BMI and Association with Cardiovascular Disease: How are They Related?

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Over the years body mass index (BMI) has become the standard used by physicians to identify those who are at risk for cardiovascular disease, hypertension, metabolic disorders like type 2 diabetes, and certain forms of cancer. BMI is often used to prescribe weight-loss medications or as a threshold for bariatric surgery for obesity. The drawback is that BMI cannot determine how much fat you have as opposed to what percent of your weight is due to bone, muscle, or organs.

Key takeaways:

- BMI used to be the standard in determining obesity and the threshold for weight-loss medication or bariatric surgery.
- BMI cannot measure visceral fat (the fat around the organs), which is a better predictor of risk for metabolic and cardiovascular diseases.
- The American Medical Association is recommending that BMI be used with other tests that look at actual body fat when assessing obesity and the risk of metabolic or cardiovascular disease.

What is BMI?

BMI is a measure of your weight-to-height ratio. If you are taller, you generally weigh more than a shorter person. Your BMI is calculated by dividing your weight in kilograms by your height in meters squared: weight (kg) ÷ height (m^2).

The current BMI classifications are:

Classification	BMI
Underweight	<18.5
Healthy	18.5 - 24.9
Overweight	25.0 - 29.9
Obese	>30.0

Increased BMI has been associated with higher risk of cardiovascular disease, hypertension, metabolic disorders like type 2 diabetes, sleep apnea, osteoarthritis, liver disease, gallbladder disease, and certain forms of cancer.

Is BMI an accurate measure of health?

BMI measures excess weight and has been used as a screen for obesity and health risks. The drawback with BMI is that BMI is not able to determine how much of a person's weight is due solely to fat rather than bone, muscle, water, and organs.

BMI does not account for the fact that many people with a significant amount of muscle will

weigh more and have a higher weight to height ratio, placing them in an overweight or obese category when they are healthy. The reality is that those who have more muscle than fat burn more calories and may have a healthier body composition than someone with more fat.

Is BMI still a useful measure?

An elevated BMI does not mean that you will develop cardiovascular disease, hypertension, or diabetes. It does mean that your risk of developing one of those diseases may be significantly increased over those in the healthy weight category. BMI cannot determine actual body fat so it is just one piece of information that your doctor can use to evaluate your health risks.

Factors that make BMI less accurate include:

1. **Race and ethnicity.** Researchers have found that there are biological and genetic factors that play a role in evaluating the risk of disease in certain groups. BMI cannot account for these factors. In 2011, researchers found that Black women showed less risk of metabolic diseases than White women, even though they had higher BMIs. Other studies have shown that people of Asian or Middle Eastern descent have a higher risk of diabetes or other metabolic disease at a lower BMI than those with European roots.
2. **Weight.** Those with a bigger waist circumference (more apple shaped than

pear) have a higher risk for cardiovascular and metabolic diseases, regardless of weight.

3. **Muscle mass.** Muscle is denser than fat. Those with a lot of muscle can have a higher BMI, despite being in good health and looking slim.
4. **Age.** As we age, we lose muscle mass and have more body fat. This can falsely throw someone into an overweight, high-risk category, if BMI is the only factor assessed.

Other determinants of disease risk

BMI is not the only factor to look at when determining risk of disease.

- **Muscle vs. fat.** Having more muscle can increase metabolism and help decrease obesity and related conditions.
- **Waist circumference.** A waist circumference of 40 inches for men and 35 inches for women increases the risk of obesity-related metabolic or cardiovascular issues.
- **Heart rate.** Regardless of your BMI, if you have a high resting heart rate, you are at more risk for heart attack and death.
- **Blood sugar.** The amount of sugar (glucose) in your blood can put you at risk for prediabetes and diabetes.
- **Cholesterol.** High levels of LDL (bad cholesterol) vs. HDL (good cholesterol) in

your blood can increase your risk of heart attack and stroke.

- **Blood pressure.** The amount of pressure your blood exerts against the walls of your arteries as your heart beats is a good indicator of how healthy your heart is.

BMI: the imperfect tool

A new study examined data from 10,000 American adults between 2011 and 2018 revealing that 36% of these adults were labeled obese based upon their BMI. However, when this group was studied using the percent of body fat as the measurement, it was found that 74% of this group fell into the obese category. The physician who led the study concluded that many people with a normal BMI can still be obese.

It is difficult to determine the percentage of lean muscle vs. fat. This determination would create a more accurate picture of your risk for heart disease and metabolic disorder. BMI measures cannot discern this.

BMI is an easy, **inexpensive measurement of body mass.** It only requires a scale, stadiometer (to measure height) and calculator. BMI should be used as an initial screening tool that can lead to further evaluation and testing if you fall within an unhealthy or obese category.

The American Medical Association (AMA) has begun to take steps to avoid relying solely on BMI when assessing health and obesity. The AMA's new policy encourages the use of measures in addition to BMI to screen for

obesity and health risks, such as assessing where fat is distributed in the body, waist circumference, and what percentage of a person's weight is due to fat.

Other health risk screenings may include caliper measurements of skinfold thickness, weighing underwater, bioelectrical impedance, isotope dilution, and dual-energy x-ray absorptiometry (DEXA). These methods are not always available and can be expensive or require specially trained staff. Some tests may also be difficult to standardize, making it harder to rely on comparisons.

Measuring fat: indicator of health risk

Fat is an endocrine tissue. Fat cells secrete inflammatory chemicals such as cytokines to surrounding tissues. The longer amount of time your carry excess fat, the more time it will secrete inflammatory cytokines and other chemicals that contribute to the development of chronic diseases.

Visceral fat is stored deep in your body, surrounding your organs. It correlates to an increased risk of type 2 diabetes and cardiovascular disease. **BMI does not measure your percentage of fat.** This distribution of your body fat can be estimated with an android-to-gynoid fat ratio. A scan which compares the fat around your belly (android fat) to the fat around your thighs and hips (gynoid fat) is done. When determining your android fat

to gynoid fat ratio, anything over 1.0 means that you are obese due to having more visceral fat.

BMI remains a good tool in areas where there are no resources for sophisticated equipment and testing. It also can be used in conjunction with other measures to give a more complete picture of your health risk. The AMA reminds us that body shape and fat composition, race, ethnicity, gender, and age are all important considerations when applying BMI measures to obesity and health risk. The AMA concludes that it still finds BMI to be a helpful measure but cautions physicians to understand its limitations.

Resources:

1. Body Mass Index: Considerations for Practitioners.
2. Measuring Obesity.
3. BMI alone may not be a sufficient indicator of metabolic health.
4. BMI alone may not be a sufficient indicator of metabolic health.
5. AMA adopts new policy clarifying role of BMI as a measure in medicine.
6. AMA: Use of BMI alone is an imperfect clinical measure.
