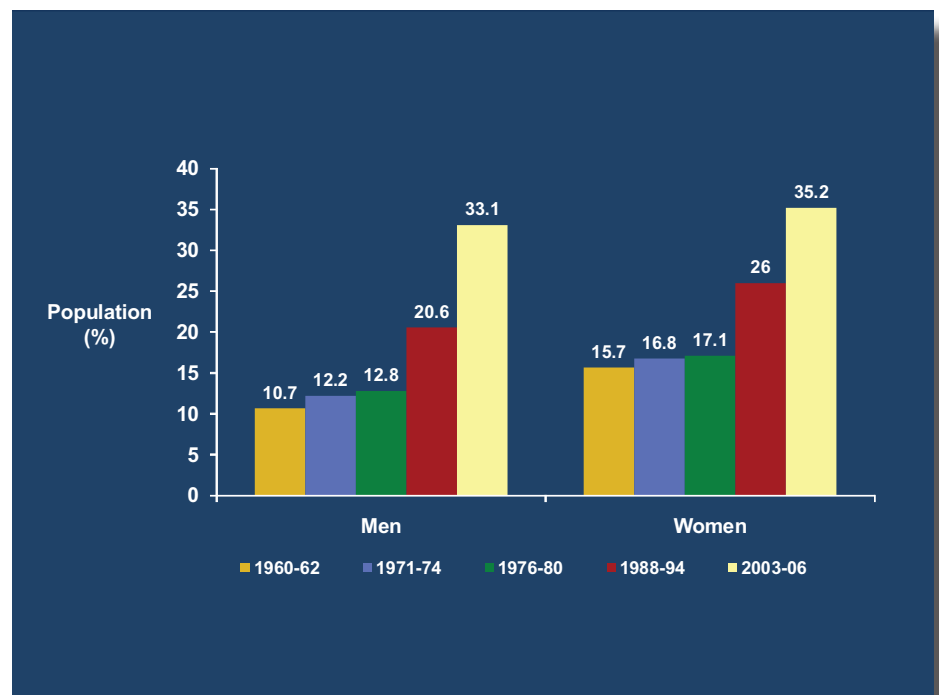


Figure 1. Age-adjusted prevalence of obesity (BMI ≥ 30 kg/m²) in US adults aged 20-74 years.¹

BC is a 50-year-old white male who presented to his primary care physician's office for a routine physical exam. Initial work-up revealed a blood pressure of 130/85 mm Hg and weight of 346 pounds. Otherwise, his physical exam was normal.

His family history was negative for diabetes, coronary artery disease, and hypercholesterolemia, but positive for hypertension and obesity.

His laboratory results were as follows:

- Fasting blood glucose: 119 mg/dL
- Total cholesterol (Total-C): 166 mg/dL
- High-density lipoprotein cholesterol (HDL-C): 40 mg/dL
- Low-density lipoprotein cholesterol (LDL-C): 99 mg/dL
- Triglycerides: 136 mg/dL

Does this patient's glucose level warrant an oral glucose tolerance test?

- a. Yes
- b. No

(b) By definition, this patient has prediabetes or impaired fasting glucose (fasting blood glucose 100-125 mg/dL). While some experts agree that a glycated hemoglobin (A1C) of 6.0% to <6.5% indicates potential risk for prediabetes,³ a PreDx Diabetes Risk Score provides a more comprehensive risk assessment for this patient.⁴

Results of his PreDx test were as follows:

- Fasting glucose: 119 mg/dL
- A1C: 6.1%

- Insulin: 25 μ U/mL
- High-sensitivity C-reactive protein (hsCRP): 10.0 mg/L
- Ferritin: 849 ng/mL
- Interleukin-2 receptor alpha (IL-2RA): 390 U/mL
- Adiponectin: 5.9 μ g/mL

These values correspond to a score of 9.3, indicating a 31.7% risk of developing diabetes within 5 years (Figure 2).

What is your initial intervention for this patient?

- Weight loss
- Glucose lowering
- Lipid-modifying therapy
- Both a and b
- Both a and c
- a, b, and c

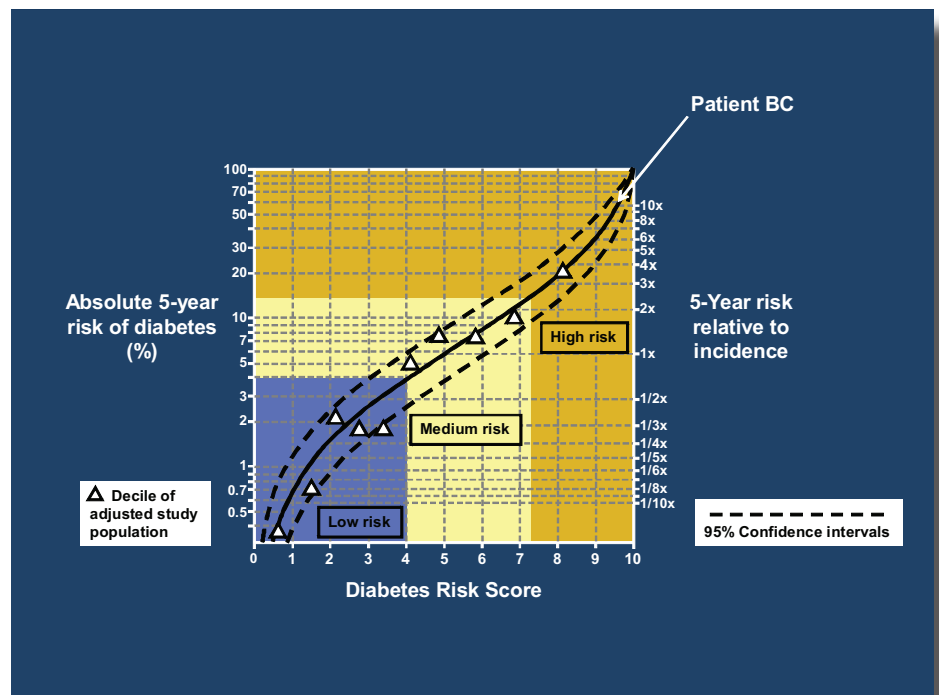


Figure 2. Patient BC's position on the continuum of diabetes risk.

(c) BC's physician chose a strategy of weight loss in combination with lipid-modifying therapy. He prescribed a weight-loss program that included an exercise prescription and dietary counseling. BC enrolled in a local gym and began avoiding starchy foods and eating at fast food restaurants. The physician also started BC on daily fish oil, niacin, and a multivitamin. Many health organizations, including the American Heart Association, recommend daily intake of fish oil for lowering risk of heart disease. BC was also asked to come to his doctor's office for weekly weight checks.

It is very important to inform patients about weight-loss results that may be expected, to avoid unrealistic expectations. The primary target should not be body weight normalization, but rather some level of weight loss. Even a 5%-10% weight loss can lead to substantial improvements in risk factors. Obese individuals with good cardiorespiratory fitness levels have shown reduced cardiovascular mortality risk vs lean subjects with poor fitness levels.²

BC exercised for an average of 120 minutes per week. After 6 months of his lifestyle modification regimen, he had lost a total of 30 pounds, Total-C dropped to 149 mg/dL, LDL-C dropped to 72 mg/dL, HDL-C improved to 53 mg/dL, and triglycerides dropped to 120 mg/dL. He told his physician that he was feeling better overall and was anxious to have his PreDx repeated.

Repeat PreDx testing was as follows:

- Fasting glucose: 135 mg/dL
- A1C: 5.4%
- Insulin: 47 μ U/mL
- hsCRP: 5.1 mg/L
- Ferritin: 541 ng/mL
- IL-2RA: 414 U/mL
- Adiponectin: 6.5 μ g/mL

These values correspond to a score of 9.6, which was a 0.3 rise from his initial scoring 6 months prior. This translated to a 45.6% risk of developing diabetes within the next 5 years.

What is the likely reason that this patient's PreDx score increased rather than decreased?

Although this patient has done a good job of losing weight and improving his overall lipid profile, his risk for diabetes has risen. In fact, basen upon the fasting glucose level of 135 mg/dL, he may be diabetic. The changes in the Diabetes Risk Score for this patient

are largely related to the increase in insulin and glucose, and these findings highlight the fact that diabetes risk is multifactorial, with multiple biological pathways involved in diabetes progression.

How should this patient now be treated?

Data from the Diabetes Prevention Program showed that in a patient with prediabetes, early use of metformin can decrease the risk of developing diabetes as much as 31%.⁵ Some experts also believe that early use of metformin in this setting can delay the onset of diabetes by up to 3 years.⁶

BC was referred for a follow-up glucose test to confirm possible diabetes and started on metformin 500 mg twice daily. He was given an appointment with the diabetes educator and was enrolled in a hospital-sponsored weight-loss program that follows the Diabetes Prevention Program guidelines. PreDx testing will be repeated in 6 months.

References

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