

Premium

Health & Wellness Genetic Profile

Name: Sample Report

Report Number: HW-AGS000000

Report Date: 2018-06-19

Your AGS Genetic Journey has Begun

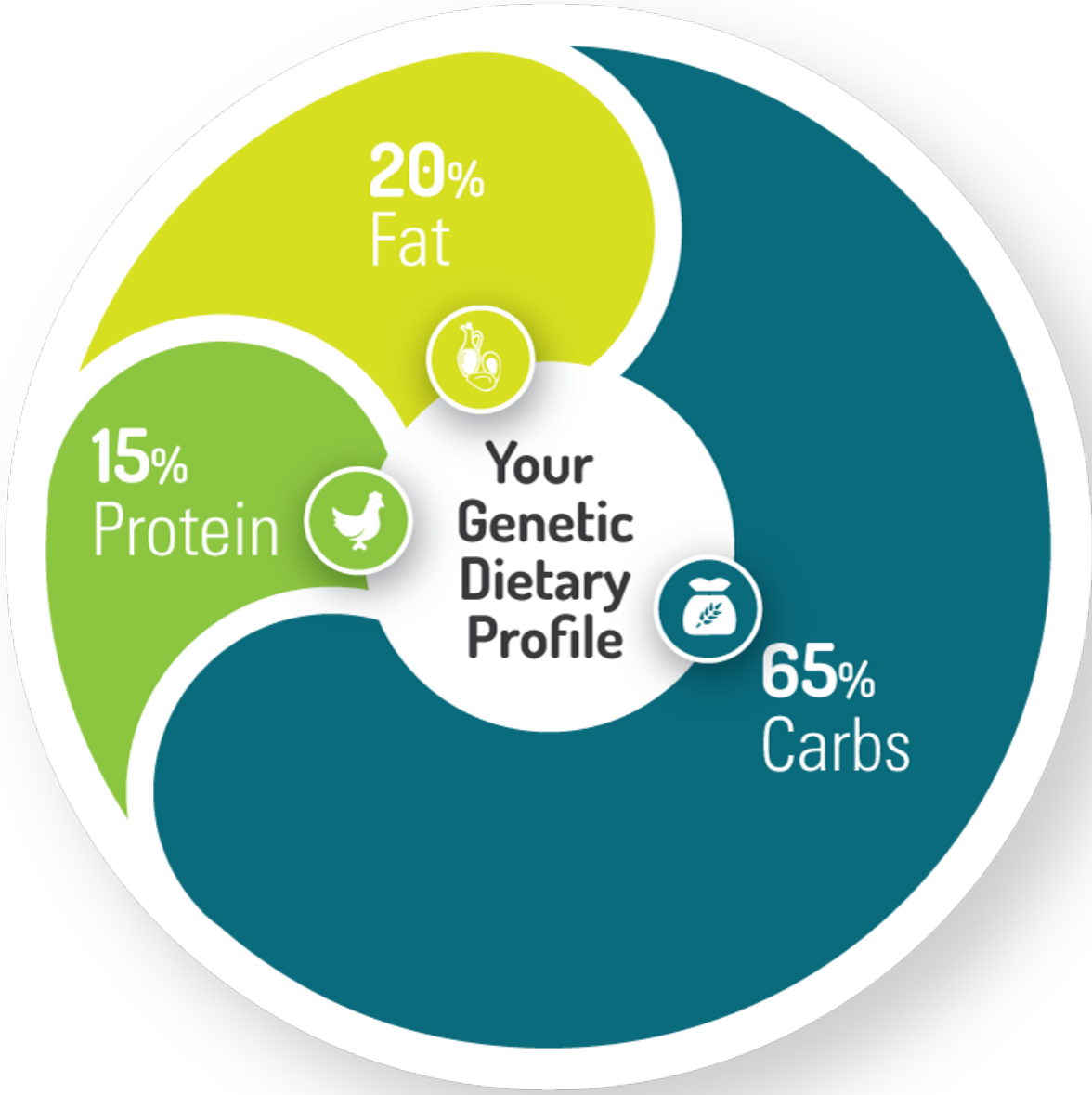


Today is a new beginning,
a chance to make changes,
a first step in achieving your goal of
becoming a healthier version of
yourself. ***You are on the right path!***



Genetic Summary Highlights

Your Macronutrients: (p. 4)



15% Protein:

Your results revealed that for optimal health 15% of your macronutrients should come from protein.

65% Carbohydrates (Carbs):

Your carbohydrate percentage is ideally 65% of your macronutrients. Focus on complex carbs and limit intake from simple carbs like white rice, white flour, white sugar, pasta, white breads, potato chips, etc.

20% Fat:

Your ideal fat macro intake should be 20% of your total daily calories. Portion control is always a good idea and try to stay away from trans fats, as well as limiting your saturated fat intake.

Fats (p. 4 & 10)



MUFAs



Your genotype shows a higher risk in the tendency to gain weight when consuming monounsaturated fats (MUFA).



PUFAs

Your genotype is associated with a normal lipogenic response.

Beverages (p. 5 & 10)



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 & 10)



Vitamin A

Your genotype shows that you likely have the ability to convert the plant based Vitamin A (beta-carotene) to the active (retinol) form.



Vitamin B6

Your genotype is associated with normal levels of Vitamin B6.



Folate

Although you have some genetic predisposition of reduced ability to utilize folate, the tendency for undesirable health issues is low.



Vitamin B12

Your genotype shows that you have a proper Vitamin B12 absorption function.



Vitamin D



Your genetic profile shows a tendency towards a lower Vitamin D concentration.



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 normal iron status.

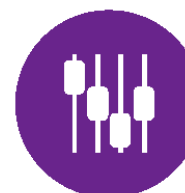
Your Behavior (p. 8 & 10)



Food Cravings



Your genotype has shown an impairment in the ability to accurately trigger your satiety, also known as "fullness", receptors during a meal.



Taste



Your genotype shows a high sensitivity to bitter-tasting foods.



Sweet Tooth

Your genotype shows that you have a lesser tendency to crave sweet foods.



Emotional Eating

Your genotype shows that you have a lower risk of emotional and binge eating.



Addictive Behaviors

Your genotype shows that you have a lower tendency for addictive behaviors, you have higher tendency to just-have-one bite.

Your Exercise / Activity (p. 7 & 10)



Power

60% Power means light, medium, and/or heavy strength training using weights or your body resistance.



Endurance

40% Endurance is 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 obtain an increased HDL-cholesterol, the "good" cholesterol, level while doing endurance exercises.



Blood Pressure

Your genotype shows that having a low sodium diet can lower your blood pressure effectively.

Your Stress Response (p. 8)



Short-Term Stress

Your genotype shows a higher short-term stress tolerance.



Long-Term Stress

Your genotype shows a slightly decreased long-term stress tolerance.



Stress Hypertension

Your genotype shows an increased risk of hypertension caused by stress.

Health Awareness and Effort Score (page 8)



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).

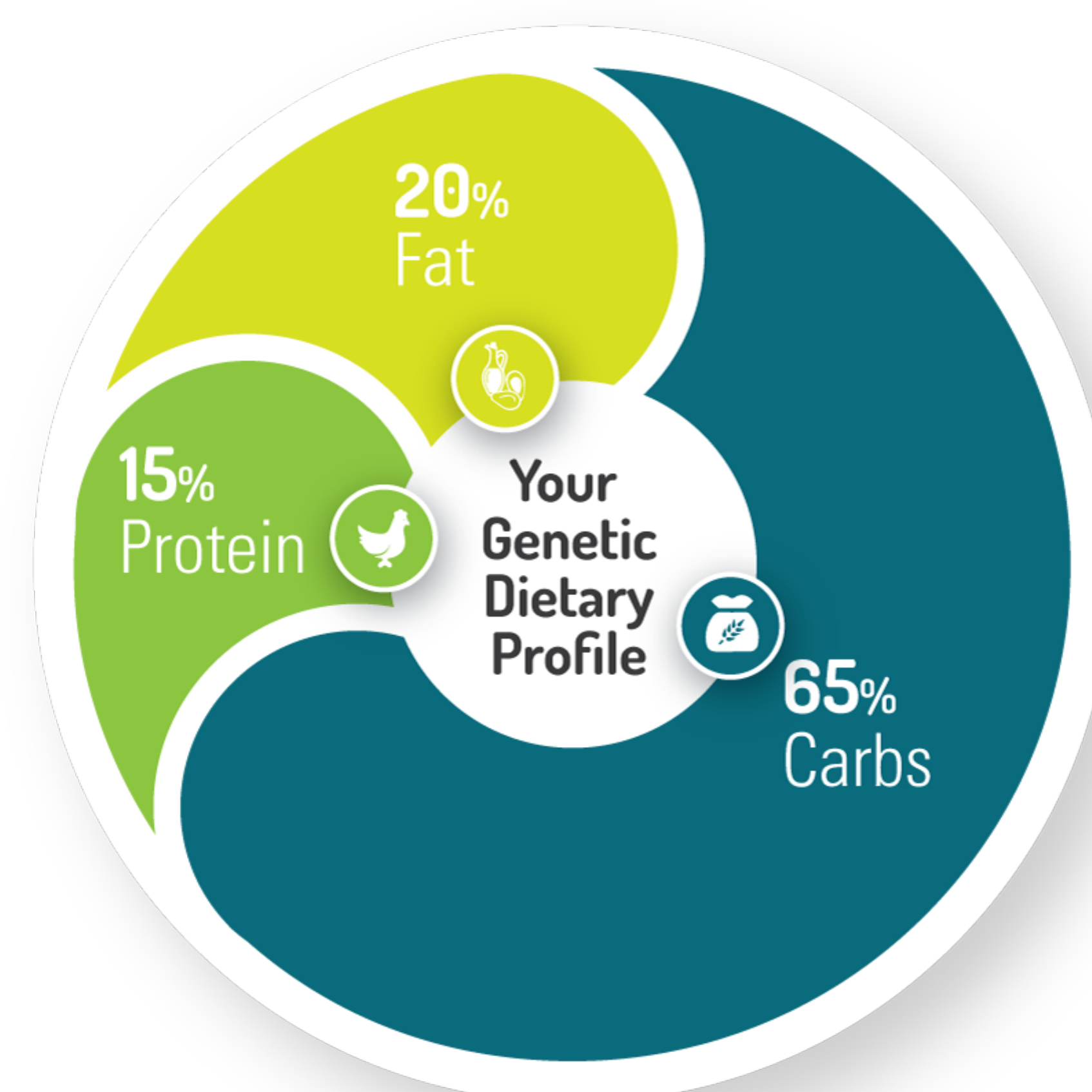
Pay particular attention to this actionable recommendation to better your health moving forward.

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 offer one-on-one consultations with our trained Genetic Health Specialists (visit www.ags-health.com/consultations). 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!



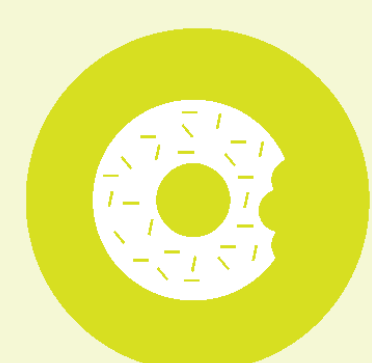
Explanation of Pie Chart

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.



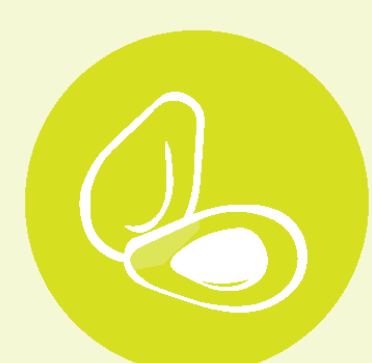
Protein:

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:

Your genotype is associated with a normal lipogenic response. Incorporating a moderate amount of PUFA into your daily diet will likely help maintain an optimal level of LDL-cholesterol (bad cholesterol).



Carbohydrates:

Your genotype shows there is a limited response to dietary carbohydrates. It is important that you stay within your recommended range based on your Genetic Dietary Profile (pie chart). Consume the majority of your carbohydrate from complex carbohydrates such as whole grains, fiber rich vegetables, and legumes.

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

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:

15% Protein:

Your results revealed that for optimal health 15% 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.

65% Carbohydrates (Carbs):

Carbohydrates are the body's primary energy source. Since your carbohydrate percentage is ideally 65% 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:

Since your ideal carbohydrate intake compromises half of your total macronutrients, be aware of combining those carbohydrates with protein (meat, fish, beans, nuts, eggs, dairy) and fibre (whole grains, fruits, vegetables) at every meal. When eaten together, these foods take longer to digest than simpler carbohydrates, so you stay fuller, longer. For example, oatmeal + 2 eggs, popcorn + 2-4 slices rolled low sodium turkey, 1 large slice of pizza + grilled chicken salad, apple + 1 string cheese. There are endless combinations. Shop and stock foods that are quick and easy.



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
- White cold water fish - halibut, cod, mahi mahi = open hand size 1 inch thick grilled or baked
- Eggs = 2 eggs + 1/3 cup eggs whites
- Cottage Cheese = 1 cup or fist size
- Whole grain bread = 1 large slice or 2 small slices
- 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
- Sweet potato = fist 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:

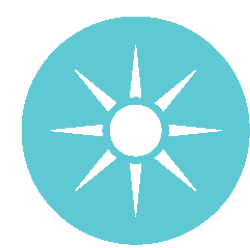


Vitamin A:

Your genotype shows that you likely have the ability to convert the plant based Vitamin A (beta-carotene) to the active (retinol) form. Your body has the ability to utilize both plant (e.g. carrots, pumpkin, spinach, and sweet-potato) and animal (e.g. dairy, eggs, salmon, and liver which contain the active Vitamin A, retinol) based forms.

Tip:

This is good news! Continue consuming your favorite foods that contain Vitamin A noted in the recommendation. If you want to make sure your level of Vitamin A is ideal, consider having your provider order you a simple micronutrient test (blood draw required).



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, 0 oz turkey breast and 3 oz lean grass fed beef. Three servings per day is ideal.



Folate:

Although you have some genetic predisposition of reduced ability to utilize folate, the tendency for undesirable health issues is low as long as you ensure adequate intake of folate-rich foods, including fortified breakfast cereals and green leafy vegetables.

Tip:

It is important for you to eat foods containing folate and take in supplement with folic acid. Top foods containing 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. Consider getting folate supplement that is methelated.



Iron:

Your genetic profile is associated with a normal iron status. However, it is a good idea to incorporate adequate iron-rich foods in your diet such as spinach, pumpkin seeds and chickpeas.

Tip:

Since your genetic profile for iron is normal, continue adding in iron dense foods to your diet like Spirulina, beef liver, lean grass fed beef, lentils and 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 a proper Vitamin B12 absorbtion function. To obtain adequate levels of Vitamin B12, it is important that you consume foods such as meat, dairy, and eggs. You may also consider taking a dietary supplement with Vitamin B12.

Tip:

Vitamin B12 occurs naturally in a wide variety of animal products. Vegans and vegetarians can use fortified cereals to improve their Vitamin B12 intake.



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.



60% Power is light, medium, and/or heavy strength training using weights or your body resistance. Training can be incorporated into the same workout. After you have completed your intervals, do 50 walking lunges, 25 pushups, and a 1-minute plank holds to round out a full body training session. 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.

40% 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. A good example of this is interval training it is ideal, easy, and proven to burn the most fat over the course of the day. For example, jog to the end of your street or to the nearest light pole and then walk back or walk to the next. Repeat 8-10 times.



Other options:

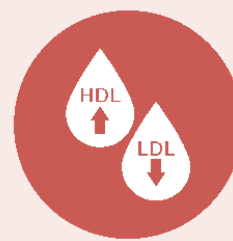
- 2-5 mile jog + 20 minutes upper body power lifting
- 45 + min fast paced hike. Stop every 15 minutes to do 50 pushups + 25 tricep dips on a rock
- 45 min crossfit or p30x workout (gym or home)

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 obtain an increased HDL-cholesterol, the "good" cholesterol, level while doing endurance exercises. Make sure you include exercises in your fitness plan to improve your stamina and endurance (e.g. running, cycling, swimming). These exercise types will be most beneficial to your HDL-cholesterol level.



Blood Pressure

You have a moderate risk of higher blood pressure based on your genetic profile. Having a low sodium diet is recommended to reduce your risk of high blood pressure. Controlling your sodium, fat, and total calorie intakes will help you maintain a healthy blood pressure.

Your Behavior:

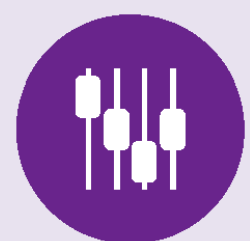


Food Cravings and Satiety:

Your genotype has shown an impairment in the ability to accurately trigger your satiety, also known 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, brussels 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 that you have a lesser tendency to crave sweet foods. In addition, your ability to taste sugar and level of sweetness is normal. This combination allows you to regulate the amount of sugary foods you eat and this is a great benefit to your overall health and wellness.

Tip:

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

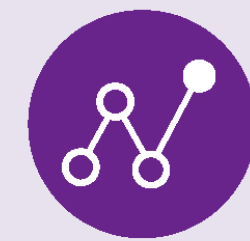


Emotional Eating:

Your genotype is associated with a lower risk of emotional and binge eating. Your proper activity in dopamine and opioid neuronal circuits leads to a lower chance of having emotional and binge eating.

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 that you have a lower tendency for addictive behaviors. When you eat palatable foods such as sweets and carbs, you have a higher tendency to just-have-one and stop before overeating.

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 Stress Response:



Short-Term Stress

Your genotype is associated with higher tolerance for short-term stress, the process of adapting well when faced with adversity, trauma, tragedy, threats or significant life problems. However, this genotype is also shown to be less willing to seek out new approaches.

Tip:

Remember to take a step back to consider alternative approaches to challenges that may improve your odds for success. Stress has a reduced short-term effect on you, but you must keep a good work / life balance.



Long-Term Stress

Your genotype is associated with decreased activity and slight impairment of the MTHFR enzyme, leading to a lower level of active folate, which is essential for regulating stress responses long term such as mood swing, overeating and depression.

Tip:

Stress-related mood swings can be tricky to understand and process so physical exercise should be considered as a go-to remedy. Exercise will help metabolize the excessive stress hormones and restore your body and mind to a calmer, more relaxed state. Meditation is another valuable tool to resettle your mind during stressful life events.



Stress Hypertension

Your genotype is associated with an increased risk to hypertension caused by stress. Be aware of your diet to better moderate your blood pressure. If you are feeling stressed, consider taking time to rest and calm down.

Tip:

Because your genotype shows an increased risk of hypertension, remember to monitor your sodium intake and your stress levels. When you feel stressed, consider taking time to calm down. Remember that what you eat affects how you respond to stress. Make sure to get enough rest to be prepared for what life throws your way.

Your Health Awareness and Effort Score:

You have a moderate-to-high Health Awareness and Effort Score

Your 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 shows a moderate-to-high Health Awareness and Effort Score. This tendency implies you may need to be more conscious of healthy eating and exert more effort to maintain healthy weight or to lose weight. Keep in mind that this tendency can be overcome with lifestyle and behavioral changes using your individualized nutritional tips and recommendations from this report. You may consider consulting your healthcare providers for more professional advice.



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.

The most common way people give up their
power is by thinking they don't have any.
You have the the power, now put it to use.

*The journey of a thousand miles
begins with one step!*

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 additive 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 a typical rate. This may make it more difficult for you to lose weight only using exercises.
- When compared with the general population, you have a slightly increased genetic tendency of weight gain and higher obesity risk. You are advised to pay extra attention to food groups and portion sizes to manage your calories intake and maintain a healthy weight. You may learn more about food groups and portion sizes from your physician or dietitian.

Normal 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.

No known risk of increased BMI

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 and rs number

Genotype headline

CC TC **TT**

MC4R rs17782313

#

Gene description is written below each genotype headline for more information.

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.

Increased risk of higher 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.

No known risk of increased 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.

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.

No genetic tendency to overeat

AG GG AA

OPRM1 rs1799971

60

OPRM1 encodes the mu-opioid receptor of the endogenous opioid system, which rewards our body upon stimulation such as emotional attachment, alcohol and food intake. While the exact mechanism remains unknown, studies showed that individuals possessing the G allele gained an increased reward upon stimulation, and hence are prone to addictive and abusive behavior.

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 T allele are more likely to have addictive behaviors than those with the C allele.

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 Choice

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

- Limit your total fat intake to no more than 30% of your daily calorie intake for optimal health.
- 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.
- Your genotype is associated with a normal lipogenic response. Incorporating a moderate amount of PUFA into your daily diet will likely help maintain an optimal level of LDL-cholesterol (bad cholesterol).

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).

Genetic tendency for better LDL 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 shows there is a limited response to dietary carbohydrates. It is important that you stay within your recommended range based on your Genetic Dietary Profile (pie chart). Consume the majority of your carbohydrate from complex carbohydrates such as whole grains, fiber rich vegetables, and legumes.

Limited response to HDL on carbohydrates

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 that you have a lesser tendency to crave sweet foods. In addition, your ability to taste sugar and level of sweetness is normal. This combination allows you to regulate the amount of sugary foods you eat and this is a great benefit to your overall health and wellness.
- 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.

Normal tendency to eat sweets

TC TT **CC** | SLC2A2 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 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.
- 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.
- Your genotype is associated with the inability to fully digest sugar (lactose) in dairy products. Consider milk alternatives & oat milk to ensure bones health.

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 A allele 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 average. You may not be genetically inclined to perform better in endurance-oriented exercises. However, endurance exercises such as jogging and swimming are still beneficial for your cardiovascular health.

Enhanced benefits in endurance performance

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.

Normal benefit 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.

No known benefit 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.

Enhanced benefit in endurance performance

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.

No 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.

Increased 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. Due to your ability to highly respond to resistance based exercises, it is recommended that you incorporate them in your workout routine. 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 you 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 has shown to benefit from the consumption of protein during exercise and/or stress, specifically when trying to preserve lean muscle mass. You may also lose lean body mass and water weight rather than fat with endurance training. Healthy protein sources include lean meats such as chicken, turkey, and fish, along with eggs. If you are a vegetarian, various types of beans and grains can be healthy protein sources.
- Your genotype shows that you will benefit more from stamina and endurance exercises than other genotypes. These exercises are categorized as lower resistance but higher distances and times, examples are running, cycling, and swimming. These endurance based exercises have also shown to benefit your HDL-cholesterol, your "good" cholesterol levels. Exercising between 45-60minutes, 3-4x per week, using body weight and/or minimal resistance will support healthy HDL-cholesterol levels.
- Your genotype shows that you do not have a tendency to have high blood pressure. If your blood pressure levels are not within the normal range, exercise should be used in combination with healthy nutrition, managing your calories, healthy fat levels, and limiting your sodium intake.

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 susceptibility 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.

Loss of lean body mass with exercise

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.

Increased HDL benefit with 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.

No known risk of high 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 a lower level of LDL-cholesterol and normal level of HDL-cholesterol (good cholesterol) when compared to others. Therefore, controlling carbohydrate may not be your priority concern. You may enjoy a slightly higher flexibility on carbohydrate intake and focus on complex carbohydrates such as wholegrain bread.
- Your genotype shows that you may obtain an increased HDL-cholesterol, the "good" cholesterol, level while doing endurance exercises. Make sure you include exercises in your fitness plan to improve your stamina and endurance (e.g. running, cycling, swimming). These exercise types will be most beneficial to your HDL-cholesterol level.

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.

No known benefit from carb-restricted diet

GG CC GC

KCTD10 rs10850219

15

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

Increased HDL-C with endurance exercise

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.

Exercise to increase good cholesterol

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 a moderate risk of higher blood pressure based on your genetic profile. Having a low sodium diet is recommended to reduce your risk of high blood pressure. Controlling your sodium, fat, and total calorie intakes will help you maintain a healthy blood pressure.

No associated 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. If only it was as simple as - eat less and exercise more to become thinner and healthier. We know that some genetic inclinations determine just how easy it is for us to make healthy choices concerning 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.
- Your genotype is associated with a lower risk of emotional and binge eating. Your proper activity in dopamine and opioid neuronal circuits leads to a lower chance of having emotional and binge eating.
- Your genotype shows that you have a lower tendency for addictive behaviors. When you eat palatable foods such as sweets and carbs, you have higher tendency to just-have-one and stop before overeating.

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.

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.

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 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. Individuals with the T allele are more likely to have behavioral addictions, the compulsion to continually engage in negative behaviors impacting on one's healthy or daily life.

No genetic tendency to emotional eating

AG GG **AA**

OPRM1 rs1799971

60

OPRM1 encodes the mu-opioid receptor of the endogenous opioid system, which rewards our body upon stimulation such as emotional attachment, alcohol and food intake. While the exact mechanism remains unknown, studies showed that individuals possessing the G allele gained an increased reward upon stimulation, and hence are prone to addictive and abusive behavior.

Low tendency for addictive behaviors

AA GA **GG**

COMT rs4680

44

This well studied SNP is referred to the 'Worrier vs. Warrior' gene. Individuals with the G allele are known as the 'Warrior' and are less exploratory with lower dopamine levels; higher pain threshold, better stress resiliency, albeit with a modest reduction in executive cognition performance under most conditions. Individuals with the A allele are known as the 'Worrier' and are more exploratory with 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 but have an increased risk of addictive behaviors such as overeating and alcohol dependency.

Your Stress Response

Genetics can impact how you absorb nutrients, respond to exercise, and react to various environmental factors. You may be surprised to learn that genetic markers can affect your stress response as well. Some markers control neurotransmitters such as dopamine. Others play a role in regulating your physical response to stress. This leads to phenotypes with varying degrees of susceptibility to stress. Understanding your personal stress response can make you better equipped when facing difficult challenges in life.

Short-Term Stress

Recommendations

- Your genotype is associated with higher tolerance for short-term stress, the process of adapting well when faced with adversity, trauma, tragedy, threats or significant life problems. However, this genotype is also shown to be less willing to seek out new approaches.

High stress resistance

AA AG **GG** | COMT rs4680 61

Catechol-O-methyltransferase (COMT) regulates the prefrontal cortex (PFC) function through the dopaminergic pathway. Individuals with the G allele have lower resting dopamine levels, causing a greater response to dopamine upon stress resulting in better stress resiliency. Individuals with the A allele have higher resting dopamine levels, causing a reduced response to dopamine when under stress and are therefore more vulnerable to stress. These individuals may have an advantage in daily memory and attention tasks.

High stress resistance

CT TT **CC** | DRD2 rs1800497 62

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 have fewer dopamine receptors and therefore a higher sensitivity to stress. They also tend to be more cautious than those with the C allele.

Normal stress-coping style

AA GA **GG** | BDNF rs6265 63

This gene is associated with different levels of risk for depression. Individuals with the GG genotype produce a higher level of the stress hormone called cortisol which is a key part of the fight-or-flight mechanism. This genotype is associated with a higher anxiety risk and higher levels of depression symptoms. Individuals with an A allele produce lower levels of cortisol, have less anxiety and may be protected against stress-related symptoms of depression.

Lower response to stress

AG GG **AA** | OPRM1 rs1799971 64

OPRM1 encodes the mu-opioid receptor, which governs the hypothalamic-pituitary-adrenal (HPA) axis that is the system that control the response to stress. Studies have shown that individuals carrying the G allele have a stronger cortisol response, and hence a stronger response to stress. Individuals with the AA genotype have a reduced response to stress.

Long-Term Stress

Recommendations

- Your genotype is associated with decreased activity and slight impairment of the MTHFR enzyme, leading to a lower level of active folate, which is essential for regulating stress responses long term such as mood swing, overeating and depression.

Increased stress susceptibility

CA CC AA | MTHFR rs1801131 65

MTHFR encodes methylenetetrahydrofolate reductase which plays a crucial role in converting dietary folate into methylfolate, the active form of Vitamin B9. Low folate levels in individuals with the C allele have been shown to be associated with higher susceptibility to emotional stress and depression. Individuals with the AA genotype have a normal ability to form active folate and are less likely to suffer from emotional stress and depression.

Normal stress response

TC TT CC | MTHFR rs1801133 66

MTHFR encodes methylenetetrahydrofolate reductase which plays a crucial role in converting dietary folate into methylfolate, which is essential in regulating mood through serotonin and S-adenosylmethionine (SAME). Studies have shown the low folate level in the individuals with the T allele may lead to a stronger response to stress, and these individuals may face more difficulties in regulating mood and emotions. Individuals with the CC genotype have a normal ability in converting folate to its active form and can regulate their mood better.

Stress Hypertension

Recommendations

- Your genotype is associated with an increased risk to hypertension caused by stress. Be aware of your diet to better moderate your blood pressure. If you are feeling stressed, consider taking time to rest and calm down .

Higher risk of hypertension caused by stress

AA AG GG | ACE rs4343 67

This gene regulates the Angiotensin I-converting enzyme (ACE) activity, which has a vital role in maintaining blood pressure and sodium homeostasis. Studies have shown that A allele carriers are associated with lower stress tolerance, which may result in hypertension (high blood pressure). Individuals with the G allele are associated with higher stress tolerance and therefore lower risk in hypertension.

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 likely have the ability to convert the plant based Vitamin A (beta-carotene) to the active (retinol) form. Your body has the ability to utilize both plant (e.g. carrots, pumpkin, spinach, and sweet-potato) and animal (e.g. dairy, eggs, salmon, and liver which contain the active Vitamin A, retinol) based forms.
- Your genotype shows a normal ability to form retinoids. With a properly maintained diet, this translates to healthier, less oily skin, and reduced likelihood of developing wrinkles, lesions, and acne. Be sure to continue eating healthy sources of vitamin A, such as fish and eggs. Consider using supplements if your diet is restricted from such foods.

Normal 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

- Although you have some genetic predisposition of reduced ability to utilize folate, the tendency for undesirable health issues is low as long as you ensure adequate intake of folate-rich foods, including fortified breakfast cereals and green leafy vegetables.

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.

Normal 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 a proper Vitamin B12 absorption function. To obtain adequate levels of Vitamin B12, it is important that you consume foods such as meat, dairy, and eggs. You may also consider taking a dietary supplement with Vitamin B12.

Adequate Vitamin B12 absorption function

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 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.
- Your genotype shows you tend to have a lower level of circulating vitamin D. You can increase your vitamin D by incorporating D3-rich foods such as egg yolk and beef liver. Getting limited sun exposure of 15-20 minutes daily can also help generate vitamin D, but make sure you take precautions against sun-related skin damage.

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 GG genotype 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 α-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 normal iron status. However, it is a good idea to incorporate adequate iron-rich foods in your diet such as spinach, pumpkin seeds and chickpeas.

Normal 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.

Normal 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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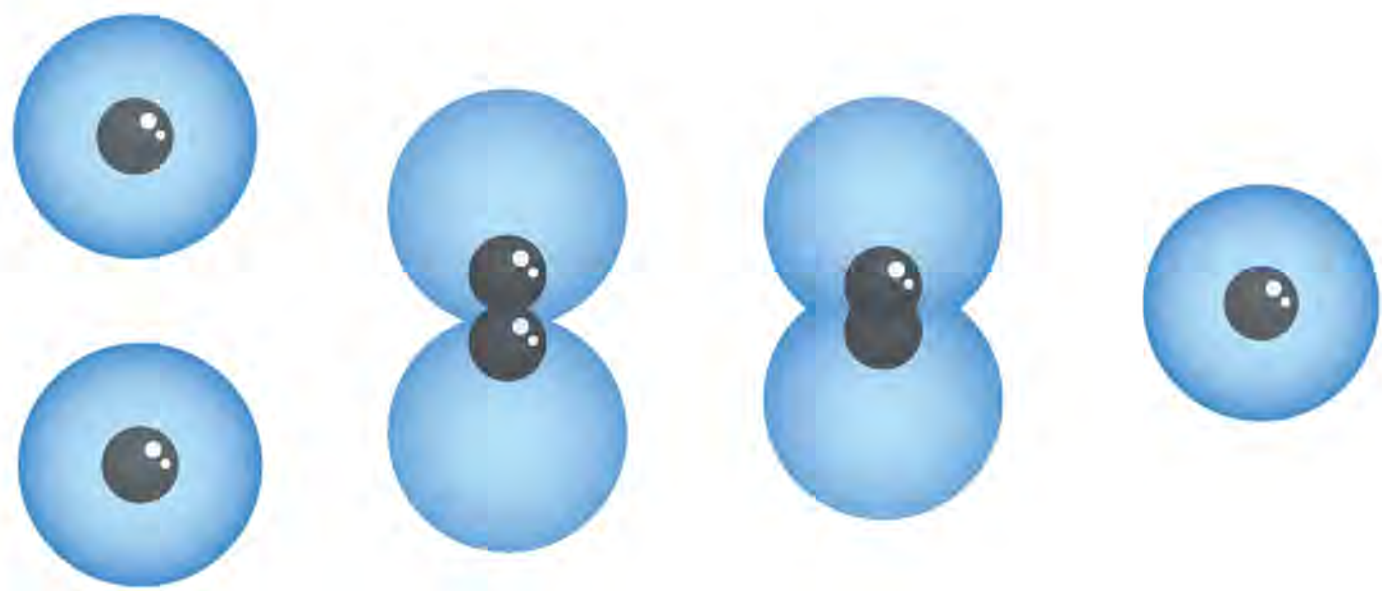
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GENETICS 101

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

Advanced Genomic Solutions (AGS) Ltd. is accredited by the College of American Pathologists (CAP Number: 9479295) and Clinical Laboratory Improvement Act (CLIA) of 1988 (CLIA Number: 99D2143058) to perform high complexity clinical testing. This test is not intended for the purpose of medical diagnosis and is used for advisory purposes only. The genetic tests are only intended as serving an advisory role in health plan decisions. The test only detects specific allele(s) instead of all alleles for the genes. It does not rule out the possibility that other alleles in the genes might be potential variants. Individuals carrying non-tested alleles may have different responses and phenotype results. Apart from genetics factors, non-genetic factors such as age, diet, supplements, concomitant medications, personal health history, family health history, ethnicity, pregnancy, and environmental factors, all need to be taken into account when making decisions for health plan change. This report contains personal privacy information, non-authorized person should not read or transferred to others. The laboratory disclaims all responsibility for any negative or potentially negative side effects experienced by the user.

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.



PRIVACY STATEMENT

Unlike other genetic companies, AGS does not sell or transfer our client's data or any personal information. AGS adheres to strict confidentiality and privacy laws that ensure all our clients genetic information is kept private. No exceptions.

WE TAKE YOUR PRIVACY VERY SERIOUSLY

Confidentiality is a respected part of the AGS code of ethics. Your privacy is our number one priority. We pledge to uphold the highest standards of bioethics and maintain rigorous policies and procedures to keep your data safe and secure. We will not even share your DNA data with your physician without your permission and we will never sell your data. That is our strict policy. We guarantee it.

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