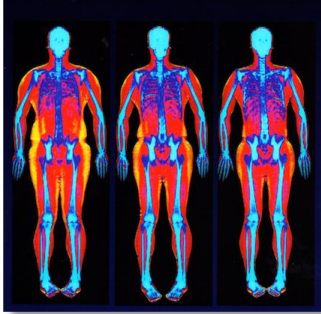


Whole Body Composition Analysis

Measuring body fat is important for determining fitness and assessing cardiovascular health.



Weight alone is not a clear indicator of health, because it does not distinguish between pounds that come from body fat and those that come from lean body mass and bone. Carrying too much fat is called obesity, and puts a person at risk for many serious medical conditions including heart disease, diabetes, stroke, arthritis, and even certain forms of cancer according to the National Institutes of Health. In fact, obesity contributes to at least half of the chronic diseases in western society.

Not all pounds are the same.

The definition of obesity has continued to evolve in recent years as our understanding of adipose, or fat tissue continues to deepen. Currently, the formal definition of obesity is based on the body mass index or BMI (weight/height²). However, using BMI has limitations. A normal BMI can falsely reassure those with normal overall body weight but unhealthy abdominal fat; it can also falsely label an athletic or large framed person as obese or 'overweight'. Obesity is intended to be an indicator of excess of body fat regardless of weight, but is often misapplied to muscular people. It is likely that over time the formal definition of obesity will include some direct measure of body fat and/or fat distribution.

The human body is composed of fat, bone, and non-fatty tissue. The non-fatty tissue compartment is mostly muscle, but also includes water and organs. Body proportion of fat and lean tissue reflects fitness, diet and exercise habits; impacts future risk of disease, and is linked to longevity. Several methods beyond body weight measure body 'fatness', including DEXA (dual-energy Xray technology). The DEXA method offers safe and effective measure of your actual body's proportions of fat, lean tissue and bone. The body fat percentage, and how fat is distributed within the body are valuable health indicators that the DEXA method uniquely offers.

Not all fat is the same.

Recent research indicates that trunk fat, particularly the fat surrounding internal organs ("visceral adipose tissue") is associated with risk for diabetes, heart disease and certain cancers. The visceral fat has also been linked to longevity in recent research. Some patients have a normal body weight but may carry excess visceral adipose tissue that increases their risk. The DEXA test measures the amount of visceral fat with a high degree of accuracy.

Body composition changes over time.

As people age, dieting to lose weight without exercise can often lead to unintended muscle loss if you do not have sufficient exercise. It is theoretically possible to be 'thinner' but have 'more fatness'. You should only be losing fat when you are on a diet. Following the body composition scans during a diet and exercise program can be used to identify the undesired situation of losing muscle instead or, or along with fat during the program.



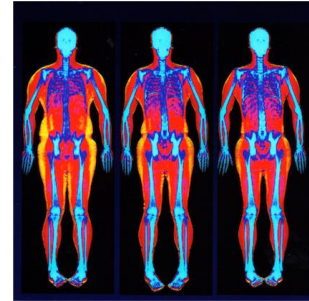
DEXA scanning safely and accurately quantifies body composition

Whole body composition assessment can be done by using DEXA Xray technology. DEXA scanning is commonly used in medical practice to evaluate bone density and to diagnose osteoporosis, a condition that often affects women after menopause but may also be found in men. DEXA has high precision in assessing body composition,

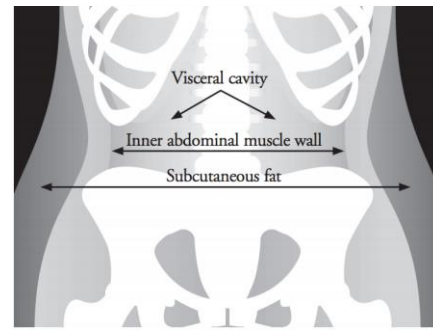
involves very low radiation exposure (less than 1/10th the radiation exposure of a chest Xray) and has the capacity to quantify regional fat, lean and bone mass. The bone densitometry machine in this office (Hologic Discovery W) has been specially equipped with hardware and software that allows for the performance of whole body composition scans. DEXA is a simple, noninvasive scan. The machine assesses body composition by sending out a thin, invisible beam of low-dose x-rays with two distinct energy peaks through your bones, muscle and fat tissue. One peak is absorbed by soft tissues and the other by bone. This allows for an exact measurement of body fat, lean and bone.

Here are some of the important health measures obtained on a DEXA body composition scan:

1. **Body Fat Percentage.** We all need some body fat to keep us healthy, warm, and safe. Fat serves many roles, including crucial vitamin and energy storage, fertility regulation in women and temperature control. A woman's body requires a minimum amount of essential fat compared to a man's body to maintain normal function. Medical professionals have determined that an optimal, healthy range of body fat is approximately 14 – 20% for men and 14 – 24% for women. Generally speaking, levels of fat mass below these are detrimental to human health. Ideal body composition varies with age, as Table 1 shows. Fat appears yellow on the body scan.



2. **Visceral Fat.** The scan quantifies with a high degree of accuracy the amount of visceral or organ fat in the body. Visceral fat is highly correlated with disease risk and longevity, even more so than waist circumference. The Visceral Adipose Tissue score (VAT, cm²) is a highly accurate measure of organ fat reported on DEXA scans. Current research suggests that the subcutaneous fat, the abdominal fat underlying skin and outside the abdominal cavity, is less closely tied to poor health compared to visceral fat. Visceral fat adversely affects health by secreting various metabolically active proteins into the blood, raising the risk for whole body inflammation, diabetes, cardiovascular risk, and certain cancers. The VAT score is also tied to longevity in recent research. The good news is that the VAT score can be lowered through healthy lifestyle changes.



VAT score (cm ²)	Low Risk	Higher Risk	Highest Risk
	<100	100 - 160	>160

3. **Lean Body Mass** is mostly muscle, but also includes internal organs, connective tissues, and fluids (e.g. water and blood). Generally speaking, a healthier body composition will have more lean mass (or lean body mass percentage) and a lower fat mass (or fat mass percentage). The scan tell you with great deal of accuracy the amount of muscle in your limbs and trunk compared to others your age. Muscle mass determines your metabolic rate, your strength, and plays large role in your risk for falls and fracture. Lean mass appears red on the scan.

Many people would benefit from undergoing a body composition scan

- ✓ Those embarking on diets, new exercise regimens or new weight loss treatments who want to:
 - Assess baseline % body fat and accurately track changes in body fat in response to treatment
 - Watch out for unintentional muscle loss during weight loss
 - Obtain accurate estimate of caloric needs based on lean mass

- ✓ Athletes who want an accurate assessment of body fat and leanness.
- ✓ Those with a family history of diabetes, even if they are in the normal weight range for height
- ✓ Those with a waist circumference or body mass index above the ideal range, to accurately determine how much of the measure is related to extra muscle (a healthy finding) versus extra visceral fat (an unhealthy finding)
- ✓ Those with eating disorders
- ✓ Those who are in the normal weight range but who are not exercising regularly. The results can be an 'eye opener' and strong motivator to begin exercising on a regular basis.
- ✓ Elderly or frail patients at risk for falls, fractures, or with known osteoporosis and osteopenia to obtain better definition of fracture risk.
- ✓ Patients with low muscle mass who want an accurate assessment of lean muscle mass for accurate drug dosing (such as antibiotics or chemotherapy) and accurate estimates of kidney function.
- ✓ Patients on medications that can affect metabolism and fat distribution, including steroids, HIV medications, or hormonal suppression.

How should I prepare for the test?

The scan can be done at any time. However, it is easiest to compare your results on repeated scans over time if you come for your test in a fasting state. Therefore, we recommend that you schedule your exam in the morning fasting, even without drinking any water since midnight the night before. You will need to remove all jewelry and piercings, undress, and put on a gown. You will have to remove any hair ties or fasteners. You will be asked to empty your bladder. Women of childbearing age will have a urine pregnancy test performed. You will lie on a padded table with an x-ray generator below and a detector (imaging device) above. The machine is open. Once on the table you will be asked to lie flat and still with your toes pointing inward for approximately 7 minutes while the arm of the machine passes over your body taking measurements. It is important that you stay as still as possible during the procedure to ensure a clear, useful image. The DEXA whole body composition scan takes approximately 10 minutes to perform.

Please inform the doctor if you recently had a barium examination or have been injected with a contrast material for a CT scan or radioisotope scan. You may have to wait 10-14 days before undergoing a DEXA test. Women should always inform the doctor or nurse if there is a possibility they are pregnant. All women of childbearing years will be asked to have a urine pregnancy test prior to undergoing a DEXA scan.

What do I do with the results?

Compare your total body fat percentage to the ideal values for your age and gender as listed in table 1 and 2. Other important measures can include the Fat Mass Index (FMI), the visceral adipose tissue score (VAT) and the lean or muscle mass indicators. Your physician will provide you with the full report as well as a narrative letter highlighting the results most relevant to your own personal health needs.

- **If your percent body fat falls into the fair to excellent range**, keep up the good work with diet and exercise.
- **If you are in the normal weight range for height (normal BMI) but your percent body fat is high and falls into the poor or very poor categories**, you will need to start an exercise program that combines strength building (muscle training) with aerobic conditioning. For some, it may be helpful to design a personal fitness program with the help of a personal trainer. You can monitor your success with exercise with a follow up body composition scan in 2 to 12 months at your choice.
- **If you are overweight and your percent body fat is poor to very poor**, you will need a combination of diet and exercise to improve your body composition and lower your risk for diabetes, heart disease and certain cancers.
- **If you are underweight and your percent body fat or fat mass index (FMI) falls into the risky category**, you will need to alter your diet and exercise program.
- **If your visceral adipose tissue (VAT) score is high**, any safe healthy weight loss program -- or sometimes simply exercise alone -- will lower the visceral adipose tissue.
- Share your report and physician letter with your consulting physicians and other health professionals like nutritionists, physical therapists and trainers.

What is the cost of a Whole Body Scan?

The test costs \$300.00, which includes a personalized report and analysis by the physician on how the results are most relevant to your health. At this time, the test is generally not reimbursed by any health insurance plans. The technology is mostly used in research studies.

What are the concerns with this method? Aren't there cheaper, easier ways to do this?

You will be exposed to a small amount of radiation during a DXA body composition scan similar to standing outside for 3 hours at sea level. It is equivalent to about 1/10th of the radiation associated with a chest X-ray. Other body composition methods can be informative, but provide limited information and are subject to more errors. Skin caliper testing does not take your body shape, or ethnicity, or body mass index into consideration. The results from bio-impedance scales can vary depending on how hydrated you are that day, or how much you have recently exercised.

What is "normal?"

Many people desire a rating system for assessing their current level of body fat. The following table provides a meaningful rating system.

MALE: Total Body Fat %

Age	Risky	Excellent	Good	Fair	Poor	Very Poor
19-24	<6%	10.8	14.9	19.0	23.3	>23.3
25-29		12.8	16.5	20.3	24.4	>24.4
30-34		14.5	18.0	21.5	25.2	>25.2
35-39		16.1	19.4	22.6	26.1	>26.1
40-44		17.5	20.5	23.6	26.9	>26.9
45-49		18.6	21.5	24.5	27.6	>27.6
50-54		19.8	22.7	25.6	28.7	>28.7
55-59		20.2	23.2	26.2	29.3	>29.3
60+		20.3	23.5	26.7	29.8	>29.8

FEMALE: Total Body Fat %

Age	Risky	Excellent	Good	Fair	Poor	Very Poor
19-24	<9%	18.9	22.1	25.0	29.6	>29.6
25-29		18.9	22.0	25.4	29.8	>29.8
30-34		19.7	22.7	26.4	30.5	>30.5
35-39		21.0	24.0	27.7	31.5	>31.5
40-44		22.6	25.6	29.3	32.8	>32.8
45-49		24.3	27.3	30.9	34.1	>34.1
50-54		26.6	29.7	33.1	36.2	>36.2
55-59		27.4	30.7	34.0	37.3	>37.3
60+		27.6	31.0	34.4	38.0	>38.0

Body Fat and Fitness, across all ages and heights

Description	Women	Men
Essential fat	10-13%	2-5%
Athletes	14-20%	6-13%
Fitness	21-24%	14-17%
Average	25-31%	18-24%
Obese / Excess body fat	32% or higher	25% or higher

SIMPLE TIPS ON EXERCISE AND EATING HEALTHY

EXERCISE:

Exercise plays important roles in weight management and overall fitness for people of all ages. It is important to achieve and maintain ideal percent body fat with age.

For maintaining fitness, you need a minimum of 30 minutes of moderate to intensive physical exercise most days of the week, for approximately 150 minutes total weekly. 75 minutes weekly of vigorous aerobic exercise may also be a reasonable goal. Planning an exercise program should be based on personal goals as well as on individual capabilities. The most important element is to think long term and make exercise a permanent part of your life.

Moderately intense:

- Brisk Walking (3-4 mph)
- Cycling (10 mph)
- Swimming or calisthenics
- Doubles tennis or table tennis
- Golf (without cart)
- Housecleaning, general
- Raking leaves, gardening
- Dancing
- Active play with children

Vigorous exercise examples:

- Jogging \geq 6 miles / hour
- Shoveling
- Carrying heavy loads
- Brisk bicycling (14 – 16 miles/ hour)

(Source: Journal of the American Medical Association 273; 402:1995)

DIET CHANGES

For most people, maintaining a desirable weight and body fat percentage can only be achieved through an integrated program of nutrition and exercise – or balancing energy intake with energy expenditure. Reducing weight and body fat requires cutting back on calories and increasing the amount of exercise.

Dieting alone won't work for losing weight. Even when a person's weight-control system has genetic flaws that may respond to newly available pharmaceuticals, proper nutrition and plenty of exercise is still part of the prescription for health.

Most Americans have more than enough to eat, but many people don't eat a healthy range of foods. Consuming too many calories from any kind of food source can produce fat.

Healthy dietary goals, based on a 2000 kcal / day diet, include:

- ⇒ Fruits & vegetables – at least 4.5 cups per day
- ⇒ Fish (oily preferred) – at least two 3.5-ounce servings per week
- ⇒ Fiber rich whole grains – at least three 1-ounce servings per day
- ⇒ Nuts/legumes/seeds – over 4 ounces per week

A healthy diet LIMITS the following:

- 📄 Sodium – less than 1500 mg per day
- 📄 Sugar sweetened drinks – no more than 36 ounces per week
- 📄 Processed meats – less than 2 servings / week
- 📄 Saturated fat to – less than 7% of total energy intake
- 📄 Added sugars – less than 100 kcal / day for women and 150 kcal / day for men
- 📄 No trans-fats at all

Adapted from Lloyd-Jones et al 2010

Break old habits

Often the first step to a good diet lies in changing food and eating behavior.

- ⇒ Do not skip meals
- ⇒ Eat a series of small meals through your day
- ⇒ Avoid a big meal late in the evening
- ⇒ Wait 12 hours between last meal of the day and your first meal the next morning
- ⇒ Do not eat in front of the television
- ⇒ Eat and chew slowly
- ⇒ Use a smaller-sized plate to achieve a ‘full plate’
- ⇒ Don’t go back for seconds
- ⇒ Bake or broil food instead of frying
- ⇒ Learn about food values and make healthy combinations in meals
- ⇒ Weigh yourself regularly and focus on measuring body fat percentage
- ⇒ Reward yourself with non-food pleasures
- ⇒ Sleep at least 7 hours / night