Health & Wellness Genetic Profile

Name: Sample, Report

Report Number: HW-AGS0000

Report Date: 2017-08-16

Your AGS Genetic Journey has Begun

AGS
ADVANCED GENOMICS MADE PERSONAL

Today is a new beginning,
a chance to make changes,
a first step in achieving your goal of
becoming a healthier version of yourself.
You are on the right path!

Genetic Summary Highlights

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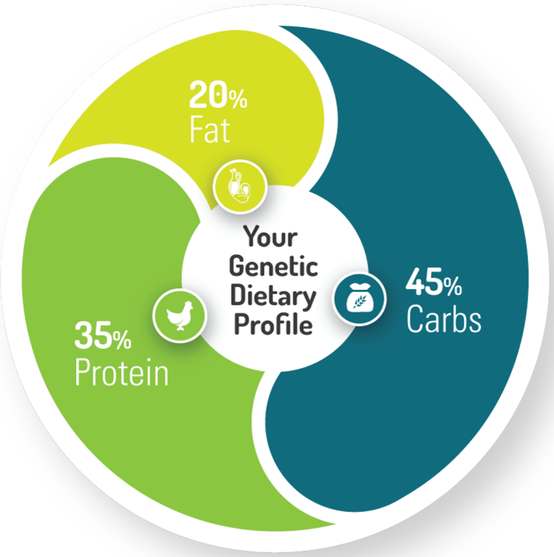
Your Micronutrients: (p. 4)



Protein: Your results revealed that for optimal health 35% of your macronutrients should come from protein.

Carbs: Since your carbohydrate percentage is ideally 45% of your macronutrients, you will want to focus on complex carbs and limit intake from simple carbs like white rice, white flour, white sugar, Pasta, white breads, potato chips, etc.

Fat: Healthy fats (i.e. monounsaturated and polyunsaturated) are essential for almost every human activity. Your ideal fat macro intake should be 20% of your total daily calories.

Fats (p. 4 & 12)

MUFAs	Your genotype shows a higher risk in the tendency to gain weight when consuming monounsaturated fats (MUFA).
PUFAs	You are fairly responsive to PUFA than people with other genotypes.

Beverages (p.5 & 15)

Lactose	Your genotype is associated with the inability to fully digest sugar (lactose) in dairy products.
Caffeine	Your genotype shows that you are a fast metabolizer of caffeine and would have less negative symptoms due to its consumption.
Alcohol	Your genotype shows that you are a fast metabolizer of alcohol.

Your Vitamins and Supplements (p. 6 & 23)

Vitamin A	Your genotype shows that you have some difficulty converting plant based Vitamin A (beta-carotene) to the active form (retinol).
Vitamin D	Your genetic profile shows a tendency towards a lower Vitamin D concentration.
Vitamin B6	Your genotype is associated with normal levels of Vitamin B6.
Folate	Your genotype is associated with the inability to optimally activate dietary forms of folate.
Vitamin B12	Your genotype shows that you have an impairment in the absorption of Vitamin B12 in the small intestines.
Vitamin E	Your genotype shows that you may have decreased levels of Vitamin E, alpha-tocopherol blood concentration.
Iron	Your genetic profile is associated with a low iron status.

Your Behavior (p. 8 & 22)

Food Cravings	Your genotype has shown an impairment in the ability to accurately trigger your satiety,
Taste	Your genotype shows a high sensitivity to bitter-tasting foods.
Sweet Tooth	Your genotype shows you have a low tendency to crave sweet foods and that you have a normal ability to taste sweetness in food.
Emotional Eating	You may turn to food for comfort when facing a difficult problem, feeling stressed or even feeling bored.
Addictive Behaviors	Your genotype shows an increased tendency for addictive behaviors.

Your Exercise / Activity (p. 7 & 16)

Power
40% Power means light, medium, and/or heavy strength training using weight or your body resistance.

Endurance
60% Endurance means cardio - keeping your heart rate elevated for a period of time.

Injury and Recovery
Your genotype shows that your tendency for soft tissue injuries is high.

Cholesterol (HDL & LDL)
Your genotype shows that you may not experience an increase in HDL-cholesterol (good) levels by performing endurance focused exercises or training.

Blood Pressure
You have an increased risk of higher blood pressure based on your genetic profile.

Overall Health Awareness and Effort Score (p. 8 & 9)

This score is a rating between 1 and 10 (1 means a low level of awareness and effort level is required to stay healthy, 10 means a high level of effort and awareness is required to stay fit).

Your genetic tendency indicates you have a **moderate** Health Awareness and Effort Score. This means the amount of effort and energy you put towards overall well-being, you will see equal results. Be a health conscious person to get the results you desire.

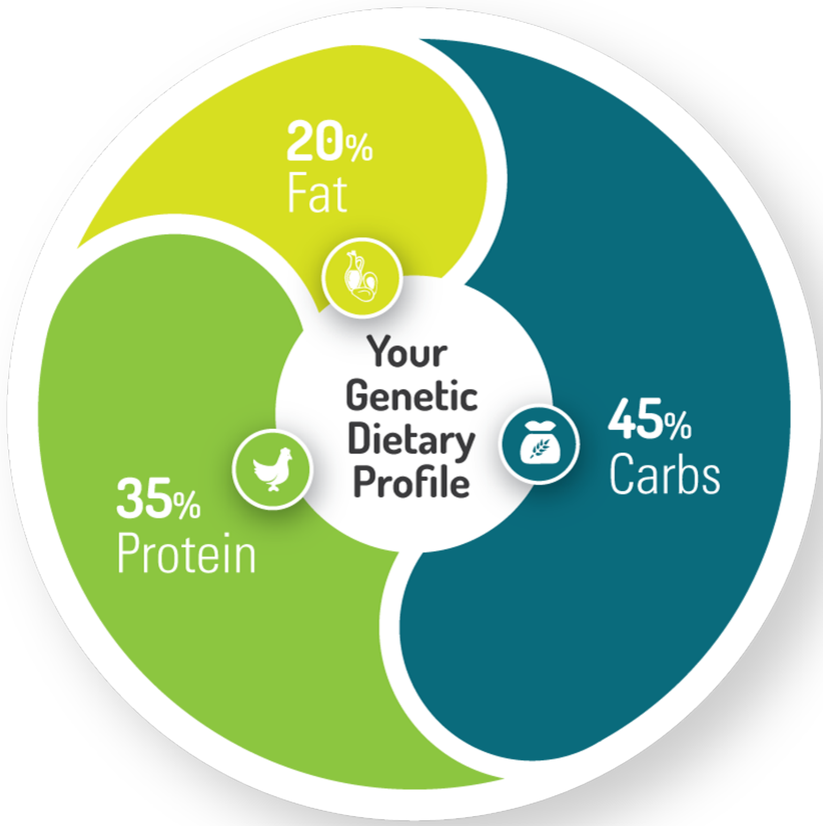
⚠ = Pay particular attention to this actionable recommendation to better your health moving forward.

Your AGS Genetic Journey has Begun:

Your Genetically Optimized Nutrition Plan

Congratulations! Welcome to Your AGS Genetically Optimized Nutrition Plan that is truly about YOU. Your DNA was extracted, tested, analyzed and evaluated to confirm this report's accuracy. Receiving this report is just the beginning of your very exciting genetic journey and we are here to support you. To fully understand this report, and to grasp its full potential, we urge you to contact us to schedule your complimentary consultation with one of our Genetic Health Specialists. Our team will walk you through your report and answer your questions. This important step is a part of our core beliefs and mission statement to support your health initiative and help guide your efforts towards reaching your optimal health goals, whatever they may be. Armed with your DNA results, you now have the power to make adjustments to your diet, fitness and lifestyle.

Always consult your physician before beginning any diet or exercise program. Information within this report is not intended to replace any advice from your healthcare professional. We encourage you to share this information with your doctor to confirm any deficiencies. Let's get started!



Explanation of Pie Chart

Your Genetic Dietary Profile (above) outlines the percentage of daily calories that should come from each Macronutrient; protein, carbohydrates, and fats. Based on your genetic metabolism you will be able to optimally process and metabolize these specific percentages daily for healthy repair of tissues and organs, building of lean muscle, and provide a stable and sustainable energy source. Your total daily calorie intake should be calculated by understanding your goals, evaluating your body composition, and describing your general activity. You can also consult a health or wellness care provider for more complete analysis and dietary planning.

Protein:

Protein is used by your body to retain, build and repair muscle and plays a role in reviving fat-burning metabolism. It also helps reduce hunger pangs that can lead to snack attacks. Additionally, protein works to slow the release of carbohydrates into your bloodstream, which can prevent the sudden spikes in blood sugar that encourage fat storage and dragging energy levels. Refer to Your Nutritional Tips section for more specific protein food suggestions.

Fats:

Limit your total fat intake to no more than 30% of your daily calorie intake for optimal health.

MUFAs:

Your genotype shows a higher risk in the tendency to gain weight when consuming monounsaturated fats (MUFA). Choosing polyunsaturated fats (PUFA) may be better options for your weight loss or maintenance goals. Polyunsaturated fats found in plant based oils, sunflower, and flaxseed are better food options for you.

PUFAs:

You are fairly responsive to PUFA than people with other genotypes. It is recommended to consume adequate levels of PUFA to lower or maintain a healthy LDL-cholesterol (bad cholesterol) level.

This section represents all Fats in your diet. Refer to Your Genetic Dietary Profile for % of Fat intake.

Carbohydrates:

Your genotype is slightly affected by the consumption of carbohydrates. Consuming carbohydrates in excess of what is recommended could cause you to have lower levels of HDL cholesterol, the "good" cholesterol. In addition, you should consume complex carbohydrates such as whole grains, legumes/beans, and fiber rich vegetables.

Your Nutritional Tips:

This section is designed to give tips about how you can improve or augment actions in your life to have a healthier lifestyle; it is not meant to be an all-inclusive plan. It includes major components that are considered to be parts of a lifestyle that lead to good health and are based on a 1,500-calorie diet. In addition, it may also mention some of the tips about avoiding actions (the don'ts) that lead to unhealthy living. There is a lot of confusion when it comes to health and nutrition, but these suggestions come straight from your genes:

How to eat for optimal health:

35% Protein:

Your results revealed that for optimal health 35% of your macronutrients should come from protein. Protein is made up of amino acids, which are primary building blocks for muscle, skin and bones. You should focus on LEAN Proteins. Stay away from protein that is high in saturated fat like Fatty Cuts of Steak.

45% Carbohydrates (Carbs):

Carbohydrates are the body's primary energy source. Since your carbohydrate percentage is ideally 45% of your macronutrients, you will want to focus on Complex Carbs and limit intake from Simple Carbs like White rice, White Flour, White Sugar, Pasta, White Breads, Potato Chips, etc. Complex carbs will help digest slower, help you feel more sustained energy and keep you feeling satiated longer. Your best choices are listed in the grocery list.

20% Fat:

Healthy fats (i.e. monounsaturated and polyunsaturated) are essential for almost every human activity. Your ideal fat macro intake should be 20% of your total daily calories. Not only do healthy fats help you feel full, they are used for energy, brain function, and protein synthesis. Fat is not the enemy but should be consumed in moderation. Portion control is always a good idea! Stay away from TRANS Fats (hydrogenated oils or partially hydrogenated oils). Try to limit your saturated fat intake as well (i.e. mayonnaise, vegetable oil, lard, and canola oil).

Important:

Consuming high protein can sometimes cause your body's pH balance to lean more acidic vs. alkaline. Over the long run this can cause internal inflammation. To combat this in a mild and gentle way, adding 16 oz warm lemon water upon waking daily will be highly beneficial. Consuming 1/2 of a whole lemon + 2 cups WARM (not hot) water within 15 minutes of waking provides your body with plenty of essential Vitamins, minerals and vital trace elements. It's also a great energy booster for when we wake up first thing in the morning as our tissues are dehydrated and in desperate need of fluid to gently push out toxins stored from the day(s) before.

Lactose:

Your genotype is associated with the inability to fully digest sugar (lactose) in dairy products. Consider milk alternatives & oat milk to ensure bones health.

Caffeine:

Your genotype shows that you are a fast metabolizer of caffeine and would have less negative symptoms due to its consumption. It is recommended to have no more than (2) 8oz cups of coffee per day and to keep hydrated.

Alcohol:

Your genotype shows that you are a fast metabolizer of alcohol. The metabolizing effect may cause you to overdrink and create habitual drinking behaviors. It is recommended for you to take caution when drinking alcohol and minimize the risk of alcohol related issues by restricting to one standard drink per day.

Grocery List:

- Chicken/Turkey Breast = 4-5 oz or smart phone size 1/2 inch thick
- Lean red meat 90/10 or greater = 4 oz 1 inch thick; the size of a hockey puck
- White cold water fish - halibut, cod, mahi mahi = open hand size 1 inch thick grilled or baked
- Lean pork tenderloin or chops = 4 oz shredded, grilled, or roasted
- Eggs = 2 eggs + 1/3 cup eggs whites
- Cottage Cheese = 1 cup or fist size
- Whole grain bread = 1 large slice or 2 small
- Lentils and beans = 1/2 cup and rinsed well
- Oatmeal = 1/2 cup uncooked / 1 cup cooked = the size of both hands made into a bowl
- Quinoa = 1/4 cup uncooked / 1/2 cup cooked or cupped palm size
- Pumpkin seeds = 1/4 cup or cupped palm
- Avocado = 1/4 of a whole
- Berries = buy in season (summer) 1 cup or handful
- Leafy greens = 3 cups or 1/2 regular size plate

Avoid These:

- Pork Sausage
- Fatty part of Lamb
- Ribs (beef and pork)
- 80/20 ground beef
- Bacon
- Processed Soy
- Chips with hydrogenated oils
- Crackers with hydrogenated oils
- Granola Bars with 15 grams of sugar or more
- Muffins
- White Bread
- Bagels
- Candy Bars

Your Vitamins and Supplements:

Vitamin A:

Your genotype shows that you have some difficulty converting plant based Vitamin A (beta-carotene) to the active form (retinol). You may compliment your sources of plant based Vitamin A (e.g. carrots and green leafy vegetables), with foods containing the active form (e.g. organic butter, eggs, fish, and liver).

Tip:

Keep eating your favorite foods that contain high Vitamin A (i.e. eggs, carrots, pumpkin, spinach, etc.) but also add in a sublingual Vitamin A supplement that can be administered beneath the tongue. Also, consider getting a simple micronutritent test (blood draw) through your doctor, so you can see exactly where your level of Vitamin A is at.

Vitamin D:

Your genetic profile shows a tendency towards a lower Vitamin D concentration. It is recommended to increase D3-rich foods in your diet. Common food sources including egg yolk, beef liver and 15-20 minutes sun exposure every day are recommended.

Tip:

Since your genetic profile shows a tendency to have low Vitamin D levels, it's essential for you to keep adding in Vitamin D rich foods, supplementing with a sublingual (drops or pellets under the tongue) vs. capsule and getting your 20 min of daily sunshine.

Vitamin B6:

Your genotype is associated with normal levels of Vitamin B6. Consuming a balance diet of adequate sources of Vitamin B6, such as meat, nuts, beans, vegetables, and grains is recommended.

Tip:

Since your genetic profile is associated with normal B6 serum levels, continue adding in foods high in B6 such as 1 cup cooked pinto bean, 1/4 cup roasted sunflower seeds, 1/4 cups sesame seeds, 4 oz chicken breast, o oz turkey breast and 3 oz lean grass fed beef. Three servings per day is ideal.

Folate:

Your genotype is associated with the inability to optimally activate dietary forms of folate which is found in foods such as green leafy vegetables, asparagus, kale, spinach, and broccoli. Not activated folate will cause a deficiency, which is also associated with Vitamin B12 deficiency and elevated homocysteine levels.

Tip:

Getting your folate through foods is very important for you! Top 10 foods that contain folate are: 1/2 cup garbonzo beans, 3 oz liver, 1/2 cup pinto beans, 1 cup spinach, 1/2 cup asparagus, 1/2 cup avocado, 1/2 cup beets, 1/2 cup black eyed peas, 1 cup broccoli.

Iron:

Your genetic profile is associated with a low iron status. Incorporate adequate iron-rich foods in diet such as red meats, fish and poultry, spinach, pumpkin seeds and chickpeas. If you experience chronic fatigue, paleness, dizziness, please consult your physician for a blood test to check your hemoglobin level and iron status.

Tip:

Consider getting a blood test to check your exact iron level. Recommended foods are: Spirulina, beef liver, lean grass fed beef, 1/2 cup lentils and 1 oz dark chocolate.

Vitamin E:

Your genotype shows that you may have decreased levels of Vitamin E, alpha-tocopherol blood concentration. Due to a tendency to have lower levels of Vitamin E, it is recommended you increase your consumption of Vitamin E foods such as seeds, nuts, avocado, and plant oils. You may consider dietary supplements for better anti-oxidizing and anti-aging effect.

Tip:

Keep eating your favorite foods containing high Vitamin E (i.e. almonds, spinach, sweet potato, etc.) but also add in Vitamin E oil to your favorite topical face and body lotions.

Vitamin B12:

Your genotype shows that you have an impairment in the absorption of Vitamin B12 in the small intestines. To obtain adequate amounts of Vitamin B12, which is found only in animal derived foods, it is important that you consume foods such as meat, dairy, and eggs. If you are a vegan or can not consume a higher amount of these animal-derived foods, it is recommended that you take a dietary supplement with Vitamin B12.

Tip:

As your genotype shows an altered ability to absorb Vitamin B12, consider a "sublingual" variety, which is better for B12 absorption and prevent having too much alcohol.

Vitamin K:

Referred to as the clotting Vitamin, Vitamin K helps your liver produce a number of blood clotting factors, which are essential for proper physical response to heal your body during minor and major injuries.

Tip:

Best food sources to replenish your Vitamin K requirements daily are: kale, hard cheese, swiss chard, turnips, asparagus, cabbage, eggs, and broccoli.

Your Exercise and Activity:

It is important to note that Your Exercise and Activity results are to support your fitness goals and to help you choose exercises and sports that fit your genetic pre-disposition. For the healthiest exercise routine, diversify your workouts by incorporating a variety of activities and gradually build your strength and endurance over time. When you perform the same exercises repeatedly, they become easier over time. In fact, your body's nervous system, muscles, and other physiological systems can adapt to a workout routine in as little as six to eight weeks. Eventually, your workouts won't offer you much of a challenge. If you don't change up your routine, your fitness level will plateau.

Remember to include the five key elements of fitness training in your workouts: aerobic exercise, strength training, core exercises, balance training, and stretching.

40% Power is light, medium, and/or heavy strength training using weight or your body resistance. For your power portion, end with 50 walking lunges, 25 pushups, and a 1 minute plank hold to round out a full body workout. To benefit most from exercise, you should work out hard enough that having a conversation with someone would be challenging. This enhances your aerobic capacity - that is, the ability of your cardiovascular system to deliver oxygen to the body's cells during exercise.

60% Endurance is cardio - keeping your heart rate elevated for a period of time. Start with elevating your heart rate 3-4 times per week for 30 minutes in duration. Intervals are ideal, easy, and proven to burn the most fat over the course of the day. For example, find an open track or quiet road/street. If you are on a track, walk the curves of the track and run the straightaways. Repeat 8-10 times. If you are on a road or street quickly jog to a light pole and walk to the next.

Other options:

- Small group fitness class that combines light-medium weights + high intensity cardio
- 45 min fast paced hike with minimal rest stops + 50 pushups before bed
- 3 mile intervals (walk 2 min/jog 2 min/sprint 30 seconds) + 50 burpies spread out over the day

WORKING OUT IS ESSENTIAL TO KEEPING YOUR METABOLISM HIGH.

Injury and Recovery

Your genotype shows that your tendency for soft tissue injuries is high. Soft tissue such as muscle, ligament, tendon, and cartilage can be damaged during contact sports such as football and repetitive exercises like long-distance running and cycling. It is essential for individuals with this genotype to get plenty of rest in between activities. It is also important to incorporate a proper warm-up before an activity and cool-down afterwards.

Cholesterol (HDL and LDL)

Your genotype shows that you may not experience an increase in HDL-cholesterol levels, the "good" cholesterol, compared to other genotypes, by performing endurance focused exercises or training. Therefore, if you are predominately using endurance exercises to raise your HDL-cholesterol levels, you may want to compliment these efforts with dietary and other lifestyle changes. It is important to note that endurance training has many other cardiovascular and body composition benefits. Therefore, it should be a part of your daily routine.

Blood Pressure

You have an increased risk of higher blood pressure based on your genetic profile. Your genotype shows that exercise and low sodium intake can lower your blood pressure more effectively than others. Incorporating at least 30 minutes, 3x per week of endurance exercise and limiting salt intake to less than 5g per day will help you maintain a healthy blood pressure.

Your Behavior:

Food Cravings and Satiety:

Your genotype has shown an impairment in the ability to accurately trigger your satiety, also know as "fullness", receptors during a meal. You may have a delayed response which will cause you to consume more calories than you need.

Tip:

It is important that you portion control as well as be aware of your hunger cravings after a meal, these two things will help you to manage your genetic tendencies.

Taste

Your genotype shows a high sensitivity to bitter-tasting foods. This sensitivity can cause an avoidance of highly nutritious vegetables such as kale, brussel sprouts, and asparagus. Your sensitivity can also cause you to add sugar to various foods and drinks.

Tip:

Be aware of your sensitivity to bitter-tasting foods and consume a variety of vegetables that are highly dense, fiber-rich, and are within the green leafy variety. Avoidance of the known highly bitter vegetables is an option, but you have other choices too. Be adventurous and try adding spices such as garlic and red pepper flakes while cooking your veggies.

Sweet Tooth

Your genotype shows you have a low tendency to crave sweet foods and that you have a normal ability to taste sweetness in food. This combination means you may crave sweetness and become satisfied without over eating.

Tip:

Take advantage of your Optimal Genetic Dietary Profile to further reduce your consumption of sugary foods.

Emotional Eating:

Sometimes the strongest food cravings hit when you're at your weakest point emotionally. You may turn to food for comfort when facing a difficult problem, feeling stressed or even feeling bored. Emotional eating can sabotage your weight-loss efforts.

Tip:

When experiencing low moods, try incorporating activities that facilitate the natural release of endorphins instead of turning to food for comfort. Try light exercise, talking with a friend or loved one, doing an activity you enjoy, or going for a brisk walk.

Addictive Behaviors:

Your genotype shows an increased tendency for addictive behaviors. The reward signals from highly palatable foods may override signals of fullness and satisfaction. You may keep eating, even when you are not hungry.

Tip:

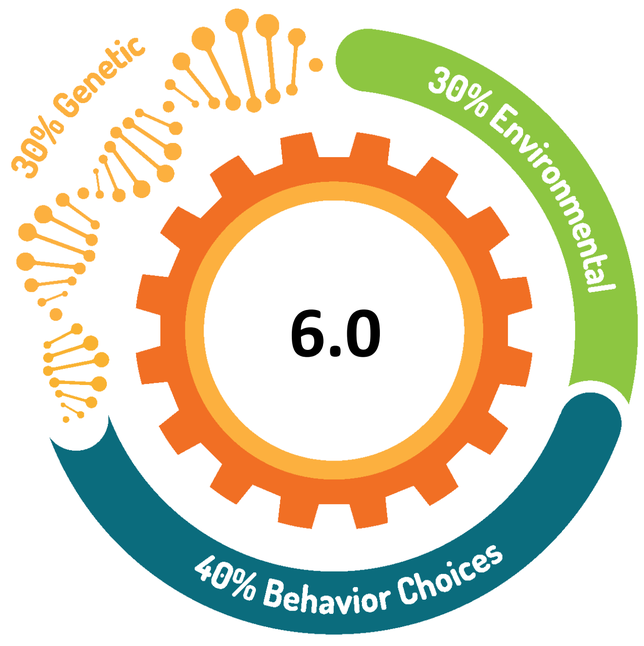
Being aware of your hunger and food cravings after a meal and properly managing your nutritional schedule will help you to manage your caloric intake.

Your Health Awareness and Effort Score:

You have a moderate Health Awareness and Effort Score

Your Overall Health Awareness and Effort Score is a rating between 1 and 10 (1 means a low level of awareness and effort level is required to stay healthy, 10 means a high level of effort and awareness is required to stay fit). This is calculated by examining SNPs in your DNA that have been associated with weight gain including BMI, waist circumference, and body fat percentage. These DNA base pairs represent various tendencies such as overeating, lower metabolic rates, cravings for sweet foods, and other behaviors that can lead to weight management issues. Being aware of your genetic tendencies will allow you to understand the level of effort you need to take to support your overall health and wellness.

Your genetic tendency indicates you have a moderate Health Awareness and Effort Score. On average, most people fall into this range. This means the amount of effort and energy you put towards overall well-being, you will see equal results. Be a health conscious person and follow Your Genetically Optimized Nutrition Plan to support your health initiative and help guide your efforts towards reaching your optimal health goals.



Your Score Above:

We evaluate the most clinically validated biomarkers for obesity and BMI by using a scientific algorithm to determine your Health Awareness and Effort Score (above).

If your score is high, it does not mean you are doomed to be obese. Instead, adhere to the right diet and exercise recommendations according to your DNA. This will keep you on track and help you to achieve optimal health and wellness.

A Brief Overview of Your Genetic Health Report

Your Health Awareness and Effort Score is made up of SNPs that are all correlated in various ways to the buildup of fat tissue in the body. How much a person weighs and how that fat tissue is distributed depends on that person's genetic makeup. Some of the most compelling studies on weight and genetics investigate separated twins to determine the "nature vs. nurture" effect in obesity. These studies show that genetics can account for 77% of the variation in body weight. Studies that look into adopted and biological parents and children show that much body type variation is genetic. However, no single SNP is capable of making someone obese. Genetic markers have an addictive effect and are sometimes "turned on and off" by other factors.

Your Health Awareness and Effort Score is a number between 1 and 10 that you can use as an indication of how your body responds genetically to weight gain. Remember, this number is not the last word in this equation. Your behavior has a significant impact on your tendency toward obesity. Even if you have a high Health Awareness and Effort Score, you can overcome it by eating well and exercising. If you burn the same amount of calories that you consume, you will not gain weight. The opposite is also true - even if your Health Awareness and Effort Score is low, you can still gain weight if you stick to the all-American diet of salt, sugar, and fat.

Genetic Weight, BMI, and Overall Wellness

Recommendations

- Your genetic profile shows that you have a tendency to burn calories at an increased rate. This may help you lose weight and maintain a healthy BMI through exercises.
- Your obesity risk is within the general range. It may not be particularly easy for you to gain or lose weight. You are recommended to incorporate some healthy dietary elements as part of your general eating habits. An example is having more fiber and whole grain foods to replace refined carbohydrates in your diet. Nevertheless, it may not be necessary for you to strictly limit your calorie intake if you have already achieved a healthy weight.

Increased resting metabolic rate

CC **GC** GG | LEPR rs1805094 | 33

One major contributor to weight gain and loss is the metabolic rate of an individual. People with a higher resting metabolism rate will naturally burn more calories than others doing the same basic activities. This leads to lower average weight and slower weight gain. Individuals with the C allele have an increased resting metabolic rate and can burn calories faster.

No known risk of increased BMI

AA AG **GG** | MC4R rs12970134 | 29

This gene is associated with an increased waist circumference, increased BMI, and insulin resistance in a study of about 15,000 people. Individuals with the A allele have an increased risk.

Increased risk of higher BMI in adolescence

TT GG GT | FTO rs3751812 | 16

This SNP is a common variant in fat mass and obesity-associated in the FTO gene and has been shown to contribute to early onset of obesity in adolescents and children. Individuals with the TT genotype tend to have an increased risk.

No known risk of increased BMI

CC TC **TT** | MC4R rs17782313 | 7

This gene is associated with an increased BMI. In a study of over 60,000 people, this gene was shown to influence fat mass, weight, and risk of obesity. Individuals with the C allele have a higher risk than others.

Explains impact of genotype on your body | Circle indicates your genotype | Gene name and SNP

Genotype headline | CC TC TT | MC4R rs17782313 | #

Gene description is written below each genotype headline for more information. | All possible genotypes | Study reference number

No known risk of increased BMI

AA GA **GG** | SH2B1 rs4788102 | 40

This gene is associated with an increased risk of BMI. Individuals with the A allele have a increased risk of a higher BMI, obesity, waist circumference and type 2 diabetes.

No known risk of increased BMI

AA **AG** GG | LEP rs7799039 | 27

This gene is associated with an increased risk of higher BMI. It is also associated with an increased weight gain in children who take risperidone (used to treat schizophrenia or bipolar disorder). Individuals with AA genotype have an increased risk.

Increased risk of higher BMI

CC **CG** GG | PCSK1_2 rs6235 | 22

This gene is consistently associated with BMI in a study of over 13,000 individuals. It affects the way protein is used by the body. Individuals with the C allele have an increased risk of a higher BMI.

Increased risk of higher BMI

CC **CT** TT | near-KCTD15 rs29941 | 8

In a large study of over 16,000 people of European descent that identified several genes associated with an increased risk of obesity, the C allele has one of the strongest associations. These individuals have a higher risk of increased BMI.

No genetic tendency to overeat

GG **AA** GA | COMT rs4680 | 18

This gene is tied to dopamine, serotonin, and noradrenaline metabolism in the brain. These neurotransmitters are, in turn, related to emotional patterns, which can affect eating behaviors. Individuals with the GG genotypes are associated with obesity, type 2 diabetes, and impaired glucose tolerance. These individuals tend to overeat more than others.

Increased risk of obesity

TC **TT** CC | FTO rs1121980 | 3

This gene is associated with an increased fat mass and risk of obesity. Published studies have shown the negative effect was doubled for inactive individuals as that of individuals conducting regular physical activity.

Increased risk of obesity

CC CT TT | ETV5 rs7647305 | 41

This gene is associated with an increased risk of obesity in adults. Published studies indicate that individuals with the C allele have an higher risk for morbid obesity and type 2 diabetes.

Increased risk of obesity

AG **GG** AA | BDNF rs6265 | 26

This gene is associated with an increased risk of obesity in a study that identified many other similar genes. The AG & GG genotypes have a relationship to an altered neurotransmitter function that plays a role in mood control.

Increased risk of obesity

CC CT TT | APOA2 rs5082 | 19

This gene is associated with an increased BMI, increased waist measurements and influences risk of obesity and heart disease. Individuals with CC genotype should avoid saturated fats.

No known increased risk of obesity

AA GA GG | ADIPOQ rs17366568 | 36

In a study with over 1,200 cases and over 1,200 controls, 29 SNPs were evaluated for their relationship to adiponectin (a protein involved in regulating glucose levels as well as fatty acid breakdown), which is inversely related to obesity levels and type 2 diabetes. Individuals with A allele have a higher risk.

Possible difficulty feeling full

AA AT TT | FTO rs9939609 | 40

This gene has been associated with obesity and diabetes. Some genotypes seem to have difficulty feeling full after eating, even when food intake is more than adequate. Thus, people with AA or AT genotype tend to overeat and gain weight.

Increased risk of obesity

AG GG AA | TMEM18 rs7561317 | 40

This gene has been associated with raising the risk of extreme childhood obesity and obesity as an adult.

No known increased risk of obesity

AA AG GG | FAIM2 rs7138803 | 40

This gene is associated with an increased risk of obesity. Individuals with A allele have a greater obesity risk than others.

No known tendency to overeat

CT TT CC | DRD2 rs1800497 | 39

This gene plays a role influencing how the brain uses dopamine, a neurotransmitter enabling an internal reward system and behavior responses. Individuals with the T allele are more likely to use food as motivation than others. As a result, they may consume more calories, binge eat and engage in emotional eating.

No increased risk of addictive behavior

TT CC CT | DRD2 rs6277 | 11

This gene plays a role influencing how the brain uses dopamine, a neurotransmitter enabling an internal reward system and behavior responses. These behavioral addictions are defined as a compulsion to continually engage in behaviors despite the negative impact on one's healthy or daily life. Individuals with the C allele are more likely to have addictive behaviors than those with the T allele.

No increased risk of childhood obesity

CC CT TT | SEC16B rs10913469 | 28

This gene has been linked to an increased risk of extreme obesity in childhood and a tendency towards obesity in adults. Individuals with the C allele have an increased risk of childhood obesity and a continuation into adulthood.

Your Food Choices

Humans vary greatly when it comes to metabolism and food processing. The process of breaking down and storing or using energy from food is extremely complicated, and we are just beginning to learn about the genes involved in metabolism. This section identifies some of the genetic variations that are related to food processing and preferences and how your body reacts to fats, proteins, and carbs. As a general rule, whole, unprocessed foods, especially fruits and vegetables, are the best fuel you can feed your body, but this section will also show you some strengths and weaknesses that will enable you to plan your diet better. These SNPs all have an environmental component that relates to the genetic hand you have been dealt. This means that how you eat and treat yourself is as important (if not more important!) as your genetics. None of these SNPs alone should be a great cause for concern, but they should be treated seriously as these have been scientifically proven to contribute to overall wellness.

Fats

Recommendations

- Your genotype shows that you will benefit from limiting your total fat intake. No more than 30% of your calories should be from fat. Your genetic report will provide further details on the types of fat that best fits your genetic profile.
- Your genotype shows that you will have a higher tendency to gain weight consuming a diet high in saturated fat. Saturated fat should contribute no more than 10% of your daily total caloric intake. Avoid foods high in saturated fat such as fatty beef, poultry with skin, butter, cheese, and other products made from whole or 2 percent milk.
- Your genotype shows a higher risk in the tendency to gain weight when consuming monounsaturated fats (MUFA). Choosing polyunsaturated fats (PUFA) may be better options for your weight loss or maintenance goals. Polyunsaturated fats found in plant based oils, sunflower, and flaxseed are better food options for you.
- You are fairly responsive to PUFA than people with other genotypes. Use PUFA to replace the saturated fat intake and make PUFA your major dietary fat source.

Increased risk of gaining body fat mass

AA AT TT | FTO rs9939609 | 40

This gene, sometimes referred to as the 'fat gene', is associated with an increased obesity and has an influence on appetite regulation. In a study of nearly 5,000 people, individuals with AA and AT genotypes experienced more difficulty feeling full and were recommended to find ways to feel fuller after eating a meal. For example, eating an apple and drinking a full glass of water before a meal, practice mindful eating (don't eat while working or watching TV, etc.) or eating for only a prescribed amount of time to make food and possibility for over eating less of a possibility).

Minimize saturated fat intake

CC CT TT | APOA2 rs5082 | 19

An extensive study of 3 independent populations found a gene-diet association with BMI and obesity risk. Individuals with the CC genotype gain weight with a high saturated fat diet (>10% total calories) and results in a significant increase in BMI. Those of CT or TT genotypes did not show a varied response at varied levels of saturated fat intake.

Limit MUFA consumptions to avoid weight gain

AA AG GG | ADIPOQ rs17300539 | 6

MUFA's are monounsaturated fatty acids, plant-based fats found in some of the world's most delicious foods - avocado, nuts and seeds, oils, olives, and dark chocolate. Studies show that these good-for-you fats enhance heart health and can protect against chronic disease. This gene is associated with an increase in BMI related to how the body processes MUFAs. People with the A allele have the ability to lose weight by consuming more MUFAs (refer to Your Genetically Optimized Nutritional Plan Pie Chart for fat intake percentages) and were able to keep the weight off after dieting. Individuals with the GG genotype who consume higher levels of MUFA (>13% total calories) may result in an increased BMI.

Genetic tendency for better LDL profile

AA GA **GG** | FADS1 rs174547 | 57

FADS1 is involved in the production of fatty acid desaturases which helps in the metabolism of polyunsaturated fatty acids (PUFA) in our body. This gene affects the circulating levels of eicosapentaenoic acid (EPA). Studies found that the G allele is associated with a normal formation of EPA, thus a lower level of LDL cholesterol (bad cholesterol).

Include PUFA to improve lipid profile

GC GG CC | PPARG rs1801282 | 12

In a meta-analysis of about 55,000 subjects, it found that individuals with the CC genotype had lower levels of total cholesterol and LDL-C concentration than individuals with the GG and CG genotypes in Asian populations. The study shows that ensuring adequate PUFA in diet could be beneficial on optimizing total cholesterol and LDL levels among GG and CG genotype carriers who have a genetic tendency of a less ideal lipid profile.

Low to moderate fat intake to raise HDL

TT CC **CT** | LIPC rs1800588 | 9

This gene is associated with the concentration of HDL-cholesterol (good cholesterol) depending on dietary fat intake. For individuals who consumed a low-fat diet, C allele carriers indicated a higher concentration of HDL-cholesterol than those with TT genotype. On the other hand, the individuals with TT genotype report the lowest HDL-cholesterol level compared with CC and CT genotypes on a high-fat diet.

Carbohydrates

Recommendations

- Your genotype is slightly affected by the consumption of carbohydrates, but not as significant as other genotypes. Consuming excess carbohydrates than what is recommended could cause you to have lower levels of HDL cholesterol, the "good" cholesterol. It is beneficial for you to consume in the lower range of carbohydrates that is recommended in your optimal nutritional profile. In addition, you should focus on consuming complex carbohydrates such as whole grains, legumes/beans, and fiber rich vegetables.

Avoid high carbohydrate diets to achieve better HDL

GG CC GC | KCTD10 rs10850219 | 15

This gene is associated with the response of HDL-cholesterol (good cholesterol) concentrations on dietary carbohydrates. Individuals with the GG genotype may experience a decrease in HDL-cholesterol concentration with a higher level of carbohydrate intake.

Tendency of better LDL-cholesterol

GG CC **GC** | MMAB rs2241201 | 15

This gene is associated with LDL-cholesterol (bad cholesterol) and HDL-cholesterol (good cholesterol) concentrations, depending on dietary carbohydrate intake. Individuals with the GG genotype have a genetic tendency towards higher LDL-cholesterol concentration than individuals with other genotypes.

Taste Sensory

Recommendations

- Your genotype shows you have a low tendency to crave sweet foods and that you have a normal ability to taste sweetness in food. This combination means you may crave sweetness and become satisfied without over eating.
- Your genotype shows that you have a high sensitivity to bitter-tasting foods. This sensitivity can cause an avoidance to foods such as black coffee, dark chocolate, and highly nutritious vegetables such as kale, brussel sprouts, and asparagus. Your sensitivity can cause you to add sugar to various foods and drinks and/or avoid them completely. It is important you recognize this sensitivity and manage your vegetable and sugar intake.

Be aware of increased desire for sweets

TC | TT CC | SLCA2 rs5400 | 21

This gene has been named the 'Sweet Tooth Gene' and is associated with the desire to consume more sugar. It is likely that individuals with the T allele are less sensitive to the amount of sugar in the blood which means they may need to eat more sugar to be satisfied.

Typical ability to taste sucrose

AA GA GG | TAS1R3 rs35744813 | 34

The TAS1R2 and TAS1R3 genes are both tied to taste perception in humans. People with AA and GA genotypes tend to have lower ability to taste sucrose. People who have a lower ability to taste sucrose may be subject to consuming an increased level of sugar to satisfy their needs.

Increased sensitivity to bitter-tasting foods

CC CG GG | TAS2R38 rs713598 | 31

Sensitivity to bitter tastes have long been known to have a genetic component with evolutionary and anthropological implications. Many poisonous things taste bitter, and being able to taste and avoid these things is an evolutionary advantage. The TAS2R38 gene on chromosome 7 is linked to this trait in humans with two SNPs that signal the ability to taste bitterness. However, this genotype is often accompanied by the desire to eat salt to mask bitter flavor. Those individuals with the G allele may tend to consume more salt and/or sugar in their diet than other genotypes to mask the bitterness in foods.

Increased sensitivity to bitter-tasting foods

CC CT TT | TAS2R38 rs1726866 | 31

This gene helps to determine the ability to perceive bitter taste in foods. The C allele is the "tasting" allele, and it is dominant to the "non-tasting" allele T, so having one copy of the C allele is enough to have the bitter tasting ability. Individuals with CC genotype may tend to be repelled by bitter-tasting foods, like cheese, wine, cabbage, raw broccoli, black coffee and dark beers. However, individuals with the TT genotype are likely (~80%) to be a non-taster of bitterness, meaning that foods that may taste bitter to others taste far less bitter to you.

Beverage Reaction

Recommendations

- Your genotype shows that you are a fast metabolizer of alcohol. The metabolizing effect could cause you to show signs of overconsumption and toxicity later than others. This slow pace could cause you to overdrink and create habitual drinking behaviors. It is recommended for you to take caution when drinking alcohol and minimize the risk of alcohol related issues by restricting to one standard drink per day.
- Your genotype shows that you are a fast metabolizer of caffeine and would have less negative symptoms due to its consumption. It is important to note that if you are consuming caffeine to keep alert or awake, this could cause over-consumption which could lead to negative health consequences. It is recommended to have no more than (2) 8oz cups of coffee per day and to keep hydrated.
- Your genotype is associated with the inability to fully digest sugar (lactose) in dairy products, also known as Lactose Intolerance. If you do not have symptoms related to Lactose Intolerance, this could be because many individuals with Lactose Intolerance are able to consume milk and milk based products in small amounts with minimal or undetectable symptoms. However, this does not mean they have the ability to properly breakdown these milk sugars. Consult your physician to confirm a diagnosis and to determine what diet is best for you.

Normal response to alcohol

AA GA **GG** | ALDH2 rs671 | 35

This gene is associated with alcohol metabolism. The presence of the A allele can cause the inability to metabolize alcohol properly making individuals process alcohol slower than normal. Individuals with the A allele often experience flushing in the face and shoulders, as well as more severe hangovers and a longer time to recover from the effects of drinking. Individuals with the A allele are less likely to suffer from alcoholism possibly because of this obvious negative physical effect. All individuals should exercise caution when consuming any alcohol and should drink in moderation to avoid adverse effects.

Increased metabolism of caffeine

AA CA CC | CYP1A2 rs762551 | 32

The CYP1A2 gene has a SNP that controls the variation in caffeine metabolism. Individuals with the AA genotype have a faster metabolism of caffeine than others. Meaning, the same amount of caffeine will have a more stimulating effect on slow metabolizers than fast metabolizers.

Increased risk of lactose intolerance

CC TC TT | MCM6 rs4988235 | 30

This gene is associated with the risk of lactose intolerance which means the body cannot easily digest lactose, a type of natural sugar found in milk and dairy products. Symptoms of lactose intolerance can be mild to severe and vary from person-to-person. These symptoms include bloating, pain and cramps, and diarrhea. Avoidance of milk and milk-containing products can alleviate these symptoms but can lead to a dietary deficiency of calcium and Vitamin D that, in turn, can lead to bone disease, such as osteoporosis.

Your Exercise & Activity

One of the keys to living a long and healthy life is having a good amount of safe and structured physical activity. Whether you enjoy going out for a walk, running 15 miles, playing sports for an hour, or practicing yoga, the benefits of exercise are hard to quantify. They include stronger bones, healthy heart, more calories burned, less excess fat and much more. Our muscles are made of two kinds of fibers, fast twitch and slow twitch. We have yet to uncover the exact genetics behind muscle type, but we do know that one person's body generally favors one over the other. Fast-twitch muscle fibers help people excel at power-based sports (sprinting, short-distance swimming, weight lifting, fast-paced sports) while slow-twitch fibers help people excel at endurance sports (distance running, cycling, hiking, etc.). To date, scientists have found some SNPs that correlate with what type of exercise will be the most beneficial to a certain person from many angles including fat loss, blood pressure, and cholesterol levels. Use this section to plan out how you are going to incorporate exercise in your drive for a healthier you.

Endurance Potential

Recommendations

- Your test results show that your endurance potential is above-average. You may be genetically inclined to perform better in endurance-oriented exercises. You may incorporate endurance-oriented exercises such as jogging and swimming to maximize your genetic potential.

No known enhanced endurance exercise benefit

GG AA **GA** | PPARD rs2016520 | 10

Endurance training benefits everyone by improving cardiovascular, respiratory and muscular endurance. Individuals with the GG genotype were found more frequently among the elite endurance athletes.

Enhanced benefits in endurance performance

AA GA GG | CKM rs8111989 | 46

Creatine kinase is essential for energy production within the muscle. This gene is associated with both cardiovascular endurance and maximal power outputs. Studies have shown that individuals with the A allele are found mostly among elite endurance athletes including long-distance runners, triathletes, and in other endurance sports.

Normal endurance performance benefit

CT TT **CC** | UCP3 rs1800849 | 47

UCP3 is expressed in skeletal muscle and helps to regulate lipid metabolism and energy expenditure. This gene is associated with an individual's efficiency in skeletal muscle contractions and their aerobic capacity. This refers to the maximum amount of oxygen consumed by the body during intense exercises, in a given time frame. It is a function of both cardiorespiratory performance and the maximum ability to remove and utilize oxygen from circulating blood. Individuals with the T allele have an enhanced benefit from aerobic exercise and are associated with elite endurance performance athletes.

Enhanced benefits in endurance performance

GG AA GA | PPARGC1A rs8192678 | 48

PPARG1A gene regulates the endurance encoded protein that is involved in production and use of metabolic energy. It also involves the conversion of slow twitch muscle fiber. Furthermore, it activates muscle fiber mitochondrial content to prevent muscle fatigue. This gene is related to endurance exercise performance. For instance, GG genotype is associated with a higher level of VO2 Max (the measurement of the maximum amount of oxygen that an individual can utilize during intense, or maximal exercise).

Enhanced aerobic endurance performance

CC CG GG | ADRB2 rs1042714 | 49

ADBR2 plays an important role in adrenaline signaling which involves many major systems in our body such as the cardiovascular system and the central nervous system. It is also related to the lipid metabolism in muscle. This gene is associated with the aerobic capacity such as cardiac output and VO2 Max (the measurement of the maximum amount of oxygen that an individual can utilize during intense, or maximal exercise). For instance, the C allele is associated with higher VO2 Max and is more prevalent in elite endurance athletes.

Normal endurance performance benefit | TT CC **CT** | BDKRB2 rs1799722 | 50

BDKRB2 gene is associated with the regulation of blood vessels which has an effect on blood pressure and blood flow. This gene has been associated with efficiency in O2 uptake and the speed of transfer of oxygen to muscles for utilization. Studies have shown that TT genotype is generally present in elite endurance athletes.

Normal endurance performance benefit | CC CG **GG** | VEGFA rs2010963 | 51

VEGFA is related to the development of new blood vessels as an adaptation to exercise. Capillary density in cardiac and skeletal muscle is related to exercise performance. Higher capillary density is known to improve aerobic capacity and reduce the time to exercise exhaustion. The study shows that the C allele is more prevalent among elite endurance athletes in sports such as long distance cyclists and marathon runners.

Enhanced benefits in endurance performance | **AA** AG GG | ACE rs4343 | 56

ACE gene regulates the Angiotensin I-converting enzyme (ACE) activity and controls blood pressure by maintaining fluid balance in the body. It has been associated with improvement in endurance performance, especially in triathletes. Multiple studies confirmed that AA genotype has a better mechanical efficiency in slow-twitch muscle fibre contraction. Therefore, it is associated with improved performance in elite endurance athletes.

Power Potential

Recommendations

- Your test results show that your power potential is above-average. Your genotypes are associated with a slight enhancement on muscular power which are shared with elite power athlete. You may also experience slightly-enhanced benefit on muscle growth and development. You may emphasize on power-oriented exercises such as sprinting and weight-lifting to reach your genetic potential.

Slight enhancement of muscle growth | CC **CT** TT | ACTN3 rs1815739 | 13

ACTN3 is associated with the ability of the body to use alpha-actinin 3 protein which is specifically expressed in fast-twitch myofibers and responsible for generating force at high velocity. Individuals with the CC & CT genotype have an increased advantage of strength and power training. CC or CT alleles are more frequent among sprint athletes but less frequent among endurance athletes.

No enhanced benefit in muscle growth and power | CC CT **TT** | IGF1 rs7136446 | 45

This gene has significant effects on muscle growth and development and plays an important role in stimulating muscle hypertrophy and muscle protein synthesis. It is related to the anabolic power output in athletes. For instance, CC genotype is associated with a greater maximal power output and has a higher body fat percentage. Both CC and TT genotypes are associated with higher IL-6 levels, which play an important role in muscle energy and hemostasis during strenuous exercise.

No enhanced benefits in power performance | GG **AA** GA | CKM rs8111989 | 46

Creatine kinase is essential for energy production within the muscle. This gene is associated with both cardiovascular endurance and maximal power outputs. Studies have shown that individuals with the GG genotype are more prevalent in strength and power-oriented sports such as weight lifting.

Response to Resistance Training

Recommendations

- Your genotype shows that you will greatly benefit in the reduction of subcutaneous fat and maintain a healthy body weight by performing resistance based exercises. Exercises such as bench press, squats, bent over rows, lateral raises, and machines utilizing the (3) major muscle groups, chest, back, and legs will be highly effective.
- Your genotype shows that you have normal grip strength which has been shown to be an indicator of your ability to maintain muscle mass as you age. It is important that you incorporate resistance based exercises, using free weights or machines, in your workout routine to maintain muscle mass and prevent accelerated age-related muscle loss.

Normal weight gain response to resistance training

CC GC **GG** | INSIG2 rs7566605 | 25

INSIG2 is associated with subcutaneous fat in young adult women and suppression of the positive effects of resistance training on men. The CC genotype shows the unusual trait of tending to increase subcutaneous fat with strength training in male. Females with the CC genotype tend to have a higher baseline level of subcutaneous fat when compared with other genotypes. Meaning individuals with the CC genotype who perform greater amounts of resistance training have a higher potential to gain weight.

Normal hand grip strength

CT TT **CC** | UCP3 rs1800849 | 47

UCP3 is expressed in skeletal muscle and helps to regulate lipid metabolism and energy expenditure. This gene is associated with the aerobic capacity in athletes and the efficiency in skeletal muscle contraction. Hand-grip strength is a good indicator to reflect physiological status in the elderly, especially for determining muscle mass and strength. For instance, T allele is associated with higher hand grip strength and also associated with preventing the age-related decline of muscle mass and performance.

Injury and Recovery

Recommendations

- Your genotype shows that your tendency for soft tissue injuries is high. Soft tissue such as muscle, ligament, tendon, and cartilage can be damaged during contact sports such as football and repetitive exercises like long-distance running and cycling. It is essential for individuals with this genotype to get plenty of rest in between activities. It is also important to incorporate a proper warm-up before an activity and cool-down afterwards.

Elevated risk of soft tissue injury with exercise

CT TT CC | GDF5 rs143383 | 52

GDF5 is involved in the growth, development and maintenance of bones, cartilage, and tendon. It is associated with Achilles tendon rupture and osteoarthritis. People with the T allele have a reduced ability to encode for essential elements that support soft tissue repair. As a result, they could be more likely to suffer from Achilles tendon rupture during exercises or even experience osteoarthritis later in life, usually starting in the mid-40s.

No reduced risk of tendon or ligament injury

TT **GG** GT | COL1A1 rs1800012 | 53

COL1A1 regulates the collagen production in our body which involves the formation of soft tissues such as tendons and ligaments. This gene is associated with the risk of soft tissue injuries. Multiple studies found that the TT genotype may be associated with a reduced risk of acute soft tissue injuries such as cruciate ligament rupture and shoulder dislocations and/or Achilles tendons ruptures.

No known risk of soft tissue injury

CC **CT** TT | COL5A1 rs12722 | 54

COL5A1 gene regulates the collagen production in our body that involves the formation of soft tissues such as tendons and ligaments. Multiple studies found that this gene is associated with potential soft tissue injury. Individuals with the TT genotype have a lower elasticity of tendons and range of motion and have a greater propensity of injury.

Exercise on Health

Recommendations

- Your genotype shows your are more responsive to exercise for weight loss than other genotypes. If your goal is to lose weight, focus on a consistent regiment of high intensity exercise for a duration between 45-60 minutes, at least 3-4x per week.
- Your genotype shows that consistent exercise will be advantageous to you to reduce body fat and maintain proper body composition, it is important that you create a workout program that allows you to stay consistent with daily activity.
- Your genotype shows that using exercise and specifically endurance training will benefit your HDL-cholesterol, or good cholesterol levels. However, it shows that the results will not be immediate and you must be patient to see improvement. It is important that you are aware of your improvement will take longer and not to compare your results with others who may have a different genotype. Endurance based exercises include longer distance hiking, biking, running, and swimming that range in time between 45-60 minutes.
- Your genotype shows that you have a tendency to have higher blood pressure than other genotypes. Your genotype also shows that when lowering your blood pressure, you are responsive to exercise. Exercise is an effective way for you to manage and reduced your blood pressure levels. Incorporate at least 30 minutes, 3x per week of exercises that combine resistance or weight bearing and endurance training.

Exercise to reduce obesity risk

TC **TT** CC | FTO rs1121980 | 3

Physical activity lessens the effect of this gene on BMI and Waist Circumference. This observation has important public health implications because this study showed that a genetic susceptibly to obesity induced by FTO variation can be overcome, at least in part, by adopting a physical lifestyle. Individuals with the T allele receive a better result when conducting daily physical activity.

Exercise to reduce obesity risk

AA AT TT | FTO rs9939609 | 40

This gene is associated with an increased risk of obesity and appetite regulation. People with the AA and AT genotypes should minimize fat intake and increase their physical activity. These two genotypes have a strong benefit with increased physical activity as this can overcome being genetically predisposed to higher BMI and obesity risk.

Exercise to reduce body fat

GA GG AA | LEP rs7799039 | 27

Studies have shown that this SNP is associated with the ability to lose body fat in response to exercise while others lose lean body mass with exercise. Individuals with the AA genotype have a tendency to lose fat-free mass during exercise.

Normal benefit from endurance exercise

CC **CT** TT | LIPC rs1800588 | 14

This gene is associated with improved HDL (good cholesterol) levels with regular physical activity. Individuals with the C allele have an increased benefit with HDL cholesterol when incorporating daily physical activity with an increasing intensity level.

Exercise to reduce blood pressure

TG **TT** GG | EDN1 rs5370 | 20

This gene is associated with a higher risk of high blood pressure. However, individuals with the T allele show an ability to keep a near-normal blood pressure with regular exercise.

Your Health

This section provides information about how genetics can affect important health markers such as those linked to high blood pressure and cholesterol. These markers pertain to your health in these areas but do not provide a definitive diagnosis. How you treat your body will also play a significant role in your blood pressure and cholesterol.

Cholesterol

Recommendations

- Your genotype shows a tendency towards lower LDL-cholesterol level when compared to others. You may have an increased HDL-cholesterol level (good cholesterol) when limiting refined carbohydrates. Be aware of simple carbohydrates in your diet such as sugary drink and white rice. Complex carbohydrates such as sweet potato and wholegrain bread are highly recommended.
- Your genotype shows that you may not experience an increase in HDL-cholesterol levels, the "good" cholesterol, compared to other genotypes, by performing endurance focused exercises or training. Therefore, if you are predominately using endurance exercises to raise your HDL-cholesterol levels, you may want to compliment these efforts with dietary and other lifestyle changes. It is important to note that endurance training has many other cardiovascular and body composition benefits. Therefore, it should be a part of your daily routine.

Tendency toward better LDL-cholesterol

GG CC **GC** | MMAB rs2241201 | 15

This gene is associated with LDL-cholesterol and HDL-cholesterol concentrations, depending on dietary carbohydrate. Individuals with the GG genotype have a genetic tendency towards higher LDL-cholesterol concentration than individuals with other genotypes. In addition, individuals with the GG genotype may experience a decrease in HDL-cholesterol concentration with a higher level of carbohydrate intake, whereas they may experience an increase in HDL-cholesterol concentration on a lower level of carbohydrate intake.

Limit refined carbs to achieve better HDL-Cholesterol

GG CC GC | KCTD10 rs10850219 | 15

This gene is associated with the response of HDL-cholesterol (good cholesterol) concentrations on dietary carbohydrates. Individuals with the GG genotype may experience a decrease in HDL-cholesterol concentration with a higher level of carbohydrate intake.

No enhanced endurance exercise benefit

CC **CT** TT | LIPC rs1800588 | 14

This gene is associated with varied concentrations of HDL-cholesterol (good cholesterol), depending on dietary fat intake. For Individuals who consume less than 30% of energy from fat, T allele carriers indicated a higher concentration of HDL-cholesterol than those with CC genotypes. No difference was found in HDL-cholesterol levels between CT and CC carriers. In addition, this gene is associated with the positive effect on HDL cholesterol when adding regular physical exercises.

No enhanced endurance exercise benefit

GG AA **GA** | PPARD rs2016520 | 10

This SNP was linked to an increased impact on HDL levels (the good Cholesterol) with endurance exercise for GG genotype.

Blood Pressure

Recommendations

- You have an increased risk of higher blood pressure based on your genetic profile. Your genotype shows that exercise and low sodium intake can lower your blood pressure more effectively than others. Incorporating at least 30 minutes, 3x per week of endurance exercise and limiting salt intake to less than 5g per day will help you maintain a healthy blood pressure.

Associated with high blood pressure risk

TG **TT** GG | EDN1 rs5370 | 20

In a nearly 10-year study, the T allele was associated with a higher risk of high blood pressure (hypertension). People with the T allele have the ability to keep a near-normal blood pressure with exercise.

Low sodium diet to reduce blood pressure

AA AG GG | ACE rs4343 | 55

ACE gene regulates the Angiotensin I-converting enzyme (ACE) activity, which has a vital role in maintaining blood pressure and sodium homeostasis. Studies show that A allele is associated with a lower ACE activity. This leads to a higher sensitivity to sodium intake which increases the risk of hypertension. For these individuals, low sodium diet is essential in lowering blood pressure.

Your Behavior

Genetic markers work in tandem with the environment and how you treat your body. It seems simple - eat less and exercise more to be thinner and healthier. But we also know that some genetic inclinations determine just how easy it is for us to make healthy choices concerning food. As a species, our natural instinct is to eat as much as we can when we have food available. Nature's way is survival of the fittest, which means survival of the one who obtains the most nutrients. In today's society, however, food is readily available for most people, and unfortunately, the food that is the most available tends to be the least healthy food.

Food Cravings

Recommendations

- Your genotype has shown an impairment in the ability to accurately trigger your satiety, also know as "fullness", receptors during a meal. You may have a delayed response which will cause you to consume more calories than you need. Portion control and the consumption of high fiber foods will help with your genetic tendencies and allow you to properly manage your caloric intake.
- Your genotype shows that you have an increased tendency for addictive behaviors. Like addictive drugs, highly palatable foods triggers the feel-good brain chemicals called dopamine. Once you experience pleasure associated with increased dopamine transmission in the brain's reward pathway from eating certain foods, they quickly feel the need to eat again. The reward signals from highly palatable foods may override other signals of fullness and satisfaction. As a result, you may keep eating, even when you are not hungry.

Less satisfaction with foods and a lesser satiety response

AA AT TT | FTO rs9939609 | 43

This gene has been well studied and is related to satisfaction with foods and feeling of fullness. Individuals with the A allele tend to have less satisfaction with foods, will be more likely to overeat and will, therefore be at a higher risk for weight gain.

Lower tendency to food cravings

CT TT CC | DRD2 rs1800497 | 39

This gene plays a role influencing how the brain uses dopamine, a neurotransmitter enabling an internal reward system and behavior responses. Individuals with the T allele experience more difficulty feeling full and have a higher risk of obesity and alcohol dependency. They also have a more difficult time stopping an addictive behavior such as smoking.

No genetic tendency to overeat

TT CC TC | TAS2R38 rs1726866 | 5

This gene has been associated with a difference in taste perception that allows disinhibition, or the inability to stop eating. A study conducted in 2010 showed that women with the T allele were more likely to display eating disinhibition in response to a stimulus.

Higher tendency for addictive behaviors

AA GA GG | COMT rs4680 | 44

The COMT gene codes for the COMT enzyme, which breaks down dopamine in the brain's prefrontal cortex. This well studied SNP is referred to the Worrier vs. Warrior. Individuals with the G allele are known as the Warrior Valine (Val), and are less exploratory with higher COMT enzymatic activity, therefore lower dopamine levels; higher pain threshold, better stress resiliency, albeit with a modest reduction in executive cognition performance under most conditions. Those individuals with the A allele are known as the Worrier Methionine (Met) and are more exploratory with lower COMT enzymatic activity, therefore higher dopamine levels; lower pain threshold, enhanced vulnerability to stress and a tendency for anxiety, yet also more efficient at processing information under most conditions. These individuals have an advantage in memory and attention tasks yet have an increased risk of addictive behaviors such as over eating and alcohol dependency.

Your Vitamins & Mineral

Some genetic markers allow us to see gaps in our ability to process foods in a way that will maximize their potential. Some people lack the ability to fully process vitamins from food. This section provides information that will help you decide if you need to complement your diet with a daily vitamin supplement and, if so, which vitamins may be most beneficial to you.

Vitamin A

Recommendations

- Your genotype shows that you have some degree of difficulty to convert plant based Vitamin A (beta-carotene) to the more active form (retinol) which is readily used by the body. Adequate intake and utilization of Vitamin A is critical for the body. Therefore, it is recommended to compliment your sources of plant based Vitamin A (beta-carotene) which is found in spinach, carrots, bell peppers, and dark green leafy vegetables, with the intake of foods which contain the active form such as organic butter, eggs, fish, and liver. In addition, dietary supplements containing either the retinyl acetate or retinyl palmitate forms can be beneficial to reduce the possibilities of further deficiencies, consult with your physician or health care expert to understand your optimal dosage.

Reduced ability to form Vitamin A

TA TT AA | BCMO1 rs12934922 | 24

This gene is associated with converting beta-carotene into Vitamin A so it can be used by the body. Our bodies need Vitamin A for physiological functions involving healthy skin, vision and immune system. Individuals with the T allele will benefit from a diet rich in beta-carotene (carrots, pumpkin, sweet potato, spinach). It is recommended to consult your physician to confirm a deficiency in Vitamin A levels.

Normal ability to form Vitamin A

TC TT CC | BCMO1 rs7501331 | 24

This gene are responsible for transporting retinol (Vitamin A) into the bloodstream. People who have a reduced ability to convert plant-based carotenes (Vitamin A precursors) to retinol may require more Vitamin A found in foods from animal sources. Individuals that carry the T allele are at risk for a Vitamin A deficiency and should consume more animal-sourced Vitamin A.

Vitamin B6

Recommendations

- Your genotype is associated with normal levels of Vitamin B6. Consuming a balance diet of adequate sources of Vitamin B6, such as meat, nuts, beans, vegetables, and grains is recommended.

Normal Vitamin B6 serum level

CC CT TT | NBPF3 rs4654748 | 17

This gene has been associated with decreased levels of Vitamin B6, an important part of brain function, glucose metabolism, and heart health.

Folate

Recommendations

- Your genotype is associated with impaired methylenetetrahydrofolate reductase (MTHFR) enzyme activity. This will result in the inability to optimally activate dietary forms of folate which is found in foods such as green leafy vegetables, asparagus, kale, spinach, and broccoli. Not activated folate will cause a deficiency, which is also associated with Vitamin B12 deficiency and elevated homocysteine levels.

Impaired ability to convert folate | AC CC AA | MTHFR rs1801131 | 37

MTHFR encodes methylenetetrahydrofolate reductase which plays a crucial role in converting dietary folate into methylfolate, the active form of Vitamin B9. Low folate levels can lead to a number of adverse side effects including cardiovascular disease, fatigue and depression. Individuals with the C allele have a decreased ability to form active folate and therefore have a higher propensity for folate deficiency.

Impaired ability to convert folate | TC TT CC | MTHFR rs1801133 | 37

Many biochemical processes in the body use folate, or Vitamin B9, which is naturally found in green leafy vegetables. This gene is directly related to how the body converts dietary folate into methylfolate, the active form of Vitamin B9. Individuals with the T allele are known to have difficulty converting folate into its usable state.

Vitamin B12

Recommendations

- Your genotype shows that you have an impairment in the absorption of Vitamin B12 in the small intestines. To obtain adequate amounts of Vitamin B12, which is found only in animal derived foods, it is important that you consume foods such as meat, dairy, and eggs. If you are a vegan or can not consume a higher amount of these animal-derived foods, it is recommended that you take a dietary supplement with Vitamin B12.

Possible altered Vitamin B12 absorption | GA GG AA | FUT2 rs602662 | 17

This SNP has the strongest association to levels of Vitamin B12. Vitamin B12, one of eight B Vitamins, plays a key role in the normal functioning of the brain and nervous system, and the formation of red blood cells. Individuals with GG and GA genotypes are at higher risk of Vitamin B12 deficiency due to a potentially lower ability to absorb Vitamin B12.

Vitamin D

Vitamin D, measured by 25(OH)D (calcidiol), is critical for calcium-phosphate metabolism and bone mineralization. Low blood concentration of 25(OH)D leads to an increase in the risk of vitamin D insufficient, which is associated with some common chronic diseases, such as rickets, osteoporosis, fractures, cardiovascular diseases and several types of cancer.

Recommendations

- Your genotype shows that you have a tendency to have lower levels of Vitamin D. You may not be able to activate your Vitamin D from sunlight and/or Vitamin D from foods as efficiently as other genotypes. However, you can still obtain higher levels of Vitamin D by nutritional and lifestyle changes. It is recommended that you get 15-20 minutes of unobstructed sunlight per day and consume foods that are higher in Vitamin D such as egg yolks and beef liver. Dietary supplements which include Vitamin D3 can also be very useful to prevent further deficiencies due to diet and lifestyle.

Reduced Vitamin D serum level

GA GG AA | near-CYP2R1 rs10741657 | 1

This gene controls the key vitamin D 25-hydroxylase which hydroxylates vitamin D3 (cholecalciferol) to 25-OH cholecalciferol (calcidiol) in the liver. This is a critical step in vitamin D metabolism. Carriers of GG genotype have the genetic tendency of lower 25(OH)D concentration than individuals with the AA genotype.

Normal Vitamin D serum level

GG GT TT | near-DHCR7 rs12785878 | 1

In a study of nearly 34,000 people, this gene was associated with insufficiency of Vitamin D, an important Vitamin for skeletal health. Vitamin D is essential for a wide range of physiological processes including immune function and calcium homeostasis, or skeletal health. Individuals with the G allele are more likely to be Vitamin D deficient.

Normal Vitamin D serum level

CC AA CA | GC rs2282679 | 1

Many studies have shown this gene has been linked to Vitamin D deficiencies. These studies show individuals with the C allele have a genetic tendency towards a lower Vitamin D level.

Vitamin E

Recommendations

- Your genotype shows that you may have decreased levels of Vitamin E, alpha-tocopherol blood concentration. Due to a tendency to have lower levels of Vitamin E, it is recommended you increase your consumption of Vitamin E foods such as seeds, nuts, avocado, and plant oils. You may consider dietary supplements for better anti-oxidizing and anti-aging effect.

Reduced a-tocopherol plasma level

CC AA CA | INTERGENIC rs12272004 | 4

α-tocopherol is one form of vitamin E, a fat-soluble vitamin with antioxidant properties. Individuals with the A allele indicated a higher concentration of α-tocopherol than people with the CC genotype. Low plasma level of α-tocopherol increases the risk of disability and frailty in elderly and poor cognitive function.

Iron Status

Recommendations

- Your genetic profile is associated with a low iron status. Incorporate adequate iron-rich foods in diet such as red meats, fish and poultry, spinach, pumpkin seeds and chickpeas. If you experience chronic fatigue, paleness, dizziness, please consult your physician for a blood test to check your hemoglobin level and iron status.

Reduced ability in iron absorption

TC | TT | CC | TMPRSS6 rs855791 | 58

TMPRSS6 is related to the regulation of iron balance. Studies showed that the T allele is associated with the lower level of hemoglobin (marker of iron status) in the body. Low iron status is associated with the increased risk of Iron deficiency anemia. Iron deficiency anemia isn't something to self-diagnose or treat. Consult your physician for a blood test and diagnosis.

Reduced ability of iron absorption

CC | CT | TT | TMPRSS6 rs4820268 | 59

TMPRSS6 is related to the regulation of iron balance. Studies showed that the C allele is associated with a lower level of hemoglobin (marker of iron status) in the body. Without enough iron, red blood cells can't carry enough oxygen to body tissues. Iron deficiency anemia signs and symptoms may include extreme fatigue, weakness, headache, dizziness or lightheadedness and poor appetite.

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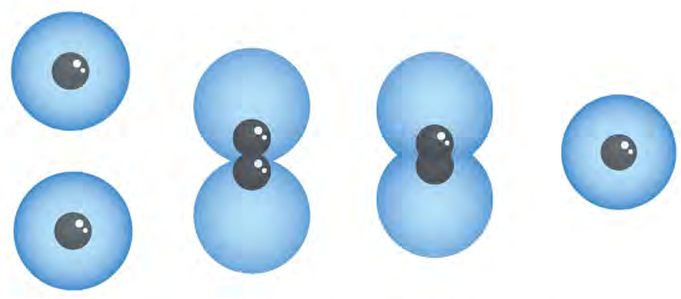
GENETICS 101

DNA is the genetic material in our cells that makes us who we are. You inherit this genetic material, half from your mother and half from your father. It determines your physical appearance, like your hair and eye color.



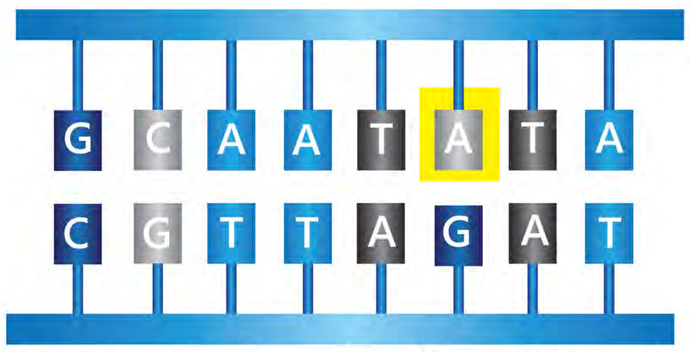
You get half of your DNA from your mother and half from your father.

It can also influence how your body functions, such as whether you are able to process fat efficiently or tend to have high blood pressure. Knowing what your individual genetic profile says can help you understand your body, recognize your deficiencies, and possibly overcome any negative genetic tendencies.

Your genotype is your genetic makeup, your actual strands of DNA comprised of a 3 billion base strand in which each individual base is one of four possible molecules. The four types of bases are: adenine (A), thymine (T), guanine (G), and cytosine (C). These bases form long, twisted-chains of DNA, and a piece of DNA containing millions of base pairs packed tightly is called a "chromosome."

DNA is made up of billions of base pairs.

The base pairs of DNA give instructions to the body to perform certain actions. For example, some base pairs contain instructions on making enzymes to digest food. The base pairs may give some very specific instructions too, such as telling only certain skin cells to make hair while other skin cells do not. Sometimes, when DNA is being copied to make new cells, "mistakes" are made in the copying of bases. These variations are called SNPs or single-nucleotide polymorphisms. For example, a series where the original sequence is "GCAA TCTA" can be mutated to "GCAATAT A" (highlighted in yellow below).



Sometimes mistakes called SNPs occur in our DNA.

This mistake, like a typo or a mistake in a computer program, can change the instructions the DNA gives to the body. The change may be minor or not have any noticeable effect. Or it may be a major change that affects the body significantly, such as failing to make a protein that leaves the body susceptible to disease.

The other genes you have and your environment determine how your body responds to the SNPs that you have. For example, you may have other genes that compensate for the "mistake" in the copying. Or you may have compensated for the error by eating (or not eating) certain foods. You and another person may have the same SNP but respond to it differently and thus have different phenotypes.

This genetic report contains information about your genetic profile or genotype. It tells you what SNPs you have, or where alterations happened in copying your genetic material. Understanding the potential issues your personal genotype contains will help you deal with and possibly even overcome the way those genes may be expressed. This report gives you practical suggestions to improve your phenotype, or the expression of your genetic material, in order to live a healthier lifestyle.

TERMS YOU SHOULD KNOW

DNA *(DeoxyriboNucleic Acid)*: A nucleic acid that carries genetic information contained in each cell

Genotype: The genetic makeup of an organism

Phenotype: The expression of a certain trait based on genetic and environmental influences

SNP *(Single-Nucleotide Polymorphism)*: A commonly found change in a single nucleotide base in a DNA sequence

DISCLAIMER

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METHODOLOGY AND LIMITATION

Testing for genetic variation/mutation on listed genes was performed using PCR with allele-specific probes and/or the application refractory mutation system (ARMS). Test results do not rule out the possibility that this individual could be a carrier of other mutations/ variations not detected by this gene mutation variation panel. Rare mutations surrounding these alleles may also affect our detection of genetic variations. Other non-genetic and genetic factors that are not tested by this assay can affect the responses and phenotype results.

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