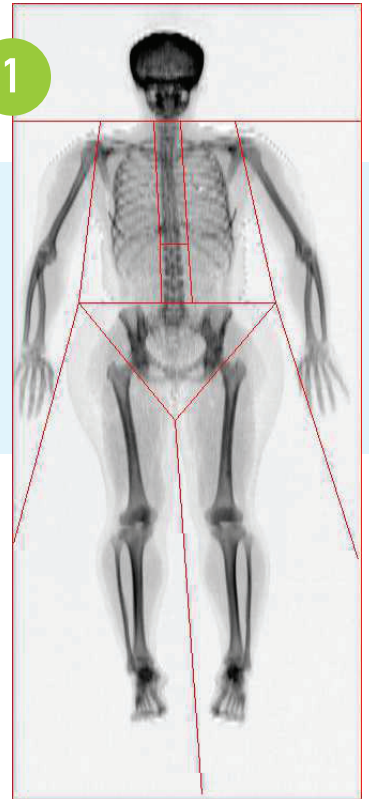


## TOTAL BODY BONE DENSITY SCAN

1

### DID YOU KNOW?

As we age, our **total bone mass** usually decreases. Regular participation in weight-bearing activity and resistance exercise (e.g. weight training) can not only delay the start of and slow bone loss, but it may even increase bone mass in older people and postmenopausal women. Unlike other body composition assessment methods, **DEXA** is able to measure **(BMC)** and takes bone mass into account when calculating your **total body composition**.



2

### DXA Results Summary:

## TOTAL BODY BONE DENSITY RESULTS BY REGION: DXA RESULTS SUMMARY

Region	Area (cm <sup>2</sup> )	BMC (cm <sup>2</sup> )	BMD (g/cm <sup>2</sup> )
L Arm	206.25	161.12	0.781
R Arm	209.43	163.84	0.782
L Ribs	133.93	104.91	0.783
R Ribs	121.61	86.37	0.710
T Spine	119.22	119.32	1.001
L Spine	53.65	61.78	1.152
Pelvis	189.96	245.89	1.294
L Leg	330.24	404.91	1.226
R Leg	334.61	411.05	1.228
Subtotal	1698.90	1759.18	1.035
Head	255.13	793.37	3.110
<b>Total</b>	<b>1954.04</b>	<b>2552.55</b>	<b>1.306</b>

The total body bone density scan measurement can help identify persons who may be at greater risk for fracture due to decreased bone density.

**Region:** Represents the region of the body that is being measured for example L Arm is Left Arm. T Spine is Thoracic Spine region which refers to the upper and middle back. L Spine is the Lumbar Spine region which refers to the lower back.

**Area:** Represents the bone surface area of the region of your body being measured in centimetres squared (cm<sup>2</sup>).

**Bone Mineral Content (BMC):** BMC represents the weight of all the bones in your body measured in grams (g). This is also known as **total bone mass**.

**Bone Mineral Density (BMD):** Is BMC (g) divided by the Area (cm<sup>2</sup>) from which the measure was taken. BMD is usually measured in specific clinical regions such as the lower back (lumbar spine) and the top of the leg bone (femoral neck). These sites are clinically important, as it's where the majority of fractures occur, particularly in women, as a result of low BMD or osteoporosis.

TBARI209

## HOW DO YOU COMPARE?

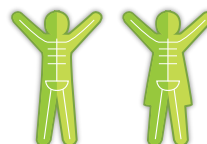
In your report, we are referring to the **BMC (g)** column.



The dry weight of the skeleton of most males weighs between 2kg and 4kg.



The dry weight of the skeleton of most females weighs between 1.5kg and 2.5kg.

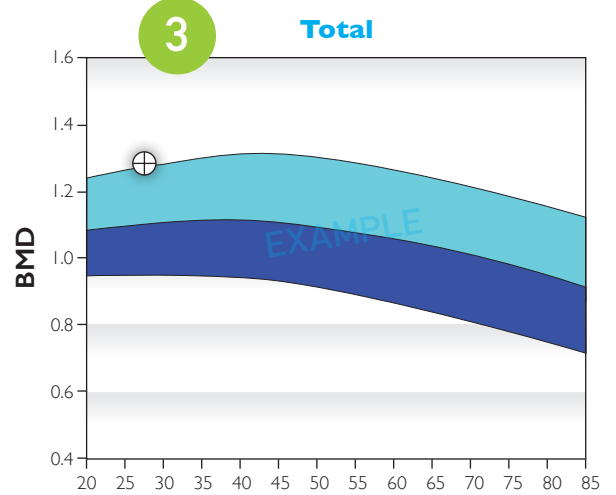


The wet component, bone marrow and water, can weigh up to 2-3kg on top of the weight of your bones.

## TOTAL BODY BONE MINERAL DENSITY (BMD) PLOT COMPARED WITH AGE

This graph plots your total BMD when compared with your age.

The circle indicates where your total BMD lies according to average adults your age. The light blue area is ideal.



## DIGITAL BODY COMPOSITION IMAGE

This image is a graphic representation of bone, lean mass and fat mass.

The different tissue types are shown as; blue for bone, lean tissue is red/pink and fat tissue is yellow.



Images not for diagnostic use



## X- RAY IMAGE WITH MARKERS PLACED FOR 8 BODY REGIONS

- Left Arm
- Right Arm
- Trunk (Torso)
- Left Leg
- Right Leg
- Head
- Android (Abdomen region)
- Gynoid (Hip/Buttock region)
- Visceral Adipose Tissue (VAT)

## BODY COMPOSITION RESULTS TABLE

Table showing precise measurements of:

**Fat mass:** The amount of fat, in grams (g), in the body. Also known as **adipose tissue**.

### DID YOU KNOW?

As a consequence of childbearing and other hormone-related functions, females require about 3 times (12-14% of body mass) as much essential fat when compared with males (3% of body mass). Utilisation of this reserve may impair normal body function.

**Lean Mass + Bone Mineral Content (BMC g):** The amount of **fat free mass (lean mass) + bone mineral content (BMC)** in that region of your body in grams (g). **Fat free mass** refers to mass with no extractable fat namely; muscle, organs, connective tissue (tendons, ligaments etc), bone marrow & body fluids (blood & water). This number is used to determine resting metabolic rate (RMR).

**Total Mass (g):** Is **fat mass plus lean + BMC = Total mass in grams (g)**.

**% Fat:** The amount of fat mass as a percentage of the total mass of that region. E.g if the total mass is 50000g (50kg) and the Fat Mass is 25000g (25kg) then the % fat is 50% (25000g/50000g)

**Total:** The sum of Total Mass, Fat Mass & Lean Mass + BMC to give overall % body fat. Total % body fat reflects the proportion of your total body weight that is **fat mass**.

**Android (A):** Abdominal region

**Gynoid (G):** Hip/buttock region

Region	Fat Mass (g)	Lean + BMC (g)	Total Mass (g)	% Fat	% Fat percentile	
					YN	AM
L Arm	1250	2622	3872	32.3	32	29
R Arm	1164	2770	3933	29.6	24	22
Trunk	6607	24006	30613	21.6	22	19
L Leg	4016	8914	12931	31.1	15	14
R Leg	4097	9090	13186	31.1	14	13
Subtotal	17134	47402	64535	26.5	19	16
Head	914	3908	4823	19.0		
<b>Total</b>	<b>18048</b>	<b>51310</b>	<b>69358</b>	<b>26.0</b>	<b>19</b>	<b>16</b>
Android (A)	960	3406	4366	22.0		
Gynoid (G)	3645	8215	11860	30.7		

## RECOMMENDED % BODY FAT RANGES

	Age	Low	Recommended	High	Very High
Female	20-39	5-20	21-33	34-38	>38
	40-59	5-22	23-34	35-40	>40
	60-79	5-23	24-36	37-41	>41
Male	20-39	5-7	8-20	21-25	>24
	40-59	5-10	11-21	22-27	>27
	60-79	5-12	13-25	26-30	>30

Based on Gallagher et al., American Journal of Clinical Nutrition, Vol.72, Sept. 2000

## HOW DO YOU COMPARE?

In your report, we are referring to the **Fat (g)** column.



Total fat of most males should weigh between 10kg and 15kg and up to 20kg in very tall individuals.



Total fat of most females should weigh between 20kg and 25kg. You are doing very well if you fall between 15kg to 20kg. Professional female athletes normally sit between 10kg and 15kg of total fat mass.

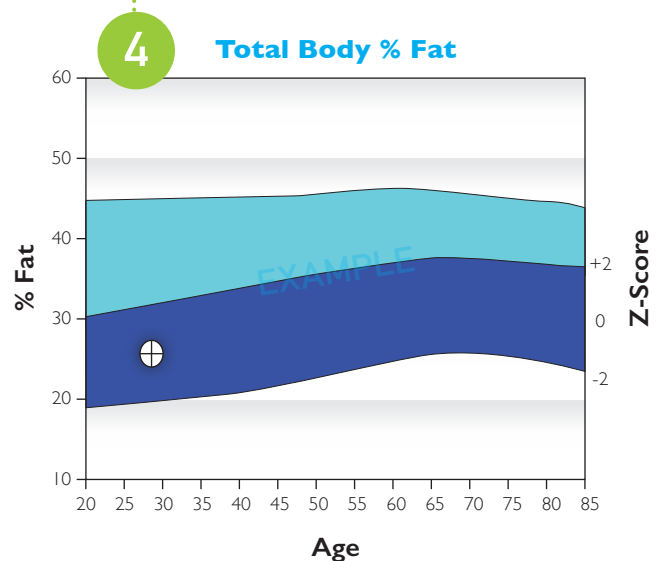
## PLOT OF % FAT COMPARED TO AGE GROUP

This graph plots your total % body fat compared with your age.

The line in the middle of the 2 different coloured blues (light blue and dark blue) denotes the average % fat of people aged as per the horizontal axis. Please look at where your result is plotted. If your circle is above the middle line, your % fat is above the average % fat of people the same age and gender as you. If your circle is below the middle line, your % fat is below the average % fat of people the same age and gender as you.

**Z-Score:** The Z-Score on the right hand side of the graph is a statistical representation of how your % body fat compares to an **age matched reference mean**. This is another way of saying the mean (average) of adults the same age and gender as you.

The z-score bands here are +2 and -2 standard deviations.



Source: NHANES Classic White Female.

## 5 BMI INDICATOR



The Body Mass Index is unfortunately the current standard measure for clinical obesity. The problem with BMI is that it is a measure of excess weight, not excess fat and it is not gender specific.

BMI is a two factor equation which only accounts for height and weight. It does not account for your muscle mass or your body composition in the equation.

MeasureUp does not calculate BMI as it is a flawed method of clinical assessment. A much more robust index is the FMI or Fat Mass/Height<sup>2</sup> (kg/m<sup>2</sup>) which takes into account your fat mass relative to your height.

## ADIPOSE INDICES

This table represents measurements of the adipose (fat tissue) in your body. Fat mass includes your essential fat as well as your storage fat.

**Essential fat:** is the fat required for normal functioning and is stored in the marrow of bones as well as in the heart, lungs, liver, spleen, kidneys, intestines, muscles and the central nervous system.

**Storage fat:** is excess fat that consists of two components;

**1. Subcutaneous fat:** is found predominantly directly beneath the surface of the skin.

**2. Visceral adipose tissue (VAT):** is found in the intra-abdominal cavity (greater omentum) area below the abdominal muscles. Visceral fat (VAT) is stored around major vital organs such as the liver, kidney and pancreas. Visceral Fat is very mobile and is strongly correlated with metabolic diseases such as insulin resistance, type 2 diabetes and cardiovascular disease. An excess of body fat (storage fat) is undesirable for good health and fitness.

Region	Result	% Fat percentile	
		YN	AM
<b>Total % Body Fat</b>	<b>26.0</b>	<b>19</b>	<b>16</b>
Fat Mass / Height <sup>2</sup> (kg/m <sup>2</sup> )	6.79	36	33
Android / Gynoid Ratio	0.72		
% Fat Trunk / % Fat Legs	0.69	38	34
Trunk/Limb Fat Mass Ratio	0.63	26	22
Est.VAT Mass (g)	237		
Est.VAT Volume (cm <sup>3</sup> )	256		
<b>Est. VAT Area (cm<sup>2</sup>)</b>	<b>49.1</b>		



**Total Body % Fat:** Total % body fat reflects the proportion of your body weight that is fat mass.

**Fat Mass/Height<sup>2</sup> (kg/m<sup>2</sup>):** Known as the Fat Mass index, indicates how much fat mass you have relative to your height. This is the best measure of excess fat. Ideally males should be below 4.0kg/m<sup>2</sup> and below 5.5kg/m<sup>2</sup> for females.<sup>1</sup>

**Android/Gynoid Ratio:** The Android / Gynoid ratio (A/G) compares your Android fat (Abdomen region) to your Gynoid fat (hip region) to assess your body fat distribution. Anything greater than 1.0 indicates your Android (abdomen) region has greater fat distribution than your Gynoid (Hip region) and vice versa.

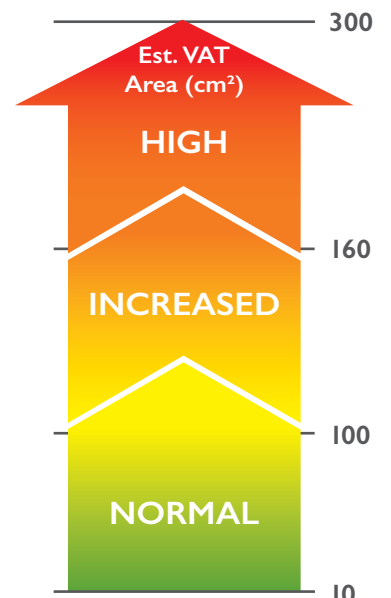
We also find these two regions very useful in examining fat loss from these specific regions over time. Did your fat loss come from your abdomen or your hips?

**Est VAT (cm<sup>2</sup>):** Estimated amount of visceral fat. The research literature suggests that if your Est. Vat Area (cm<sup>2</sup>) is greater than 100, you may have an increased risk of metabolic diseases such as insulin resistance, type 2 diabetes and cardiovascular disease.

**% Fat Percentile YN:** If your YN percentile is 40, it means your %fat is greater than 40% of young normal (YN) adults. The lower the number, the better.

**% Fat Percentile AM:** If your YN percentile is 35, it means your %fat is greater than 35% of age matched (AM) adults (adults the same age as you). The lower the number, the better.

### Visceral Fat Classification



1. Schutz et al. Int J Obes. 26, 953-960 2002

## LEAN INDICES

7

This table represents measurements of the fat free (lean) mass in your body. The most important measurement in this table is;

**Appen. Lean/Height<sup>2</sup>(kg/m<sup>2</sup>):** This is known as the Skeletal muscle mass index (SMI). If your SMI is below 7.26kg/m<sup>2</sup> for males and 5.5kg/m<sup>2</sup> for females you are defined as having Sarcopenia (low muscle mass).<sup>2</sup>

Measure	Result	Percentile	
		YN	AM
Lean/Height <sup>2</sup> (kg/m <sup>2</sup> )	18.4	83	81
Appen. Lean/Height <sup>2</sup> (kg/m <sup>2</sup> )	8.38	88	87

Est. VAT = Estimated Visceral Adipose Tissue  
 YN = Young Normal  
 AM = Age Matched

**Lean Indices Percentile YN:** If your YN percentile is 40, it means your lean mass is higher than 40% of young normal (YN) adults. The higher the number, the better.

**Lean Indices Percentile AM:** If your YN percentile is 35, it means your lean mass is higher than 35% of age matched (AM) adults (adults the same age as you). The higher the number, the better.

## HOW DO YOU COMPARE?

In your report, we are referring to the **Lean (g)** column.



Total lean mass of most males should weigh over 60kg and over 55kg in shorter individuals.



Total lean mass of most females should weigh 40kg and over 35kg in shorter individuals.

## DXA RESULTS SUMMARY

8

This table shows your BMC, Fat Mass, Lean Mass, Lean + BMC, Total Mass and % Fat for each region. This table differs from the Body Composition Results Table 3 by separating out Lean Mass from BMC.

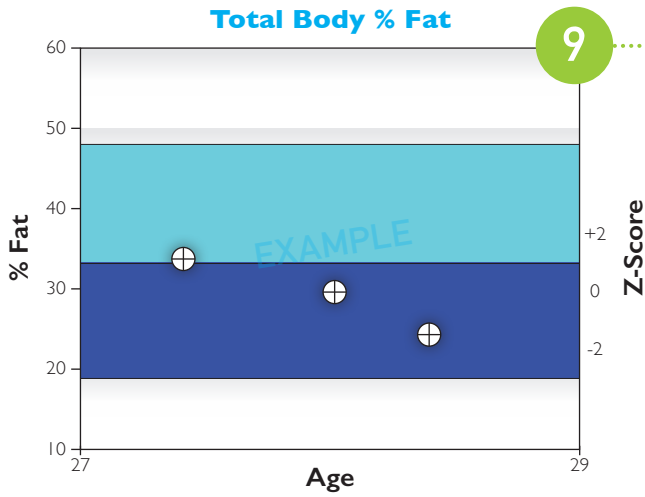
From this table you can determine muscle symmetry between L & R Arm as well as L & R Leg by viewing the Lean Mass column.

Region	BMC (g)	Fat Mass (g)	Lean Mass (g)	Lean + BMC (g)	Total Mass (g)	% Fat
L Arm	161.12	1249.8	2461.3	2622.4	3872.2	32.3
R Arm	163.84	1163.7	2605.8	2769.7	3933.3	29.6
Trunk	618.27	6607.1	23387.6	24005.9	30613.0	21.6
L Leg	404.91	4016.5	8509.2	8914.1	12930.5	31.1
R Leg	411.05	4096.6	8678.7	9089.8	13186.4	31.1
Subtotal	1759.18	17133.7	45642.6	47401.8	64535.4	26.5
Head	793.37	914.1	3115.1	3908.5	4822.6	19.0
<b>Total</b>	<b>2552.55</b>	<b>18047.8</b>	<b>48757.7</b>	<b>51310.2</b>	<b>69358.0</b>	<b>26.0</b>

The larger the difference, the larger the muscle imbalance between your left and right arm or leg. Your dominant arm will often have higher Lean Mass than your non-dominant arm (200-300g). The same applies to your legs with a difference of less than 10% being normal.

If you have had a previous DEXA scan with MeasureUp, you can also use this table to see exact regional changes in your fat mass and lean mass over the course of your scan history. By comparing each region of your body to previous scans, you are able to identify exactly where you have lost fat, gained muscle or vice versa.

2. Cruz-Jentoft et al. Age Ageing. 39, 412-423 2010



Source: NHANES Classic White Female.

## TRACKING YOUR % BODY FAT, FAT MASS & LEAN MASS VALUES OVER TIME

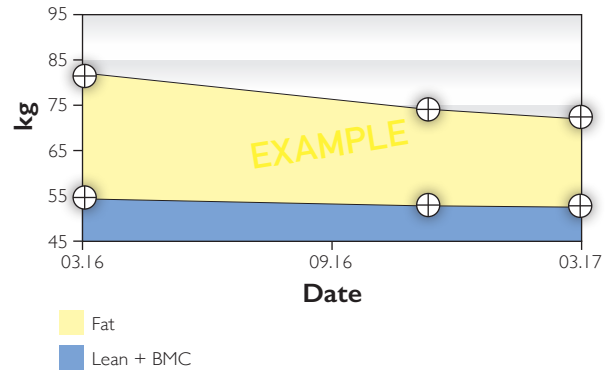
If you are a repeat client and track your changes using DEXA, we are able to provide you with rate of change graphs and reports over the course of your scan history. These graphs and tables provide you with an easy reference point for changes that have occurred in your body composition over time.

### 9.1 Total Body % Fat Results Over Time

Scan Date	Age	% Fat	Lean Mass (g)	Lean + BMC (g)	Total Mass (g)	% Fat
27.03.2017	28	26.0	19	16	-7.9	-3.0
17.11.2016	28	29.0	32	29	-4.9	-4.9
10.03.2016	27	33.9	57	54		

EXAMPLE

### 9.5 Compartmental Trending



### 9.2 Total Fat Mass Results Over Time

Scan Date	Age	Fat Mass (g)	Change/Month vs		Change vs	
			Baseline	Previous	Baseline	Previous
27.03.2017	28	18048	-751	-673	-9425	-2874
17.11.2016	28	20921	791	-791	-6552	-6552
10.03.2016	27	27473				

EXAMPLE

### 9.3 Total Lean Mass Results Over Time

Scan Date	Age	Fat Mass (g)	Change/Month vs		Change vs	
			Baseline	Previous	Baseline	Previous
27.03.2017	28	48758	-185	42	-2324	178
17.11.2016	28	48580	302	-302	-2501	-2501
10.03.2016	27	51081				

EXAMPLE

### 9.4 Total Mass Results Over Time

Scan Date	Age	Fat Mass (g)	Change/Month vs		Change vs	
			Baseline	Previous	Baseline	Previous
27.03.2017	28	69358	-926	-627	-11616	-2677
17.11.2016	28	72035	1080	-1080	-8939	-8939
10.03.2016	27	80974				

EXAMPLE

### 9.6 Visual colour comparison over time of changes in your body composition



YN = Young Normal  
AM = Age Matched

## GLOSSARY

<b>Body composition</b>	The ratio of lean body mass (structural and functional elements in cells, body water, muscle, bone, heart, liver, kidneys, etc.) to body fat (essential and storage) mass.
<b>Dual energy x-ray absorptiometry (DEXA)</b>	<p>The gold standard test for measuring bone density and body composition.</p> <p>It can accurately and precisely monitor changes in muscle, bone and fat in those who are undergoing clinical management of a condition, weight loss treatments and health and fitness programs. It is painless and non-invasive, requiring no special preparations.</p> <p>For this exam, you lie on a padded table while the x-ray scanning machine moves over your entire body. The exam takes about 6 minutes to complete, and the radiation dosage from the x-ray is less than 10% of that used for a chest x-ray or less than the exposure from an airline flight from Sydney to Brisbane.</p>
<b>Bone mineral content (BMC)</b>	The total amount of bone mass in the skeleton that is expressed in grams (g).
<b>Bone mineral density (BMD)</b>	BMD is measured in grams per square centimetre (g/cm <sup>2</sup> ) using dual energy x-ray absorptiometry or BMC divided by Area.
<b>Fat mass – Fat (g)</b>	<p>The amount of fat, in grams (g), in the body.</p> <p>Fat contains nine calories per gram; it has the most calories of the macronutrients.</p>
<b>Lean mass – Lean (g)</b>	Everything in the body except fat, including organs, skin and all body tissue including muscle tissue. Approximately 50-60% of lean body mass is water. The same as FFM.
<b>Fat free mass (FFM) – Lean + BMC (g)</b>	Another term for lean body mass, FFM refers to muscle, bones, organs, and connective tissue. The three compartments of the body are fat free mass, fat mass, and water.
<b>Osteopenia</b>	A condition in which there is a decrease in bone mineral density but not necessarily an increase in the risk or incidence of fracture.
<b>Osteoporosis</b>	A condition in which there is a decrease in bone mineral content and bone mineral density and an increased risk and/or incidence of fracture.
<b>Visceral adipose tissue (VAT)</b>	<p>VAT area is a specific assessment of your abdominal region (Central Adipose Tissue).</p> <p>The research literature suggests that if your Est. VAT Area (cm<sup>2</sup>) measurement is over 100g/cm<sup>2</sup> you have an increased risk of cardiovascular disease and/or type 2 diabetes.</p>
<b>T-score</b>	A statistical measure used to determine the SD about a young adult mean. In the BD area you are compared to a group of young adult females aged 20 - 29 years.