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TOTAL BODY FAT

Body Fat (also known as "adipose tissue") is an organ that carries out many essential functions, as well as helping store energy in our bodies. Body Fat makes and sends lots of chemical messengers in and around our bodies that are essential for our well-being. However, excess body fat can lead to significant clinical complications and is linked to the development of many diseases.

VISCERAL FAT

Visceral fat (also known as "intra-abdominal fat") is all the fat found on the inside of your abdomen, around your organs (liver, kidneys, pancreas, gut etc.), and is metabolically very active. Too much visceral fat is potentially harmful as it is linked to the development of numerous serious health conditions, including type-2 diabetes, fatty liver, some forms of cancer and coronary heart disease.

WAIST CIRCUMFERENCE

According to the World Health Organization (WHO) the waist is best measured in a horizontal line halfway on the side of the body between the iliac crest (the pelvic bone) and the bottom of the ribcage.

HIP CIRCUMFERENCE

According to the World Health Organization (WHO) the hip is best measured in a horizontal line at the widest point of the buttocks of a person.

WAIST TO HIP RATIO

Waist-to-hip ratio measures the difference between the waist circumference and the hip circumference. The measurement determines how much fat is stored on the waist, hips, and buttocks. Waist-to-hip ratio (WHR) is one of several measurements that can be used to see if excess weight is putting health at risk.

WAIST TO HEIGHT RATIO

Waist-to-height ratio is obtained by dividing your waist size by your height. Men and women should keep their waist circumference to no more than half of their height. The waist to height ratio is equally valid for children and adults, irrespective of age and recent guidelines suggest that 0.5 as the key figure for men and women of all ethnicities.

BVI RISK INDICATOR

The new Body Volume Index (BVI) looks at the risk of metabolic syndrome and is different from the Body Mass Index (BMI). BVI looks at where a person's weight is distributed on the body, whereas BMI just looks at total weight.

BVI takes a person's body shape and divides it into 7 sections digitally using the unique BVI technology developed over 15 years. BVI can then work out where the weight is for the arms, legs, chest, abdomen and pelvis; just from two digital images.

The health risk is then predicted by looking at the relationship between the torso volume and the volumes of the four limbs. This relationship is important because almost all sport and exercise is designed to help a person increase the volume in their arms and legs and to reduce their torso volume.

Undertaking sport or exercise is designed to help people reduce their fat and to increase their muscle mass, which moves volume from the torso to the arms and legs. Some examples are Soccer, Rugby, Tennis, Athletics, Cycling, Skiing, Aerobics where moving the arms and legs are key, but there are many more.

BMI just doesn't work like this because muscle weighs more than fat, so if someone exercises to reduce their BMI, their BMI Number will go up as their overall weight has increased. BMI just uses total height and weight, so it doesn't measure part-volumes of the body like BVI does.

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Therefore, if a person reduces their central volume and moves weight to their arms and legs, BVI calculates that the extra volume is muscle, meaning there is a reduced risk of health. The Body Mass Index was a good measure to have when it was invented in 1842, but times have moved on and technology now allows us to measure part-volumes of the body digitally.

This is why BVI has now been proven to be a 19% improvement over BMI as a predictor of metabolic health risk. This is nearly one-fifth more people who can be correctly assessed, so BVI correctly captures the health risk of more people at the initial time of healthcare and clinical evaluation than BMI can.

The BVI Risk Indicator, as a risk of the metabolic syndrome, is divided into four quartiles, each providing an indicator of risk as being LOW, LOW TO MEDIUM, MEDIUM TO HIGH or HIGH risk. The ranges are explained more in the other resources document for integration with the API.

BVI NUMBER

The Body Volume Index (BVI) has been developed from over fifteen years of research and development by pioneers in body measurement and a consortium of international healthcare and scientific collaborators.

After development of the initial BVI software and algorithms by the collaborators, the outputs were analysed and validated against the Body Mass Index (BMI) by Mayo Clinic. On 1,280 patients over a 10-year period, 105 different body volume combinations were considered, meaning that over 134,000 permutations of body volumes were evaluated.

Mayo Clinic eventually considered that height, weight, gender, central abdomen, pelvic and chest volumes ultimately provided the best combination of measurements for the prediction of cardio-metabolic risk and this has led to the BVI Number available today.

The BVI Number range is between 1 and 20, so can be easily distinguished from the range for BMI which is usually between 18 and 35. The BVI number increases as a person's future risk is calculated, and has been determined to account for age differences with those who have a higher risk as they get older. The key marker for risk with the BVI Number is '13'. Those with a BVI Number under 13 are less at risk than those with a number higher than 13.

As a risk indicator, the new BVI Number can be used in a number of different ways with the API:-

- The BVI Number can be used on its own as a better predictor than BMI.
- The BVI Number can be used alongside BMI, for cross comparison, in a large research study for example.
- The BVI Number can be even added to a BMI Number to create a new single number. An athlete and someone who is obese with a high abdomen volume might have the same BMI as each other e.g. 32, meaning that they are both technically obese using BMI. However, by adding the BVI and BMI numbers together, they will then each have different numbers, more representative of their individual risk.

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BMI was invented in 1842 by a Belgium statistician, who designed it to be used as a general measure for populations or for averaged measurements.

BVI now addresses the need to have a number for individuals that is more representative of a person's body shape and weight distribution.

BACKGROUND INFORMATION

THE METABOLIC SYNDROME – General Background & Description

Metabolic syndrome is a cluster of conditions that occur together, increasing your risk of heart disease, stroke and type 2 diabetes. These conditions include increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol or triglyceride levels.

The BVI number has been designed to predict the risk of three key factors that affect the Metabolic Syndrome; Diabetes, Hypertension & Cardio-Vascular Risk;

Diabetes is a serious condition where your blood glucose level is too high. It can happen when your body doesn't produce enough insulin or the insulin it produces isn't effective, or when your body can't produce any insulin at all.

Hypertension, also known as high or raised blood pressure, is a condition in which the blood vessels have persistently raised pressure. Blood is carried from the heart to all parts of the body in the vessels. Each time the heart beats, it pumps blood into the vessels.

Cardiovascular disease is something that relates to the heart and blood vessels. An example of something cardiovascular is heart disease; cardiovascular disease relates to the circulatory system, that is the heart and blood vessels.

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