Maximize Your Fitness Potential

Holistic Wellness. Personalized.

Educational Reference Material Only.
Not Specific To Your Genotype.

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genixpro

This report is intended as supplement material to assist the reader in understanding their DNA results published in **GENIXPRO™ HEALTH SCREENING** report, and obtained by testing a sample for response to a selection of key genes that are associated with health, diet and fitness. This report is intended as educational information, and is not intended to be used solely by the reader/user/patient/consumer in medical decision-making without the prior consultation with a licensed health care professional. Any assertions or recommendations in the report as to exercise programs or diet, whether specific or general, are based on following assumptions:

1. That you are in a good state of health and do not have any medical problems that you are aware of;
2. That you have not had any recurring illness in the past 12 months;
3. That no medical practitioner has ever advised you not to exercise;
4. That you are not on any prescribed medication that may impact either your ability to exercise safely or your diet;
5. That you do not have any dietary restrictions or food allergies; and
6. That there is no other reason why you should not follow the assertions or recommendations in this report.

If you have any concerns at any time about whether or not these assumptions are correct in your particular circumstances, before acting, or not acting, on any of the assertions or recommendations, you must consult a trainer, nutritionist and/or a qualified medical practitioner. Should the results indicate an unexpected abnormality, the same should be reconfirmed.

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CALL-TO-ACTION RECOMMENDATIONS

SECTION	INTERPRETATION
Assessment Categories	A holistic assessment based on the gene(s) tested and our observation summary for the trait assessed.
Fitness Recommendations	Based on the assessment, suggested diet recommendation.
Supplement Recommendations	Based on the assessment, suggested diet and supplements (if needed).

HOW TO INTERPRET THIS REPORT?

The genetic markers and studies selected for this GENIXPRO™ report represent the best and most recent genetic research in nutrition and weight-related health conditions. For each key marker in the report, we analyze a selection of genetic variants. The variant you hold is your genotype, and depending on which variation you possess we can report on the scientific strength of its association with each of the GENIXPRO™ markers. Further details are provided in the "Science Behind The Story" section.

Some research can be described as stronger than others based on the size of the population studied and whether the outcome has been replicated. Due to the current state of scientific research on the genetics of fitness and nutrition, most of the studies referenced in your report are based on individuals of Caucasian ethnicity. While we all have the same genes, there are genetic and non-genetic factors in different ethnicities that might yield different outcomes for non-Caucasian/ Asian population.

Your report is categorized in 6 sections with multiple traits (or conditions) classified within each. Details for each trait include a brief description of the trait, assessment categories and Call-to-Action recommendations on nutrition and supplements based on your DNA assessment, Clinical findings and Lifestyle information you've shared earlier. The appendix section includes details of all genes tested, their scientific significance, and a star system to rate the strength of the research evidence for the genetic marker and the associated genotype result.

Nutrition

- Diet and Metabolism 
- Eating Behavior 
- Detoxification | Antioxidants 
- Vitamins | Minerals 
- Food Sensitivity 
- Cardiovascular Health 

Fitness

- Fitness | Exercise 
- Muscle Characteristics 
- Injury Susceptibility 
- Bone and Joint Health 
- Body and Weight 
- Lifestyle Traits 

Studies have shown a link between genetics and exercise, and how people respond to exercise for weight loss and other health benefits. A few examples of this link include the ACE and ACTN3 genes and the association with elite athlete status, as well as the LPL gene and its connection to the loss of body fat in response to exercise.

REMEMBER: YOUR GENES CANNOT CHANGE, BUT YOUR LIFESTYLE CAN. The earlier we act, the better. This is why we consider the two together; and by identifying and analyzing your unique genetic characteristics, you may now personalize your training, diet and lifestyle choices to match your individual needs in achieving your goals and better results. Faster. Together.

From your DNA analysis, we provide unique scientific insights in to the following key areas in relation to fitness:-

FITNESS AND EXERCISE PROFILE

Know your strength and endurance profile. Identify fitness program(s) best suited for your body-type

MUSCLE CHARACTERISTICS

What your genes say about your muscle damage risk, soreness, cramping, lactation and slow muscle repair

BONE AND JOINT HEALTH

What your genes say about joint flexibility, ligament & cartilage health, achilles tendinopathy

INJURY SUSCEPTIBILITY

Find out if you are one of those individuals genetically more prone to overall tendon and ligament injury risk or stress fractures?

LIFESTYLE TRAITS

Find out if you're at risk of lifestyle diseases like type-2 diabetes, hypertension, cardiovascular disease, among others. Know more about your sleep quality and stress resilience.

BODY AND WEIGHT

Your predisposition to obesity, weight-loss regain tendency or resting metabolic rate impairment. Genetically guided weight-management. Personalised.

Sample GenixPRO™ Fitness Summary

Fitness and Exercise Profile

Trait	Sample Assessment
Endurance Training	Normal Benefit
Strength Training	Enhanced Benefit
Cardiorespiratory Fitness (VO2 Max)	Increased
Motivation to Exercise	Low
Post Exercise Recovery	Moderate
Exercise Response: BMI	Enhanced Benefit
Exercise Response: Blood Pressure	Enhanced Benefit
Exercise Response: HDL Cholesterol	Normal Benefit
Exercise Response: Body Fat Loss	Normal Benefit
Exercise Response: Insulin Sensitivity	Enhanced Benefit
Exercise Response: Heart Rate	Normal Benefit

Muscle Characteristics

Trait	Sample Assessment
Lean Body Mass	Average
Muscle Damage Risk	Normal Risk

Injury Susceptibility

Trait	Sample Assessment
Risk of ACL Injury	Increased Risk
Achilles Tendinopathy	Typical
Inflammation Risk	Moderate Risk
Pain Sensitivity	Moderate Sensitivity

Bone and Joint Health

Trait	Sample Assessment
Stress Fracture Risk	Average Risk
Joint, Ligament and Cartilage Laxity	Typical
Risk for Osteoporosis	Not Reported
Risk for Rheumatoid Arthritis	Not Reported

BODY AND WEIGHT

TRAIT	SAMPLE ASSESSMENT
OBESITY PREDISPOSITION	TYPICAL LIKELIHOOD
DIFFICULTY IN LOSING WEIGHT	LOW
WEIGHT-LOSS REGAIN TENDENCY	MORE LIKELY TO REGAIN WEIGHT

LIFESTYLE TRAITS

TRAIT	SAMPLE ASSESSMENT
STRESS RESILIENCE	SLIGHTLY LOW
SLEEP QUALITY	DEFICIENT
SLEEP DEPTH	DEFICIENT
SLEEP DURATION	DEFICIENT
CIRCADIAN RHYTHM	LIKELY MORNING PERSON
NARCOLEPSY	MORE LIKELY
INSOMNIA	LESS LIKELY
HYPERSOMNIA	MORE LIKELY
OBSTRUCTIVE SLEEP APNEA	LESS LIKELY

LIFESTYLE TRAITS

TRAIT	SAMPLE ASSESSMENT
RISK FOR TYPE-2 DIABETES	NOT REPORTED
RISK FOR HYPERTENSION	NOT REPORTED
RISK FOR ATRIAL FIBRILLATION	NOT REPORTED
RISK FOR MYOCARDIAL INFARCTION	NOT REPORTED
RISK FOR CORONARY ARTERY DISEASE	NOT REPORTED
RISK FOR CHRONIC KIDNEY DISEASE	NOT REPORTED
RISK FOR GOUT	NOT REPORTED
RISK FOR NON ALCOHOLIC FATTY LIVER DISEASE	NOT REPORTED
RISK FOR RESPIRATORY INFECTIONS	SLIGHTLY HIGH RISK
IMMUNE SYSTEM RESPONSE	MODERATE RESILIENCE

FITNESS AND EXERCISE PROFILE

There are genes for aerobic fitness and for muscular power, for adaptability to training, and for the size and shape of your body. Our objective in this section is to equip you with an understanding of relevant genetic information you can act upon and help design workout or nutrition plans that optimize or improve your chances of reaching a certain milestone, whether that's increasing your muscle mass or improving your exercise performance.

FITNESS AND EXERCISE PROFILE	
TRAIT	SAMPLE ASSESSMENT
ENDURANCE TRAINING	NORMAL BENEFIT
STRENGTH TRAINING	ENHANCED BENEFIT
CARDIORESPIRATORY FITNESS (VO2 MAX)	INCREASED
MOTIVATION TO EXERCISE	LOW
POST EXERCISE RECOVERY	MODERATE
EXERCISE RESPONSE: BMI	ENHANCED BENEFIT
EXERCISE RESPONSE: BLOOD PRESSURE	ENHANCED BENEFIT
EXERCISE RESPONSE: HDL CHOLESTEROL	NORMAL BENEFIT
EXERCISE RESPONSE: BODY FAT LOSS	NORMAL BENEFIT
EXERCISE RESPONSE: INSULIN SENSITIVITY	ENHANCED BENEFIT

ENDURANCE TRAINING

Endurance training is lower intensity activity where the goal is prolonged athletic output over an extended distance or for an extended period of time. Endurance exercises are important for heart health; are among one of the four types of exercise along with strength, balance and flexibility. Ideally all four types should be included in a balanced fitness plan. Endurance depends on the proportion of slow-twitch fibers in skeletal muscle. Slow twitch fibers are able to provide their own energy source, and can sustain contractions for an extended period of time. Studies have identified a number of genetic variants associated with higher proportion of slow-twitch fibers, and higher oxygen supplies to muscle tissues.

ASSESSMENT CATEGORIES

NORMAL BENEFIT — ENHANCED BENEFIT

GENES TESTED	NRF2, PPARA, PPARD, ACE, PPARGC1A, ADRB1, ADRB2, ACTN3, VEGFA, AMPD1, LIPC, HIF1A, NFIA-AS2, GSTP1, GNB3, MSTN, UCP3, ADRB3

ENDURANCE ACTIVITIES

MARATHON

MOUNTAIN CLIMBING

TRIATHLON

Individuals with ***"Enhanced Benefit"*** would benefit more from physical activities such as long distance running, swimming, jogging and biking. They may require more rest between sets and should progressively increase workload - be it volume, resistance, length or distance. Endurance activity keeps your heart, lungs and circulatory system healthy and improves your overall fitness. As a result, people who get the recommended regular physical activity can reduce the risk of many diseases such as diabetes, heart disease and stroke.

Magnesium is useful under heavy aerobic training, as it improves energy utilization and reduces the stress of exercise, allowing quicker recovery. Food sources include nuts, dark leafy greens, lentils, and mackerel. Branch chain amino acids (BCAAs) have been shown to reduce fatigue during prolonged aerobic exercise, and are found in meat, chicken, fish, dairy products and eggs. These foods are also rich in beta-alanine, which helps increase the time to exhaustion during aerobic exercise.

STRENGTH TRAINING

Your muscle power measures the maximum amount of force you can exert in a high intensity, short-burst exercise performed quickly. When your muscle structure favors power exercises, you have the potential to perform well in physical activities which require speed and strength over shorter time periods - usually less than 45 seconds. A high percentage implies a larger proportion of stronger 'fast twitch' muscle, with lower capacity for endurance. This means that individuals may excel at sports that require more power, e.g. sprinting or rowing. Recent studies find that strength training may be more effective at reducing the risk of heart disease than aerobic exercises.

ASSESSMENT CATEGORIES

GENES TESTED	ACE, ACTN3, PPARA, AMPD1, PPARG, IGF2BP2, NOS3, AGT, ADRB1, ADRB2, SOD2, IL6, IGF1, LPL, TRHR, INSIG2

POWER ACTIVITIES


SPRINTING


POWER LIFTING


TRACK CYCLING

Individuals with ***"Enhanced Benefit"*** would perform well in activities like sprinting, power lifting, track cycling, and weightlifting. You will be able to adapt to different kinds of sporting activities (both speed or endurance sports) by training specifically for the sport. You will benefit from alternating periods of low rep (3-6 reps) training using higher loads, and higher rep (8-12 reps) training using lower loads. Training in purely one way, be it all endurance or all strength without a balance between the two can often have a negative impact, so make sure to vary your exercises.

Creatine has been shown to improve the power output of athletes in speed and strength sports, while alpha-GPC increases peak power output of athletes during resistance training. Both nutrients are found in red meat, while organ meats are also a good source of alpha-GPC. Creatine has also been shown to increase the length of time to exhaustion.

CARDIORESPIRATORY FITNESS (VO2 MAX)

Our body needs oxygen when exercising. Oxygen transport to muscles is the key determinant of aerobic capacity and resistance to fatigue. Fitness can be measured by the volume of oxygen one can consume while exercising at maximum capacity. Sporting performance is dependent on how effectively our heart, lungs and muscles use oxygen.

Scientists use **VO2 MAX** as a measure to determine the maximum or optimum capacity of an individual's body to transport and use oxygen during incremental exercises. Those with higher aerobic ability have higher VO_2 MAX values and can exercise more intensely than those who are not as well conditioned. It is an extremely popular measure of progress amongst endurance athletes.

ASSESSMENT CATEGORIES

GENES TESTED	PPARGC1A, ADRB1, ADRB2, EDN1, NFIA-AS2, IL6, VEGFA, GSTP1, NRF2, ESSRB, ACSL1, PPARA

A "Typical" or "Decreased" assessment means that you will still benefit from additional cardiovascular exercises. Aim to train so that you achieve a resting heart rate below 60 beats per minute indicating enhanced endurance. A good starting point is 20 minutes of cardiovascular exercise twice a week, at a rate of perceived exertion (RPE) or exercise intensity of 6 on 10 (breathing heavily, but able to maintain a conversation). More advanced trainees can use aerobic interval training, (alternate periods of fast and slow training), to boost VO2Max more quickly. Swimming, cycling and rowing are good choices. Jogging is suitable only if you have no history of foot or joint pain.

Magnesium (Mg) has been shown to improve energy utilization under heavy aerobic training and reduce the stress of exercise, allowing for faster recovery. Foods rich in Mg include nuts, dark leafy greens, lentils and mackerel. Meat, chicken, fish, dairy products, and eggs are rich in BCAAs (branch chain amino acids), beta-alanine and creatine and including them in your diet may help reduce fatigue during prolonged aerobic exercise and improve muscular strength and endurance.

CARDIORESPIRATORY FITNESS (VO2 MAX)

UNDERSTANDING YOUR VO_2 MAX SCORE

The best way to calculate your own VO_2 MAX score is to find a local health clinic or gym who should be able to perform a short VO_2 MAX test, either on a motorized treadmill or an exercise bike. Otherwise, the below guide will help you calculate your VO_2 MAX score at any gym equipped with a step machine.

CALCULATING YOUR OWN VO_2 MAX IN 3 EASY STEPS

1. Step in time up and down on a step machine at a rate of 22 steps per minute for female, and 24 steps per minute for male.
2. After 3-minutes, remain standing and immediately measure your pulse rate for 10 seconds by gently pressing your index and middle fingers on your neck or wrist and counting the total number of pulsing beats you feel. (Note: Do not press too firmly when feeling for a pulse.)
3. To get your heart rate, simply count the number of heart beats per minute for 10 seconds and then multiply the number of beats counted by 6, which will give you your standing heart rate.

Heart Rate = # of beats in 10 seconds x 6.

Now use the following equations to calculate your VO_2 MAX:

MALE: VO_2 MAX = 111.33 – (0.42 X Heart Rate)

FEMALE: VO_2 MAX = 65.81 – (0.1847 X Heart Rate)

MOTIVATION TO EXERCISE

A sedentary lifestyle and lack of physical activity can contribute to or be a risk factor for a variety of health problems, such as obesity, cardiovascular disease, diabetes as well as some cancers; among others. Your motivation for physical activity is partly influenced by your genes. A large study identified that up to 70% of the variance in adult exercise behavior is due to genetic factors - how your body feels during a workout, how you are predisposed to respond mentally to the challenge, all come down to your genes. Specific genetic variations may result in a lower biological desire to engage in physical activity, making exercise your least preferred activity. However, note that there is a difference between Exercise Aversion and a Lack of Motivation, where the former is a stronger inhibition factor.

ASSESSMENT CATEGORIES

GENES TESTED	BDNF, DRD2, COL1A1, CNR1, GABRG3

The trait assesses genetic markers for reinforcement value for exercise i.e. whether individuals feel that the reward of exercising is greater than doing other non-physical activities such as watching TV, playing video games, etc.

Your genetic assessment may indicate a "Low" motivation to exercise. If you do not exercise regularly, try joining a social fitness group or try a new activity you find interesting.

You may also try to find a exercise partner who will hold you accountable and make workouts more fun.

Conversely, an assessment of "High" indicates you're likely to enjoy any form of physical activity and will benefit more from it than individuals who do not share similar genetic predisposition.

POST EXERCISE RECOVERY

When exercising, some individuals are able to recover very quickly - ready to train hard again after very little rest, whereas others don't seem to bounce back quite as fast, needing a longer break between intense training sessions. Research has revealed that certain genetic variations infer a delayed recovery from hard exercise training.

Injury and recovery are intertwined. Being slow at recovering from heavy exercise is likely to place you at a greater risk of injury. This delayed recovery or increased susceptibility to injury necessitates a balanced, well managed training program with strong emphasis on recovery strategies, conditioning exercises and nutrition.

ASSESSMENT CATEGORIES

GENES TESTED	IL6, IL6R, CRP, TNF, SOD2, MMP3, BCL11A, SCN10A, MED13L, CHRM2, CCDC141

EXERCISE Recovery is classically considered as the time between sessions. We typically require 2-3 days between hard training sessions. If your assessment indicates moderate recovery rate, once a training base is established you may expect to hit 2-3 hard training sessions per week. Other 'steady' recovery and conditioning sessions can be built around these hard training sessions. Individuals with slow recovery rate will need to work with their fitness coach to design appropriate fitness plan while being mindful of the predisposition to increased injury risk.

NUTRITION Managing your nutrition is important for optimal recovery and keeping the inflammatory process under check. As inflammation influences recovery rates, you should look to consume mostly anti-inflammatory and anti-oxidant foods in your diet. A diet low in carbohydrates can help to reduce post-exercise inflammation, however consuming carbohydrate based beverages during exhaustive exercise can help to reduce levels of inflammatory cytokines such as IL-6 and CRP. Consuming a good protein source after exercise is also known to decrease inflammation and assist recovery. Anti-oxidants can be consumed from green leafy vegetables and cruciferous vegetables, as well as green tea.

Post-Exercise Nutrition Needs

Every time we push our bodies through exercise, we can cause inflammation and oxidative stress in our cells. It is important to refuel and repair your muscles so your body is ready for the next event or training session. If you neglect post-exercise nutritional support and recovery time, you risk running low on energy during your next exercise session and jeopardizing your overall training plan.

Your assessment may also indicate variations in gene(s) important in free radical clearance [GSTM1, GSTT1]. In such cases, it is recommended that you consume adequate amounts of antioxidants in your daily diet.

If your assessment indicates variations in gene(s) related to immune support and recovery [IL6R], then in order to complement this genetic component, it is recommended that you include Omega-3 fatty acids in your daily diet.

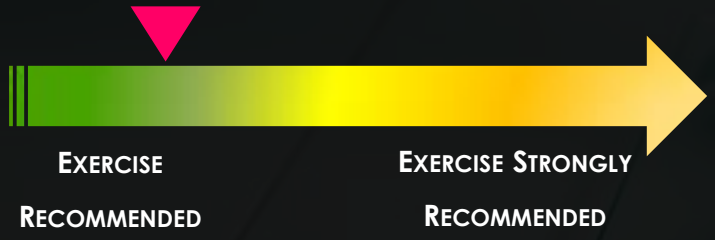
Sample Recommendation: Micronutrient Needs	
Nutrient	**Recommended Daily Intake**
Vitamin A	2,700 IU / 810 µg
Beta Carotene	5.4 mg
Vitamin C	105 mg
Vitamin E	15 IU / 13.5 mg
Omega-3	1.6 g
Cruciferous Vegetables	2-3 servings per week
Alpha Lipoic Acid	100 mg

BMI RESPONSE TO EXERCISE

Genetics plays a key role in weight loss and weight management. Although exercise is a crucial weight management tool, we respond differently to exercise and diets and lose weight at differing rates. Studies have shown that carriers of some genetic variations have more difficulty losing weight, and improving their metabolic health, compared to people without this genetic variation. Those with genetic variants associated with obesity, sensitivity to fat (FTO, PPARG), type 2 diabetes (TCF7L2), and emotional eating (CLOCK, MC4R), do not lose weight as easily as others, while on the same diet and exercise plans.

Many people feel discouraged after a few weeks of dieting when they do not see the anticipated results. Understanding your genetic predisposition may help you develop an optimal weight management plan.

ASSESSMENT CATEGORIES



GENES TESTED	ADRB1, ADRB2, ADRB3, FTO, ADIPOQ

The possible outcomes in this report are "Exercise Strongly Recommended" and "Exercise Recommended." If your report shows "Exercise Recommended," you have one less risk factor for being overweight. However, this should not be taken as one less reason to exercise, because being physically active is beneficial to all individuals, regardless of their genetic makeup. Individuals with the "Exercise Strongly Recommended" outcome contain a specific variant (T allele) in the genetic marker rs1121890 of the FTO gene, which has been shown to be associated with increased body mass index (BMI) and waistline. However, a large study showed that people who have this variant could reduce their propensity to increased BMI by being physically active.

BLOOD PRESSURE RESPONSE TO EXERCISE

Moderate-intensity exercises are known to play a major role in combating hypertension - high blood pressure. In fact, aerobic exercise training is generally recommended as lifestyle therapy to prevent, treat and control hypertension. With increasing incidence of hypertension, general guidelines call for at least 30 min. of low intensity aerobic exercises daily, which helps to decrease blood pressure.

EDN1 gene variation has been shown to increase the likelihood of hypertension in people with low cardio respiratory fitness. However, people with altered genotype of EDN1 reported lower blood pressure when they stay active and have high cardio respiratory fitness. Cardio respiratory fitness refers to the ability of the heart and lungs to provide muscles with oxygen for physical activity. Exercises in either cases should be planned in consultation with your physician and fitness expert.

ASSESSMENT CATEGORIES

GENES TESTED	EDN1, GNB3

Regular exercise - such as brisk walking, cycling, swimming, dancing, tennis and jogging - of at least 30 min. per day will most likely result in lowering your blood pressure over time. Exercises you should avoid for blood pressure reduction include weight lifting and sprinting, until the readings normalize. Physical activity may temporarily cause your blood pressure to rise before it lowers your blood pressure over time. So if you have high blood pressure, it is important to always consult your physician and increase fitness activities gradually, not putting too much strain on your heart.

If you have high blood pressure, it's best to eat meals low in saturated fat, trans fat, cholesterol, salt (sodium), and added sugars. Too much salt or sodium can cause body to retain fluid, which increases blood pressure. American Heart Association recommends consuming 1,500 mg of salt a day, if you have hypertension, diabetes, or chronic kidney disease. Getting plenty of potassium and minimizing alcohol consumption help prevent and control high blood pressure.

LOWER CHOLESTEROL. LOWER BODY FAT.

Exercises are known to play a major role in maintaining appropriate levels of HDL cholesterol, lowering body fat and BMI. However, individual response to exercises varies based on their genetic composition. Genetic variants of ADRB2 and ADRB3 genes in individuals play a major role in deciding the benefit gained due to exercise and diet plans.

High HDL levels reduce the risk of heart attack and stroke, but low levels increase the risk. Exercising, quitting smoking and maintaining body weight is known to boost HDL levels. People with genetic variants in the PPARD, CETP and LIPC genes had increased levels of HDL cholesterol after several weeks of training program. It is also stipulated that exercise increases the size of the lipoprotein particles that carry cholesterol through the blood, reducing the possibility that smaller particles may clog arteries.

ASSESSMENT CATEGORIES

GENES TESTED	PPARD, FTO, ADRB2, ADRB3, CETP, LIPC, ADIPOQ, FABP2, PLIN, PPARG, PPARD

Even if one may not have genetic predispositions for cholesterol reduction benefits through exercise, one can still achieve better cardiovascular health by engaging in regular exercise and keeping a low-cholesterol diet. In addition to helping with weight loss, increased physical activity can lower your triglycerides while increasing your HDL levels. Check your GENIXPRO™ NUTRITION report to see if you have predispositions that may affect your fat consumption and fat processing.

About150-300 minutes of moderate intensity or 75-150 minutes of vigorous intensity exercise per week is typically recommended. Moderate exercises (where you can easily maintain a conversation) include: brisk walking, cycling (15 km/hr. or slower) etc. Vigorous exercises (where you breathe heavily) include running, swimming, aerobic dancing, professional biking and hiking uphill. Avoid trans fats, as they can increase LDL and lower HDL cholesterol levels. Foods prepared with shortening, such as cakes and cookies, often contain trans fats, as do most fried foods and some margarines. Omega-3 rich foods help, like flaxseed, mixed greens, walnuts, salmon, mackerel, tuna.

INSULIN SENSITIVITY RESPONSE TO EXERCISE

Have you ever wondered why, after all the exercise and healthy eating you do, you still can't shift that last bit of fat? Understanding your Insulin sensitivity may be the key.

Insulin is a hormone that is normally released by the beta cells of the pancreas. One of the main functions of insulin is to lower blood glucose levels by enabling glucose to enter the cells of the body, where it is used for energy or stored for future use. Insulin sensitivity means rapid processing of sugar (glucose), while insulin resistance means less rapid processing of sugar by the body. A person who is insulin-sensitive needs only a relatively small amount of insulin to keep blood glucose levels in the normal range and to keep the body's cells supplied with the glucose they need. A person who is insulin-resistant, on the other hand, needs a lot more insulin to get the same blood-glucose-lowering effects.

ASSESSMENT CATEGORIES

GENES TESTED	PPARG, FTO, TCF7L2, LIPC, ADIPOQ

Insulin resistance is associated with numerous health risks. It causes hyperinsulinemia, or high circulating insulin levels, which may be directly damaging to blood vessels. Hyperinsulinemia is also associated with high blood pressure, heart disease and heart failure, obesity (particularly abdominal obesity), osteoporosis (thinning bones), and certain types of cancer, such as colon, breast, and prostate cancer. In contrast, having low circulating insulin levels is associated with greater longevity.

The effect of exercise on increases in insulin sensitivity depends upon the genetic variants of LIPC gene in the body, and individuals with certain genotype show an "Enhanced Benefit" compared to other individuals. Physical activity has the biggest effect of any measure you could take to improve your insulin sensitivity. Any type of physical activity has the potential to make your insulin work better, and combining aerobic activities — such as brisk walking, swimming, and cycling — with resistance training, or weight training, appears to have the greatest effect.

MUSCLE CHARACTERISTICS

Are you one of those individuals who take a very long time to heal after a muscle injury? The ability and speed of your muscles to repair themselves is primarily genetic. The higher the capacity of your muscles to repair themselves, the more potential you have to perform rigorous exercises without worrying about the long-term impact of over-training.

Prolonged strenuous exercise results in activation of inflammatory factors. Genetic factors enhance the inflammatory response and may slow down the repair process following exercise. A person with higher predisposition to inflammation will benefit from less frequent exercise activities, and longer recovery periods. If the body is not fully recovered it may result in injuries, muscle straining and over-training. This is particularly important for high-intensity weight training athletes and bodybuilders.

MUSCLE CHARACTERISTICS	
TRAIT	SAMPLE ASSESSMENT
LEAN BODY MASS	LOW
MUSCLE DAMAGE RISK	INCREASED RISK

LEAN BODY MASS

Lean body mass (LBM) is the proportion of your weight that isn't fat. It has a strong genetic component. The goal of any fitness enthusiast is to drop weight while keeping your LBM the same, in other words, dropping your body fat percentage.

If you have a predisposition for a higher LBM, you have a better chance of attaining a muscular body through exercise compared to the average population. Low LBM is generally related to issues like higher body weight, obesity, impaired protein balance, osteoporosis and sarcopenia. Genetic variations in the MTHFR gene are associated with lower LBM.

ASSESSMENT CATEGORIES

GENES TESTED	TRHR, GLYAT, INADL, MTHFR, IGF2

Resistance or weight training, such as body building, is the fastest way to maximize lean muscle gain. 3-4 sessions per week of resistance training should be sufficient.

Use body building style techniques to maximize LBM. Use a weight about 75% of your best lift, performing 10-15 reps, with each set lasting 30-45 seconds. Focus efforts on compound exercises such as squats, chin ups. Ensure proper recovery from your training sessions for good results.

You may need more protein, Vitamin D and B Vitamins to achieve lean mass gains. Typically 1.5-2g of protein per kg of bodyweight. Chicken, turkey, tuna and salmon are great sources of complete protein. Vegetarian options include soy (tofu), cottage cheese, quinoa, spirulina powder, legumes and beans.

Creatine, from foods like venison, salmon and tuna, is also valuable for gaining lean mass. Supplement with a whole protein source such as whey, eggs, or casein if needed, to help achieve your goals. Good sleep quality and adequate caloric intake helps with lean mass gains.

MUSCLE DAMAGE RISK

A muscle strain, or pulled muscle, occurs when your muscle is overstretched or torn. This usually occurs as a result of fatigue, overuse, or improper use of a muscle. Strains can happen in any muscle, but they're most common in your lower back, neck, shoulder, and hamstring.

Muscle damage can be caused by different reasons, including increased lactate oxidation, deficient lactate efflux pathways or release of intracellular muscle components into the bloodstream. Genetic variations have been found to be associated with increased risk of muscle injury, muscle cramping, and lactate accumulation in the muscle.

ASSESSMENT CATEGORIES

GENES TESTED	SOD2, MYLK, SLC16A1, AMPD1, CCL2

If you're assessed at "Increased Risk", avoid high-intensity sports, and instead focus your exercises on those that improve the tenacity and flexibility of your core muscles. Be conscious of muscle strains and over-training. Try to limit yourself to 2-3 rigorous training sessions per week, with the remaining exercise sessions being of only moderate intensity. Recommended fitness activities include race walking, elliptical trainer, swimming (freestyle), cycling. If involved in intensive physical activities and sports, monitor your Creatine Kinase (CK) levels. A high level of CK in your blood is the clearest warning of over-training.

Anti-inflammatory foods may relieve muscle soreness. These include foods high in omega-3 fatty acids, such as salmon, tuna, flaxseeds and walnuts. Spices such as ginger and turmeric are also effective anti-inflammatories, so use them abundantly when preparing your meals.

Decrease your intake of refined carbohydrates and fructose, as sugar prevents the release of human growth hormone (needed for tissue repair). Ensure that you have adequate protein intake, as amino acids are the building blocks of muscle. Consider supplementing with a good quality whey protein to boost your protein levels and support recovery.

INJURY SUSCEPTIBILITY

Injury is always a default risk when undertaking any form of exercise. Some individuals appear to be more 'injury prone' than others, and this may partly be attributed to genetics. Scientific evidence suggests that certain genetic variations contribute to risk of injuries, and have been associated with soft tissue injuries particularly in tendon and ligaments (including cruciate ligament, shoulder dislocation and Achilles tendon ruptures). Individuals with a higher genetic injury risk may need to adjust their training plan to include more injury prevention sessions than the average individual.

INJURY SUSCEPTIBILITY	
TRAIT	SAMPLE ASSESSMENT
RISK OF ACL INJURY	INCREASED RISK
ACHILLES TENDINOPATHY	TYPICAL
INFLAMMATION RISK	MODERATE RISK
PAIN SENSITIVITY	MODERATE SENSITIVITY

RISK OF ACL INJURY

Anterior cruciate ligament (ACL) ruptures are considered to be the most severe joint injury in sports and they are very common in a sporting population. Athletes are involved with sudden deceleration of the body from jumping and forward running while the knee is in a shallow flexion angle. Sudden change in particular direction, such as in soccer, rugby and football, contributes to a higher risk of rupturing the ACL. There are extrinsic and intrinsic factors, including genetic variations, which influence the risk of ACL.

ASSESSMENT CATEGORIES

NORMAL RISK | MODERATE RISK | INCREASED RISK

GENES TESTED	COL1A1, COL3A1, COL12A1, WTAPP1

If assessed at "Increased Risk," ensure that you have adequate range of motion in all joints. Poor flexibility adds to injury risk whereas good posture and alignment are essential to avoiding it. Limit participation in team sports that involve sudden change of direction, e.g. soccer, rugby, and football. Recommended sports and activities include hiking, brisk walking, moderate running, cycling, and stationary rowing.

Use slow eccentric training (lowering weights very slowly) to increase tendon and ligament strength. Be conservative when increasing the load, or the frequency of intense training sessions. Massage, stretching, and deep tissue treatments are great for maintaining flexibility of soft tissue.

Tendons and ligaments are made of collagen. More collagen is needed when there is injury to these tissue. Vitamin C and manganese are essential for collagen production in the body. Dietary sources of vitamin C include citrus fruits, kiwi, broccoli, berries, capsicum, and guava, while manganese rich foods include spinach, pumpkin seeds, garbanzo beans and walnuts. Boosting your vitamin B6 and B12 levels will also help, as these support nerve function, and the production of amino acids needed to build muscles, tendons and ligaments. Animal products, such as salmon, chicken and eggs are great sources of B vitamins.

ACHILLES TENDINOPATHY

The Achilles tendon connects your calf muscles to your heel bone. Tendinopathy describes either the inflammation or tiny tears to the tendon. Achilles tendon injury includes degenerative and painful conditions that affect athletes in a wide range of sports, including up to 20% of runners.

This is a multifactorial condition for which various genetic risk factors have been identified. If you have a G/G genotype you may be more "Injury-Prone," while other genotypes have a "Typical" likelihood of developing Achilles Tendinopathy. A study has shown that people with G/G genotype at MMP3 had 2.5 times more chance of developing Achilles Tendinopathy compared to other genotypes.

ASSESSMENT CATEGORIES

GENES TESTED	MMP3, COL5A1, MIR608, BMP4

If your assessment reads "Injury Prone," exercise to strengthen your calf muscles. You may want to lookup online for videos on a variety of ankle strengthening exercises and stretches using a resistance loop band. Avoid an abrupt change of exercise intensity. Try to minimize high-impact sports, such as running which pose a higher risk for Achilles tendon injury. Switch to low-impact sports, such as walking, biking or swimming, which can both strengthen your muscles and pose reduced injury risk.

High-quality proteins contain the essential amino acids necessary to encourage normal protein formation and more likely to stimulate collagen production in the connective tissue. Research suggests some phytonutrients (found in berries and alliums, as well as other fruits and vegetables) may influence tendon and ligament cells.

A healthy and diverse diet containing fruits and vegetables, legumes, whole grains, mushrooms, roots, and fish is much more likely to improve your health and by extension connective tissue health.

INFLAMMATION RISK

Inflammation is a protective immune response to infection, trauma, or injury. It is a process by which the body's white blood cells and substances they produce protect us from infection with foreign organisms, such as bacteria and viruses. However, in some diseases, like arthritis, the body's immune system triggers an inflammatory response when there are no foreign invaders to fight off. In these diseases, called autoimmune diseases, the body's normally protective immune system causes damage to its own tissues. The body responds as if normal tissues are infected or somehow abnormal. Chronic inflammation is also involved in the pathogenesis of most common cancers.

ASSESSMENT CATEGORIES

GENES TESTED	CRP, IL6, HNF1A, RPL27P2, GCKR, ACKR1, TNF-A

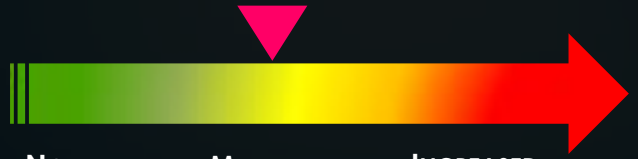
The American Journal of Clinical Nutrition warns that processed sugars trigger the release of inflammatory messengers called cytokines. Sugar goes by many names so look out for any word ending in "ose," e.g. fructose or sucrose on ingredient labels. Several studies have shown that saturated fats trigger adipose (fat tissue) inflammation, which is not only an indicator for heart disease but it also worsens arthritis inflammation. According to the National Cancer Institute processed food, refined carbohydrates, meat products (especially red meat), full-fat dairy products, gluten, pasta dishes, alcohol and grain-based desserts are some sources of inflammation.

Trans fat found in fast foods and other fried products, processed snack foods, frozen breakfast products, cookies, donuts, crackers and most stick margarines is known to trigger systemic inflammation and should be avoided. Excess consumption of Omega-6s can trigger the body to produce pro-inflammatory chemicals. These fatty acids are found in oils such corn, safflower, sunflower, grapeseed, soy, peanut, and vegetable; mayonnaise; and many salad dressings. MSG can trigger two important pathways of chronic inflammation as well as affect liver health and must be avoided.

PAIN SENSITIVITY

Pain is defined by the International Association for the Study of Pain (IASP) as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage" and pain is perceived as both a sensory and emotional experience. There is an important distinction between the body's responses to pain (nociception) and the subjective experience of pain. Measured outcomes of pain perception include pain reactivity, sensory threshold, pain threshold, and pain tolerance, as well as self-reporting of the pain experience. Various genes encoding for receptors are now known to play a major role in the sensitivity, perception and expression of pain.

ASSESSMENT CATEGORIES



GENES TESTED	COMT, SCN9A, CCT5, TRPV1

Recent studies have found that people who report higher levels of pain are more likely to carry a particular DNA base, an A instead of a G, at a defined location in the gene SCN9A. The A version is found in an estimated 10 to 30 percent of people, though its presence varies in populations of different ancestry.

Regular exercise is recommended if your assessment indicates Increased Sensitivity, as recent findings suggest the longer we continue to work out, the greater our tolerance for discomfort can grow. Although anyone in this situation should consult a doctor before making any significant lifestyle changes.

Foods high in the amino acid tryptophan may lower pain sensitivity, and include hazelnuts, sesame seeds, sunflower seeds, turkey, dairy products, soy, seafood, whole grains, rice, beans, and lentils. Green leafy vegetables, pineapple, apple, citrus fruits, onion, garlic, green tea also have anti inflammatory properties to lower pain sensitivity.

BONE AND JOINT HEALTH

Our bones are not a fixed structure. Our cells work continuously to dissolve old bone and create new bone tissue. After the age of 30, both men and women start losing bone mass; the loss is particularly marked in women after menopause. According to latest research both nutrition and genetic factors play an important role in determining bone health. Peak bone mass is to a great extent genetically determined.

The vitamin D receptor (VDR) gene accounts for around 70% of the entire genetic influence on bone density, playing an important role in calcium homeostasis, bone cell growth and differentiation, and intestinal calcium absorption. Individuals with TT genotype are associated with higher bone turnover, increased bone loss, lower bone mass density and osteoporosis in the lumbar spine. These individuals must ensure adequate calcium and Vitamin D intake and reduce caffeine consumption to less than 300mg/day. For such individuals it may be prudent to test Vitamin D levels.

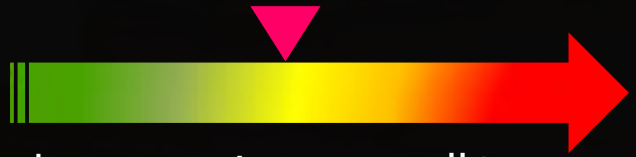
INJURY SUSCEPTIBILITY	
TRAIT	SAMPLE ASSESSMENT
STRESS FRACTURE RISK	AVERAGE RISK
JOINT, LIGAMENT AND CARTILAGE LAXITY	TYPICAL
RISK FOR OSTEOPOROSIS	AVERAGE RISK
RISK FOR RHEUMATOID ARTHRITIS	AVERAGE RISK

Stress Fracture Risk

Stress fractures are small cracks in a bone, common overuse injuries caused by the application of repetitive movements or force. E.g. running long distances or repeatedly jumping up and down. They may also arise from normal use of a bone that's been weakened. Anyone can experience a stress fracture, but some people have higher predisposition.

Stress fractures affect up to 20% of athletes, particularly female athletes. The major determinant of stress fracture risk is bone mineral density. Bone density has a large genetic component - up to 85% of bone mineral density variability is explained by genetics.

Assessment Categories



Low Risk	Average Risk	High Risk
Genes Tested	AKAP11, MEF2C, ZBTB40, WNT16, C7orf76, WLS, COLEC10, STARD3NL, CCDC170, SOX6, GALNT3, and more…	

If you run frequently, try to include low impact exercise such as cycling, swimming. Pay attention to maintaining your bone mineral density. You may like to talk to your health care provider about testing and supplementation for bone mass density. Resistance, or weight bearing training is among most effective exercise for bone health. When your bones and muscles are placed under a load, your body releases growth hormone, which triggers increased bone repair and bone growth. At least 2-3 weekly resistance training sessions may be recommended for individuals with moderate/high risk for stress fracture. Strengthening calf muscles have been shown to have substantial impact on preventing stress fractures.

Calcium is essential for bone formation, bone health and strength. Equally important is vitamin D and collagen. Controlled exposure to sunlight helps to boost vitamin D. Food sources of vitamin D include swordfish, salmon, anchovies, sardines, cheese, egg yolk, liver, and other organ meats. Bone broth is wonderful for bone health as it is abundant in the amino acids that build collagen. Magnesium is an important nutrient contributing to stronger, denser bones. As a general precaution, avoid excessive intake of sodium, coffee, wheat bran, and sugar to help reduce the risk for stress fractures.

JOINT, LIGAMENT AND CARTILAGE LAXITY

While flexibility and range of motion can be improved with regular stretching, some people have inherent joint flexibility that is a highly heritable trait. Genetic variants in several collagen genes alter amino acid sequence and change the amount of collagen proteins being produced affecting architecture and biomechanical properties of some tissues, including ligaments. Therefore, people with these genetic variants in general have higher range of motion and better joint laxity and flexibility.

Interestingly, the research has shown that violinists, flautists, and pianists with lax finger joints suffer less pain than their less flexible peers. An opposite spectrum of this is risk of non-contact soft tissue injuries while doing very active sports. Other genetic variants in the collagen genes reduce joint flexibility and potentially protect from cruciate ligament, shoulder dislocation, and anterior cruciate ligament ruptures.

ASSESSMENT CATEGORIES

GENES TESTED	GDF5, COL12A1, COL1A1

You can increase your joint flexibility by engaging in yoga exercises and other stretching exercises. Try the Hip Flexor exercise.

Tendons and ligaments are made of collagen. More collagen is needed when there is injury to these tissue. Vitamin C and manganese are essential for collagen production in the body. Dietary sources of vitamin C include citrus fruits, kiwi, broccoli, berries, capsicum, and guava, while manganese rich foods include chia seeds, flaxseeds, tofu, spinach and walnuts. Boosting your vitamin B6 and B12 levels will also help, as these support nerve function, and the production of amino acids needed to build muscles, tendons and ligaments. Animal products, such as salmon, chicken and eggs are great sources of B vitamins.

RISK FOR OSTEOPOROSIS

Osteoporosis is a condition in which bones become fragile and brittle, leading to an increased risk of fracture. Bone is a living tissue made up of minerals such as calcium and phosphorus. The body constantly remodels and rebuilds bones to keep them strong. However, in osteoporosis, bones break down faster than they rebuild. Although bones remain the same size, they become more porous and more brittle, leading to a loss in bone mineral density. The lower your bone mineral density, the higher your risk of fractures.

Women tend to be more at risk of osteoporosis than men. Being small or light-framed increases risk of osteoporosis, as you start off with less bone to draw on, when the inevitable bone loss starts. In addition, having a family history of osteoporosis may put you at increased risk.

ASSESSMENT CATEGORIES

LOW RISK	AVERAGE RISK	HIGH RISK

GENES TESTED	ALDH7A1, FTCDNL1, MECOM, COLEC10, SOX6,RAP1A, OSBPL1A

Osteoporosis is a 'silent' medical condition — there are no symptoms or pain until there is a fracture. You should aim to prevent osteoporosis by modifying your lifestyle while you are still young. Bones stop growing in the early 20s, but continued calcium intake and a healthy lifestyle are important to maintain bone mass.

Bone calcium loss increases markedly from about 50 years onwards, although lifestyle and adequate calcium intake helps reduce the loss. For these reasons you should stop smoking, avoid excessive alcohol, undertake weight-bearing exercise, and ensure that your diet contains enough calcium and vitamin D.

RISK FOR RHEUMATOID ARTHRITIS

Rheumatoid arthritis (RA) is an autoimmune and inflammatory disease, which means that your immune system attacks healthy cells in your body by mistake, causing inflammation in the affected areas. RA mainly attacks the joints, commonly joints in the hands, wrists, and knees. In a joint with RA, the lining of the joint becomes inflamed, causing damage to joint tissue. This tissue damage can cause long-lasting or chronic pain, unsteadiness (lack of balance), and deformity (misshapenness). Individuals born with variations in HLA (human leukocyte antigen) class II genes are more likely to develop RA. The risk of RA may be highest when people with these genes are exposed to environmental factors like smoking or when a person is obese.

ASSESSMENT CATEGORIES

LOW RISK	AVERAGE RISK	HIGH RISK

GENES TESTED	HLA-DRB1, PTPN22, HLA-DQA1, HLA-DQB1, HLA-DR4, CCR6, STAT4, TRAF1, CTLA4, ANKRD55, PHTF1, LOC102723649, and more…

While RA can strike at any age, the onset of symptoms usually begins between the ages of 40 and 60. Women are three times more likely to get rheumatoid arthritis than men. According to a 2016 study published in The Lancet, genetics plays a part in between 40-65 percent of all confirmed cases and can increase the risk three times vs. population.

Smoking has a cause-and-effect relationship with RA. Not only do cigarettes increase your risk of getting the disease, they can accelerate the progression of your symptoms, sometimes severely. Similarly, obesity can trigger systemic inflammation, caused by the accumulation of adipose (fat) cells and the hyper-production of inflammatory proteins known as cytokines. Sudden and excessive release of stress hormones, such as cortisol and adrenaline either due to physical overexertion or emotional stress, may have a knock-on effect that intensifies the autoimmune response as well.

BODY AND WEIGHT

Your weight can be influenced by many genes. This section of your report interprets how your genes may relate to your metabolism, whether you're likely to maintain weight-loss, and your predisposition to obesity. Your actual weight is a result of a combination of factors including lifestyle, environment and genetics.

Your Obesity Risk assessment is a measure of your likelihood, based on genetics, to have a BMI over 30 (clinically overweight or obese). Since your weight is affected by many factors, it is possible for your Obesity Risk result to be very different than your actual weight. More importantly, the genetics of obesity do not lead to an inevitable outcome. Individuals have a choice of managing lifestyle to counteract genetics. E.g. some people that are of normal weight BMI can have an Obesity Risk of above average or high. This is commonly seen in someone who is controlling diet, nutrition, eating behaviors and/or exercise to manage their body weight. Conversely, some people who have an actual BMI in the obese categories can have an Obesity Risk of average, below average or low. This can sometimes be explained by lifestyle choices, environment or other health factors that have led a person to become obese without having the associated obesity genes.

BODY AND WEIGHT	
TRAIT	SAMPLE ASSESSMENT
OBESITY PREDISPOSITION	TYPICAL LIKELIHOOD
DIFFICULTY IN LOSING WEIGHT	LOW
WEIGHT-LOSS REGAIN TENDENCY	MORE LIKELY TO REGAIN WEIGHT

OBESITY PREDISPOSITION

Obesity is influenced by both genetic and environmental factors. It is well-documented that genetics accounts for 40~70% of an individual's predisposition to obesity. When someone reaches a BMI of 30-35 (clinically obese) or above 40 (morbidly obese), genetic factors with strong effects are likely to be involved.

Variants in the FTO, FABP2 and PPARG genes have been found to be associated with weight gain through fat consumption. Variants of two receptors in fat cells, ADRB2 and ADRB3, are found to be associated with high BMI and excessive weight gain due to high carb intake, in particular refined carbs. Genetic variants in MC4R gene are associated with increased frequency of snacking, and higher risk of diabetes.

ASSESSMENT CATEGORIES

TYPICAL LIKELIHOOD	INCREASED LIKELIHOOD
GENES TESTED	PPARG, FTO, PLIN, ADIPOQ, LEPR, KCTD15, ADRB2, ADRB3, FABP2, MC4R and more…

Experts recommend 150-300 min. of moderate intensity or 75-150 min. of vigorous intensity physical activity per week, with two hours being properly designed strength training. Split the remaining 30-60 min. into two or three sessions of either cardiovascular exercise or interval training.

Maintain a healthy body weight by having your daily calorie intake equal to about 26-28 times your bodyweight in kilograms. For example, a 70kg man with a sedentary lifestyle would eat about 1,900 calories per day. See a fitness and nutrition professional to help you adjust this for your genetics, lean body mass and activity level.

DIFFICULTY IN LOSING WEIGHT

Individuals respond differently to exercise and diets, and lose weight at differing rates. Studies have shown that carriers of some genetic variations have more difficulty losing weight, and improving their metabolic health, compared to those without this genetic variation. Those with genetic variants associated with obesity, sensitivity to fat (FTO, PPARG), type 2 diabetes (TCF7L2) emotional eating (CLOCK, SIRT1) and food addiction (DRD2), do not lose weight as easily as others, while on the same diet and exercise plans. It is important to remember that genetics plays a key role in weight loss and weight management. Many people feel discouraged after a few weeks of dieting when they do not see the anticipated results. Understanding your genetic predisposition may help you develop an optimal weight management plan.

ASSESSMENT CATEGORIES

GENES TESTED	CLOCK, FAAH, FTO, LOC646736, PPM1K, TCF7L2, TFAP2B, PPARG

Maintain a healthy weight by making healthier food choices, e.g. increasing your portion of vegetables to rice or noodles, replacing fried foods with grilled or steamed options, and ensuring that you are drinking at least 8 glasses of clean, plain water every day are good basic habits to practice towards achieving and maintaining a healthy weight. Foods abundant in omega-3 fatty acids such as sardines, mackerel, tuna, and salmon, flax seeds, and variety of nuts are beneficial for weight management, and also increase the feeling of satiety, making you feel more satisfied and full after eating, leading to less tendency to overeat, or snack between meals.

Perform at least 3 hours of physical activity per week. With 2 of those hours being properly designed strength training. The remaining hour would be split into three 20 min session of either cardiovascular exercise, or interval training. Swimming, cycling and rowing are good choices. Jogging is suitable if you have no history of foot or joint pain.

WEIGHT-LOSS REGAIN TENDENCY

There are genes associated with the tendency to gain weight back after an individual loses weight, and there are genes that protect an individual from weight regain. Depending upon the genotype an individual may have higher, moderate or low ability to store dietary fat in the body and tendency to regain weight. For instance, individuals with G/G or C/G genotype of ADIPoQ may have normal to lower extent of fat storage ability from the diet, however, are "More Likely to Gain Weight Back". Those with C/C genotype may have a very high ability to absorb dietary fat and store it in the body but are more likely to "Maintain Weight Loss". If your assessment indicates a propensity to regain weight, consult your physician or dietician and fitness expert to suggest you appropriate diet and exercise program to keep those extra pounds off.

ASSESSMENT CATEGORIES

GENES TESTED	PPARG, NEGR1, BDNF, IL6, KTCD15, TMEM18, TFAP2B, FTO, ADIPOQ

Increase 'non-exercise' physical activity such as walking, active recreational activities, housework, washing car, gardening to complement your strength training and maintain resting metabolism momentum.

Increase your protein intake, as protein has a higher thermic effect, i.e. more calories are consumed to digest, compared to fats and carbohydrates. Supplementation with L-carnitine or green tea helps burn fat. L-carnitine burns fat for cellular energy, while green tea has been shown to be effective in reducing fat in obese populations. Drinking 3-4 cups of green tea a day has shown to assist weight reduction. A good starting point for weight loss is to moderately reduce calorie intake to eating a diet of about 22-24 times your bodyweight in kg, e.g. 70kg man with a sedentary lifestyle would eat about 1,600 calories per day. See a fitness and nutrition professional to help you adjust this for your genetics, lean body mass and activity level.

LIFESTYLE TRAITS

This category assesses essential genetic traits related to sleep and health conditions (lifestyle diseases). Depending on where you're currently based and/or where your blood/saliva sample was originally collected for DNA assessment, you may notice "Not Reported" mentioned against various health conditions assessment. This is done in order to comply with the respective country's Ministry of Health regulations on reporting of disease predispositions directly to consumer for direct-to-consumer (DTC) genetic tests.

LIFESTYLE TRAITS	
TRAIT	SAMPLE ASSESSMENT
STRESS RESILIENCE	SLIGHTLY LOW
SLEEP QUALITY	DEFICIENT
SLEEP DEPTH	DEFICIENT
SLEEP DURATION	DEFICIENT
CIRCADIAN RHYTHM	LIKELY MORNING PERSON
NARCOLEPSY	MORE LIKELY
INSOMNIA	LESS LIKELY
HYPERSOMNIA	MORE LIKELY
OBSTRUCTIVE SLEEP APNEA	LESS LIKELY

LIFESTYLE TRAITS	
TRAIT	SAMPLE ASSESSMENT
RISK FOR TYPE-2 DIABETES	NOT REPORTED
RISK FOR HYPERTENSION	NOT REPORTED
RISK FOR ATRIAL FIBRILLATION	NOT REPORTED
RISK FOR MYOCARDIAL INFARCTION	NOT REPORTED
RISK FOR CORONARY ARTERY DISEASE	NOT REPORTED
RISK FOR CHRONIC KIDNEY DISEASE	NOT REPORTED
RISK FOR GOUT	NOT REPORTED
RISK FOR NON ALCOHOLIC FATTY LIVER DISEASE	NOT REPORTED

SLEEP - QUALITY, DURATION, DEPTH

Adequate, restful sleep remains a vital aspect of an overall healthy lifestyle. Poor sleep quality has been associated with both immediate and long-term health effects, including reduced concentration, cognitive impairment, depression, and more severe conditions like heart disease and Alzheimer's disease. Recently published scientific research studies found 47 genetic associations across eight sleep traits pertaining to the timing, quality, and duration of sleep. Ten of these genetic links related to sleep duration are new, as are 26 associated with sleep quality. The results include one gene in particular, PDE11A, that includes an uncommon variant impacting both sleep duration and quality. Interestingly enough, the same gene was previously noted as a potential drug target for treating certain behavioral and mood stability disorders.

ASSESSMENT CATEGORIES

GENES TESTED	CACNA1C, SLC2A13, FGF12, INTERGENIC, LOC105378029, TMC5, TUSC1, MIR1269A

PERCENTAGE OF TIME SPENT IN SLEEP STAGES*

SLEEP STAGE	DROWSY SLEEP		LIGHT SLEEP		DEEP SLEEP		REM SLEEP	
AGE (YEARS)	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
36 AND BELOW	~10%	~10%	50-60%	50-60%	10-25%	10-25%	20-25%	20-25%
37-54	6%	5%	61%	59%	11%	14%	20%	21%
55-60	6%	5%	65%	56%	8%	17%	19%	20%
61-70	7%	5%	65%	57%	7%	17%	18%	19%
71 AND ABOVE	8%	5%	67%	57%	6%	17%	18%	19%

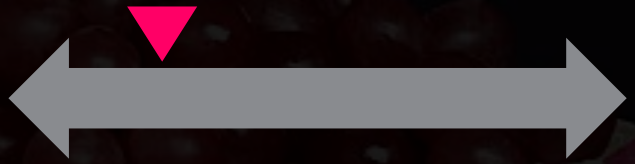
**Sound Asleep: The Expert Guide to Sleeping Well by Dr. Chris Idzikowski*

CIRCADIAN RHYTHM

Circadian rhythms are roughly 24-hour cycles of activity controlled by the brain that tell our bodies when to sleep and help regulate other biological processes. Disruptions to the cycle contribute to jet lag and have been previously implicated in sleep disorders, depression and even obesity. How circadian rhythm manifests itself depends on a number of factors, such as age, gender, sunlight and temperature, as well as genes.

Being born with a predisposition toward waking early ("Likely Morning Person") or sleeping in ("Likely Evening Person") may make it more difficult for people to change their circadian rhythm. But, changing life circumstances and exposure to light — such as sitting in front of a computer in an office late at night, shift work, or going for a hike on a vacation — can change whether someone is a morning person or a night person.

ASSESSMENT CATEGORIES



LIKELY MORNING PERSON	LIKELY EVENING PERSON
GENES TESTED	CLOCK, RGS16, PER2, HCRTR2, PER3, CLN5, PLCL1, SHFM1, FBXL13

To avoid a sleep disorder, your lifestyle should fit into your own personal circadian rhythm. If you've had difficulties following a consistent sleep schedule, here are some suggestions you could incorporate in to your lifestyle:

- Practice Intermittent Fasting: Time-restricted eating can help put you back in sync with your circadian rhythm
- Avoid bright and blue lights: Exposure to blue light – produced by the Sun, screens of TV sets, computers, and smartphones – disrupts the production of melatonin, a hormone that regulates the sleep-wake cycle
- Avoid caffeine at least within 6 hours before bedtime, and aim to go to bed at the same time, every night.

Narcolepsy

Narcolepsy is a chronic sleep disorder that disrupts the normal sleep-wake cycle. It is characterized by excessive daytime sleepiness. Affected individuals feel tired during the day, and several times a day they may experience an overwhelming urge to sleep. "Sleep attacks" can occur at unusual times, such as during a meal or in the middle of a conversation. They last from a few seconds to a few minutes and often lead to a longer nap, after which affected individuals wake up feeling refreshed.

Sleep can be categorized into two phases: REM sleep (dreaming with no movement during sleep) and non-REM sleep. REM accounts for 20~25% of total sleep and the rest is non-REM. These alternate with each cycle being 90~120 minutes, and repeat 5 times overnight. For narcolepsy, the interval is shortened and usually fall into REM sleep within 15 minutes. Most affected individuals have trouble sleeping for more than a few hours at night.

Assessment Categories

Genes Tested	TRA, ZNF365, HLA-DQA2, TRB, DNMT1, IL10RB, CCR1

Recent research has revealed that narcolepsy with cataplexy is caused by a lack of hypocretins, key brain chemicals that help sustain alertness and prevent REM sleep from occurring at the wrong times. Changes in several genes belonging to HLA family (as well as several additional genes) that influence the risk of developing narcolepsy. Many of these genes are thought to play roles in immune system function.

In addition to genetics, age, and triggering infections or inflammation play important roles in the development of narcolepsy. For example, studies suggest that bacterial or viral infections such as strep throat (streptococcus), colds, and influenza may be involved in triggering narcolepsy in people who are at risk.

OBSTRUCTIVE SLEEP APNEA (OSA)

Obstructive sleep apnea is a condition in which individuals experience pauses in breathing (apnea) during sleep, which are associated with partial or complete closure of the throat (upper airway). Complete closure can lead to apnea while partial closure allows breathing but decrease the intake of oxygen (hypopnea). Individuals with OSA may experience interrupted sleep with frequent awakenings and loud snoring. Repeated pauses in breathing lead to episodes of lower-than-normal oxygen levels (hypoxemia) and a buildup of carbon dioxide (hypercapnia) in the bloodstream. Interrupted and poor quality sleep can lead to daytime sleepiness and fatigue, impaired attention and memory, headaches, depression, and sexual dysfunction. Variants in the NRG1, GPR83, CCDC162P, PLCB1 genes and those associated with craniofacial structure, body fat distribution and neural control of the upper airway muscles interact to result in OSA.

ASSESSMENT CATEGORIES

GENES TESTED	GPR83, NRG1, RP11-45A12.2, TSPAN18, AC124997.1, PLCB1, C6ORF183/CCDC162P

OSA is more common among obese individuals. If fat builds up inside the upper airway, you must be careful and aim to lose weight since the airway becomes narrower and symptoms like snoring worsen. Smoking and excessive alcohol consumption also have negative effects on the airway muscles and mucous membranes.

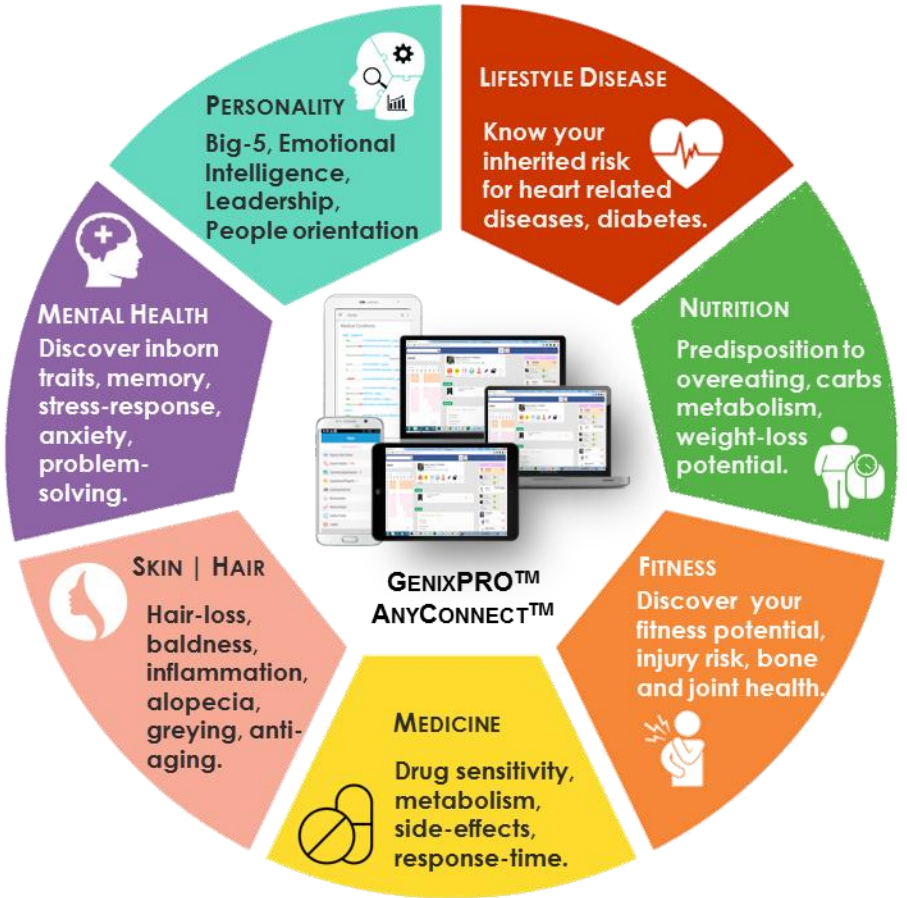
Maintain a healthy body weight and follow your suggested daily calorie intake plan recommended in your report. See a fitness and nutrition professional to help you adjust the plan for your genetics, body mass and activity levels. You may wish to consult a sleep specialist if symptoms begin to appear or worsen.

WHAT'S NEXT – ACTION PLAN

In your endeavor towards self-discovery, we hope that you found this supplemental reading insightful and interesting. So, now that you have a better understanding of your body's nutrigenomic profile, what can you do with this information?

With this report you're now equipped with the most advanced knowledge available for your personalized weight management, and we want to help you make the most of it to maximize your potential. We offer a selection of bespoke nutrition/diet consultations for whatever your goal may be, from optimizing diet for the next upcoming Marathon to natural weight-reduction. Our team of accredited nutrition and fitness practitioners will be happy to assist you in designing and implementing the right diet and weight-loss programs individually tailored exactly to your genetic results, taking in to account all of the areas we test for. Once the optimal diet type baselines are set, we will further personalize by constantly evaluating the genetic contribution of relevant diet and lifestyle choices in relation to new research made available periodically.

Please visit **www.GENIXPRO.com**, call **GENIXPRO™ Customer Service** or email **ehs@genixpro.com** to find out more about our bespoke DNA-based weight-management programmes.



The scientific studies referenced in this report are provided below and can be referenced at www.pubmed.gov and other repositories. All of these papers were published in peer-reviewed journals. PubMed is a service managed by the National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, and it tracks more than 19 million citations for biomedical articles and scientific research.

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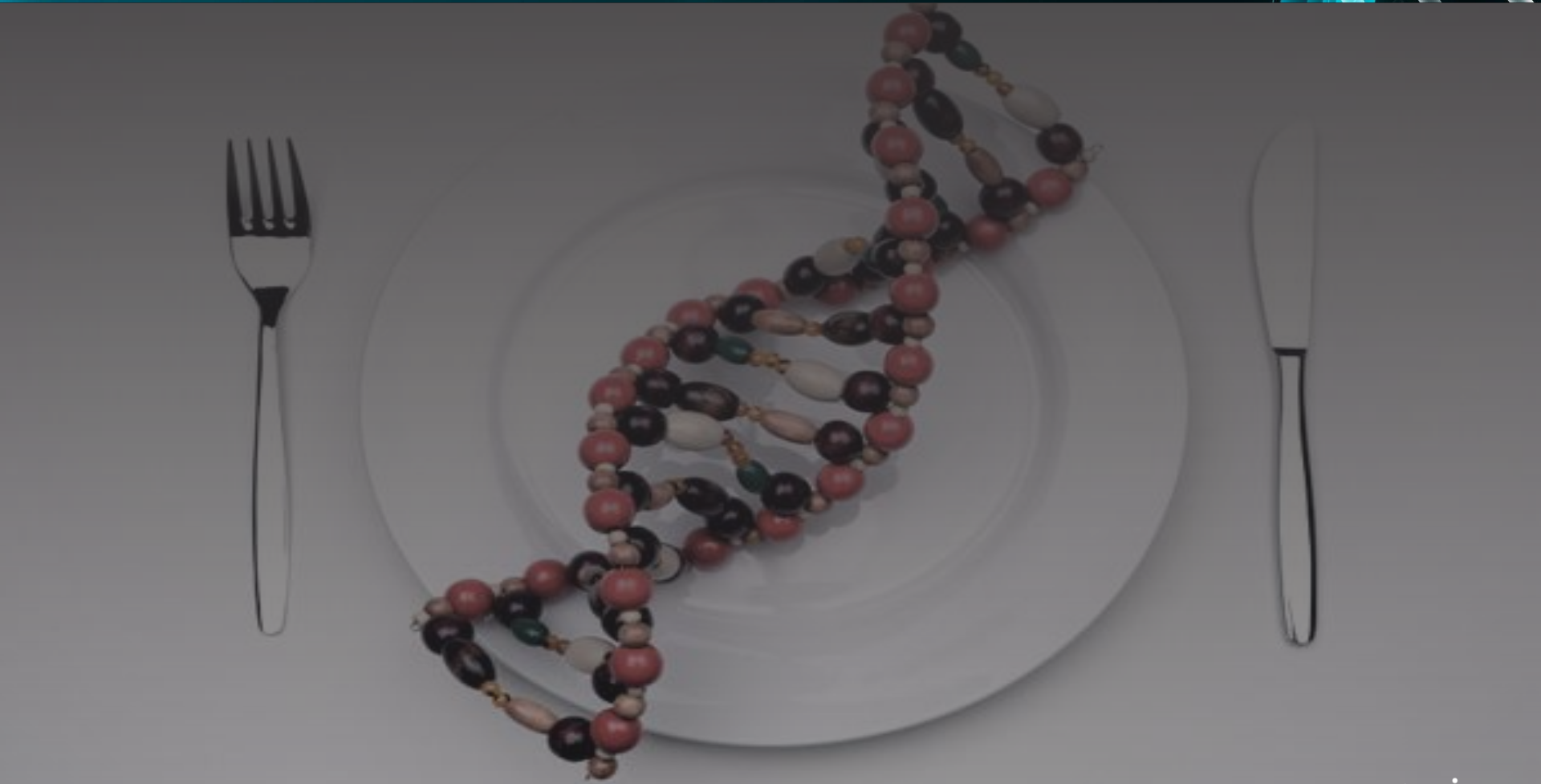

genixpro = PERSONALIZED HEALTHCARE

 GENETICS +  CLINICAL +  LIFESTYLE

UNDERSTANDING GENETICS

Before reading your full report, please take a moment to read this background information to help you better understand your results and to guide you on how best to make use of what you learn from your GenixPRO™ results.

The GenixPRO™ FITNESS report is designed for individuals of any fitness level. Whether you are an absolute beginner just wanting to train the best way for your body, a personal trainer keen to offer the very best service to your clients, or a professional athlete seeking that extra edge, our report can help you.

WHAT ARE GENES?

A gene is a segment of the DNA (short for deoxyribonucleic acid) molecule that contains the instructions for how, when and where your body makes each of the many thousands of proteins required for life. Each gene is comprised of thousands of combinations of four letters that make up your genetic code: A, T, C, and G. Each gene's code combines these "letters" in various ways, spelling out the "words" that specify which amino acid is needed at every step in the process of making the proteins required for your body to develop and function. Increasingly, your genes can also tell you whether you are predisposed to specific health risks.

WHAT ARE GENE VARIATIONS?

With the exception of identical twins, all individuals have minor differences in the information that their DNA contains and it's these differences that make each of us unique. Gene variations are slight changes in the genetic code that are present in at least one percent of the population.

For example - one genetic "letter" (A, T, C, or G) may be replaced by another. These variations can lead to different processes in the body, just as altering one letter in a word can completely change its meaning. When the variation affects only one genetic letter [think of **G**et vs. **S**et] it is called a "single nucleotide polymorphism" (or SNP, pronounced "snip"). You'll notice which of these SNP's you possess under the "Allele Result" in each gene table in this report.

ARE GENE VARIATIONS "BAD"?

For a given population, one genetic code for a gene may be found more frequently than other genetic codes for that same gene. The genetic codes for those genes that appear less frequently are referred to as "variants". Variations should not be thought of as "good" or "bad," rather genetic variations are simply the differences in the forms of the genes present in our bodies. The key is to know which form of the gene you carry, so that you can make the right exercise, dietary and lifestyle choices to minimize potential health risks.

NUTRITION + GENETICS = NUTRIGENETICS?

Nutrigenetics is the scientific study of the effects of our individual genetic variations in response to our diet, exercise and lifestyle choices, all of which can cause the genes to be "expressed" in a favorable or unfavorable way. Nutrigenetics enables us to identify the way-forward on our journey towards maximizing our individual, optimal health potential.

The levels referred to in the cardio training table below represent zone training that can be done either with a Heart Rate (HR) Monitor or simply by your Rate of Perceived Exertion (RPE). You will need to test yourself for your Threshold Heart Rate if you wish to determine your training levels with a heart rate monitor (see below). RPE is simply a 0-10 scale of how you perceive a training session to be - 0 being nothing and 10 being maximal output. Levels 1 to 4 are considered endurance style training, whereas level 5 and above is used in short duration speed and interval training exercises.

LEVEL	INTENSITY	% OF THRESHOLD HR	RPE
1	RECOVERY	<81%	<2
2	AEROBIC	81-89%	2-3
3	TEMPO	90-93%	3-4
4	SUB-THRESHOLD	94-99%	4-5
5	SUPRA-THRESHOLD	100-102%	6-7
6	AEROBIC CAPACITY	103-106%	>7
7	ANAEROBIC CAPACITY	>106%	MAXIMAL

MEASURING YOUR THRESHOLD HEART RATE AND SETTING YOUR TRAINING ZONES

Perform a solid warm-up, and then do a 30 minute time trial (all out) on a relatively flat course. Record your average heart rate for the final 20 minutes of the time trial. This is your LTHR. To set your zones, your LTHR is the figure that should go between Level 4 and 5 (100%) in the cardio table above. To work out the other zone heart rates, simply multiply the LTHR by the percentages given.

UNDERSTANDING YOUR FULL GENOTYPE BREAKDOWN

The table below provides a full breakdown of each of the genes we have tested your DNA for, and your individual allele response to that gene. We have also detailed the effect that your particular allele response is associated with.

ENDURANCE / POWER PROFILE AND VO_2 MAX POTENTIAL			
GENE	**VARIATION**	**RESULT**	**EFFECT**
ACE	rs4646994	I/I	Endurance profile
ADRB2	rs1042713	A/G	Intermediate VO_2 MAX capacity
ADRB2	rs1042714	C/G	Better VO2 Max capacity, Endurance profile
AGT	rs699	C/C	Small association with Strength profile
ACTN3	rs1815739	C/C	Advantage for sprint and Strength profile
BDKRB2	rs1799722	C/T	Associated with Endurance
COL5A1	rs12722	C/T	No measured impact on Strength/Endurance
CRP	rs1205	G/A	Exercise positive for VO_2 MAX / Endurance profile
IL6	rs1800795	G/G	Associated with Strength performance
NRF	rs7181866	A/A	No measured impact on fitness
PPARA	rs4253778	G/G	Associated with Endurance
PPARGC1A	rs8192678	G/G	Strength/ Endurance mix
TRHR	rs16892496	T/G	No measured impact on fitness
VEGF	rs2010963	G/G	Reduced VEGF production that may reduce effect of training
VDR	rs731236	C/T	No measured impact on fitness

UNDERSTANDING YOUR FULL GENOTYPE BREAKDOWN

POST EXERCISE RECOVERY AND INJURY RISK			
GENE	**VARIATION**	**RESULT**	**EFFECT**
CRP	rs1205	G/A	Regular exercise has positive impact on recovery
GSTM1	INDEL	I	No measured impact on fitness
GSTT1	INDEL	I	No measured impact on fitness
IL6	rs1800795	G/G	No measured impact on fitness
IL6R	rs2228145	A/C	Associated with intermediate fatigue and longer recovery times
SOD2	rs4880	T/T	No measured impact on fitness
TNF	rs1800629	A/G	Nutrients for support of recovery
COL1A1	rs1800012	T/T	Typical injury risk
COL5A1	rs12722	C/T	Associated with increased tendinopathy risk
GDF	rs143383	T/T	Associated with increased tendinopathy risk

Want to know more about your genetic results?

Included with your GenixPRO™ Fitness Report is our full Genotype Support Guide. To understand more about your individual results, why not grab a pen and mark cross-reference your results from the table above to see where you lie in relation to every possible gene response?

GLOSSARY

AEROBIC: *Anything relating to, involving, or requiring oxygen. E.g. "Aerobic exercise"*

ALLELE: *An allele is an alternative form of a gene (one member of a pair) that is located at a specific position on a specific DNA chromosome. E.g. "You have the ID allele of the ACE gene."*

CRUCIFEROUS VEGETABLES: *Relating to or denoting plants of the cabbage family.*

ENDURANCE: *A sport or activity that requires the ability to perform for long periods of time at low intensities, such as marathon running and cross-country skiing.*

GENOTYPE: *The genetic constitution of an individual organism.*

NUTRIGENETICS: *A branch of nutritional science, which aims to identify nutritional recommendations for individuals based on their DNA.*

POWER: *A sport or activity that requires the ability to perform at a high intensity for short periods of time, such as sprinting and power lifting.*

TENDINOPATHY: *A chronic injury to a tendon, often also referred to as tendonitis.*