DYNAMIC DNA
LABORATORIES

FITNESS REPORT

Genetic Testing For an Active Lifestyle

Sample Report

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Introduction

Modern genetics is a rapidly advancing field. This expansion of self-understanding has led to the amazing discovery that all humans share more than 99% of their DNA. It is in the <1% variation that makes each of us unique from everyone else in the world. Despite the common association of human genetics with hereditary disorders and disease predisposition, this discovery has also led to the understanding that no one approach to diet and fitness will work for everyone. Most people who have seriously engaged in a diet and exercise plan are likely already aware of this. The goal of this report is to offer an explanation to these commonly held ideologies and provide answers to important questions surrounding your diet, nutrition, exercise, and metabolism.

It is our hope that this report will be useful to anyone, regardless of his or her current level of health or physical fitness. Whether you find yourself 40 pounds overweight or have run two marathons in the past month, the information contained in this report will help you live a healthier lifestyle and understand how your body functions like never before, at the genetic level.

If after reviewing this report you have any questions, please feel free to contact us regarding any aspect of this document. We also strongly urge you to review these findings with your primary care physician and discuss any changes to your diet or exercise plan before making any changes.

Thank you for giving us the opportunity to contribute to your overall health and wellness!

Austin O'Reilly, Founder
Dynamic DNA Laboratories, LLC

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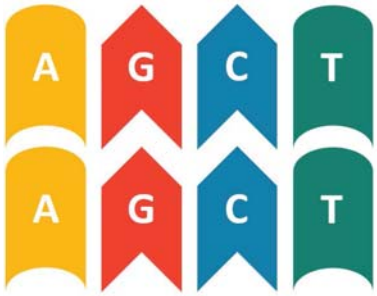
Basics of Biology

To get the most out of this report it will be helpful to understand some commonly used terms in biology. Please take a minute to read this section before moving on to the rest of your report!

1) There are four letters to your genetic code: A, T, C and G. These letters are often called alleles.

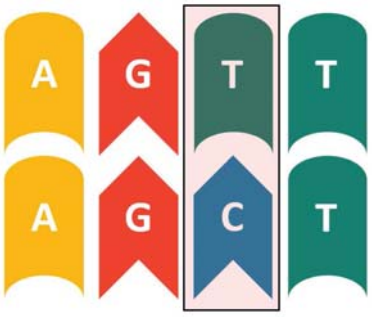
2) You have two copies of your genetic code, one from your mom and another from your dad.



Copy from Mom

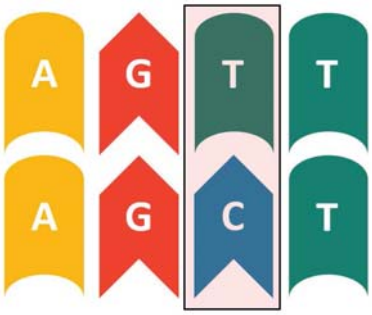
Copy from Dad

3) Changes in your genetic code are called "SNPs". The sequence of your genetic code at a SNP is called a "Genotype".



C/T Genotype

4) SNPs are always named with a number that begins with "rs".



C/T Genotype at SNP rs1234

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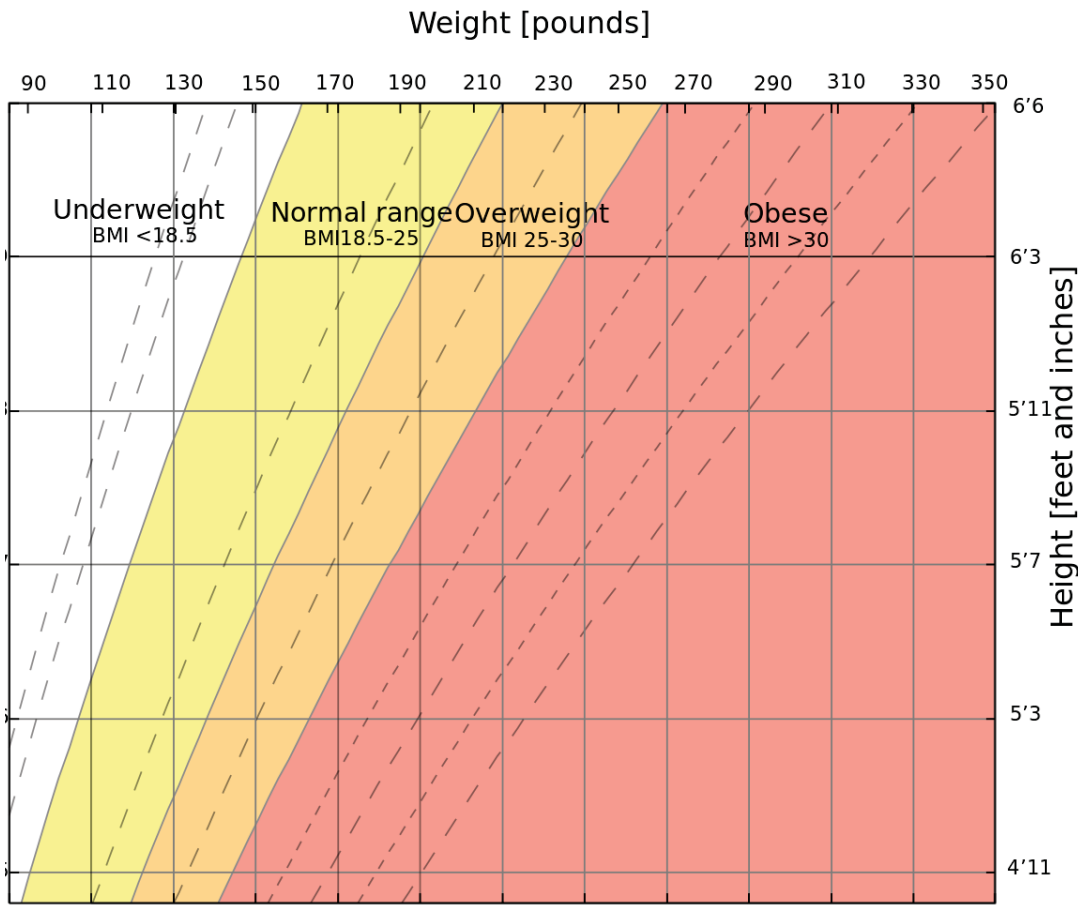
BODY MASS INDEX (BMI)

Body mass index (BMI) is a value obtained from height and weight of an individual that is used to categorize an individual into a class of body type. BMI results are a single number that is then interpreted using a series of ranges such as those listed in the figure below. There is some debate on the exact values, but generally speaking obesity is defined as a BMI of over 30. The BMI is useful because it is a single measurement that can indicate an individual's risk of comorbidities (co-occurring condition) that may result from being over or underweight. Please note that this BMI calculation is only valid for men and women over the age of 20. If you do not see your BMI metrics to the right you may not have provided us with your height and weight along with your test requisition.

Customer Information	
Name	Sample Report
Date	October 2, 2018
Weight	120 lbs.
Height	66"
Age	33
Sex	Female

Body Mass Index Calculations	
BMI	**19.4**
BMI Result	**Normal Weight**
Risk of Comorbidities	**Average**



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Build

Blood pressure, muscle volume, and muscle growth all play an important role in your fitness training. We all want to know how we can increase muscle mass and experience muscle growth, right? The results you see in the gym are often influenced by your genetics and have an effect on all of these variables. Knowing how your genes plays a role in how you will respond to various types of training and regulate blood pressure can be found here.

The genetic factors in this section will explain how muscle growth is regulated by the body. You may experience fewer problems with blood pressure while others may be predisposed to higher blood pressure. Some individuals are more likely to experience a significant increase in physical strength & power while some may not...

YOUR RESULT

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Build

Blood Pressure and Muscle Growth

The *AGT* gene produces a protein called Angiotensin, which plays an important role in how blood pressure is regulated in the human body. Small changes in the level of Angiotensin in the body can also influence the growth of skeletal and cardiac muscle. A well-studied SNP in the *AGT* gene has been linked to increased muscle growth and power. However, this same SNP has also been linked to a slightly increased risk for hypertension, or high blood pressure. If you have one or more copies of the "G" allele at this gene you may experience an increase in muscle growth and performance as a result of continued training. [1, 2]

YOUR RESULT

Moderate Benefit

Moderate susceptibility to high blood pressure and you are likely to experience some increased power and strength in your training as a result of this SNP.

MARKER TESTED

Gene	SNP	Your Genotype
AGT	rs699	GA

Build

Muscle Volume

When it comes to muscle growth, one of the best studied genes is *MSTN*. This gene produces a protein called myostatin that acts as a "stop sign" for muscle growth and development. Individuals who have an altered form of the *MSTN* gene and produce less myostatin have significantly more muscle mass than average individuals. While these genetic variants are somewhat rare, they may often explain why some individuals just seem to be "naturally stronger" than others. So, if your results show that you have an increased potential for muscle growth you should consider yourself lucky and explore engaging in more strength and power-based exercises to make the most of your unique *MSTN* gene! [3, 4, 5]

YOUR RESULT

Increased

People with your genotype have an increased volume of muscle. Additionally, your muscles may not breakdown as quickly as individuals who lack this genotype.

MARKER TESTED

Gene	SNP	Your Genotype
MSTN	rs397515373	GG
MSTN	rs1805086	AA

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Build

Pain Tolerance

YOUR RESULT

Lower Tolerance

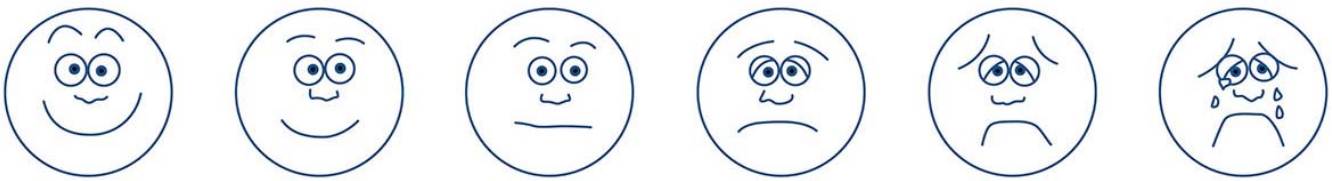
Based on your COMT profile, you are probably more sensitive to pain that the average person.

MARKER TESTED

Gene	SNP	Your Genotype
COMT	rs4633	GG
COMT	rs6269	GG
COMT	rs4680	GG

Everyone experiences pain a little differently. Some people may have no trouble sitting still for an elaborate tattoo, while others may find tears in their eyes after stubbing their toe. Having a low pain tolerance may seem like a bad thing but pain is an important message our bodies send to our brains. Pain is our body's way of telling us: "Hey, something is wrong!" If you aren't getting as many of these signals, or your brain has gotten used to ignoring these signals, you may be at higher risk of injury or disease. This can be especially critical during exercise when we are pushing our bodies to their limits—it's important to know when we need to stop and allow time for recovery. At the opposite end of the spectrum are those that suffer from chronic pain or have unusual pain sensitivities, which not only interfere with your daily life but can be extremely debilitating.

There are many factors that contribute to an individual's pain tolerance including biological, environmental, emotional, and social factors. Past experiences, including conditioning, trauma, or previous diseases or injuries, can impact our perception of pain as well. In addition, scientists are discovering that there are genetic factors that influence our pain tolerance. The *COMT* gene codes an enzyme responsible for breaking down catecholamines like dopamine, epinephrine, and norepinephrine. Studies have found that mutations within this gene can result in either a lower or higher than average pain sensitivity. [45]



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Cardiovascular

Cardiovascular health and exercise greatly influence the body, and your genes play a key role in determining both. Your heart functions in a way that transports the necessary oxygen to your working muscles, and this is vital for you to perform exercises at different intensities. During a workout, your body increases heart rate in order to speed up the circulation process. The genetic markers that are presented in this section will allow you to make the most of your cardiovascular health. You will discover if you are more likely to see an increased response to an endurance-type training or heavy weight training, as well as key traits related to aerobic capacity/response, blood vessel formation, vascular function and nitric oxide metabolism.

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Cardiovascular

Aerobic Capacity

Some of us have a higher aerobic capacity due to our genetics. Having a high aerobic capacity allows your body to work harder during extended exercise. *PPARGC1A* is a gene that produces a protein which is very important for cellular respiration and controls the metabolic pathway that is used for fuel during aerobic exercise. The genes *ADRB1* and *ADRB2* code for adrenergic receptors, which are triggered by the adrenaline generated during exercise in order to increase heart rate, mobilize energy, and divert blood flow into muscles. Your genotype at SNPs within these genes can influence your VO_2 max, which is the maximum volume of oxygen your lungs can utilize during exercise and is a common measurement of aerobic capacity. [8, 9, 10]

YOUR RESULT

Slightly Reduced

Individuals with your genetic profile have a slightly decreased VO2 max and may see an decreased response to endurance-type training.

MARKER TESTED

Gene	SNP	Your Genotype
ADRB2	rs1042714	GG
ADRB2	rs1042713	GG
ADRB1	rs1081253	GG
PPARGC1A	rs8192678	AG

Cardiovascular

Aerobic Exercise Response

Aerobic exercise is also known as cardio exercise. This is a type of exercise that requires increased pumping of oxygenated blood by the heart to deliver oxygen to the muscles. When you begin to exercise, your body immediately adjusts to the change in activity level.

The *AKT1* gene codes for an enzyme related to muscle building and metabolism. Some of us carry a specific version of the gene that is linked to a greater increase in VO2 max in response to aerobic exercise. [11]

YOUR RESULT

Possibly Increased

When engaging in an aerobic training program, you may experience more rapid improvements in aerobic capacity as compared to individuals lacking this genetic variant.

MARKER TESTED

Gene	SNP	Your Genotype
AKT1	rs1130214	AC

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Cardiovascular

Anaerobic Exercise Response

The gene *AMPD1* is responsible for making an enzyme (*AMPD*) that helps regulate how much lactic acid is accumulated during and after periods of high intensity exercise. Generally speaking, the more *AMPD* an individual produces, the higher their anaerobic capacity during intense exercise. However, this extra boost of anaerobic energy often comes at the cost of increased muscle soreness and fatigue following bouts of strenuous training. While studies indicate that individuals with a "G/G" or "A/G" genotype may not see any changes in *AMPD* levels, individuals with a "A/A" genotype are far more likely to see the effects of this marker. [12, 13]

YOUR RESULT

Possibly Decreased

Individuals with your genotype often experience excess muscle cramps and pain following strenuous exercise, but tend to have a higher anaerobic capacity. However, these findings have not been observed in every individual with this genotype.

MARKER TESTED

Gene	SNP	Your Genotype
AMPD1	rs17602729	AG

Cardiovascular

Blood Vessel Formation

New blood vessels are continually forming in the body, especially in response to an aggressive training program. This physiological response is key to ensuring that new and developing muscles are receiving a constant supply of oxygen and nutrients provided by the blood. However, not all individuals build their cardiovascular network equally. A series of studies have identified a genetic variant in the *VEGFA* gene that influences how well your body can create new blood vessels in response to training. If you have one or more copies of the "A" allele at this position you are likely to develop new blood vessels more efficiently than individuals lacking this allele. If this is your genotype, you may find that you are capable of adding muscle bulk easier than others and also may have more muscular endurance due to the increased flow of blood to your muscles. [14]

YOUR RESULT

Normal

You are likely to develop an average number of new blood vessels in response to training.

MARKER TESTED

Gene	SNP	Your Genotype
VEGFA	rs3025039	GG

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Cardiovascular

Nitric Oxide Metabolism

Nitric Oxide is involved in the widening of the blood vessels, which increases blood flow. *NOS3* (Nitric Acid Snythase 3) is an enzyme that enables the production of nitric oxide (NO). Variations in this gene may affect the predisposition for power and strength performance. NO also plays an important role in helping memory & behavior by transmitting information between your nerve cells in the brain, fighting off bacteria, regulating blood pressure, reducing inflammation, and improving sleep quality. The best way to increase NO is through exercise. When you exercise, muscles need more oxygen that is supplied by the blood. With the heart pumping and supplying more blood to your muscles, your arteries release NO which relaxes and widens the vessels and allows for more blood to pass through. [15]

YOUR RESULT

Average

People with your genotype produce average levels of Nitric Oxide (NO), which helps to widen blood vessels during exercise and promote healthy blood flow.

MARKER TESTED

Gene	SNP	Your Genotype
NOS3	rs2070744	AA

Cardiovascular

Vascular Function

Bradykinin is a molecule that is responsible for widening of the blood vessels, therefore blood flow and blood pressure is regulated. Different variations of this gene will lead to lower or higher expression of this receptor, and are also associated with hypertension risk. Hypertension, also known as high blood pressure, is the increased force of blood flowing through the blood vessels.[16, 17]

YOUR RESULT

Possibly Enhanced

Individuals with your genotype are at an average risk for developing hypertension. You may have an enhanced benefit when engaging in endurance-type activities as a result of this SNP.

MARKER TESTED

Gene	SNP	Your Genotype
BDKRB2	rs5443	GG

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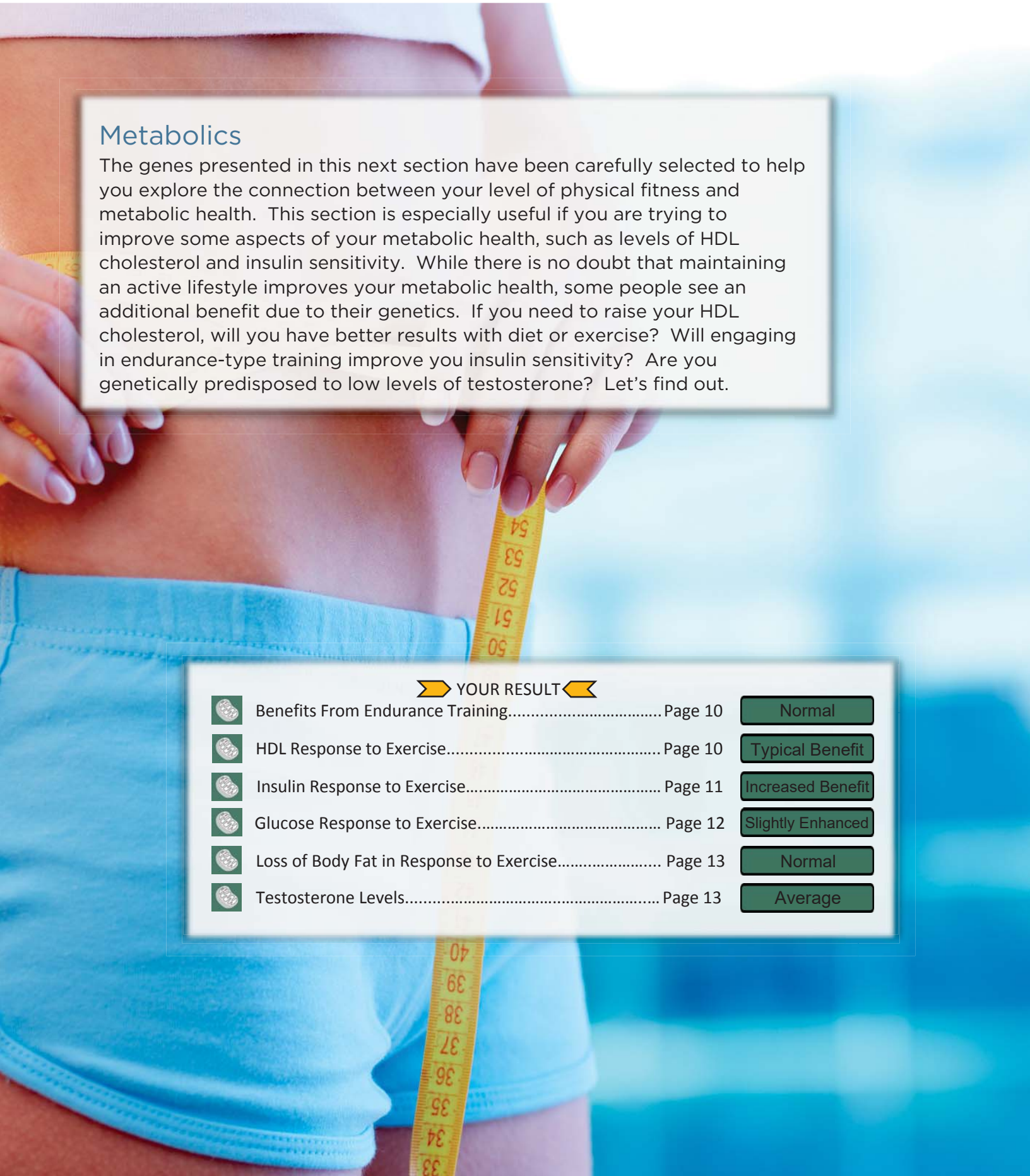

Metabolics

The genes presented in this next section have been carefully selected to help you explore the connection between your level of physical fitness and metabolic health. This section is especially useful if you are trying to improve some aspects of your metabolic health, such as levels of HDL cholesterol and insulin sensitivity. While there is no doubt that maintaining an active lifestyle improves your metabolic health, some people see an additional benefit due to their genetics. If you need to raise your HDL cholesterol, will you have better results with diet or exercise? Will engaging in endurance-type training improve you insulin sensitivity? Are you genetically predisposed to low levels of testosterone? Let's find out.

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Metabolics

Benefit From Endurance Training

Endurance training is defined as an exercise of moderate intensity that is conducted for a longer period of time. Running and cycling are great examples of endurance training. Endurance training not only increases your workout performance, but also contributes to your overall health. Some people have a genetic marker in the *PPARD* gene that has been associated with increased health benefits from endurance-type training. If you have one or more copies of the "G" allele at this position you are likely to experience additional benefits from engaging in these exercises. It should be noted that endurance training is beneficial for nearly everyone, but individuals who lack this genotype may want to focus more on high-intensity or resistance-based exercises. [18]

YOUR RESULT

Normal

Your genotype results in average benefits from endurance training.

MARKER TESTED

Gene	SNP	Your Genotype
PPARD	rs2016520	AA

Metabolics

HDL Response to Exercise

Exercise has many benefits, but one of the most important may be an increase in HDL (high-density lipoprotein) cholesterol levels. Contrary to the popular belief that all cholesterol is bad, HDL cholesterol is very beneficial for the body and having more is a good thing. HDL functions as a "maintenance crew" for the inner walls of blood vessels, reducing the "bad" LDL (low-density lipoprotein) cholesterol that can damage vessels. Nearly everyone will experience an increase in HDL cholesterol as a result of exercise, but individuals with one or more copies of allele "G" at position rs2016520 in the *PPARD* gene are likely to see an additional boost in their numbers. If you do not have a copy of the "G" allele you will still likely see an improvement in HDL after exercising, but probably not to the same extent. [19]

YOUR RESULT

Typical Benefit

Based on your genotype, your HDL cholesterol levels will receive a typical benefit from exercise.

MARKER TESTED

Gene	SNP	Your Genotype
PPARD	rs2016520	AA

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Metabolics

Insulin Response to Exercise

Many people may not be clear on the role of insulin in the human body. Generally speaking, insulin signals your body to transport glucose (sugar) from your blood to your cells where it can be converted into energy. However, the body can often become "resistant" to the effects of insulin which is associated with several negative health outcomes, such as obesity and type 2 diabetes. The human body can become resistant to insulin in response to several different conditions, but largely because of sustained levels of high blood sugar. The good news is that proper diet and exercise can help increase insulin sensitivity. A genetic variant in the *LIPC* gene has been shown to notably increase insulin sensitivity as a result of exercise in certain individuals. Individuals with a genotype of "G/G" or "A/G" have been shown to have an "Increased Benefit" in insulin sensitivity as a result of exercise compared to those with a "A/A" genotype. It is important to remember that if you do not have this variant, exercise is still highly beneficial and can still help improve insulin sensitivity.[20]

YOUR RESULT

Increased Benefit

Your exercise is associated with a 5% improvement in insulin sensitivity.

MARKER TESTED

Gene	SNP	Your Genotype
LIPC	rs1800588	GG

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Metabolics

Glucose Response to Exercise

YOUR RESULT

Slightly Enhanced

Slight improvement in glucose metabolism in response to regular endurance training.

MARKER TESTED

Gene	SNP	Your Genotype
PPARG	rs1801282	GC

Glucose (sugar) is the body's preferred energy source. Our body extracts the glucose from the sugars and carbohydrates in the food we eat and sends it to the blood stream, where it's then known as blood sugar. From our blood stream, insulin transports glucose into our cells where it undergoes further chemical reactions to convert the glucose into ATP, the main energy source for our cells. The entire process of converting the food we eat into energy that our cells can use is known as metabolism.

A slow or poor metabolism means the body is less efficient at converting glucose into cellular energy and is more likely to store it in fat cells. This results in weight gain and an increased risk for negative health outcomes like diabetes or cardiovascular disease. A regular exercise program can improve metabolism and help to lower those risks. Interestingly, a SNP in PPARG, a gene involved in fat cell differentiation, has been shown to be associated with improvements in glucose metabolism in response to regular endurance training.[64]

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Metabolics

Loss of Body Fat in Response to Exercise

Weight control and the loss of body fat are one of many benefits that result from regular exercise. For many people, burning excess fat is their primary fitness goal. Given this, it may be surprising to learn that not everyone burns fat equally during exercise. A genetic variant in the *LPL* gene has been associated with how much fat is burned during exercise. Individuals with one or more "G" alleles at position rs328 in the *LPL* gene have been shown to have an "Enhanced" ability to burn fat as a result of exercise. Of course, if you lack this genetic variant you will still lose fat in response to exercise, but be aware that it may take a little more effort as compared to others with the beneficial variant. [21]

YOUR RESULT

Normal

People with your genotype experience a typical reduction in body fat in response to exercise.

MARKER TESTED

Gene	SNP	Your Genotype
LPL	rs328	CC

Metabolics

Testosterone Levels

Testosterone plays a vital role in your body's functioning. It aids in building muscle, regulates your libido, helps control production of red blood cells, bone mass, muscle mass, and strength. For these reasons, it is beneficial to boost your testosterone. This can be accomplished by focusing on shorter workouts that include resistance training, high intensity training, and shorter rest periods. Genetically, if you have low testosterone you are at higher risk for increased body fat, reduced metabolic health, and reduced muscle mass. [22]

YOUR RESULT

Average

People with your genotype at these two locations typically have average levels of testosterone.

MARKER TESTED

Gene	SNP	Your Genotype
SHBG	rs727428	GG
SHBG	rs6259	GG