It is well recognized that the clustering atherogenic and diabetogenic abnormalities of the metabolic syndrome are highly prevalent in our affluent, sedentary populations. Indeed, we have designed for ourselves devices as well as working and living environments that spare us from various physical activities. Unfortunately, this sedentary environment cannot protect us against the energy-dense, refined diet that has been adopted by an increasing proportion of our population, leading to the development of a positive energy balance, weight gain, and obesity.

In this regard, one of the key contributions of the recommendations of the National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III) has been to recognize the major role played by obesity, especially abdominal obesity, as the most prevalent form of the metabolic syndrome. NCEP-ATP III guidelines have also emphasized the importance of measuring waist circumference as a simple approach to identify, in clinical practice, individuals with an excessive accumulation of abdominal fat and at risk of exhibiting features of the metabolic syndrome. It is now well accepted that the metabolic syndrome is a prevalent and powerful risk factor not only for type 2 diabetes mellitus but also for cardiovascular disease and that it is frequently accompanied by abdominal obesity. Abdominally obese individuals with a preferential excess of visceral (or intraabdominal) adipose tissue are characterized by the most severe metabolic abnormalities. Thus, among patients with the features of the metabolic syndrome and at high global risk for cardiovascular disease, it is important in clinical practice to optimally manage the risk associated with this condition by treating not only the individual metabolic abnormalities and risk factors (hypertension, hyperglycemia, atherogenic dyslipidemia) according to guidelines but also by targeting the cause of the most prevalent form of the metabolic syndrome: abdominal obesity. Furthermore, considering the epidemic proportions that the metabolic syndrome has reached and its impact on the cardiovascular health of our sedentary population, we must have a better understanding of environmental factors (among which diet and physical activity/exercise are key features) involved in its development to implement relevant and effective preventive/therapeutic approaches.

Low Cardiorespiratory Fitness: An Important Risk Marker for the Metabolic Syndrome

It is well documented that, provided the stimulus is adequate, regular physical activity and endurance exercise training can induce body fat loss and a mobilization of abdominal and visceral adipose tissue, can increase insulin sensitivity, and can improve the atherogenic lipoprotein profile as well as other features of the metabolic syndrome, including inflammation. Blair and colleagues at the Cooper Aerobic Center have been among the first to publish evidence that low cardiorespiratory fitness is among the strongest risk factors for cardiovascular disease and related mortality. In this issue of Circulation, LaMonte and colleagues report convincing evidence from their prospective follow-up database of subjects examined at the Cooper Aerobic Center that cardiorespiratory fitness, which is currently the most reliable index of physical activity, is an independent predictor of the risk of developing the metabolic syndrome over time. This carefully conducted study emphasizes further the relevance in clinical practice of gathering information on the physical fitness status of patients. Furthermore, these results also dramatically raise the issue that we urgently need to create environments that provide opportunities for exercise and other physical activity for our children, who are characterized by declining fitness levels.

Interpretation of NCEP-ATP III Guidelines: Confusion Between Definition and Clinical Criteria to Help Identify Patients With the Metabolic Syndrome

This important article also raises issues that deserve comment. First, LaMonte and colleagues have relied on the NCEP-ATP III criteria to identify individuals with the metabolic syndrome. It is important to keep in mind that NCEP-ATP III criteria were proposed as simple tools to help health professionals identify individuals likely to have the cluster of metabolic abnormalities of the metabolic syndrome. The most widely accepted definition of the metabolic syndrome includes a state of insulin resistance that may or may not be accompanied by hyperglycemia, and/or an elevated

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Cardiorespiratory Fitness and Incidence of Metabolic Syndrome: Potential Mechanisms and Pending Issues

How a high fitness level may protect against the metabolic syndrome is a topic of great public health/clinical relevance. In this regard, Blair and colleagues have published seminal papers showing that a low level of cardiorespiratory fitness (which can be simply assessed by poor performance on a maximal exercise test) was a powerful predictor of cardiovascular disease events and mortality as well as of the risk of developing type 2 diabetes mellitus. This group also pioneered the interesting notion that being apparently fat yet fit could be nevertheless associated with a substantially reduced risk of metabolic complications and of cardiovascular disease compared with unfit, normal-weight individuals. On the basis of these observations and considering the role of abdominal obesity and of excess visceral adipose tissue in the pathophysiology of the metabolic syndrome, some key questions require further attention. For instance, should we prioritize weight loss or should we increase energy expenditure by promoting more physical activity to reduce the risk of type 2 diabetes mellitus and cardiovascular disease and related mortality? Because exercise intensity is an important element of an exercise training program to improve cardiorespiratory fitness, should we emphasize the intensity component of the exercise prescription to optimally improve cardiorespiratory fitness and reduce cardiovascular risk? Although it is the simplest and most reliable index available in clinical practice, cardiorespiratory fitness is not only a marker of physical activity but also has a significant genetic basis. Some sedentary individuals with good genetic predispositions may nevertheless perform quite well on a treadmill test. Thus, the health benefits of cardiorespiratory fitness may also be partly mediated by some favorable genetic characteristics conferring protection against the development of the metabolic syndrome and cardiovascular disease. Standardized exercise training studies conducted in initially sedentary individuals are essential to dissociate the adaptation of a condition that we have previously referred to as “metabolic fitness” (an individual’s metabolic risk profile) from the response of cardiorespiratory fitness to increased physical activity or exercise training. Several exercise training studies conducted and published by our group have failed to show any correlation between the magnitude of increase in cardiorespiratory fitness and improvements in cardiovascular disease risk factors. The loss of body fat, especially abdominal fat, has often been found to be a significant correlate of exercise training–related metabolic improvements. Furthermore, exercise training has been shown to substantially mobilize visceral adipose tissue even in the absence of a change in body weight. Thus, even when perfectly matched for body mass index or total adiposity, there is evidence that fit individuals may have less visceral fat than unfit fat subjects.

In summary, until we fully understand the biological mediators of the link between cardiorespiratory fitness and cardiovascular disease, we should not confuse a marker of risk (fitness) with a therapeutic target (improving fitness). However, this last point should be discussed in academic debates, as we will never emphasize enough: (1) the powerful prognostic value of poor fitness as a predictor of metabolic diseases and related morbidity and mortality, and (2) that a physically active lifestyle combined with healthy nutritional habits reduce the likelihood of developing abdominal obesity, features of the metabolic syndrome, type 2 diabetes mellitus, and cardiovascular disease. LaMonte et al should be commended for their continued and significant contribution to the
field of exercise, fitness, and cardiovascular health. It is hoped that this important study will challenge all relevant stakeholders and stimulate the creation of safe environments that allow a physically active lifestyle at home, at school, and at work. Reshaping our sedentary habits will be a huge challenge that will go beyond the capacities of our medical model because the North American urban environment has been designed to be friendlier to cars than to human beings.

References


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Our Passive Lifestyle, Our Toxic Diet, and the Atherogenic/Diabetogenic Metabolic Syndrome: Can We Afford to Be Sedentary and Unfit?
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