ENERGY GX

Prepared for: Susan Smith

MyBodyGX

Welcome To Your MyBody GX Personal Report

EnergyGX Personal Report
July 29, 2018

Congratulations! You are holding in your hands the codes to maximizing your health, fitness and well-being—in depth insights that, up until now, have never been available. We have always inherently understood that everything from wrinkles to heart disease "runs in the family," or is passed down from generation to generation through our DNA. But until now, figuring out exactly what traits we've inherited, and more importantly, what to do with that knowledge, took a lifetime of trial and error to sort through and often remained a mystery.

No more. Scientists can now identify and analyze dozens of traits embedded in your DNA that influence how your body works and how your diet, exercise and lifestyle habits and behaviors directly impact how you feel, function and look - right down to the cellular level. Healthy Aging not only provides you with a road map of your specific genes, but also gives you a concrete action plan for optimizing your genetic potential with this knowledge. *Healthy Aging will help you understand yourself and take steps to make you feel, function and look better immediately and long-term for a healthier, longer life.*

What is Genetic Testing?

Genetic testing utilizes a physical specimen from the body (saliva, blood, or other tissues) to reveal information about a person's chromosomes or their genes. In addition to identifying key genes, information is evaluated about areas on each gene that may differ between people. These areas are known as single nucleotide polymorphisms (SNPs). We use the term genotype to describe the outcome of your individual genetic tests.

Which Traits Were Analyzed?

To produce your results for Healthy Aging we looked at genes that are related to three major health categories: How You Feel, How You Function and How You Look.

What Can Your Results Tell You?
Or Why Is Your Genotype Important?

There's a saying when it comes to genetics: Your genes load the rifle; but something else pulls the trigger. That is to say that *how genes are expressed is affected by your lifestyle, as well as other environmental factors*. Not all of those factors are within your control, of course, but many are. Knowledge is power.

To empower you with the best genetic testing knowledge possible, we have established stringent criteria for studies that we use to help us evaluate the potential impact of your genotype for each gene tested. We select the largest and most

scientifically valid genome-wide association studies to calculate a score for the different genes or gene combinations for all genes tested. Your results indicate which gene combinations you have in each category, and you receive a rating for each trait in a category. The studies we used as the basis for our recommendations are available for reference in this report.

Your ratings reflect your potential level of response to diet, exercise, lifestyle and other behaviors with regard to how your body feels, functions and looks, including an array of traits ranging from how likely you are to crave sugar to your risk for mental acuity decline, based on your genetic analysis. Keep in mind that the presence of certain genotypes does not mean that any given outcome is certain. So while your analysis might show that you have an increased or decreased potential for a certain health trait, it does not mean that you will, in fact, express that trait. The analysis simply suggests that there is a greater chance that you will, but behavioral, environmental and other factors can also play a role in whether you will express that trait and exhibit that result. However, these results may provide important insights into how your body might perform optimally. Based on this information, we provide personalized suggestions that can help you achieve optimum results.

Personalized medicine, or individualized advice based on a person's genetic profile, is still in its infancy because there is still much to be understood about genes and their interactions with each other and other influences such as diet, exercise and the environment. Genetic research is a relatively new field and many new discoveries are being made every day. We will maintain a continually updated research database, with analyses that will be modified as new and better research becomes available.

On the following pages you will see a summary of your results, followed by a detailed explanation and success strategy. You can't change your genes, but you can control the diet, exercise and lifestyle behaviors that influence those genes and take steps starting today to minimize genes that may cause undesirable outcomes and to maximize your health and wellness genetic potential.

What You'll Learn About You

On the following pages you will see a summary of your results, followed by a detailed explanation and strategy for success. This guidance can help you adopt the diet, exercise and lifestyle behaviors that will have you feeling, functioning and looking your best.

REPORT SUMMARY


LOOK


FEEL


FUNCTION

REPORT SUMMARY

LOOK

Sun Sensitivity	NORMAL	IRF4, LOC105374875, NTM, TYR, HERC2, MC1R, CPNE7, MC1R, RPS2P1, ASIP
Skin Aging	NORMAL	IRF4, SPATA33, RALY/ASIP, BNC2
Facial Aging	IMPROVED	STXBP5L
Stretch Marks	ABOVE AVERAGE	ELN, SRPX, HMCN1, LOC105373353
Skin Glycation	BELOW AVERAGE	AGER, GLO1
Fat Loss Response To Cardio	NORMAL	ADRB2, LPL
Body Composition Response To Strength Training	ENHANCED	NRXN3, GNPDA2, LRRN6C, PRKD1, GPRC5B, SLC39A8, FTO, FLJ35779, MAP2K5, QPCTL-GIPR, NEGR1, LRP1B, MTCH2, MTIF3, RPL27A, SEC16B, FAIM2, FANCL, ETV5, TFAP2B

FEEL

Intrinsic Motivation To Exercise	LESS LIKELY	BDNF
Addictive Behavior And Stimulus Control	MORE LIKELY	DRD2
Impulse Control And Taste Preference	BELOW AVERAGE	FTO
Sleep Duration	NORMAL	ABCC9, LOC101927400, DRD2
Sugar Intake	ABOVE AVERAGE	SLC2A2, GLUT2

REPORT SUMMARY

FUNCTION

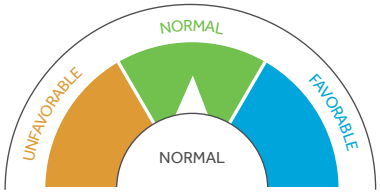
Mental Acuity	SLIGHTLY ABOVE AVERAGE	APOE, BDNF
Age Related Hearing Loss	INCREASED	GRM7
Kidney Function With Aging	ABOVE AVERAGE	UMOD, GALNTL5, GALNT11
Longevity	NORMAL	FOXO3, APOC1 (APOE-CI-CII)
Fitness Response To Cardio	BELOW AVERAGE	AMPD1, APOE
Systemic Inflammation	ABOVE AVERAGE	CRP, APOC1 (APOE-CI-CII), HNF1A
Polyunsaturated Fatty Acid Tendency	SLIGHTLY ABOVE AVERAGE	FADS1-2
Cholesterol Response To Dietary Fat	SENSITIVE	LIPC
Insulin Response To Dietary Fat	SENSITIVE	FTO
Trig Response To Cardio	NORMAL	CYYR1, GLT8D2, RBFOX1, ZNF385D
Lactose Intolerance	LIKELY	MCM6
Calcium Tendency	BELOW AVERAGE	CASR, DGKD, GCKR, LINC00709, CARS, LOC105370176, CYP24A1
Copper Tendency	BELOW AVERAGE	SMIM1, SELENBP1
Magnesium Tendency	NORMAL	MUC1, SHROOM3, TRPM6, DCDC5, ATP2B1, MECOM
Dietary Choline Tendency	SLIGHTLY INCREASED	PEMT
Selenium Tendency	NORMAL	DMGDH
Zinc Tendency	NORMAL	CA1, PPCDC, LINC01420

LOOK

SUN SENSITIVITY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a NORMAL level of sun sensitivity. That means that your skin will likely burn during prolonged amounts of unprotected exposure to the sun's UV rays, but that it will also likely eventually tan. It's important to remember that there is no such thing as a "healthy" tan, however, and that unprotected sun exposure can cause early aging of your skin and increase your risk for skin cancer.



Your genetic profile indicates that you are inclined to have a NORMAL level of sun sensitivity.

We recommend that you protect your skin from any chance of burning and the long-term risk for skin cancer by taking some common sense steps to protect your skin from UV ray exposure.

SUCCESS STRATEGIES

Having skin that isn't especially prone to burning means that you can expose your skin to small amounts—15 minutes or so—of unprotected sunlight, which helps your body create Vitamin D. But you still need to be mindful of the potential long-term damage and increased skin cancer risk from prolonged exposure. Here's how to keep your skin safe.

Wear sunscreen. When you're going out for the day, wear sunscreen. Look for one that is broad spectrum, meaning that it protects against both the burning UVB rays and the deeper damaging UVA rays. For best protection, choose one that is rated sun protection factor (SPF) 30 or higher and at least 4 star UVA protection.

Cover your vulnerable spots. Wear a hat to cover your head, face and ears, which are especially susceptible to long term exposure and sun damage.

RELATED GENES / SNPs

IRF4, LOC105374875, NTM, TYR, HERC2, MC1R, CPNE7, MC1R, RPS2P1, ASIP

The genes and associated SNPs that are included in this category have been shown in studies to have significant associations with a person's level of sun sensitivity.

How sensitive you are to the sun relates to how easily (or not) your skin burns. Some people are genetically inclined to tan easily in response to sun exposure. Others, however, have skin that turns painfully red and/or even blisters from exposure to the sun's ultraviolet (UV) rays. Sunburns often take an hour or more of unprotected sun exposure to occur, but can happen in as little as 30 minutes. Your sun sensitivity is determined by a number of factors including having fair skin, light colored hair and taking medications such as certain antibiotics and NSAIDs that increase your skin's sensitivity to sunburn. Genes also play a major role in your level of sun sensitivity.

LOOK

SUN SENSITIVITY

Be mindful of midday exposure. The sun's rays are strongest from about 10 a.m. to 3 p.m. If you're going to be out all day, take extra protection in the form of a light cover up or umbrella to give your skin some shade.

Follow up research on a skin pigmentation genome-wide association study revealed that the T allele of the IRF4 gene is associated with an 87 percent greater risk of sun sensitivity. The variant acted much like a dimmer switch in that when the switch in the IRF4 enhancer is in the "on" position, ample pigment is made. In turn, that melanin pigment gets transferred to the skin cells near the surface of the skin and protects the skin from UV radiation in sunlight. If the switch is turned "off", as in the case with the T allele, the pathway is less effective and less melanin is ultimately produced, leaving you vulnerable to burning.

In another genome-wide association study of skin sensitivity and tanning response after exposure to sunlight in more than 10,000 men and women of European ancestry, researchers discovered that an A allele variation of the gene HERC2 (which is known as a pigmentation SNP) is associated with increased tanning ability and decreased risk of sun burning. Other research has found a strong link between genotype and hair and eye color and sun sensitivity (which is why fair skinned, blue eyed people are more likely to burn than those with darker complexions and darker hair and eye colors).

Because sun sensitivity can lead to sun damage and increases your risk for skin cancer, it's important for people who are most sensitive to the sun to balance their need for healthy sun exposure to get ample amounts of vitamin D with sun protection. High sun sensitivity risk alleles are most common in people of European descent and are generally not seen in those of sub-Saharan Africa or East Asian descent.

Though tanning is the result of an increased production of eumelanin and

LOOK

SUN SENSITIVITY

your skin's attempt to protect itself from further damage, it does not mean that good tanners are immune to sun damage or related skin cancer.

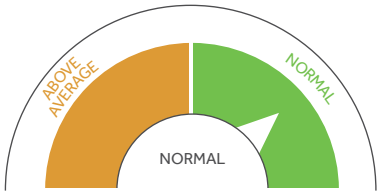
Our analysis investigated which genotypes for these genes were present in your DNA. Your rating of FAVORABLE, NORMAL, or UNFAVORABLE reflects your tanning response, which in turn reflects your level of sun sensitivity and likelihood of burning.

LOOK

SKIN AGING

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a NORMAL likelihood of developing age spots. That means your skin is likely to develop some spots overtime, but you aren't at a particularly high risk for early or excessive discoloration.



Your genetic profile indicates that you are likely to have a NORMAL level of skin aging as evidenced by age spots.

Because chronic, prolonged sun exposure is an independent risk for age spots, we recommend that you help maintain a healthy, youthful looking skin complexion by taking precautions to minimize sun damage and its symptoms.

SUCCESS STRATEGIES

Sun exposure as well as genetics are the culprits behind age spots. Since you're at an average risk for these patchy discolorations, you'll want to practice sun smart strategies to avoid or minimize spots.

Use sunscreen. Consistent sunscreen use is your best protection against future age spots. Wear a sunscreen of at least SPF 30 and with 4 star UVA protection to minimize short and long term skin damage. Reapply every two hours, more often if you've been swimming and/or sweating. Be especially vigilant if you're going to be out for any length of time between the peak sun hours of 10 a.m. and 3 p.m.

Protect high damage zones. Your face, head (if your hair is thinning), forearms and hands are the areas that spots are most likely to appear because they see the most sun. Use an umbrella to seek shade at the beach and pool. Wear a

RELATED GENES / SNPs

IRF4, SPATA33, RALY/ASIP, BNC2

The genes and their associated SNPs included in this category have been shown in studies to have significant associations with a person's susceptibility to visible symptoms of skin aging, particularly lentigines, pigmented patches of skin more commonly called "age spots."

Lentigines are brown lesions that form on the skin from chronic sun exposure and other factors. They generally appear on the face, hands, forearms and upper chest. Though they take years to develop, these tan or brown spots seemingly appear out of nowhere and are very common in adults over the age of 50. Though age spots are harmless, people may not like the way they look and often turn to bleaching creams or other dermatological treatments to fade them.

Age spots are primarily caused by years of prolonged sun exposure as melanin becomes concentrated in small patches. Unsurprisingly, fair skinned people are more at risk for age spots. Age spots are also caused by an underlying genetic

LOOK

SKIN AGING

broad brimmed hat and a light, but tightly woven cover-up when you're out for long periods of time in strong sunlight.

Treat spots early. If you should notice some spots, you can diminish their appearance by using an over-the-counter fade cream. Look for one that contains hydroquinone, glycolic acid or kojic acid. Use only as directed and be aware that some of these products, particularly those containing hydroquinone, may cause temporary skin irritation.

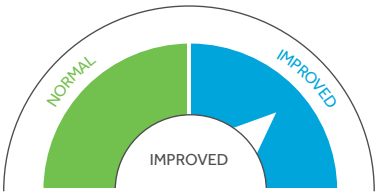
component that is independent of melanin production, however, according to a study of more than 2,800 men and women of North European ancestry, which identified four genes with strong associations to age spots that were at least partially independent of skin color. Women also seem to be at a higher risk, though those findings are inconclusive and the reasons why are still unclear.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of either NORMAL or ABOVE AVERAGE indicates the likelihood that you will develop age spots over time.

FACIAL AGING

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you an IMPROVED level of visible skin aging. That means that while most people will see wrinkles as early as their late twenties, you're not likely to notice lines, wrinkles and skin thinning and sagging until later. As with all physical conditions, however, genes are only part of the story. A certain amount of skin aging is, of course, inevitable. Also, since skin aging is ultimately caused by skin damage, your lifestyle and dietary habits can accelerate the process no matter what your genetic makeup.



Your genetic profile indicates that you are likely to have an IMPROVED level of skin aging.

You can maximize your fortunate genetic predilection by taking steps to protect your skin from undue damage and help it maintain its elasticity over time.

SUCCESS STRATEGIES

The longer you can keep your skin's structural support system—which includes the collagen, elastin and the extrafibrillar matrix—healthy and strong, the more firm and youthful it appears. Your skin is genetically more likely to maintain its integrity overtime, but you can also take steps to protect against premature skin aging by minimizing your exposure to damaging elements, such as sun and smoke.

The biggest culprit behind premature signs of skin aging is sun exposure. The sun's UV rays, particularly the deep penetrating UVA rays damage the skin's collagen and elastin fibers. Wear sunscreen of at least SPF 30, especially if you burn easily, and be sure the label indicates that it provides at least 4 star UVA protection as well.

Also, keep your skin, as well as the rest of you, in good shape by eating a diet rich in fruits, vegetables and essential omega-3 fatty acids, all of which have

RELATED GENES / SNPs

STXBP5L

The gene and its associated SNP included in this category have been shown in studies to have significant associations with a person's susceptibility to visible signs of facial aging.

As is the case with all of our organs, our skin, especially that on our face, ages over time. Visible signs of facial aging include wrinkling, especially around the eyes and mouth; creases or frown lines in the forehead, and thinning and sagging or folding of your skin, particularly around your eyes, mouth and jawline.

Some amount of visible facial aging is inevitable with the passage of time. However, there are certain lifestyle behaviors that accelerate and/or exacerbate it such as smoking, poor nutrition and sun damage. Genetics also plays a role, especially in the case of Caucasians.

In the first ever genome-wide association

LOOK

FACIAL AGING

been shown to keep maintain skin integrity and protect it from damage. Stay well-hydrated to keep skin supple, as dehydration robs the skin of elasticity.

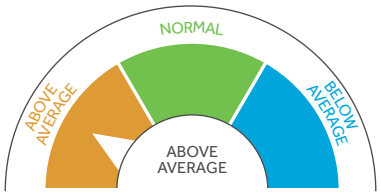
study of its kind, researchers examined more than 500 middle-aged French Caucasian women to identify the factors that may affect the severity of skin aging. They found that those who carried the A allele of this gene showed less aging, particularly skin wrinkling and sagging (age spots were not influenced by this gene), over time.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL or IMPROVED reflects the degree to which you are likely to experience visible signs of skin aging with the passage of time.

STRETCH MARKS

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you an ABOVE AVERAGE likelihood of developing stretch marks. That means you're more susceptible to developing visible lines of tissue scarring, particularly during times of relatively rapid weight changes, though they may also appear on their own where elastic fibers are weak.



Your genetic profile indicates that you are likely to have an ABOVE AVERAGE level of susceptibility to stretch marks.

We recommend taking extra steps in your diet and lifestyle to maintain healthy skin elasticity to minimize the occurrence of these striations.

SUCCESS STRATEGIES

Stretch marks often fade over time, though some may remain more prominent. Practicing healthy skin hygiene can help prevent their occurrence and expedite their fading.

Stay hydrated. Dehydrated skin is less resilient skin. Keep your entire body, including your skin, well hydrated. The Institute of Medicine recommends that women drink about 9 cups of fluids per day and men drink about 13 cups a day to maintain optimum hydration.

Feed your skin. Eat foods that are rich in skin-nourishing nutrients, especially:

Silica: This trace mineral strengthens your connective tissues and is essential for healthy skin. You can get it from asparagus, whole grains, oats, beets and corn.

RELATED GENES / SNPs

ELN, SRPX, HMCN1, LOC105373353

The genes and their associated SNPs included in this category have been shown in studies to have significant associations with a person's susceptibility to developing striae distensae, commonly known as stretch marks.

Stretch marks are a form of scarring that creates indented, sometimes discolored, streaks along the skin. They are caused by a rapid stretching and subsequent tearing of the dermis. They are usually associated with pregnancy, but also can occur during puberty, and after any sudden or large weight gain, including breast enhancement surgery. Depending on your skin tone, these striations may appear pink, purple, black or red and tend to fade over time. Stretch marks are extremely common, with up to 80 percent of the population experiencing them. Women are more prone to stretch marks (likely because of pregnancy) as are people using corticosteroid medications, as these medications thin the skin and leave it more vulnerable to damage. Medical conditions

LOOK

STRETCH MARKS

Omega-3 fatty acids: You need essential fatty acids, especially omega-3s, for your skin to repair and regenerate. Cold water fish like salmon and mackerel, as well as flax seeds, are excellent sources.

Zinc: This mineral helps control the production of oil in your skin. You can get what you need through shellfish, pumpkin seeds, oats, eggs and Brazil nuts.

Selenium: Another mineral your body uses to maintain skin health and elasticity. Whole grains, nuts, eggs and seafood are good sources.

Vitamin C: This antioxidant plays an essential role in collagen synthesis, which helps maintain the integrity of your skin. Excellent sources include citrus fruits, bell peppers and leafy greens.

Vitamin A: This well-known wrinkle fighter also promotes skin regeneration. Get what you need through foods rich in beta carotene (a precursor to vitamin A) such as orange and yellow fruits and vegetables such as carrots, bell peppers and sweet potatoes, as well as dark leafy greens.

such as Cushing's syndrome (caused by prolonged exposure to cortisol), as well as adrenal gland diseases also raise your risk. There are also genetic risk factors for stretch marks.

At the extreme end of the genetic spectrum are connective tissue diseases such as Marfan syndrome and congenital contractural arachnodactyly, which are caused by mutations in certain genes and lead to stretch marks as well as other symptoms. However, you don't need to have a congenital disease to be genetically predisposed to stretch marks. In one study of nearly 34,000 men and women of European descent, researchers identified four gene SNPs that are significantly associated with stretch marks.

Our analysis investigated which genotypes for these genes were present in your DNA. Your rating of ABOVE AVERAGE, NORMAL or BELOW AVERAGE reflects the degree to which you are likely to experience stretch marks.

Stay active. Exercise is good for your entire body, including your skin, because it boosts circulation, which brings oxygen and nutrient-rich blood to your cells and removes metabolic waste. Get at least 30 minutes a day.

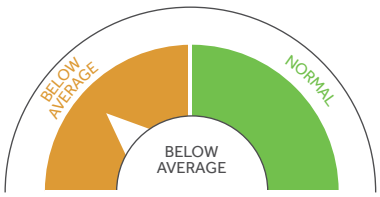
Moisturize. There are no magic creams or potions to prevent stretch marks, but keeping your skin moisturized can help keep your skin healthy and minimize their appearance.

See a dermatologist. If your stretch marks are very bothersome, see your dermatologist. Though there are no "cures" for stretch marks, some in office techniques like laser treatments may also improve their appearance.

SKIN GLYCATION

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a BELOW AVERAGE level of protection against skin glycation. That means you are more susceptible to AGEs (advanced glycation end products) damage and premature skin aging as evidenced by marked loss skin tone in the form of sagginess and wrinkles.



Your genetic profile indicates that you are likely to have BELOW AVERAGE levels of protection against AGEs (advanced glycation end products) and skin glycation.

You can reduce your risk of skin deterioration and premature aging via skin glycation by practicing healthy diet, exercise and lifestyle habits to maintain healthy skin integrity.

SUCCESS STRATEGIES

Even if you don't necessarily stress about wrinkles and skin tone, it's important to protect yourself against skin glycation because the AGEs that damage the integrity of your skin are also wreaking havoc on the organs inside your body that you can't see. Here's how to minimize the levels of AGEs in your system.

Avoid simple sugars. Not surprisingly, the best way to minimize your exposure to this glucose-driven cell damage is to avoid dumping tons of the sugary stuff into your system. That means minimizing your intake of simple sugars like white sugar and especially fructose and high fructose corn syrup, which studies show increase your rate of glycation by 10 times. Stick to whole grains and other complex carbohydrates, which are rich in healthy fiber and release less glucose into your system.

RELATED GENES / SNPs

AGER, GLO1

The genes and their associated SNPs included in this category have been shown in studies to have significant associations with a person's susceptibility to skin glycation—deterioration of certain proteins in skin that causes visible signs of aging such as fine lines, wrinkles, sagginess and dullness or loss of radiance.

As the name implies, skin glycation is glucose (sugar) driven. It occurs when sugar molecules in your system glom onto proteins in your skin, such as collagen and elastin (which give your skin its firm, plump, springy texture) and form what are known as advanced glycation end products (AGEs for short). AGEs cause your protein fibers to become rigid, brittle and prone to breaking down. High levels of glucose (blood sugar) may accelerate this process, but it also occurs when cells are exposed to normal blood sugar levels over time. How susceptible you are to skin glycation also depends on your genes, as some people have genetic variations that

LOOK

SKIN GLYCATION

Be wary of BBQ. Cooking or caramelizing foods at high temperatures as with barbequing creates AGEs, which when you eat them can do their damage to your collagen and elastin fibers, creating skin glycation. Eat these foods sparingly.

Eat more blueberries. Blueberries are rich in antioxidant compounds called anthocyanins, which are particularly potent for blocking AGE formation and collagen breakdown. Make them one of your two to three servings of fruits you eat each day.

Drink green tea. Well known for its cancer-fighting properties, green tea contains a powerful antioxidant compound called epigallocatechin gallate (EGCG) that protects your skin and interferes with the glycation process.

Get ample vitamin C. Your body uses the antioxidant vitamin C to produce collagen. Eat at least five servings of fruits and vegetables a day to get your fill of this protective micronutrient. Citrus fruits, peppers and strawberries are particularly good sources.

appear to make them more susceptible to the effects of AGEs.

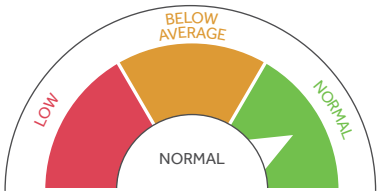
The main enzyme that protects your cells from AGEs is known as glyoxalase 1. The gene that influences that activity is GLO1. In a recent study of 326 men and women with either healthy blood sugar levels or with type 1 or type 2 diabetes, researchers found that the specific SNP variations in the GLO1 gene people carried predicted their level of protective enzyme activity, with those carrying minor alleles having lower enzyme activity—e.g., increased risk for skin glycation.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of either NORMAL or BELOW AVERAGE reflects the level of natural glycation protection you have based on your genotype.

FAT LOSS RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a NORMAL fat loss response to cardio. That means your genotype showed few, if any, of the 'unfavorable' gene combinations. It's important to remember that genes are only one factor that influences how much fat you lose when you exercise. But in general, given your genotype, you can expect to lose a usual amount of body fat by participating in a program of at least 3 days per week of moderate to vigorous intensity cardio exercise.



Your genetic profile indicates that your fat loss response to cardio is NORMAL.

That's a good thing whether or not you're looking to lose weight, because it means you can more easily maintain a healthy body composition. We recommend that you participate in regular cardiovascular exercise like walking, swimming or an exercise class like Zumba or indoor cycling for a total of at least 30 minutes most days a week to optimize your genetic potential.

You can optimize the influence of your favorable genotype by engaging in aerobic exercise most days a week, more frequently and/or at a higher intensity if weight loss is your goal.

SUCCESS STRATEGIES

Regardless of genotype, everyone can benefit from getting the standard recommended 150 minutes of cardiovascular exercise a week. Your genetic profile predicts that you can expect a favorable amount of fat loss from this amount of physical activity.

To accelerate your fat loss, try increasing one or all of the following: the number of days per week you exercise, the length of time of your exercise session, and/or the intensity of your exercise session. High intensity interval

RELATED GENES / SNPs

ADRB2, LPL

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's ability to lose fat from a regular program of cardio exercise.

The desire to lose excess fat is a common one in America, where statistics show that 69 percent of us have at least some excess fat to lose. Along with a balanced diet, regular exercise is one of the ways to lose fat and improve body composition. Though everyone can lose some fat through exercise, how easily it comes off appears to be influenced by your genes.

In one large study, researchers put sedentary men and women on a 20-week cardio program where they exercised on a bike 3 days a week, starting at a moderate intensity for 30 minute sessions and building up to slightly harder bouts lasting for 50 minutes for the last 6 weeks of the study.

All the men in the study shed fat regardless of genotype. It was a different

FAT LOSS RESPONSE TO CARDIO

training, where you push yourself for a few very hard for short bouts (e.g. 30 to 60 seconds followed by easy recovery) within a cardio session can speed up fat loss, according to research.

Also include upper and lower body strength training exercises such as squats and push-ups at least twice a week to maintain lean muscle tissue.

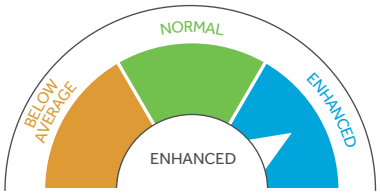
story for the women, however. Though all the women lost some fat, women who carried certain variations of these genes lost less fat over the course of the 5-month study than their peers who carried more 'favorable' genotypes.

Our analysis investigated which genotype for each of these genes was present in your DNA. Your rating of either NORMAL, BELOW AVERAGE or LOW reflects whether your genotypes included those that carried a risk of experiencing a reduced fat loss response from a regular program of cardio exercise.

BODY COMPOSITION RESPONSE TO STRENGTH TRAINING

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits an ENHANCED body composition response to resistance training exercise. That means that along with improving strength and building lean muscle tissue, you are likely to lose weight and lower your body fat when you engage in a regular strength training routine. That's good news because maintaining a healthy body composition not only lowers your risk for chronic disease like heart disease and diabetes, but also being stronger and lighter gives you more energy for work, play and other physical activity. And of course, a lean body composition helps you look your best too.



Your genetic profile indicates that your body composition response to strength training is ENHANCED, meaning you are more likely to both make muscle and lose fat when you strength training regularly.

You can maximize the benefits of your favorable genotype by incorporating resistance training in to your exercise routine two to three times a week.

RELATED GENES / SNPs

NRXN3, GNPDA2, LRRN6C, PRKD1, GPRC5B, SLC39A8, FTO, FLJ35779, MAP2K5, QPCTL-GIPR, NEGR1, LRP1B, MTCH2, MTIF3, RPL27A, SEC16B, FAIM2, FANCL, ETV5, TFAP2B

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's ability to improve their body composition in response to strength training.

Body composition refers to the proportion of muscle mass you have as well as the amount of body fat you have in relation to the muscle. For good health, men should strive for a body composition that is less than 25 percent fat and women should aim for less than 30 percent fat. Maintaining a healthy body composition can help lower your chances of developing cardiovascular disease as well as diabetes and certain cancers.

Resistance, or weight, training helps you build and maintain lean muscle tissue and

SUCCESS STRATEGIES

Resistance training improves strength and the amount of muscle mass a person has. However, it does not typically burn enough calories to cause clinically significant weight loss or fat loss. For optimal body composition with less body fat, you should include 200 to 300 minutes of cardio on most days of the week and adhere to a healthy, reduced-calorie diet.

When you do strength train, it's important to lift weights that are heavy enough to provide your muscles with a sufficient stimulus that they are

BODY COMPOSITION RESPONSE TO STRENGTH TRAINING

pushed to build lean muscle tissue. Many new lifters, especially, do not lift heavy enough weight to either build muscle or get stronger. Make sure that you feel challenged by the last few reps of every set of an exercise that you do. Perform strength training exercises such as squats, lunges, rows and chest presses that target every major upper and lower body muscle group. Perform 2 to 3 sets of 8 to 15 repetitions of each exercise

Try new muscle challenges. You may also benefit from trying different forms of resistance training. Barbell-type workouts that focus on challenging weights with high reps may produce a greater calorie burn that results in more fat loss. Kettlebell workouts may provide a more endurance-based approach that revs your heart rate and leads to a greater calorie burn while also working every major muscle.

Power it up. Include at least one day of power training with significantly heavier weight. Power training entails doing fewer repetitions of heavier weights. Instead of doing 3 sets of 8 to 15 repetitions, you might choose a heavier weight and do 1 to 3 sets of 5 to 8 reps with 2 to 3 minutes of rest in between sets. If you participate in power training, build up a base level of strength following a traditional resistance-training program for at least 6 to 8 weeks before you start power training. Give yourself 2 to 3 days of recovery between power training sessions.

may also help reduce the percentage and sometimes amount of body fat you have. By improving your body composition, you'll be stronger to perform more physical activity of all kinds. Lean muscle tissue also contributes to a leaner appearance and, potentially, to a higher metabolism, or greater number of calories burned each day.

Numerous factors, including your predominant muscle fiber type, your hormones and the type of strength training you do influence how your body composition will respond to a resistance training program. Your genotype also plays a significant role.

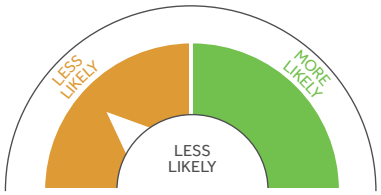
In one large study, researchers had 148 volunteers participate in an intense resistance training program for one year. They found that those who carried the most "favorable" gene variations enjoyed a full gamut of body composition benefits and not only improved their strength and muscle mass, but also experienced significant weight loss and body fat reduction. Those with less favorable genotypes still got stronger, but showed a decreased ability to lose weight and reduce body fat percentage by resistance training.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of either ENHANCED, NORMAL or BELOW AVERAGE reflects whether your genotypes included those that carried a risk of an enhanced or reduced body composition response to resistance training exercise.

INTRINSIC MOTIVATION TO EXERCISE

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you LESS LIKELY to be intrinsically motivated to exercise. That means you are less likely to derive pleasure from exercising for exercise's sake, so may feel less motivated to start or continue an exercise program. The good news is that there are many sources of exercise motivation, and plenty of people with DNA profiles like yours develop successful strategies to maintain an active, healthy lifestyle.



Your genetic profile indicates that you are LESS LIKELY to have intrinsic motivation to exercise.

You will be more inclined to start and maintain an exercise schedule that includes at least 30 minutes of physical activity a day if you employ extrinsic motivation strategies that help make exercise feel more rewarding.

SUCCESS STRATEGIES

Being less inclined to be intrinsically motivated to exercise is very different from having no motivation to exercise. It just means you have to look for other sources of motivation that are linked to exercise, just not necessarily the exercise itself. These tips have been proven to help provide the motivation many people need to get moving.

Buddy up. Research shows that people are more likely to start and stick with an exercise plan when they have companionship—someone to workout with and who keeps them accountable. Find a friend to meet for regular walks, jogs, or gym sessions.

Sign up for a charity event. Sign up for a walk, run, or bike ride that benefits a charity of your choice. A concrete event like a 5K run and doing good for others are motivation to keep moving. There are also apps that will donate

RELATED GENES / SNPs

BDNF

The gene and associated SNP included in this category have been shown to have significant associations with a person's intrinsic motivation to exercise.

Everyone needs at least 30 minutes of exercise at least five days a week for good health. People who are intrinsically motivated to exercise tend to exercise longer and more often—and reap the related health benefits—because they find exercise itself rewarding. They're the ones who hop out of bed raring to hit the gym or head out for a run because they enjoy it. People less intrinsically motivated to exercise can also enjoy exercise, but may need to find some extrinsic motivation like planning workouts with friends or rewarding themselves to maintain a consistent exercise routine.

Most of us inherently know whether or not we're intrinsically motivated to exercise. However, knowing that you're genetically more or less inclined to be intrinsically

INTRINSIC MOTIVATION TO EXERCISE

money to your favorite charity for every step you take.

Use technology to your advantage. Invest in an activity tracker or download an activity tracking app to your smartphone that will let you set a daily movement goal and will prompt you to get moving when you are falling short of the mark and will reward you when you hit it. Studies show that individuals who begin using activity trackers exercise more and achieve better results after they begin using the devices than they did before using them. Many fitness trackers offer "challenges" you can participate in with other users, which often brings out the competitive nature in us!

Use positive affirmations. Remind yourself of the rewards of exercise with positive affirmations such as "Exercise helps me feel more calm and relaxed." "Exercise makes me look and feel great." Put a daily reminder in your phone: "I feel good each time I finish exercising."

motivated can help you establish strategies that may help ensure your success.

In one study, researchers collected DNA samples from a group of healthy adult men and women then observed the group while they performed a moderate 30-minute treadmill workout. After the half hour session was up, the exercisers were told that the session was complete and they could either begin a cool down or could keep going. Those with at least one copy of the 'favorable' allele were more than 2 ½ times likely to keep going than their peers with an 'unfavorable' genotype.

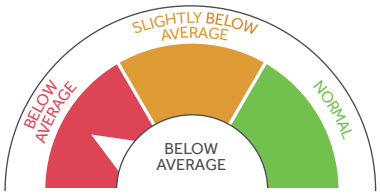
Our analysis investigated which genotype for this gene was present in your DNA. Your rating of either MORE LIKELY or LESS LIKELY reflects whether your genotypes included those that carried a risk for being low in intrinsic motivation or for being likely to be high in intrinsic motivation.

Try new things. Maybe you're not intrinsically motivated to exercise because you haven't found a form of exercise you truly like. Take a dance class; try CrossFit; join a friend for a bike ride. You may find an activity that motivates you to do it because you love it.

IMPULSE CONTROL & TASTE PREFERENCE

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that may give you a BELOW AVERAGE level of impulse control and increased risk for consuming high calorie foods as you age. That means that you are at a higher risk for becoming more impulsive and for overeating high calorie foods as you get older. The good news is that by being aware of this tendency in your DNA, you can start employing scientifically proven techniques that will help you remain mindful of what and when and how much you're eating.



Your genetic profile indicates that you will likely have a BELOW AVERAGE level of impulse control and increased risk of consuming excess high calorie foods as you age.

You'll be less likely to succumb to the lure of high fat sweets and snacks and to eat impulsively by committing to following some key mindful eating strategies.

SUCCESS STRATEGIES

Being at a high risk for impulse eating overtime means you need to be vigilant about binge-proofing your food environment and developing mindful eating habits and practices.

Take the edge off your appetite at home. Social situations and impulse eating go hand in hand like chips and dip. Set yourself up for success by having a light, but fiber-rich and filling snack like an apple and peanut butter before you leave the house. It'll be far easier to resist picking at all the finger foods at the party or event. Also, position yourself away from the food table, so you won't mindlessly nibble while you socialize.

RELATED GENES / SNPs

FTO

The gene and associated SNPs included in this category have been shown to have significant associations with a person's impulsivity and taste preference for fatty foods as they age.

Impulse control, especially in the presence of an abundance of calorie-dense, fatty foods is essential for maintaining a healthy, portion-controlled diet. So called "mindless" eating or eating just because its there, is a common problem in our society where food is present everywhere you turn. Even small things, such as the size of the food container and being around others can lure you into impulse eating. Fatty rich foods are also easy to overeat once you start eating them because they stimulate powerful pleasure centers in your brain.

While some people are aware of their impulsivity, many people eat and overeat impulsively without being aware of it,

FEEL

IMPULSE CONTROL & TASTE PREFERENCE

especially in social situations, when eating out and when food is readily available, like during meetings or other functions where cookies and pastries are out for the taking. Though we tend to think of resisting impulsive eating as an act of "willpower," it takes a good deal of mindfulness to avoid slipping into impulse eating behavior and there also appears to be a genetic component underlying some of this behavior.

Results from the Baltimore Longitudinal Study of Aging (BLSA) indicate that people who carry a risk allele of the FTO gene are not only at a 67% higher risk for becoming obese, but also for having reduced activity in the region of the brain that dictates impulse control and taste preference, leaving them more susceptible to consume—and overeat—high calorie, fatty foods, which of course is likely an underlying factor behind their being overweight.

Our analysis investigated which genotype was present in your DNA. Your rating of NORMAL, SLIGHTLY BELOW AVERAGE, or BELOW AVERAGE indicates your level of impulse control and your relative risk for consuming high calorie foods as you age.

Stash sweet and treats out of sight. The best binge prevention is not keeping your common binge-foods in the house. Sometimes that's impossible, however. In that case, keep treats, sweets, and high calorie snacks stowed away in the least convenient space in your kitchen cupboards. It's harder to impulsively eat when food is out of sight. If you know there's a certain food, like mint chocolate chip ice cream, that you cannot resist, don't keep it in the house. Enjoy it as an occasional treat when you go out, instead. And clear the counters of candy jars. In one study people who kept candy in sight (and arm's reach) weighed about 15 pounds more than those who didn't.

Eat mindfully. Turn off the computer or television and focus on your food. People who eat while watching TV consume 28 percent more food, according to a study out of the Cornell University Food and Brand Lab. By paying attention to the food on your plate instead of other distractions, you'll be aware of what and how much you're eating. You'll enjoy it more, too.

Dish out appropriate portions. If you want a snack or sweet, measure out a portion and put the rest away. Eating straight from the box, bag, or container makes it challenging to not over indulge even for people with high impulse control. Research shows people eating out of large containers eat more than 50 percent more than those eating the same snacks in reasonably sized containers.

Quiet impulses with healthy outlets. You are more susceptible to impulse and overeating when you are stressed. Get at least 150 minutes of physical activity every week. Practice healthy stress reduction habits like yoga, meditation, and engaging in hobbies.

Get proper sleep. Research shows that sleep deprived people crave sugar and fat-filled high calorie foods. In a study from the University of Chicago, people who reported several nights of poor sleep consumed about 300 more calories per day than those who were properly rested. That's because sleep deprivation produces brain chemicals similar to those found in cannabis (marijuana) that famously produce "the munchies."

Stick to scheduled meal times. Skipping meals leaves you vulnerable to impulsive eating as you grow increasingly hungry, and also more likely to reach for high calorie foods too bolster your flagging energy levels. Regularly timed meals and snacks can help improve your satiety so you aren't at the mercy of your impulses.

IMPULSE CONTROL & TASTE PREFERENCE

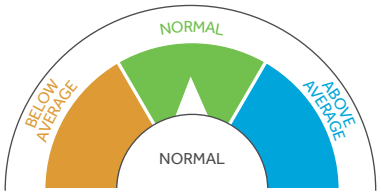
Keep healthy foods within reach. If you struggle with impulsive eating, keep plenty of baby carrots, pepper strips, apples, clementines, and other healthy snacks in sight and easily accessible when the urge to nibble is hard to overcome.

Ask "Why?" before you eat. Get into the habit of pausing and asking why you're reaching for something to eat or drink outside of regular mealtimes. Are you hungry? If so, choose a nutritious food that will satisfy you. Are you bored? Stressed? Stuck on a problem at work? Is it just because it's there, like leftover mac and cheese from your kids' lunch? Pause one moment to identify why you're choosing to eat what you're reaching for. It will make you mindful and able to find another non-food outlet or diversion to satisfy the underlying motivation.

SLEEP DURATION

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to get an NORMAL amount of sleep per night. That's good news because adequate sleep protects your health and improves your mood and general daytime functioning. It's important to keep in mind, however, that the majority of factors that influence sleep duration are not genetic. So even if you have a genetic predisposition for average sleep, you must still practice good sleep hygiene to ensure that you get sufficient rest and reap the many health benefits associated with regularly getting a good night's sleep.



Your genetic profile indicates that you may be likely to get a NORMAL amount of sleep per night.

Since the average American sleeps just 6.8 hours of sleep a night, that's good news. Because many lifestyle, diet, and behavior factors impact your sleep duration, you'll be more likely to maximize your genetic potential and to consistently get the recommended 7 to 8 hours of restorative sleep each night if you implement habits that are conducive to good sleep.

SUCCESS STRATEGIES

Sleep has a powerful effect on health. So it bodes well for your general well being that you are genetically inclined to get an average amount of sleep per night. Remember, however, that average is sometimes shy of enough depending on your personal needs. Be sure to practice good sleep hygiene to ensure you get the proper amount of restorative sleep you need.

Keep caffeine intake to healthy limits. Regardless of your genetic makeup, too much caffeine can wreck your sleep. Caffeine works by binding to your brain's nerve receptors, speeding them up, which triggers your pituitary glands to secrete adrenaline. Hence the energy buzz. The half-life of caffeine is about

RELATED GENES / SNPs

ABCC9, LOC101927400, DRD2

The genes and their associated SNPs that are included in this category have been shown to have significant associations with sleep duration.

Sleep is essential for physical and psychological health. Research shows that sleep plays a critical role in immunity, metabolism, learning, memory and a host of vital functions. Getting too little sleep (6 hours or less) doesn't just make you feel drowsy and irritable during the day, but also has been linked with an increased risk for heart disease, diabetes, poor cognitive function, getting sick and weight gain. Research shows that adults sleeping 5 or fewer hours a night have 55% greater odds of becoming obese.

Research also shows that Americans currently average 6.8 hours of sleep a night, with 26 percent averaging 6 hours or less and 14 percent averaging 5 hours or less. Many factors, including age, gender, lifestyle, diet, caffeine and alcohol consumption, occupation, light exposure

SLEEP DURATION

six hours, so if your last mug is at 4 p.m., by 10 p.m., you still have a shot of espresso's worth flowing through your system, which research shows can reduce your sleep by an hour. Have your last cup at before 4, so you can wind down and fall asleep more easily.

Nix the nightcaps. A glass of wine, beer or your favorite spirit may make you feel drowsy initially, but too much alcohol close to bedtime disrupts your sleep architecture. Alcohol within an hour of bedtime lengthens your non-REM sleep and shortens your REM sleep during the first half of the night, so you are in more wakeful territory longer. As your liver clears the ethanol from your bloodstream, your body can go into a bit of withdrawal during the second half of the night, making you restless and more likely to toss and turn. Drink moderately and avoid alcohol an hour or two before bedtime.

Reduce your light exposure. Bathing yourself in artificial light—whether from light bulbs or screens—in the evening suppresses your melatonin—a hormone produced in the pineal gland of the brain that is critical for your natural sleep-wake cycle—so your body temperature doesn't dip and your body doesn't get the signals that it is time to start the stages of sleep. Your smartphone or tablet also emit blue wavelength light, which has been shown to be especially harmful to circadian rhythm function. Dim the lights and shut down all electronics 30 minutes before you want to be asleep. Also consider downloading a blue light-filtering app if you must be on your device at night.

Create a comfy sleep environment. Humans sleep best in cool, dark, quiet conditions. Set your thermostat to between 60 and 67 degrees for the optimum ambient sleeping temperature. Consider black out curtains if outside light enters your bedroom. Earplugs or white noise machines can block out disruptive noise.

Quiet your mind. Problem-solving beta brain waves aren't conducive to deep sleep. If your brain races with worries at night, consider keeping a bedside journal to jot down your concerns with notes to address them the following day. Mind calming practices such as repeating mantras and meditation also can calm beta brain wave activity so you can drift into slower alpha, theta, and deep sleep delta wave activity.

and general health influence how much (or little) sleep we get each night. Your genes may also play a role in sleep duration.

Studies show the inheritability of sleep duration to be anywhere between 9 and 44 percent. Variations in the genes, or *alleles*, listed above have been shown to influence sleep duration, with each allele increasing or decreasing sleep by 3 to 4 minutes. Compared to other factors, genes may not move the needle on sleep in a giant way, but even small amounts of additional sleep if you are typically a short sleeper can improve your well-being. Consider that research shows just a 10-minute nap is sufficient for significantly improving alertness and cognitive performance for more than two hours, and just three minutes of stage 2 sleep (the stage where we drift off and become less aware of our surroundings) has recuperative benefits and you'll appreciate how key every minute of sleep is to your well-being.

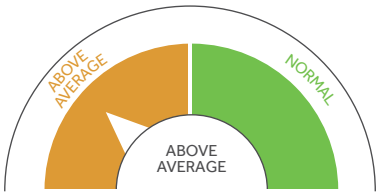
Trending your sleep duration in a healthy direction may also set the stage for improved sleep hygiene and better sleep duration long term, which may trigger a cascade of further genetic outcomes. One British study reported that there are approximately 500 genes that are affected by sleep duration. When volunteers who typically slept 7 ½ hours shaved an hour off their nightly rest, the genes associated with inflammation, immune response, stress, diabetes and risk of cancer became more active. The opposite occurred when the volunteers who typically slept 6 ½ hours added an hour of sleep.

Our analysis investigated which genotype of each of these 5 genes was present in your DNA. Your rating of NORMAL, BELOW AVERAGE, or ABOVE AVERAGE reflects whether your genotypes include those that carried a risk of reduced healthy sleep duration.

SUGAR INTAKE

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to consume an ABOVE AVERAGE amount of sugar. That means you may be likely to crave and overeat sugary foods, which is very easy to do. Sugar triggers the same cascade of feel-good brain chemicals like serotonin and dopamine as cocaine. New science shows that overloading on sugar alters our brain's opioid receptor levels in areas of the brain that control food intake, making it hard to regulate how much we eat. Being genetically inclined to overeat sugar increases your risk of consuming far too much sugar. The average person already consumes well above the recommended limit of 5 to 10 percent of daily calories. So it's essential for good health to employ some sugar strategies to reduce your intake.



Your genetic profile indicates you are likely to consume an ABOVE AVERAGE amount of sugar.

You can reduce your added sugar consumption—and avoid the negative health consequences related to eating too much sugar—by raising your awareness of what foods contain added sugar and how much you presently consume, so you can choose better alternatives. Strategies for quelling and coping with sugar cravings will also help.

SUCCESS STRATEGIES

Pretty much everyone these days eats far too much sugar—in many cases twice the recommended daily maximum amount—without even realizing it. Being genetically inclined to seek out sugar makes you especially vulnerable to the many ill effects of excessive sugar consumption. You can dramatically slash yours and protect your health by adopting sugar savvy habits and practices.

Ditch the sweetened soft drinks. Soda, juices (without the fiber of the whole

RELATED GENES / SNPs

SLC2A2, GLUT2

The gene and associated SNPs included in this category have been shown to have significant associations with a person's daily sugar intake, which in excess can have profound negative health consequences, including increasing the risk for weight gain (and obesity), diabetes, and heart disease.

Dietary sugar—especially the added, nutritionally empty kind found in sodas, sweets, dressings, cereals, condiments and processed foods – is a major public health problem. U.S. Departments of Agriculture and Health and Human Services currently urge eating less than 10 percent of your calories from *added* (not naturally occurring sugar found in whole food) sugar. That's about 49 grams, or 12 to 13 teaspoons (there are

FEEL

SUGAR INTAKE

fruit, it's pure sugar) and sweetened beverages are the main sources of sugar in many people's diets. One 12 oz. can of cola alone contains 39 grams. Opt for water (sparking or mineral if you like bubbles) with a squeeze of lemon or other sliced fruit.

Eat balanced meals. You are more susceptible to sugar cravings when your blood sugar is low. Be sure to eat regular, balanced meals that include protein, complex carbohydrates, and healthy fats to maintain even energy levels and avoid blood sugar spikes and crashes.

Read the ingredients. It's not enough to check nutrition labels for grams of sugar, because foods like tomato sauces, dairy products and yogurt contain natural sugars, which are okay. Read the ingredients and check for added sugars including beet sugar, brown sugar, cane sugar, corn sugar, corn sweetener, corn syrup, fruit juice concentrates or purees, high-fructose corn syrup, honey, malt sugar, molasses, raw sugar, syrup, maple syrup and of course, sugar. Also be on the lookout for sugar molecules ending in "-ose" - things like dextrose, fructose, glucose, lactose, maltose and sucrose. If those ingredients are in the top 3 on the list that's too much.

Beware low fat. Many low-fat products are high in added sugar, because that's what their manufacturers use to boost the flavor once the fat is gone.

Eat natural sweets. Carrots, corn, apples and berries are all naturally sweet and good for you. Snacking on naturally sweet produce can satisfy a craving for sweetness without all the added sugars. Fruits and vegetables are also high in fiber, which slows the stream of sugar into your bloodstream

Avoid artificial sweeteners. It may seem logical to replace your sugar-sweetened soft drinks with diet varieties, but artificial sweeteners have been linked to weight gain, glucose intolerance and increases in health harming visceral belly fat. Recent research suggests that artificial sweeteners not only don't trip the neurons in your brain that tell you that you've eaten, but also may disrupt healthy gut bacteria that promotes healthy insulin response and energy storage.

4 grams of sugar in every teaspoon/cube and 4 calories per gram/16 calories per teaspoon) for a 2,000-calorie a day diet. Americans today far exceed that amount, consuming about 88 grams or 22 teaspoons a day of added sugars. The World Health Organization recommends slicing your intake to half that much, sticking to just 5 percent of your daily intake, or 25 grams a day.

Because added sugar is found in so many surprising places, even the most health conscious people may consume much more than they realize or intend. So we all need to make a concerted effort to read labels and keep our intake in check. What's more, there appears to be a genetic component to the body's ability to sense how much sugar we are taking in and to regulate our food intake accordingly. One study found of more than 680 men and women—including both young, healthy adults and those who were overweight with early Type 2 diabetes—found that men and women who were carriers of the 'unfavorable' allele consistently consumed about 20 grams more sugar each day, mostly from baked goods, chocolate and sweetened beverages, compared with those with the 'favorable' genotype.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of either NORMAL or ABOVE AVERAGE reflects whether or not your genotypes included those that carried a risk for habitual consumption of an excess amount of sugar.

MENTAL ACUITY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your gene profile exhibits characteristics that make you at a SLIGHTLY ABOVE AVERAGE risk for mental acuity decline with age. That means you are slightly more likely to experience age-related problems with memory and brain function. The good news is that there are many lifestyle and behavioral factors that impact your brain health and cognitive ability. You can minimize decline and build and protect your brain's health and sharpen your mind with a healthy diet and regular physical and mental exercise.

Your genetic profile indicates that you are at a SLIGHTLY ABOVE AVERAGE risk for mental acuity decline with age.

Minimize the impact of those genes and protect and build your brain with physical and mental exercises that will help you maintain healthy cognitive function as you get older.

SUCCESS STRATEGIES

Everyone is concerned about declining mental sharpness with age because it is essential to our independence, physical well being and simple joy of life. Adopting a lifestyle that includes regular physical exercise, continual learning and cognitive stimulation, and a diet that is high in essential nutrients has been shown to be the most effective means for preserving and even enhancing your cognitive function at any age.

Eat like a Mediterranean. Protect your brain health by eating a traditional Mediterranean diet that is rich in olive oil, fish, vegetables, beans, nuts, fruits, whole grains, and is low in refined sugars and meat. This diet has been shown to be the best for brain health because it is high in anti-inflammatory monounsaturated fats, which protect your arteries (your brain needs good circulation) and your general health. One Columbia University study that tracked the eating habits of nearly 2,000 men and women for close to five

RELATED GENES / SNPs

APOE, BDNF

The genes and their associated SNPs that are included in this category have been shown to have significant associations with age-related mental acuity decline.

Brain-derived neurotropic factor (BDNF) is a protein that helps you grow new brain cells and helps keep your existing neurons alive. It's vital for learning, short and long term memory and higher thinking. It is encoded by the BDNF gene. It also appears to be an important marker of cognitive health and memory in women (though for reasons not yet clear, the association is not strong in men).

One study of 369 older adults, average age of about 73, found that women who had one of two minor variations of this gene had an increased risk of poorer cognitive performance (memory and perceptual speed, how quickly your brain interprets and organizes information) as compared with their peers who carried

FUNCTION

MENTAL ACUITY

major forms of the gene. The more minor variations of these genes they carried, the greater their risk of decreased cognitive function, especially regarding memory and perceptual speed. Other research shows that the interaction of BDNF with another genotype (APOE4) increases the likelihood and magnitude of mental auity decline.

It can be scary to hear that you're at a higher risk for mental acuity decline. Remember, however, that gene science is still relatively very young and there are a great many factors that impact your brain health and cognitive functioning beyond genetic predisposition. Likewise, there are myriad steps you can take to help maintain healthy brain function as you age. Knowing that you may be at above average risk genetically gives you time to take those steps early to protect your brain later in life.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of LOWER, SLIGHTLY ABOVE AVERAGE, or ABOVE AVERAGE reflects whether your genotypes included those that carried a risk for more or less mental acuity decline with age.

years found that those who most closely followed a Mediterranean style diet showed a 28 percent lower risk of mild cognitive impairment compared to those who did not follow Mediterranean eating patterns. Moderate consumption of alcohol, particularly wine, that is a hallmark of this diet may have its own protective effect against mental acuity decline.

Go for fish. You'll already be eating fish if you follow a Mediterranean diet, but it bears emphasis. Seafood and freshwater fish are especially good for your brain. Fatty fish, like wild salmon, herring, sardines, and anchovies are especially rich in the omega-3 fatty acid DHA, which is highly concentrated in the brain. Eat at least two 4 ounce servings of fatty fish each week to boost your omega-3 levels and protect your cognitive health.

Get at least 30 minutes of physical activity a day. Exercise is essential for brain health. When you exercise you dramatically increase the production of neurotropins such as BDNF, which promotes stem cell division and new brain cell formation, effectively doubling or tripling the production of neurons. In one study, researchers had 59 sedentary adults either start an aerobic exercise program (brisk walking) or remain sedentary for 6 months. After just three months, scans showed that the exercisers had built their brains so that they had the volume of people three years younger. One meta analysis of 15 studies that included more than 33,000 men and women followed for up to 12 years showed that people with the highest levels of physical activity were 38 percent less likely to show signs of mental acuity decline over time compared to their peers who did very little activity. It only takes 30 minutes a day to reap potent brain benefits.

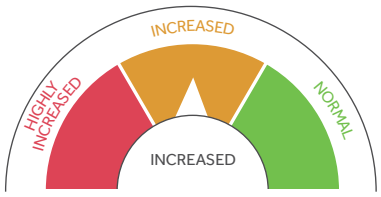
Exercise your brain. Every task you perform stimulates a vast network of billions of neurons connected by trillions of synapses within your brain. When you perform novel or challenging tasks such as learning a new language, playing chess, solving puzzles and even intricate physical tasks like ballroom dancing, you engage new pathways, stimulate neurogenesis, and build what you could call a cognitive reserve. Challenge and exercise your brain daily to delay the onset of and/or reduce the impact of age related mental acuity decline.

Make sleep a priority. When you sleep, your glymphatic system—a network of water channels in the brain—become active and shuttles waste, which would otherwise build up and damage brain cells, out of your brain. Too little sleep long term is bad for brain health. Get 7 to 8 hours a night.

AGE RELATED HEARING LOSS

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you INCREASED risk for age-related hearing loss. That means your hereditary risk for hearing loss is higher than normal. That doesn't mean you are fated to lose your hearing, of course. One third of permanent hearing damage is preventable. It's just especially important that you be vigilant about protecting your ear health to maintain your hearing and minimize loss throughout your lifespan.



Your genetic profile indicates that you have an INCREASED risk for age-related hearing loss.

We recommend that you take extra precautions to protect your ears, maintain good general health and avoid damage and health conditions that can contribute to hearing loss over time.

SUCCESS STRATEGIES

Everyone, regardless of genetic makeup, is at some risk for hearing decline over time. As someone with increased risk, protecting your hearing and ear health is particularly important.

Turn it down. There's more noise in our everyday life than we're often aware of. Everyday appliances like hair dryers, blenders, and coffee grinders all send out uncomfortable decibel levels. As a rule of thumb, if something is noisy enough to be uncomfortable, it's noisy enough to damage your hearing. Turn the hair dryer on medium or low; wrap a dishtowel around the base of blenders and coffee grinders to muffle the noise.

Wear hearing protection. Protect your ears when you know they'll be exposed to particularly loud sounds and/or environments, such as when you're mowing the lawn, blowing leaves, using heavy machinery, attending a loud music venue, hanging around loud motor vehicles and so forth. Earplugs or

RELATED GENES / SNPs

GRM7

The gene and its associated SNPs that are included in this category have all been shown to have significant associations with a person's risk for developing age-related hearing loss.

Hearing loss is the most prevalent sensory impairment as we get older. About 20 percent of Americans report some degree of hearing loss, and by age 65 one in three of us has at least some trouble with our hearing. Hearing loss can be isolating since we use this sense as one of our primary forms of conversation.

Age-related hearing loss happens as the tiny hair cells in your inner ears slowly break down and can't pick up sound vibrations as well as they used to. The loss of these cells often happens with aging itself, but there are numerous contributing factors such as exposure to loud noise, health conditions like heart disease and diabetes, certain antibiotics and other medications and heredity.

AGE RELATED HEARING LOSS

earmuffs can reduce noise by a hearing protecting 30 decibels.

Minimize earbud time. Wearing earbuds can place your ears at a higher risk for damage because the sound is going directly into your ears without dissipating in the air. Headphones max volume is around 105 decibels. Normal talking is between 50 and 60 decibels. Ear health experts recommend keeping the volume on your player to 60 percent of max—the level of someone talking loudly—and limit it to about 60 minutes a day.

Manage diseases related to hearing loss. Diabetes, high blood pressure and heart disease can increase your risk for suffering hearing loss because they affect the blood supply to your ears. Control your blood pressure and manage your insulin to help maintain healthy ear function.

Get your hearing checked. Hearing loss happens so gradually many people don't realize it's happening until they've suffered significant loss. Get your hearing tested as part of your annual physical.

We've long known that people who have family members with hearing loss are more likely to have hearing loss themselves as they age. A recent study of 3,434 men and women from six different countries identified people with certain gene variations (specifically those carrying the T allele, which was associated with 2.5 times higher risk) as having a much greater risk for age-related hearing loss. Other variations were connected to even greater risk for hearing loss over time, though the age of onset, the rate of decline and the type of hearing loss they experience—e.g. whether it's mostly certain pitches or tones or trouble with word recognition—varies from person to person.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL, INCREASED or HIGHLY INCREASED reflects whether or not your genotype includes those that put you at a higher risk for age-related hearing loss.

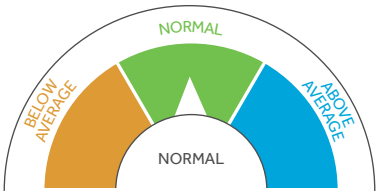
Check your meds. A long list of medications including antibiotics and high doses of aspirin can harm your ears and lead to hearing loss. Talk to your doctor about hearing damage concerns when receiving any prescriptions so you can work to find an alternative drug or take other measures to minimize potential damage.

Heed warning signs. Be aware and see your doctor if you notice any changes in your hearing, including ringing in your ears, trouble hearing conversations, can't hear high-pitched sounds and/or have difficult hearing over the phone.

LONGEVITY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a NORMAL likelihood of extreme longevity. That means you may be more likely to live into your 90s and 100s. It's important to remember, however, that genes are only one of many factors that contribute to a long lifespan. Your lifestyle, diet, exercise habits and other behaviors have been shown in numerous studies to have a major impact on lifespan and longevity.



Your genetic profile indicates that you have a NORMAL likelihood of extreme longevity.

You can make the most of your advantageous genetic profile by adopting healthy lifestyle behaviors that will help you avoid the common chronic diseases that can shorten your lifespan regardless of genetic profile.

SUCCESS STRATEGIES

"Good genes" contribute to longevity, but lifestyle plays a major role. You still need to take care of your health and practice lifestyle, diet and exercise behaviors that will maximize your genetic potential.

Eat well & exercise. Exercising two to four times a week increases the likelihood you will live to 90, regardless of your genes. Likewise, it is important to maintain a healthy weight, which means complementing regular physical activity with a balanced diet.

Watch your "sugars." Blood sugar and insulin sensitivity appear to be inexorably linked to longevity. The FOXO gene is a key component of the insulin pathway, as well as human longevity. Research shows that long-lived men exhibit several biological markers that indicate greater insulin sensitivity along with a favorable FOXO3A GG genotype. Other studies suggest that

RELATED GENES / SNPs

FOXO3, APOC1 (APOE-CI-CII)

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's likelihood of extreme longevity—living into one's 90s or 100s.

To live a long, healthy life is a very common human goal. Life expectancy from birth hovers in the mid- to late-70s for men and the early to mid-80s for women around the world. For those who reach age 65, life expectancy is above average. For decades, scientists have studied human lifespan and why some people live 100 years and beyond while others fall short. The answers are, of course, complex and multifactorial, including geography, culture, lifestyle and much more.

Genetics are also known to play a key role, especially in our later years. The genetic contribution to longevity in humans overall

FUNCTION

LONGEVITY

consuming high amounts of sugar and the subsequent insulin response "turns off" genes associated with longevity. Having diabetes resulted in an 86 percent increase in the risk of dying before 90 in a study published in the Archives of Internal Medicine study.

Eliminate processed, white flour, high sugar foods from your diet as much as possible. Instead eat a balanced, high fiber, primarily plant food diet that is known to help maintain healthy blood sugar levels.

Keep your heart healthy. High blood pressure is a major health risk and can shorten your lifespan. Know your numbers and maintain a healthy blood pressure level of 120/80.

Don't smoke. Nobody has to tell you that. But don't.

has been widely estimated to be about 25 percent. The older you get, the more genes come into play. Scientists now know that genetic factors have an increasing impact, particularly after 60 and profoundly from age 85 onwards.

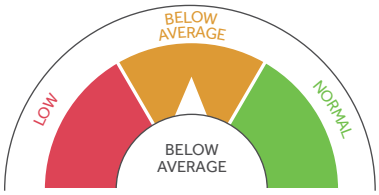
A growing body of research on thousands of the "oldest of the old," those in their 90s and 100s, show that these two genes and their alleles are strongly associated with one's likelihood for extreme longevity, while other gene mutations appear to reduce that likelihood by up to 50 percent. Interestingly, previous research has shown that long-lived families carry as many genetic mutations that put them at risk for disease as the general population. These other gene variants just appear to promote healthy aging and protect them from disease.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of BELOW AVERAGE, NORMAL or ABOVE AVERAGE reflects whether or not your genotype included that those increase your likelihood to live into your 90s or 100s.

FITNESS RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits a BELOW AVERAGE fitness response to high-intensity exercise. That means you may experience fewer gains from high intensity workouts as someone with a more favorable genotype. That doesn't mean you can't benefit from exercise, however. You can still improve your fitness and reap the many health gains from aerobic exercise. But you will likely see greater gains from longer, moderate intensity workouts. Or you may benefit from endurance-based resistance workouts such as circuit training.



Your genetic profile indicates that your fitness response to moderate-to-high-intensity cardio is BELOW AVERAGE.

Though your genotype might limit your fitness improvements in response to high-intensity exercise, you can still improve your fitness by performing longer, moderate intensity workouts.

SUCCESS STRATEGIES

The good news is that even if your genotype doesn't respond optimally to high intensity workouts, you can still get fit and see results through an exercise routine that includes longer endurance workouts.

Perform moderate-intensity cardio workouts such as brisk walking, jogging, cycling, swimming or exercise classes 4 or more days per week. If you're just starting out, begin with 20 to 30 minute sessions and increase the duration by 5 or 10 minutes each week until you are up to 60 to 90 minutes. You may want to consider training for an endurance event like a charity bike ride or a 10K, half-marathon or even an Olympic distance triathlon.

Also consider an endurance-based resistance training program like circuit

RELATED GENES / SNPs

AMPD1, APOE

The genes and associated SNPs included in this category have been shown to have significant associations with a person's cardiovascular fitness response to moderate-to-high intensity exercise.

Exercise has innumerable health benefits, including preventing chronic diseases like diabetes and heart disease that hinder how well your body functions and your quality of life. It also makes you "fit," which means your body is more efficient at using oxygen, so you can push yourself harder running up steps, slamming tennis serves and playing with kids without feeling fatigued. Being able to handle more exercise also means burning more calories to manage your weight.

The hallmark of how fit you are is called your VO2 Max, which is a measure of your oxygen capacity—how much oxygen-rich blood your heart can pump and how much your muscles can use per minute. The

FITNESS RESPONSE TO CARDIO

training, where you move from one strength training exercise to the next with no rest between exercises.

fitter you become, the more your ability to take in more oxygen improves, the harder and longer you can exercise without getting tired.

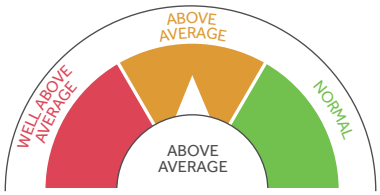
In general, your VO2 Max improves with moderate to high intensity exercise. How much it improves depends on many factors including your size, gender and as scientists now know, your genes. When researchers had sedentary men and women begin an exercise routine that included up to 50 minutes of cardio machines like spin bikes and treadmills 3 to 4 days a week for 5 to 6 months, those with an 'unfavorable' genotype experienced smaller gains in their cardiovascular fitness from the training. They also were less able to perform high intensity efforts, suggesting that their optimal fitness response may be better achieved at a lower intensity of exercise.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of NORMAL, BELOW AVERAGE or LOW reflects whether your genotypes included those that carried a risk of reduced cardiovascular fitness response from moderate-to-higher-intensity exercise.

SYSTEMIC INFLAMMATION

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a likelihood of having ABOVE AVERAGE systemic inflammation levels. That means your C-reactive protein (CRP) levels are likely to fall in a slightly elevated range. Persistently elevated systemic inflammation can lead to age-related chronic diseases like diabetes and heart disease, so it's important to keep inflammation in check. The good news is that genes are only one factor that influence CRP levels. Healthy diet and lifestyle behaviors can help significantly reduce inflammation.



Your genetic profile indicates that you are inclined to have ABOVE AVERAGE systemic inflammation levels.

You can lower your CRP levels and avoid inflammation-related chronic diseases by practicing healthy diet, exercise and lifestyle behaviors.

SUCCESS STRATEGIES

Since your screening results indicate that you're genetically inclined to have slightly elevated systemic inflammation, ask your doctor about having your CRP levels screened along with your cholesterol, triglycerides and other blood markers. A high-sensitivity C-reactive protein (hs-CRP) test is more sensitive than the standard test and also can be used to evaluate your risk for developing coronary artery disease.

Along with getting screened, practice "anti-inflammatory" lifestyle behaviors including:

Achieve and maintain a healthy weight and body composition. Body mass index (BMI) and body fat measurement are both ways to determine your body composition, and body composition is the main non-genetic determining

RELATED GENES / SNPs

CRP, APOC1 (APOE-CI-CII), HNF1A

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's systemic inflammation levels.

We've all experienced inflammation from bee stings, rolled ankles and/or bumps and bruises. That's acute inflammation that swells up, does its healing work and goes away. We also experience inflammation we don't see—low-level internal inflammation, which if unchecked can damage our blood vessels and lead to many serious chronic diseases like heart disease, diabetes, stroke, some neurodegenerative diseases like Alzheimer's and some forms of cancer.

C-reactive protein (CRP) is a protein found in your blood plasma that binds to the surface of dead or dying cells and certain bacteria to clear them from your body. When there's a lot of cellular damage to clean up, CRP levels rise. Doctors use CRP

SYSTEMIC INFLAMMATION

factor for CRP levels. Carrying excess fat, particularly around the midsection where it is most metabolically active, is known to induce chronic low-grade inflammation. It also can switch on your at-risk genes that are associated with systemic inflammation. Maintaining a healthy weight is one of the best ways to keep systemic inflammation in check. If you're overweight, even modest weight loss can have a significant positive impact on CRP levels. In one study, overweight post-menopausal women who lost at least 5 percent of their body weight had measurable reductions in CRP levels. Those who lost weight by dieting and exercising were able to reduce their CRP levels by more than 41 percent in a year.

Get at least 2 ½ hours of exercise a week. Exercise is a powerful anti-inflammatory for your body. Research finds that getting the minimum recommended 2 ½ hours of moderate exercise a week helps lower CRP levels. In a 10-year study of nearly 4,300 men and women, those who met those exercise requirements had significantly lower CRP levels than those who didn't and people who started exercising during the study to meet those levels had lower inflammation levels by the end. Other studies show that regular exercise can reduce inflammation by up to 60 percent.

Follow a Mediterranean style diet. Studies show that eating a Mediterranean style diet, which is naturally high in monounsaturated fats as well as polyunsaturated omega-3 fatty acids, may help reduce systemic inflammation. Build your diet around fruits, vegetables, whole grains, seeds and nuts. Eat fatty fish at least twice a week. Choose lean protein foods, minimizing your intake of red meat.

Sugary foods, refined foods, and foods that are made with white flour create inflammation in the body. Limit your intake of processed foods, sweets and other low-fiber snack foods like chips and crackers, which tend to be high on the glycemic index, spike blood sugar levels quickly and lead to inflammation. One study found that overweight adults who stuck to a low-glycemic food diet were able to lower their CRP levels by 48 percent over a two-year period.

levels as a general marker of systemic inflammation. Unsurprisingly, high CRP levels have been linked to a higher risk of mortality.

There are many culprits behind systemic inflammation. Barring autoimmune disease like rheumatoid arthritis, chronic inflammation can be the result of a sedentary lifestyle, being overweight (especially if you carry your excess fat in your abdomen, where it is most metabolically active), poor fitness, a diet that is high in sugar and other inflammatory foods, sleep deprivation, as well as exposure to secondhand smoke and other pollutants.

CRP is also significantly influenced by genetics. Researchers estimate that the heritability of CRP levels is up to 40 percent. In a recent genome-wide association analysis of more than 82,700 men and women, scientists identified a half a dozen genetic variations that were significantly associated with CRP levels. When they ranked the study participants according to their at-risk CRP genetic makeup, those in the highest gene score group had an average CRP level that was more than double the average level of those in the lowest gene score group.

Though this particular study did not show an association between these gene variations and cardiovascular disease, there's a strong link between chronically elevated CRP levels and heart disease. According to data from the Physicians Health Study of nearly 15,000 healthy adult men, a high level of CRP was associated with a heart attack risk three times higher than average.

Normal CRP levels vary from laboratory to laboratory, but generally there is no or very low levels of CRP detectable in

SYSTEMIC INFLAMMATION

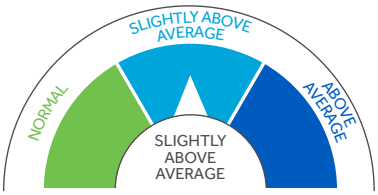
the blood. According to the American Heart Association, you are at a low risk for developing heart disease if your CRP levels are less than 1.0 mg/L; your risk is considered average if your levels are between 1.0 mg/L and 3.0 mg/L, and your risk is high if your levels are higher than 3.0mg/L.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL, ABOVE AVERAGE or WELL ABOVE AVERAGE reflects whether or not your genotype include those that increase your risk for elevated systemic inflammation levels.

POLYUNSATURATED FATTY ACID TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you the likelihood of having SLIGHTLY ABOVE AVERAGE PUFA blood levels. Your genetic profile indicates that your body is likely efficient in converting and metabolizing the fatty acids you need. That's good news because there's a strong link between cardiovascular health and lower mortality and adequate levels of these essential fatty acids in the blood. It's still important to eat a PUFA-rich diet so you maintain healthy adequate levels of these protective essential fatty acids.



Your genetic profile indicates that you are likely to have SLIGHTLY ABOVE AVERAGE blood levels of PUFAs.

We recommend that you continue to eat PUFA-rich foods—especially in lieu of those that are high in saturated fats or simple carbohydrates—to maintain your PUFA blood levels, which can help lower your cholesterol and coronary artery and heart disease risk.

SUCCESS STRATEGIES

A tall and growing body of research indicates that the healthiest, longest-living people on the planet follow PUFA-rich diets such as the much-hailed Mediterranean diet, as well as the Japanese diet, which has recently been found to reduce the risk of mortality from all causes by 15 percent among those who follow it most closely. It appears especially good at decreasing risk for heart disease and stroke. Not surprisingly, the diet, which contains ample amounts of fish, soy foods and vegetables, is also rich in PUFAs.

The American Heart Association, along with PUFA research, supports a diet that gets about 5 to 10 percent of its energy from PUFAs like linoleic acid (LA) to reduce cardiovascular disease risk. You can maintain healthy levels by

RELATED GENES / SNPs

FADS1-2

The gene and its associated SNP that is included in this category has been shown in studies to have significant associations with a person's blood levels of polyunsaturated fatty acids (PUFAs).

Your body needs a certain amount of fat to perform all of its vital biological functions including produce certain hormones, absorb fat-soluble nutrients like vitamins A, D, E and K, and maintain your body temperature. Though your body is very good at storing fat, there are essential fatty acids, such as PUFAs, that need to be eaten in your diet to maintain healthy levels.

Polyunsaturated fats include omega-3 fatty acids and omega-6 fatty acids, are found in plants like nuts, seeds, and vegetable oils and seafood, and are generally considered heart healthy. Research shows a strong association between the levels of PUFAs in the blood

FUNCTION

POLYUNSATURATED FATTY ACID TENDENCY

eating more nuts and seeds; swapping soy foods for animal protein at some meals and using olive, walnut and/or canola oil for drizzling on salads and side dishes. The US government also recommends increasing intake of foods rich in omega-3 fatty acids to balance omega-6/omega-3 fatty acids. Strive to eat 8 ounces of fish each week or increasing consumption of flaxseed, walnuts, Brussels sprouts or cauliflower or to improve levels of protective omega-3 fatty acids.

You should still avoid processed foods that are made with vegetable oils, as they not only tend to be low in nutritional value, but also PUFAs can be oxidized during processing, which may make them more harmful than healthful.

and the status of a person's health. In a 16-year analysis of 2,700 older men and women, those with the highest omega-3 PUFA levels had a mortality rate 27 percent lower than those with the lowest levels. After age 65, those with the highest levels lived an average of 2.2 years longer than those with the lowest.

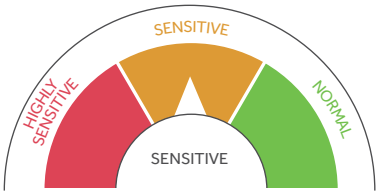
The level of these essential PUFAs in your bloodstream is largely determined by what you eat because your body cannot make its own. There is also some genetic influence to blood PUFA levels. Large scale meta-analysis gene studies have found a strong link between variations of the FADS1-2 genes and concentrations of PUFAs, particularly omega-3 fatty acid alpha-linolenic acid (ALA) and omega-6 fatty acid linoleic acid (LA), both of which have been linked to lower cholesterol levels and reduced risk for coronary artery and heart disease.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL, SLIGHTLY ABOVE AVERAGE or ABOVE AVERAGE reflects the level of circulating PUFAs that are likely to be present in your blood.

CHOLESTEROL RESPONSE TO DIETARY FAT

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a SENSITIVE cholesterol response to eating dietary fat. That means you may be more inclined to see significant changes in your cholesterol levels in response to a moderate or higher fat diet. The good news is that you don't have to—nor should you—totally eliminate this essential macronutrient from your diet. Foods rich in healthful fats like nuts, vegetable oils and fish have protective effects, particularly for cardiovascular disease. They also help you absorb a host of vitamins, fill you up so you eat less and taste good, too. It's a matter of keeping your fat intake in check and choosing the healthiest types, while minimizing those that may have negative health effects.



Your genetic profile indicates that you have a SENSITIVE cholesterol response to eating dietary fat.

We recommend that you chose a diet that is low—about 20 percent of your total daily calories—in fat and saturated fat. Focus on eating beneficial fats as part of your daily fat intake.

SUCCESS STRATEGIES

Know your fats. Evidence clearly shows that eating foods rich in healthful fats like nuts, vegetable oils and fish have protective effects, particularly for cardiovascular disease. So, though you should keep your overall fat intake relatively low, these foods are important for good health. Other fats, such as saturated fat, may have detrimental effects. So it's important to know your forms of fat:

Unsaturated

Liquid at room temperature and generally considered heart healthy; found in plants like nuts, seeds, and vegetable oils and seafood. Focus your diet around

RELATED GENES / SNPs

LIPC

The gene and associated SNPs included in this category have been shown to have significant associations with a person's blood lipid response to eating dietary fat.

Little in the nutrition landscape has been as rife with controversy and confusion as dietary fat. For decades, the brightest brains in medical science have debated, studied and scrutinized the impact the fat we eat has on our health, specifically our cholesterol levels and subsequent cardiovascular health. The results are mixed and consensus is very hard to come by. It's possible that the situation is so confounded because individual responses are just that, individual. A growing body of gene research indicates that variations in your genetic code may impact how your body responds to a host of dietary factors, including fat.

CHOLESTEROL RESPONSE TO DIETARY FAT

these. Specific foods to include in your daily and/or weekly diet:

Olive oil — A study published in the journal Molecules reported that components of olive oil, including oleic acid and secoiridoids, protect your body on the cellular level and may help slow the aging process.

Fish — The new US Dietary Guidelines recommend eating 8 ounces per week to get healthy amounts of polyunsaturated omega-3 fatty acids, eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), which fight inflammation and chronic disease.

Avocados — Animal research shows avocados may help lower inflammation, as well as improve cholesterol levels.

Tree nuts — According to a study in the British Journal of Nutrition, people who ate a daily one-ounce serving of nuts had a 50% lower rate of diabetes, a 30% reduction in heart disease and a nearly 50% lower incidence of stroke.

Saturated
Solid at room temperature and found in animal foods as well as coconut and palm oil; often deemed unhealthy for your heart, but research is equivocal, and some types may be beneficial. Best to limit them—especially those found in processed meats like sausage and lunch meats—to smaller doses.

Trans
Liquid fats made solid through a process called hydrogenation; found in fried foods, baked goods and processed snack foods. These were banned from the food supply in 2015 and manufacturers were given 3 years to eliminate them.

Track your intake. It's very hard to know how much fat you're eating every day by simply eyeballing it. You will get a far better sense of how much dietary fat you're getting by recording your food intake for at least a week in a diet app or nutrition log.

In one study, researchers measured the total cholesterol, triglycerides, LDL cholesterol, HDL cholesterol levels, and genotype of 743 overweight men and women and then asked them to eat either a high fat (40 percent of daily calories) or a low-fat (20 percent of daily calories) diet for two years, when they would retest their lipid levels.

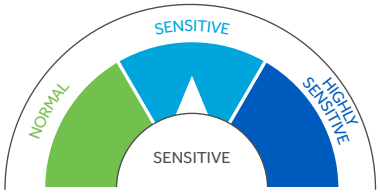
At the end of the study, the men and women who carried the A allele form of this gene were particularly sensitive to dietary fat in that when they ate a low fat diet, their total and LDL cholesterol levels dropped compared to their peers with other genotypes. Conversely, when they ate a higher fat diet, their total and LDL cholesterol levels rose. Other studies have pinned increases in protective HDL cholesterol with other variations of the LIPC gene.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL, SENSITIVE or HIGHLY SENSITIVE reflects whether or not your genotypes included those that increased your blood lipid sensitivity to dietary fat.

INSULIN RESPONSE TO DIETARY FAT

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a SENSITIVE insulin response to consuming dietary fat. That means you may experience more positive insulin sensitivity (and less insulin resistance) by eating a diet that is moderately higher in fat. The types of fat you choose still matter for insulin sensitivity and overall health, however, as do your carbohydrate choices.



Your genetic profile indicates that you have a SENSITIVE insulin response to consuming dietary fat.

Following a more moderate fat diet that gets about 30% of its calories from fat will help you maintain healthy insulin sensitivity and blood sugar levels. Carbohydrates also play a major role in insulin response, so it is important to choose complex, healthier carbohydrates.

SUCCESS STRATEGIES

The beauty of a moderate fat diet is that it is easy to do. You can pretty much eat what you want so long as you eat appropriate portions. That being said, research shows that unsaturated fats, particularly monounsaturated fats and polyunsaturated omega-3 fatty acids like those found in olive oil and fatty fish have a more positive influence on insulin response than saturated fats, like those found in meats (see Types of Fat in Cholesterol Response to Dietary Fat section for more on types of fats). So you would still be wise to skew your intake toward the healthier end of the fat spectrum. These swaps can help:

- Use olive oil instead of butter when cooking
- Eat fish or seafood at least twice a week
- Go meatless Monday (and maybe Tuesday); try bean and grain dishes and meat substitutes instead
- Choose dark chocolate, which contains healthy fats, for a sweet treat and/or dessert instead of sugary cakes and cookies.

RELATED GENES / SNPs

FTO

The gene and associated SNPs included in this category have been shown to have significant associations with a person's insulin response to eating dietary fat.

When most of us think insulin, we think sugar and carbs. However, dietary fat also drives insulin response and has long been vilified as contributing to insulin resistance and subsequent fat storage—especially deep in the abdomen where it wreaks havoc on metabolic health—and chronic conditions like diabetes and heart disease.

Low fat diets have been shown to help some people maintain healthy insulin sensitivity. As with many dietary interventions, however, they didn't and don't work for everyone. There are many reasons why, of course. The type of carbohydrates you replace fats with, how much protein you eat, how much you eat, how much you exercise and the type of fat you eat all factor into your insulin response. Research shows that there is a genetic component as well.

FUNCTION

INSULIN RESPONSE TO DIETARY FAT

Be choosy about your carbohydrates. Dietary fat has a lot of influence, but the carbs you eat are still very much key to maintaining healthy insulin response and blood sugar levels. A whole potato will always trump a potato chip in the health department. Avoid sugary, starchy refined carbohydrates, which can spike your insulin and set you up for insulin resistance overtime, and opt for slower digesting complex carbs. Good sources include whole plant foods such as fruits, vegetables, legumes, whole grains (such as brown rice, quinoa and oats), nuts and seeds.

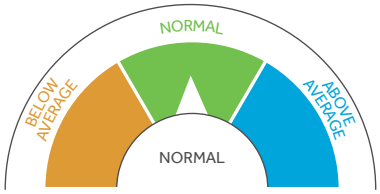
In a study published in *The Journal of Nutrition*, Boston-based researchers genotyped FTO (the gene associated with fat mass and obesity) variants among 743 overweight or obese men and women who were following either a high fat (40% of total calories) or a low fat (20% of total calories) diet for two years. In the end, regardless of how much weight they lost, those who carried certain FTO variations had less improvement in insulin sensitivity/resistance following a low fat diet than following a high fat diet—a finding that echoed an earlier European study, which also found risk allele carriers of FTO benefitted more from a high fat diet when it came to improving insulin resistance.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL, SENSITIVE or HIGHLY SENSITIVE reflects how your insulin sensitivity (a good thing, as it prevents/improves insulin resistance) responds when you consume dietary fat.

TRIGLYCERIDE RESPONSE TO CARDIO

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a NORMAL triglyceride response to cardiovascular exercise. *That means you are likely to see your levels of these harmful blood fats drop in response to regular aerobic exercise training.* That's good news, as you will be rewarded for adhering to a regular cardio routine that includes at least 30 minutes of physical activity a day most days a week. You may also reap further rewards by increasing exercise levels and intensity.



Your genetic profile indicates that you have a NORMAL triglyceride response to regular cardiovascular exercise.

If a blood test shows your triglyceride levels are elevated, we recommend getting at least 150 minutes a week of physical activity, as well as adopting lifestyle changes that can lower levels of these potentially harmful blood fats.

SUCCESS STRATEGIES

The American Heart Association (AHA) currently recommends at least 150 minutes per week of moderate exercise like walking, swimming and biking at a pace where you can easily converse. That level of exercise has also been shown to lower triglyceride levels in people with your genotype. You may be able to get an even greater response by adding a few additional exercise and lifestyle modifications.

Pick up the pace. Moderate activity is healthy for your heart. Vigorous exercise where you push the pace hard enough to breathe harder (e.g. you can only speak in short sentences) may yield even greater heart benefits and has been shown to help oxidize blood fats even better than easier activity. You can reap benefits from just 75 minutes a week in lieu of moderate activity, or even better mix them up. Add a few intervals—short 5 to 10 minute bursts—of

RELATED GENES / SNPs

CYYR1, GLT8D2, RBFOX1, ZNF385D

The genes and associated SNPs in this category have been shown to have significant associations with a person's triglyceride level response to cardiovascular exercise.

Triglycerides are a type of fat that your body uses for energy. You store them in your fat cells and they circulate in your bloodstream. When you have more triglycerides than you're burning, you end up with elevated levels, which are harmful to your body and can cause hardening of the arteries and heart disease.

A simple blood test can tell you your levels, which should fall into a healthy range:

Normal is less than 150 mg/dl.
Borderline-high is 150 to 199.
High is 200 to 499.
Very high is 500 or higher.

Regular aerobic exercise is one of the most effective methods for lowering triglycerides, since your body breaks down

TRIGLYCERIDE RESPONSE TO CARDIO

harder effort into your regular workouts once or twice a week.

Choose healthy fats and carbs. You can't out-exercise an unhealthy diet. So if your triglyceride levels are high despite following a regular exercise routine, take a look at what you're eating. Foods made with refined flour and sugar raise triglycerides. So limit those in your diet. Also swap foods with saturated fat like meats for those that are high in unsaturated fats—particularly monounsaturated fats like those found in olive oil, nuts, and avocados. Polyunsaturated omega-3 fatty acids found in fatty fish are particularly good for lowering triglyceride levels. Aim to eat fish twice a week.

fat to fuel activities like walking, biking and swimming. Research shows that, on average, exercise training helps reduce triglyceride levels between 4 to 38 mg/dL. As that range indicates, however, there is a lot of individual variation in how well any given person's triglyceride levels improve from a standard exercise program. It's become clear that genetics play a large role in that regard.

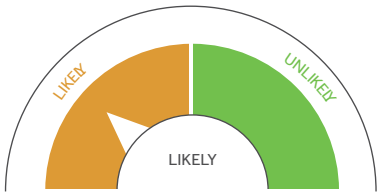
In fact, in a study of 478 men and women who were put on a 20-week endurance training program, variations of these four genes statistically explained 100% of the genetic effect of triglycerides' response to cardiovascular exercise. The good news is that, on average, triglyceride levels decreased over the course of the study. However, those with more favorable genetic variations enjoyed greater reductions while those with higher risk variations actually saw increased levels.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of BELOW AVERAGE, NORMAL or ABOVE AVERAGE reflects whether your genotype carried more or less favorable variations for lowering your triglyceride levels through cardiovascular exercise. This knowledge can help you create a more effective exercise plan to improve your heart health.

LACTOSE INTOLERANCE

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you LIKELY to be or become lactose intolerant. That means you are likely to have or develop difficulty digesting lactose, the sugar found in milk, and suffer GI distress from consuming dairy products. Since dairy products are a major source of calcium and vitamin D in the US diet, it's important to get enough of those essential nutrients elsewhere in your diet.



Your genetic profile indicates that you are LIKELY to develop lactose intolerance (if indeed you haven't already).

You can manage your condition by limiting dairy products and other foods that contain lactose. Realize that limiting dairy may also mean shortchanging essential nutrients calcium and vitamin D. The National Osteoporosis Foundation says adults need 1,000 to 1,200 mg of calcium a day and 800 to 1,000 IUs of vitamin D a day to maintain bone integrity. You can maintain your bone, muscle and general health by getting these nutrients from alternative food sources.

SUCCESS STRATEGIES

Lactose intolerance doesn't necessarily mean zero tolerance to all dairy products. Whether you're at risk or have started to develop lactose intolerance symptoms, you may be able to take in a small amount of dairy—about a cup a day—without problems. Some people who are lactose intolerant can eat yogurt with live cultures without suffering GI symptoms. Experiment with small doses. It's a matter of getting to know your own body to know what you can and can't tolerate. If you believe you have lactose intolerance, it's a good idea to also consult with your doctor to be sure your symptoms are not being caused by another problem. Once you know for certain, there are many ways

RELATED GENES / SNPs

MCM6

This gene and associated SNPs included in this category have been shown to have significant associations with a person's likelihood of being intolerant to the milk sugar lactose.

Lactose intolerance occurs when the small intestine does not make enough of an enzyme called lactase that you use to digest lactose. As lactose passes through the large intestine without being properly broken down and digested, it can cause a host of uncomfortable GI symptoms including gas, bloating, belly pain and diarrhea.

Lactose intolerance is one of the most common inherited conditions in the world, with about 65 percent of the human population experiencing a reduced ability to digest lactose during the course of their lives. It occurs far more often in people of Asian, African, South American and Native American descent than it does among Caucasians of European descent, among whom only about 15 percent of

LACTOSE INTOLERANCE

to manage it comfortably and healthfully.

Buy lactose free. You can buy nearly all dairy products in a lactose-free form. These products have added lactase in them to help you break down the lactose and have similar nutritional profiles to traditional dairy products.

Supplement the enzyme. You can take lactase capsules or tablets before eating or drinking dairy products or milk that may eliminate or ease symptoms.

Try milk alternatives. There is no shortage of alternative "milk" products on the market today. Some, like almond milk, may have more calcium than dairy milk, but not all offer as much calcium and/or vitamin D as milk, so read the labels to be sure that what you're buying is fortified.

Eat alternative calcium sources. Dairy isn't the only source of calcium. You can get healthful doses from canned sardines and salmon, fortified juices and cereals, fortified soy products, almonds and dark leafy greens like kale and collards.

Check pre-packaged foods. If you're particularly sensitive to lactose, get in the habit of reading your labels carefully. Food manufacturers often add milk and milk products to a variety of foods including breakfast foods like waffles and pancakes, bread and baked goods, soups and even salad dressings and snacks.

Get your D. Sunlight is the main source of vitamin D, but we need it from our diet, too. If you don't eat dairy, get your vitamin D from fatty fish like wild-caught salmon, mackerel and tuna and/or fortified foods like soymilk, juice and cereals.

the population experiences the condition. Severity of symptoms varies from person to person. Some with lactose intolerance can take in small amounts, such as 12 grams of lactose (the amount in a cup of milk) with minimal symptoms, while others need to avoid it entirely.

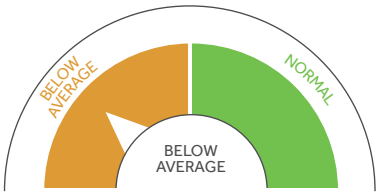
If you currently have lactose intolerance, chances are you know it. If you do not, it doesn't mean you won't develop it sometime in your lifetime. The condition tends to develop over time as lactase activity declines and becomes obvious by teen or early adult years. Some people, however, develop late-onset lactose intolerance, which can show up during your 40s or beyond. In Caucasians (but not other races where lactose intolerance is more common), certain variations of MCM6 are strongly linked to either being lactase persistent, meaning your lactase activity is maintained and you can digest lactose throughout adulthood, or developing lactose intolerance. In one Finnish study, adults with a specific variation of this gene were more than twice as likely to become lactose intolerant as an adult compared to those of other genotypes.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of LIKELY or UNLIKELY reflects whether or not your genotype included those that carried a risk for becoming lactose intolerant.

CALCIUM TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have BELOW AVERAGE blood levels of calcium. That means you are at risk for having inadequate amounts of calcium circulating in your bloodstream, so your body will be more likely to pull what it needs for healthy cellular function from your bones. That's bad because it can lead to osteoporosis—a condition of brittle bones—over time. Be sure to get at least 1,000 mg (men) to 1,200 mg (women) of calcium a day through a vitamin and mineral rich diet and practice bone-building lifestyle behaviors.



Your genetic profile indicates that you are inclined to have BELOW AVERAGE blood levels of calcium.

You can help keep your skeleton strong by eating a bone-building diet, getting regular exercise and practicing other skeleton saving behaviors.

SUCCESS STRATEGIES

Our bones naturally weaken some with age, so it's particularly important that you support your system with what it needs to maintain healthy calcium levels and to keep your skeleton strong.

Eat dairy and calcium rich foods. Dairy foods like milk, cheese and yogurt are excellent sources of calcium, which is why the US Dietary Guidelines recommend three servings of dairy a day to get your daily recommended amount. If you don't like or eat dairy, canned fish like salmon and sardines are excellent sources as are tofu, almonds, beans and fortified alternative milk products. Dark leafy greens like kale and spinach are also high in calcium, but these plant sources of calcium contain compounds that bind to calcium and make it harder to absorb, so they shouldn't be your primary source.

Get enough vitamin D. Calcium doesn't build bones without the assistance of

RELATED GENES / SNPs

CASR, DGKD, GCKR, LINC00709, CARS, LOC105370176, CYP24A1

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's blood calcium levels.

Calcium is the most plentiful mineral in the human body and is used by nearly every cell in the body. It's well known that the mineral is essential for maintaining skeletal and dental health, as your bones and teeth are where the lion's share of calcium is stored. Calcium also is required for nerve function, muscle contraction, hormone release and heart health.

Your body keeps the amount of calcium circulating in your bloodstream within a certain range to allow all your specific cells to have what they need to perform their jobs. When those levels dip below that range, your body pulls what it needs from your skeleton. Over time that leads to weakened bones.

FUNCTION

CALCIUM TENDENCY

Your calcium levels are influenced by your diet, how well your intestines absorb the calcium you take in, levels of phosphate in the body, your vitamin D levels and by levels of certain hormones like parathyroid hormone, calcitonin and estrogen. Emerging research also shows that your genotype may influence blood calcium levels. In one very large study of 39,400 men and women, researchers found variations in these genes had a significant impact on blood calcium levels, which echoes findings from previous animal research as well as a study of 1,747 twins that estimated heritability to be 33 percent for blood serum calcium levels.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of NORMAL or BELOW AVERAGE reflects whether or not your genotypes included those that increased your risk for low blood calcium levels.

vitamin D. Low calcium levels and low vitamin D levels often go hand in hand. So be sure to get enough of this essential nutrient. Fortified dairy and fatty fish are excellent sources. Also consider taking a vitamin D supplement of 2,000 IUs, which is well within the safe range.

Ramp up your intake of vitamin K. This little talked about vitamin plays an important role in calcium regulation and bone formation. Vitamin K must be present for Vitamin D to be absorbed. Low levels of vitamin K have been linked to low bone density. Eating just one serving of lettuce or other vitamin K-rich leafy green vegetables may cut the risk of hip fracture in half, according to the Harvard Nurses' Health Study. Just one serving of broccoli, Brussels sprouts or dark leafy greens delivers the 90 to 120 micrograms you need.

Consider a supplement. Calcium supplements are a source of research controversy. Some studies report that they are not useful for preventing fractures and may be linked to increase risk for heart disease. If you are concerned that you're not getting enough calcium in your diet, see your physician and get a blood serum nutrient test to find out if your levels are low. If you choose to supplement, stick to 500 mg to 600 mg a day, so as not to exceed the recommended daily amount.

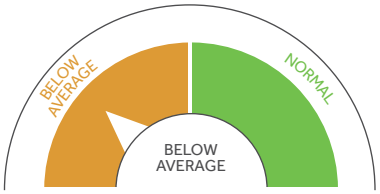
Build your bones. Your bones need some stress to get the signal to grow. Activities that include a little impact such as walking, jogging and tennis as well as activities that make your muscles work hard (which in turn stresses your bones) such as gardening help keep them strong. Strength training two or three days a week has also been shown in studies to build and maintain bone density. Numerous studies have found that even people with low and very low bone density see significant bone density gains—improving about 1 percent a year—in their spine and hips, which are the areas affected most by osteoporosis, when they participate in a regular a strength training routine.

Cut out the cola. The research is still equivocal, but there's compelling evidence that drinking too much cola can weaken your bones because the high levels of phosphorous it contains alters your calcium/phosphorous balance in an unfavorable direction. The Framingham Osteoporosis study found that women who reported drinking cola every day had lower bone mineral density than woman who said they drank it less than once a month.

COPPER TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have a BELOW AVERAGE blood copper level. It's important to maintain a healthy level of this essential mineral as it plays a key role in red blood cell production, immunity and the formation of collagen, which is necessary for maintaining healthy bones and connective tissues. Fortunately, there are many ways to boost your intake of copper to get the daily 900 micrograms you need to achieve and maintain healthy blood levels. The upper limit before copper becomes toxic is quite high, so even if you get a bit more from food, that's okay.



Your genetic profile indicates that you are likely to have a BELOW AVERAGE blood level of copper.

You can boost your blood levels by taking steps to get and maintain more copper in your diet by eating a diet rich in copper and adopting other healthy lifestyle habits that will ensure you obtain adequate amounts of this essential mineral.

SUCCESS STRATEGIES

Many people do not get the optimum amount of copper in their daily diet. It's particularly important for your genotype to seek out foods that are rich in copper to maintain healthy levels.

Eat more copper heavy hitters. Good sources of copper include: Shellfish such as oysters, clams, mussels, crab and lobster Mushrooms Tree nuts such as cashews, pecans, almonds, and macadamia nuts Legumes such as navy beans, peanuts, lentils, and soybeans Fortified cereals and whole grains Dark leafy greens Potatoes and sweet potatoes Dried fruit Cocoa and semi-sweetened chocolate

*Cook with copper.** Additional copper can come from boiling water in a copper kettle and cooking with copper cookware.

RELATED GENES / SNPs

SMIM1, SELENBP1

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's blood copper levels.

Copper is an often overlooked essential mineral that helps your body absorb iron and form red blood cells, maintains immunity, assists with energy production and helps keep bones, connective tissues, nerves and blood vessels healthy. The recommended daily amount is 900 micrograms a day. Copper is toxic in very high doses and toxicity is most often associated with a rare condition called Wilson's disease. Chronically low copper levels can pave the way for heart disease, poor bone and joint health and low immunity. Marginal to low levels of copper may occur with too much zinc supplementation (popular in the prevention and treatment of colds), dietary deficiencies and in some cases because of genetic influences.

FUNCTION

COPPER TENDENCY

Take a multivitamin. A standard daily multivitamin will provide about 25 percent of your daily copper needs.

Avoid high doses of iron, zinc and vitamin C. Taking high doses of zinc and vitamin C for colds as people sometimes do isn't recommended if you trend toward low blood levels of copper. Research suggests that 50 mg a day of zinc and 1500 mg a day of vitamin C can interfere with copper absorption, as can high levels of iron.

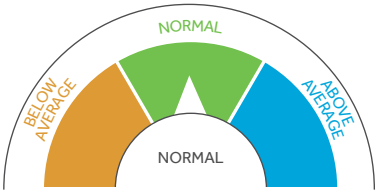
In one widespread analysis of more than 12,000 adults, genetic variations accounted for 5 percent of variation in blood copper levels. That's a small percentage, but can be significant when considering a trace mineral. Surveys also suggest that while true deficiency isn't common, many people don't get enough copper in their diet and taking high amounts of zinc, iron or vitamin C can cause an unfavorable copper blood levels.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of NORMAL or BELOW AVERAGE reflects whether your genotype included those that carried a risk for having low levels of this essential mineral.

MAGNESIUM TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that make you likely to have a NORMAL blood magnesium level. That's good news because magnesium plays an essential role in hundreds of biochemical processes including regulating blood sugar, blood pressure, muscle contraction and heart rhythm. As we age, our body's ability to absorb magnesium decreases, so it's important to eat plenty of magnesium-rich foods to maintain healthy levels of this essential mineral.



Your genetic profile indicates that you are likely to have NORMAL blood levels of magnesium.

You can maintain those healthy blood levels of this essential mineral by eating plenty of magnesium-rich foods and avoiding those that deplete it.

SUCCESS STRATEGIES

Maintain healthy blood magnesium levels by including magnesium-rich foods in your daily diet. Good sources include dark leafy greens, nuts and seeds, fatty fish, avocado, beans, whole grains, yogurt, soy foods and bananas. If you like dark chocolate, you're in luck. One 2-ounce chunk delivers about a quarter of your daily needs. Drink alcohol and coffee in moderation, as both of those can lower magnesium levels by blocking absorption and increasing excretion. Also, skip the soda. Sugary sodas are also linked to lowered magnesium levels.

Though too much magnesium from your diet doesn't pose a problem because your kidneys simply eliminate it in your urine, it is possible to overdo it from supplements and other sources. Overuse of laxatives or antacids can lead to high levels, which can cause diarrhea, nausea and abdominal cramping.

RELATED GENES / SNPs

MUC1, SHROOM3, TRPM6, DCDC5, ATP2B1, MDS1

The genes and their associated SNPs that are included in this category have been shown to have significant associations with a person's blood magnesium levels.

Magnesium doesn't get much attention in mainstream nutrition circles, but it should. The mineral plays a critical role in blood sugar control, muscle contractions and heart rhythm and is involved in more than 300 biochemical reactions in your body.

Some medical experts have recently dubbed magnesium deficiency the "invisible deficiency" because it's very difficult to pinpoint as the most common symptoms such as fatigue and muscle cramping are common side effects of many conditions. It's also very common. Studies show that only about a quarter of US adults get the 320 mg (women) to 420 mg (men) they need.

Though only about 1 percent of your magnesium is found in your blood, low

FUNCTION

MAGNESIUM TENDENCY

serum magnesium levels have been associated with multiple chronic diseases such as diabetes, heart disease and high blood pressure. Though low magnesium is generally a condition that occurs over time due to habitually low magnesium intake, high intakes of alcohol, soda and caffeine, and/or taking medications that interfere with its absorption can also cause levels to dip. There's also a genetic influence. Research shows that serum magnesium concentrations are about 27% heritable.

In one study of 15,366 men and women, researchers identified six gene variations that were associated with blood magnesium levels. These findings echoed those of another study that found these gene associations in both Caucasian and African American populations. The effects were most pronounced in post-menopausal women and/or people with low insulin levels.

Our analysis investigated which genotype for these genes was present in your DNA. Your rating of BELOW AVERAGE, NORMAL or ABOVE AVERAGE reflects whether your genotype included those that carried a risk of having low levels of this essential mineral or whether you were likely to have adequate levels.

DIETARY CHOLINE TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you a SLIGHTLY INCREASED sensitivity to low choline intake. That means you are more likely to experience organ dysfunction like fatty liver and/or muscle damage in response to eating a diet that is low in choline. Surveys show many adults, especially older adults, fall short in their choline intake. It's important that you avoid being one of them by increasing your intake of choline-rich foods. Since animal foods are the primary source in the US diet, you want to pay especially close attention to this nutrient if you follow a vegetarian or vegan diet.

Your genetic profile indicates that you have a SLIGHTLY INCREASED sensitivity to a low choline diet.

Since you are more likely to suffer organ dysfunction and muscle damage should your choline intake dip below recommended levels, you should be sure to eat plenty of choline-rich foods for optimum cell, nerve and organ function.

SUCCESS STRATEGIES

Your body creates small amounts of choline, but you still need to consume foods with this essential nutrient to get adequate amounts for healthy cell, nerve, organ and muscle function. Since your genes give you the inclination to be sensitive to the effects of a low-choline diet, that's particularly important.

Include eggs. Eggs are one of the most accessible, versatile and abundant sources of choline in the American diet. Two eggs deliver nearly 300 mg—a large portion of your recommended daily dose of this essential nutrient. You can enjoy your eggs without worrying about cholesterol. The new US Dietary Guidelines dropped the upper cholesterol recommendations, as

RELATED GENES / SNPs

PEMT

This gene and its associated SNPs that are included in this category have been shown to have significant associations with a person's sensitivity to low choline levels in their diet.

Choline is an essential nutrient that your body uses to keep cells and nerves working properly. It is particularly important for maintaining liver, muscle and brain function. It plays an important role in fetal brain development and for preventing neural tube birth defects.

The Institute of Medicine recommends 425 mg (women) to 550 mg (men) of choline per day. Pregnant women need 450 mg a day. Choline is found in many foods, but is most prevalent in animal foods like eggs, liver, fish and meats. Low levels of choline can lead to organ dysfunction, particularly fatty liver, and muscle damage.

A study published in 2009 in Nutrition

FUNCTION

DIETARY CHOLINE TENDENCY

research shows no connection between dietary cholesterol and elevated blood cholesterol.

Enjoy a variety of lean meats, poultry and seafood. Animal foods are the easiest ways to get large amounts of choline. Salmon, chicken, beef and shrimp provide between 70 and 95 mg of choline per 3 ounce serving.

Be vigilant if you're vegetarian or vegan. People who avoid meat, dairy products and eggs may be at an increased risk for low choline levels. Soymilk is a good source with 57 mg per cup. Other choline-rich foods to include in your diet are fortified grain products, peanut butter, pistachios, tofu, quinoa, broccoli, Brussels sprouts and wheat germ.

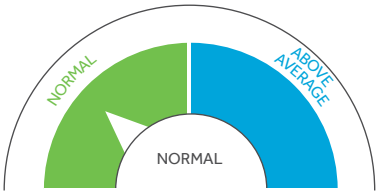
Reviews reported that the average choline intake among men and women is below Adequate Intake. Women appear most likely to fall short. Though some people will not develop adverse symptoms from eating a low choline diet, certain genetic variations (specifically carrying the C allele, especially being homozygous or carrying identical CC alleles) make you far more susceptible to organ dysfunction and muscle damage if you fall below the advised amounts. Research suggests that up to 75 percent of the population may have DNA configurations that leave them susceptible to choline deficiency. This effect is particularly pronounced in women, particularly post-menopausal women, as estrogen appears to exert protective effects.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL, SLIGHTLY INCREASED or INCREASED reflects the degree to which you are susceptible to organ dysfunction and muscle damage in response to having low dietary intake of choline.

SELENIUM TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you NORMAL blood selenium levels. That means that, like the majority of Americans, you likely have an adequate, healthy intake of this essential mineral. That's good news because selenium is necessary for strong immunity, cellular function, reproductive health and thyroid hormone production.



Your genetic profile indicates that you are likely to have NORMAL blood levels of selenium.

You can maintain healthy, adequate levels of this essential mineral by eating a diet rich in whole, unrefined foods.

SUCCESS STRATEGIES

According to the National Health and Nutrition Examination Survey (NHANES), the average daily selenium intake among Americans is 108.5 mcg. So most of us get more than enough and supplements aren't recommended.

Eating a diet high in refined foods can leave you with lower than average selenium levels, because selenium is destroyed in processing. So be sure to fill your plate with whole foods whenever possible. Rich sources of selenium include fish, shellfish and seafood like tuna, shrimp, sardines, salmon, mushrooms, asparagus, poultry, tofu, eggs, grains, sunflower seeds, spinach, cabbage, milk and Brazil nuts (which you should only eat occasionally because they're extremely high in selenium).

RELATED GENES / SNPs

DMGDH

The gene and its associated SNPs that are included in this category have been shown to have significant associations with a person's blood levels of selenium.

Selenium is an essential mineral that plays multiple roles in maintaining good health. It works as an antioxidant with other nutrients such as vitamin E in the body to fend off free radical damage; it is vital to immune system function, male fertility and sperm health, and thyroid hormone metabolism.

Low levels of selenium have been shown to increase your risk for auto-immune disorders such as thyroid disease and psoriasis, infections and maybe even certain cancers.

Selenium is found across the dietary spectrum from seafood and meat to grains (and grain-based foods) and nuts, seeds and leafy greens. Adults need about 55 micrograms of the mineral a day and

FUNCTION

SELENIUM TENDENCY

most Americans get enough through a balanced diet. Selenium is found in the soil. So how much you get from your food depends on the mineral content of the soil in which the plants you, and the animals you eat, are grown. Selenium is destroyed in food processing, so eating a diet high in refined foods can put you at risk for lower selenium levels. Blood selenium levels also are influenced by genetic factors.

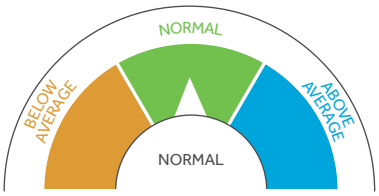
In one widespread analysis of more than 12,000 adults, genetic variations accounted for four percent of variation in blood selenium levels with minor alleles at this SNP increasing the average blood levels. That's a small percentage, but can be significant when considering a trace mineral. It's also possible to have too much of a good thing. Selenium is toxic in very high doses, which can cause GI distress, fatigue, hair loss and fingernail discoloration.

Our analysis investigated which genotype for this gene was present in your DNA. Your rating of NORMAL or ABOVE AVERAGE reflects the selenium levels that are likely to be present in your blood.

ZINC TENDENCY

WHAT YOUR GENES SAY ABOUT YOU:

Our analysis indicates that your genetic profile exhibits characteristics that give you the likelihood of having NORMAL blood zinc levels. That's good news because adequate levels of zinc help keep your immunity strong and can help protect you from both acute diseases like colds and infections as well as chronic conditions like heart disease and diabetes. Remember that genetics play just one role in your blood level zinc status and its still important to get enough of this essential mineral in your daily diet, especially if you're among the groups, like older adults and vegetarians, who may have a tendency to have a lower than adequate daily zinc intake.



Your genetic profile indicates that you are likely to have NORMAL blood levels of zinc.

We recommend eating a diet rich in foods that are good sources of this essential mineral to continue getting the minimum 8 to 11 mg of zinc you need each day to maintain the zinc blood levels you need for strong immunity and healthy cellular function.

SUCCESS STRATEGIES

Since our bodies don't store zinc, we need to eat adequate amounts in our diet every day. Most Americans do. However, a sizeable percentage of the population falls short. National nutritional surveys show that up to 45 percent of adults over the age of 60 fall below the recommended amount. Vegetarians and vegans are also at risk for marginal amounts because zinc found in plant foods is harder for the body to absorb. In fact, some experts recommend that vegetarians aim to get 50% more zinc than the recommended dietary allowance to ensure their body gets the amounts it needs.

For meat eaters, getting adequate amounts of zinc is easy, especially if you also like shellfish. Just three ounces of oysters delivers 74 mg, far and away more than any other food source. Other zinc-rich foods include lobster, crab,

RELATED GENES / SNPs

CA1, PPCDC, LINC01420

The genes and their associated SNPs that are included in this category have all been shown to have significant associations with a person's blood levels of zinc.

Zinc is an essential trace element that plays a key role in immune function, protein synthesis, wound healing, insulin function, reproduction, thyroid function, blood clotting, growth, taste, vision and smell. After iron, it's the most common mineral in the body and is found in every cell.

You don't need much zinc to perform all these functions. The recommended dietary allowance for adults is just 8 mg (women) to 11 mg (men). But you do need zinc in your daily diet because the body doesn't store it.

Zinc deficiency hinders immune

FUNCTION

ZINC TENDENCY

pork and chicken (dark meat especially). Zinc is also found in yogurt, baked beans, cashews, oatmeal, milk, kidney beans, almonds, chickpeas and fortified.

If you eat little or no meat, consider taking a multivitamin as a form of insurance for days when your diet may fall short. Getting zinc in a multivitamin is preferable to taking it alone, as too much zinc on its own can cause copper levels to drop. Multivitamins contain the right balance of both.

function and has been associated with cardiovascular disease and diabetes. Though outright deficiency is uncommon in industrialized countries like America, there is evidence that relative zinc deficiency and marginal zinc levels may be somewhat common among certain populations, particularly among older people as well as vegetarians, since red meat and poultry provide the majority of zinc in the American diet and zinc from plant sources is slightly harder for the body to absorb. Taking too much zinc, which can happen when people supplement the mineral—a popular practice for staving off cold infections—can cause toxicity. Upper limits for intake are 34 mg for women and 40 mg for men.

Genetics can influence a person's zinc blood levels. In one widespread analysis of more than 12,000 adults, genetic variations accounted for 8 percent of the variation in blood zinc levels. Our analysis investigated which genotype for these genes was present in your DNA. Your rating of BELOW AVERAGE, NORMAL or ABOVE AVERAGE reflects the zinc levels that are likely to be present in your blood.

LINKS TO RELATED STUDIES:

SUN SENSITIVITY

PLoS Genet. 2008 May 16;4(5):e1000074. doi: 10.1371/journal.pgen.1000074.

A genome-wide association study identifies novel alleles associated with hair color and skin pigmentation

https://www.ncbi.nlm.nih.gov/pubmed/?term=18483556

Han J, Kraft P, Nan H, Guo Q, Chen C, Qureshi A, Hankinson SE, Hu FB, Duffy DL, Zhao ZZ, Martin NG, Montgomery GW, Hayward NK, Thomas G, Hoover RN, Chanock S, Hunter DJ.

Cell. 2013 Nov 21;155(5):1022-33. doi: 10.1016/j.cell.2013.10.022.

A polymorphism in IRF4 affects human pigmentation through a tyrosinase-dependent MITF/TFAP2A pathway

https://www.ncbi.nlm.nih.gov/pubmed/?term=24267888

Praetorius C, Grill C, Stacey SN, Metcalf AM, Gorkin DU, Robinson KC, Van Otterloo E, Kim RS, Bergsteinsdottir K, Ogmundsdottir MH, Magnusdottir E, Mishra PJ, Davis SR, Guo T, Zaidi MR, Helgason AS, Sigurdsson MI, Meltzer PS, Merlino G, Petit V, Larue L, Loftus SK, Adams DR, Sobhiafshar U, Emre NC, Pavan WJ, Cornell R, Smith AG, McCallion AS, Fisher DE, Stefansson K, Sturm RA, Steingrimsson E.

SKIN AGING FACIAL AGING

J Invest Dermatol. 2013 Apr;133(4):929-35. doi: 10.1038/jid.2012.458. Epub 2012 Dec 6.

A genome-wide association study in Caucasian women points out a putative role of the STXBP5L gene in facial photoaging

https://www.ncbi.nlm.nih.gov/pubmed/?term=23223146

Le Clerc S1, Taing L, Ezzedine K, Latreille J, Delaneau O, Labib T, Coulonges C, Bernard A, Melak S, Carpentier W, Malvy D, Jdid R, Galan P, Hercberg S, Morizot F, Guinot C, Tschachler E, Zagury JF.

STRETCH MARKS

J Invest Dermatol. 2013 Nov;133(11):2628-31. doi: 10.1038/jid.2013.196. Epub 2013 Apr 30.

Genome-wide association analysis implicates elastic microfibrils in the development of nonsyndromic striae distensae

http://www.ncbi.nlm.nih.gov/pubmed/?term=23633020

Tung JY, Kiefer AK, Mullins M, Francke U, Eriksson N.

SKIN GLYCATION

J Clin Endocrinol Metab. 2009 Dec;94(12):5174-80. doi: 10.1210/jc.2009-1067. Epub 2009 Nov 4.

Association of polymorphism in the receptor for advanced glycation end products (RAGE) gene with circulating RAGE levels

http://www.ncbi.nlm.nih.gov/pubmed/?term=19890027

Gaens KH, Ferreira I, van der Kallen CJ, van Greevenbroek MM, Blaak EE, Feskens EJ, Dekker JM, Nijpels G, Heine RJ, 't Hart LM, de Groot PG, Stehouwer CD, Schalkwijk CG.

Gene. 2013 Feb 15;515(1):140-3. doi: 10.1016/j.gene.2012.11.009. Epub 2012 Nov 29.

Identification of glyoxalase 1 polymorphisms associated with enzyme activity

http://www.ncbi.nlm.nih.gov/pubmed/?term=23201419

Peculis R1, Konrade I, Skapare E, Fridmanis D, Nikitina-Zake L, Lejnieks A, Pirags V, Dambrova M, Klovins J.

LINKS TO RELATED STUDIES:

FAT LOSS RESPONSE TO CARDIO

J Appl Physiol (1985). 2001 Sep;91(3):1334-40.

Evidence of LPL gene-exercise interaction for body fat and LPL activity
http://www.ncbi.nlm.nih.gov/pubmed/11509533

Garenc C, P russe L, Bergeron J, Gagnon J, Chagnon YC, Borecki IB, Leon AS, Skinner JS, Wilmore JH, Rao DC, Bouchard C.

Obes Res. 2003 May;11(5):612-8.

Effects of beta2-adrenergic receptor gene variants on adiposity
http://www.ncbi.nlm.nih.gov/pubmed/12740450

Garenc C1, Pérusse L, Chagnon YC, Rankinen T, Gagnon J, Borecki IB, Leon AS, Skinner JS, Wilmore JH, Rao DC, Bouchard C; HERITAGE Family Study.

BODY COMPOSITION RESPONSE TO STRENGTH TRAINING

International Journal of Obesity (2015) 39, 1371–1375; doi:10.1038/ijo.2015.78; published online 26 May 2015

High genetic risk individuals benefit less from resistance exercise intervention
http://www.nature.com/ijo/journal/vaop/ncurrent/abs/ijo201578a.html

Y C Klimentidis, J W Bea, T Lohman, P-S Hsieh, S Going and Z Chen

INTRINSIC MOTIVATION TO EXERCISE

J Behav Med. 2014 Dec;37(6):1180-92. doi: 10.1007/s10865-014-9567-4. Epub 2014 May 8.

What keeps a body moving? The brain-derived neurotrophic factor val66met polymorphism and intrinsic motivation to exercise in humans
https://www.ncbi.nlm.nih.gov/pubmed/?term=24805993

Caldwell Hooper AE1, Bryan AD, Hagger MS.

ADDICTIVE BEHAVIOR / STIMULUS CONTROL

Transl Psychiatry. 2015 Dec 1;5:e686. doi: 10.1038/tp.2015.176.

The significant association of Taq1A genotypes in DRD2/ANKK1 with smoking cessation in a large-scale meta-analysis of Caucasian populations
https://www.ncbi.nlm.nih.gov/pubmed/?term=26624925

Ma Y, Wang M, Yuan W, Su K, Li MD

IMPULSE CONTROL TASTE PREFERENCE WITH AGING

Mol Psychiatry. 2015 Feb;20(1):133-39. doi: 10.1038/mp.2014.49. Epub 2014 May 27.

FTO genotype and aging: pleiotropic longitudinal effects on adiposity, brain function, impulsivity and diet
https://www.ncbi.nlm.nih.gov/pubmed/?term=24863145

Chuang YF, Tanaka T, Beason-Held LL, An Y, Terracciano A, Sutin AR, Kraut M, Singleton AB, Resnick SM, Thambisetty M

SUGAR INTAKE

Physiol Genomics. 2008 May 13;33(3):355-60. doi: 10.1152/physiolgenomics.00148.2007. Epub 2008 Mar 18.

Genetic variant in the glucose transporter type 2 is associated with higher intakes of sugars in two distinct populations
https://www.ncbi.nlm.nih.gov/pubmed/?term=18349384

Eny KM1, Wolever TM, Fontaine-Bisson B, El-Sohemy A.

LINKS TO RELATED STUDIES:

SLEEP DURATION

Mol Psychiatry. 2013 Jan;18(1):122-32. doi: 10.1038/mp.2011.142. Epub 2011 Nov 22.

A K(ATP) channel gene effect on sleep duration: from genome-wide association studies to function in Drosophila

https://www.ncbi.nlm.nih.gov/pubmed/?term=22105623

Allebrandt KV1, Amin N, M ller-Myhsok B, Esko T, Teder-Laving M, Azevedo RV, Hayward C, van Mill J, Vogelzangs N, Green EW, Melville SA, Lichtner P, Wichmann HE, Oostra BA, Janssens AC, Campbell H, Wilson JF, Hicks AA, Pramstaller PP, Dogas Z, Rudan I, Merrow M, Penninx B, Kyriacou CP, Metspalu A, van Duijn CM, Meitinger T, Roenneberg T.

Mol Psychiatry. 2015 Oct;20(10):1232-9. doi: 10.1038/mp.2014.133. Epub 2014 Dec 2.

Novel loci associated with usual sleep duration: the CHARGE Consortium Genome-Wide Association Study

https://www.ncbi.nlm.nih.gov/pubmed/?term=25469926

Gottlieb DJ, Hek K, Chen TH, Watson NF, Eiriksdottir G, Byrne EM, Cornelis M, Warby SC, Bandinelli S, Cherkas L, Evans DS, Grabe HJ, Lahti J, Li M Lehtim ki T Lumley T, Marciante KD, P russe L, Psaty BM, Robbins J, Tranah GJ, Vink JM Wilk JB Stafford JM, Bellis C, Biffar R, Bouchard C, Cade B Curhan GC, Eriksson JG, Ewert R Ferrucci L, F l p T, Gehrman PR, Goodloe R, Harris TB, Heath AC, Hernandez D, Hofman A, Hottenga JJ Hunter DJ, Jensen MK Johnson AD, K h nen M, Kao L, Kraft P, Larkin EK, Lauderdale DS, Luik A, Medici M, Montgomery GW, Palotie A, Patel SR, Pistis G, Porcu E, Quaye L, Raitakari O, Redline S, Rimm EB, Rotter JI, Smith AV, Spector TD, Teumer A, Uitterlinden AG, Vohl MC, Widen E, Willemsen G, Young T, Zhang X, Liu Y, Blangero J, Boomsma DI, Gudnason V, Hu F, Mangino M, Martin NG, O'Connor GT, Stone KL, Tanaka T, Viikari J, Gharib SA, Punjabi NM, R ikk nen K, V lzke H, Mignot E, Tiemeier H.

Hum Mol Genet. 2016 Jan 1;25(1):167-79. doi: 10.1093/hmg/ddv434. Epub 2015 Oct 13.

Common variants in DRD2 are associated with sleep duration: the CARe consortium

https://www.ncbi.nlm.nih.gov/pubmed/?term=26464489

Cade BE, Gottlieb DJ, Lauderdale DS, Bennett DA, Buchman AS, Buxbaum SG, De Jager PL, Evans DS, F l p T, Gharib SA, Johnson WC, Kim H, Larkin EK, Lee SK, Lim AS, Punjabi NM, Shin C, Stone KL, Tranah GJ, Weng J, Yaffe K, Zee PC, Patel SR, Zhu X, Redline S, Saxena R.

LONGEVITY

J Gerontol A Biol Sci Med Sci. 2015 Jan;70(1):110-8. doi: 10.1093/gerona/glu166. Epub 2014 Sep 8.

GWAS of longevity in CHARGE consortium confirms APOE and FOXO3 candidacy

https://www.ncbi.nlm.nih.gov/pubmed/?term=25199915

Broer L, Buchman AS, Deelen J, Evans DS, Faul JD, Lunetta KL, Sebastiani P, Smith JA, Smith AV, Tanaka T, Yu L, Arnold AM, Aspelund T, Benjamin EJ, De Jager PL, Eirkisdottir G, Evans DA, Garcia ME, Hofman A, Kaplan RC, Kardia SL, Kiel DP, Oostra BA, Orwoll ES, Parimi N, Psaty BM, Rivadeneira F, Rotter JI, Seshadri S, Singleton A, Tiemeier H, Uitterlinden AG, Zhao W, Bandinelli S, Bennett DA, Ferrucci L, Gudnason V, Harris TB, Karasik D, Launer LJ, Perls TT, Slagboom PE, Tranah GJ, Weir DR, Newman AB, van Duijn CM, Murabito JM.

Proc Natl Acad Sci U S A. 2008 Sep 16;105(37):13987-92. doi: 10.1073/pnas.0801030105. Epub 2008 Sep 2.

FOXO3A genotype is strongly associated with human longevity

https://www.ncbi.nlm.nih.gov/pubmed/?term=18765803

Willcox BJ, Donlon TA, He Q, Chen R, Grove JS, Yano K, Masaki KH, Willcox DC, Rodriguez B, Curb JD.

Rejuvenation Res. 2009 Apr;12(2):95-104. doi: 10.1089/rej.2008.0827.

Association of the FOXO3A locus with extreme longevity in a southern Italian centenarian study

https://www.ncbi.nlm.nih.gov/pubmed/?term=19415983

Anselmi CV1, Malovini A, Roncarati R, Novelli V, Villa F, Condorelli G, Bellazzi R, Puca AA.

Proc Natl Acad Sci U S A. 2009 Feb 24;106(8):2700-5. doi: 10.1073/pnas.0809594106. Epub 2009 Feb 5.

Association of FOXO3A variation with human longevity confirmed in German centenarians

https://www.ncbi.nlm.nih.gov/pubmed/?term=19196970

Flachsbart F1, Caliebe A, Kleindorp R, Blanch H, von Eller-Eberstein H, Nikolaus S, Schreiber S, Nebel A.

LINKS TO RELATED STUDIES:

Hum Mol Genet. 2009 Dec 15;18(24):4897-904. doi: 10.1093/hmg/ddp459. Epub 2009 Sep 29.

Genetic association of FOXO1A and FOXO3A with longevity trait in Han Chinese populations

https://www.ncbi.nlm.nih.gov/pubmed/?term=19793722

Li Y1, Wang WJ, Cao H, Lu J, Wu C, Hu FY, Guo J, Zhao L, Yang F, Zhang YX, Li W, Zheng GY, Cui H, Chen X, Zhu Z, He H, Dong B, Mo X, Zeng Y, Tian XL.

Aging Cell. 2010 Dec;9(6):1010-7. doi: 10.1111/j.1474-9726.2010.00627.x. Epub 2010 Oct 21.

Replication of an association of variation in the FOXO3A gene with human longevity using both case control and longitudinal data

https://www.ncbi.nlm.nih.gov/pubmed/?term=20849522

Soerensen M1, Dato S, Christensen K, McGue M, Stevnsner T, Bohr VA, Christiansen L.

FITNESS RESPONSE TO CARDIO

Physiol Genomics. 2003 Jul 7;14(2):161-6.

Associations between cardiorespiratory responses to exercise and the C34T AMPD1 gene polymorphism

http://www.ncbi.nlm.nih.gov/pubmed/12783984

Rico-Sanz J, Rankinen T, Joanisse DR, Leon AS, Skinner JS, Wilmore JH, Rao DC, Bouchard C; HERITAGE Family study.

Metabolism. 2004 Feb;53(2):193-202.

Apolipoprotein E genotype and changes in serum lipids and maximal oxygen uptake with exercise training

http://www.ncbi.nlm.nih.gov/pubmed/14767871

Thompson PD, Tsongalis GJ, Seip RL, Bilbie C, Miles M, Zoeller R, Visich P, Gordon P, Angelopoulos TJ, Pescatello L, Bausserman L, Moyna N.

Metabolism. 2004 Jan;53(1):108-16.

Association of apolipoprotein E polymorphism with blood lipids and maximal oxygen uptake in the sedentary state and after exercise training

http://www.ncbi.nlm.nih.gov/pubmed/14681851

Leon AS1, Togashi K, Rankinen T, Despr s JP, Rao DC, Skinner JS, Wilmore JH, Bouchard C.

SYSTEMIC INFLAMMATION

Circulation. 2011 Feb 22;123(7):731-8. doi: 10.1161/CIRCULATIONAHA.110.948570. Epub 2011 Feb 7.

Meta-analysis of genoe-wide association studies in 80,000 subjects identifies multiple loci for C-reactive protein levels

https://www.ncbi.nlm.nih.gov/pubmed/?term=21300955

Dehghan A, Dupuis J, Barbalic M, Bis JC, Eiriksdottir G, Lu C, Pellikka N, Wallaschofski H, Kettunen J, Henneman P, Baumert J, Strachan DP, Fuchsberger C, Vitart V, Wilson JF, Par G, Naitza S, Rudock ME, Surakka I, de Geus EJ, Alizadeh BZ, Guralnik J, Shuldiner A, Tanaka T, Zee RY, Schnabel RB, Nambi V, Kavousi M, Ripatti S, Nauck M, Smith NL, Smith AV, Sundvall J, Scheet P, Liu Y, Ruokonen A, Rose LM, Larson MG, Hoogeveen RC, Freimer NB, Teumer A, Tracy RP, Launer LJ, Buring JE, Yamamoto JF, Folsom AR, Sijbrands EJ, Pankow J, Elliott P, Keaney JF, Sun W, Sarin AP, Fontes JD, Badola S, Astor BC, Hofman A, Pouta A, Werdan K, Greiser KH, Kuss O, Meyer zu Schwabedissen HE, Thiery J, Jamshidi Y, Nolte IM, Soranzo N, Spector TD, V lzke H, Parker AN, Aspelund T, Bates D, Young L, Tsui K, Siscovick DS, Guo X, Rotter JI, Uda M, Schlessinger D, Rudan I, Hicks AA, Penninx BW, Thorand B, Gieger C, Coresh J, Willemsen G, Harris TB, Uitterlinden AG, J rvelin MR, Rice K, Radke D, Salomaa V, Willems van Dijk K, Boerwinkle E, Vasan RS, Ferrucci L, Gibson QD, Bandinelli S, Snieder H, Boomsma DI, Xiao X, Campbell H, Hayward C, Pramstaller PP, van Duijn CM, Peltonen L, Psaty BM, Gudnason V, Ridker PM, Homuth G, Koenig W, Ballantyne CM, Witteman JC, Benjamin EJ, Perola M, Chasman DI.

POLYUNATURATED FATTY ACID LEVELS

PLoS Genet. 2009 Jan;5(1):e1000338. doi: 10.1371/journal.pgen.1000338. Epub 2009 Jan 16.

Genome-wide association study of plasma polyunsaturated fatty acids in the InCHIANTI Study

https://www.ncbi.nlm.nih.gov/pubmed/19148276

Tanaka T1, Shen J, Abecasis GR, Kisialiou A, Ordovas JM, Guralnik JM, Singleton A, Bandinelli S, Cherubini A, Arnett D, Tsai MY, Ferrucci L.

LINKS TO RELATED STUDIES:

Circ Cardiovasc Genet. 2014 Jun;7(3):321-31. doi: 10.1161/CIRCGENETICS.113.000208. Epub 2014 May 13.

Genome-wide association study of plasma N6 polyunsaturated fatty acids within the cohorts for heart and aging research in genomic epidemiology consortium

https://www.ncbi.nlm.nih.gov/pubmed/24823311

Guan W, Steffen BT, Lemaitre RN, Wu JH, Tanaka T, Manichaikul A, Foy M, Rich SS, Wang L, Nettleton JA, Tang W, Gu X, Bandinelli S, King IB, McKnight B, Psaty BM, Siscovick D, Djousse L, Ida Chen YD, Ferrucci L, Fornage M, Mozafarrian D, Tsai MY, Steffen LM.

Hum Mol Genet. 2006 Jun 1;15(11):1745-56. Epub 2006 May 2.

Common genetic variants of the FADS1 FADS2 gene cluster and their reconstructed haplotypes are associated with the fatty acid composition in phospholipids

https://www.ncbi.nlm.nih.gov/pubmed/16670168

Schaeffer L1, Gohlke H, M ller M, Heid IM, Palmer LJ, Kompauer I, Demmelmair H, Illig T, Koletzko B, Heinrich J.

AGE RELATED HEARING LOSS

Hum Mol Genet. 2009 Feb 15;18(4):785-96. doi: 10.1093/hmg/ddn402. Epub 2008 Dec 1.

GRM7 variants confer susceptibility to age-related hearing impairment

https://www.ncbi.nlm.nih.gov/pubmed/?term=19047378

Friedman RA, Van Laer L, Huentelman MJ, Sheth SS, Van Eyken E, Corneveaux JJ, Tembe WD, Halperin RF, Thorburn AQ, Thys S, Bonneux S, Fransen E, Huyghe J, Pyykkõ I, Cremers CW, Kremer H, Dhooge I, Stephens D, Orzan E, Pfister M, Bille M, Parving A, Sorri M, Van de Heyning PH, Makmura L, Ohmen JD, Linthicum FH Jr, Fayad JN, Pearson JV, Craig DW, Stephan DA, Van Camp G.

KIDNEY FUNCTION WITH AGING

Kidney Int. 2015 May;87(5):1017-29. doi: 10.1038/ki.2014.361. Epub 2014 Dec 10.

Genome-wide association study of kidney function decline in individuals of European descent

https://www.ncbi.nlm.nih.gov/pubmed/?term=25493956

Gorski M, Tin A, Garnaas M, McMahon GM, Chu AY, Tayo BO, Pattaro C, Teumer A, Chasman DI, Chalmers J, Hamet P, Tremblay J, Woodward M, Aspelund T, Eiriksdottir G, Gudnason V, Harris TB, Launer LJ, Smith AV, Mitchell BD, O'Connell JR, Shuldiner AR, Coresh J, Li M, Freudenberger P, Hofer E, Schmidt H, Schmidt R, Holliday EG, Mitchell P, Wang JJ, de Boer IH, Li G, Siscovick DS, Kutalik Z, Corre T, Vollenweider P, Waeber G, Gupta J, Kanetsky PA, Hwang SJ, Olden M, Yang Q, de Andrade M, Atkinson EJ, Kardia SL, Turner ST, Stafford JM, Ding J, Liu Y, Barlassina C, Cusi D, Salvi E, Staessen JA, Ridker PM, Grallert H, Meisinger C, M ller-Nurasyid M, Krãmer BK, Kramer H, Rosas SE, Nolte IM, Penninx BW, Snieder H, Fabiola Del Greco M, Franke A, Nõthlings U, Lieb W, Bakker SJ, Gansevoort RT, van der Harst P, Dehghan A, Franco OH, Hofman A, Rivadeneira F, Sedaghat S, Uitterlinden AG, Coassin S, Haun M, Kollerits B, Kronenberg F, Paulweber B, Aumann N, Endlich K, Pietzner M, Võlker U, Rettig R, Chouraki V, Helmer C, Lambert JC, Metzger M, Stengel B, Lehtimãki T, Lyytikãinen LP, Raitakari O, Johnson A, Parsa A, Bochud M, Heid IM, Goessling W, Kõttgen A, Kao WH, Fox CS, Bõger CA.

CHOLESTEROL RESPONSE TO DIETARY FAT

J Nutr. 2015 Jun;145(6):1289-94. doi: 10.3945/jn.115.212514. Epub 2015 Apr 29.

Dietary fat intake modifies the effect of a common variant in the LIPC gene on changes in serum lipid concentrations during a long-term weight-loss intervention trial

https://www.ncbi.nlm.nih.gov/pubmed/?term=25926410

Xu M, Ng SS, Bray GA, Ryan DH, Sacks FM, Ning G, Qi L6

LINKS TO RELATED STUDIES:

INSULIN RESPONSE TO DIETARY FAT

J Nutr. 2015 May;145(5):977-82. doi: 10.3945/jn.115.210005. Epub 2015 Mar 11.

Dietary fat modifies the effects of FTO genotype on changes in insulin sensitivity

https://www.ncbi.nlm.nih.gov/pubmed/?term=25761503

Zheng Y1, Huang T1, Zhang X2, Rood J3, Bray GA3, Sacks FM1, Qi L4.

TRIGLYCERIDE RESPONSE TO CARDIO

Br J Sports Med. 2015 Dec;49(23):1524-31. doi: 10.1136/bjsports-2015-095179. Epub 2015 Oct 21.

Genomic and transcriptomic predictors of triglyceride response to regular exercise

https://www.ncbi.nlm.nih.gov/pubmed/?term=26491034

Sarzynski MA, Davidsen PK, Sung YJ, Hesselink MK, Schrauwen P, Rice TK, Rao DC, Falciani F, Bouchard C

LACTOSE INTOLERANCE

Nat Genet. 2002 Feb;30(2):233-7. Epub 2002 Jan 14.

Identification of a variant associated with adult-type hypolactasia

https://www.ncbi.nlm.nih.gov/pubmed/?term=11788828

Enattah NS1, Sahi T, Savilahti E, Terwilliger JD, Peltonen L, Jãrvelã I.

Am J Hum Genet. 2004 Jun;74(6):1102-10. Epub 2004 Apr 20.

The T allele of a single-nucleotide polymorphism 13.9 kb upstream of the lactase gene (LCT) (C513.9kbT) does not predict or cause the lactase-persistence phenotype in Africans

https://www.ncbi.nlm.nih.gov/pubmed/?term=15106124

Mulcare CA1, Weale ME, Jones AL, Connell B, Zeitlyn D, Tarekegn A, Swallow DM, Bradman N, Thomas MG.

CALCIUM TENDENCY

PLoS Genet. 2013;9(9):e1003796. doi: 10.1371/journal.pgen.1003796. Epub 2013 Sep 19.

Meta-analysis of genome-wide association studies identifies six new loci for serum calcium concentrations

https://www.ncbi.nlm.nih.gov/pubmed/?term=24068962

O'Seaghdha CM, Wu H, Yang Q, Kapur K, Guessous I, Zuber AM, Köttgen A, Stoudmann C, Teumer A, Kutalik Z, Mangino M, Dehghan A, Zhang W, Eiriksdottir G, Li G, Tanaka T, Portas L, Lopez LM, Hayward C, Lohman K, Matsuda K, Padmanabhan S, Firsov D, Sorice R, Ulivi S, Brockhaus AC, Kleber ME, Mahajan A, Ernst FD, Gudnason V, Launer LJ, Mace A, Boerwinckle E, Arking DE, Tanikawa C, Nakamura Y, Brown MJ, Gaspoz JM, Theler JM, Siscovick DS, Psaty BM, Bergmann S, Vollenweider P, Vitart V, Wright AF, Zemunik T, Boban M, Kolcic I, Navarro P, Brown EM, Estrada K, Ding J, Harris TB, Bandinelli S, Hernandez D, Singleton AB, Girotto G, Ruggiero D, d'Adamo AP, Robino A, Meitinger T, Meisinger C, Davies G, Starr JM, Chambers JC, Boehm BO, Winkelmann BR, Huang J, Murgia F, Wild SH, Campbell H, Morris AP, Franco OH, Hofman A, Uitterlinden AG, Rivadeneira F, Võlker U, Hannemann A, Biffar R, Hoffmann W, Shin SY, Lescuyer P, Henry H, Schurmann C; SUNLIGHT Consortium; GEFOS Consortium, Munroe PB, Gasparini P, Pirastu N, Ciullo M, Gieger C, Mãrz W, Lind L, Spector TD, Smith AV, Rudan I, Wilson JF, Polasek O, Deary IJ, Pirastu M, Ferrucci L, Liu Y, Kestenbaum B, Kooner JS, Witteman JC, Nauck M, Kao WH, Wallaschofski H, Bonny O, Fox CS, Bochud M.

COPPER TENDENCY

Hum Mol Genet. 2013 Oct 1;22(19):3998-4006. doi: 10.1093/hmg/ddt239. Epub 2013 May 29.

Genome-wide association study identifies loci affecting blood copper, selenium and zinc

https://www.ncbi.nlm.nih.gov/pubmed/?term=23720494

Evans DM1, Zhu G, Dy V, Heath AC, Madden PA, Kemp JP, McMahon G, St Pourcain B, Timpson NJ, Golding J, Lawlor DA, Steer C, Montgomery GW, Martin NG, Smith GD, Whitfield JB.

LINKS TO RELATED STUDIES:

MAGNESIUMTENDENCY

PLoS Genet. 2010 Aug 5;6(8). pii: e1001045. doi: 10.1371/journal.pgen.1001045.

Genome-wide association studies of serum magnesium, potassium, and sodium concentrations identify six loci influencing serum magnesium levels

https://www.ncbi.nlm.nih.gov/pubmed/?term=20700443

Meyer TE, Verwoert GC, Hwang SJ, Glazer NL, Smith AV, van Rooij FJ, Ehret GB, Boerwinkle E, Felix JF, Leak TS, Harris TB, Yang Q, Dehghan A, Aspelund T, Katz R, Homuth G, Kocher T, Rettig R, Ried JS, Gieger C, Prucha H, Pfeufer A, Meitinger T, Coresh J, Hofman A, Sarnak MJ, Chen YD, Uitterlinden AG, Chakravarti A, Psaty BM, van Duijn CM, Kao WH, Witteman JC, Gudnason V, Siscovick DS, Fox CS, Kõttgen A; Genetic Factors for Osteoporosis Consortium; Meta Analysis of Glucose and Insulin Related Traits Consortium.

BMC Genet. 2015 May 29;16:56. doi: 10.1186/s12863-015-0219-7.

Genetic loci for serum magnesium among African-Americans and gene-environment interaction at MUC1 and TRPM6 in European-Americans

https://www.ncbi.nlm.nih.gov/pubmed/?term=26058915

Tin A, Kõttgen A, Folsom AR, Maruthur NM, Tajuddin SM, Nalls MA, Evans MK, Zonderman AB, Friedrich CA, Boerwinkle E, Coresh J, Kao WH

DIETARY CHOLINE TENDENCY

J Nutr. 2011 Mar;141(3):531-4. doi: 10.3945/jn.110.130369. Epub 2011 Jan 26.

Nutritional enomics: defining the dietary requirement and effects of choline

https://www.ncbi.nlm.nih.gov/pubmed/?term=21270363

Zeisel SH

Am J Clin Nutr. 2010 Nov;92(5):1113-9. doi: 10.3945/ajcn.2010.30064. Epub 2010 Sep 22.

Dietary choline requirements of women: effects of estrogen and genetic variation

https://www.ncbi.nlm.nih.gov/pubmed/?term=20861172

Fischer LM, da Costa KA, Kwock L, Galanko J, Zeisel SH.

FASEB J. 2006 Jul;20(9):1336-44.

Common genetic polymorphisms affect the human requirement for the nutrient choline

https://www.ncbi.nlm.nih.gov/pubmed/?term=16816108

da Costa KA, Kozyreva OG, Song J, Galanko JA, Fischer LM, Zeisel SH.

SELENIUM TENDENCY / ZINC TENDENCY

Hum Mol Genet. 2013 Oct 1;22(19):3998-4006. doi: 10.1093/hmg/ddt239. Epub 2013 May 29.

Genome-wide association study identifies loci affecting blood copper, selenium and zinc

https://www.ncbi.nlm.nih.gov/pubmed/?term=23720494

Evans DM, Zhu G, Dy V, Heath AC, Madden PA, Kemp JP, McMahon G, St Pourcain B, Timpson NJ, Golding J, Lawlor DA, Steer C, Montgomery GW, Martin NG, Smith GD, Whitfield JB.

MENTAL ACUITY

Age (Dordr). 2012 Aug;34(4):1011-22. doi: 10.1007/s11357-011-9275-8. Epub 2011 Jun 22.

Brain-derived neurotrophic factor (BDNF gene: a gender-specific role in cognitive function during normal cognitive aging of the MEMO-Study?

https://www.ncbi.nlm.nih.gov/pubmed/?term=21695421

Laing KR1, Mitchell D, Wersching H, Czira ME, Berger K, Baune BT.

World J Biol Psychiatry. 2010 Sep;11(6):774-80. doi: 10.3109/15622971003797241.

Effect of brain-derived neurotrophic factor Val66Met polymorphism and serum levels on the progression of mild cognitive impairment

https://www.ncbi.nlm.nih.gov/pubmed/?term=20491609

Forlenza OV1, Diniz BS, Teixeira AL, Ojopi EB, Talib LL, Mendonåa VA, Izzo G, Gattaz WF.