



# dnaactive

## Welcome

Example

## to your DNA Active report

Date of birth: **01 Jan 2001**

Date reported: **Oct 2020**

Sample Number: **12345678**

Referring trainer: **Private**

DNA Active is designed to guide you on your journey to live a healthier and more active life, and help you reach your performance goals.



DNA Active was created by DNAlysis for trainers wanting to assist their clients in optimising their fitness.

## Genetics and personalised medicine

Genes are segments of DNA that contain the instructions your body needs to make each of the many thousands of proteins required for life. Each gene is comprised of thousands of combinations of “letters” (called bases) which make up your genetic code. The code gives the instructions to make the proteins required for proper development and function.

Genetic variations can affect the expression of a gene, thereby affecting metabolic processes that are important for maintaining a state of health. Knowledge of these variations offers a powerful advantage, enabling personalised exercise and nutritional recommendations aimed at optimising health and athletic performance.



### NORMAL GENE

Genotype for baseline performance potential

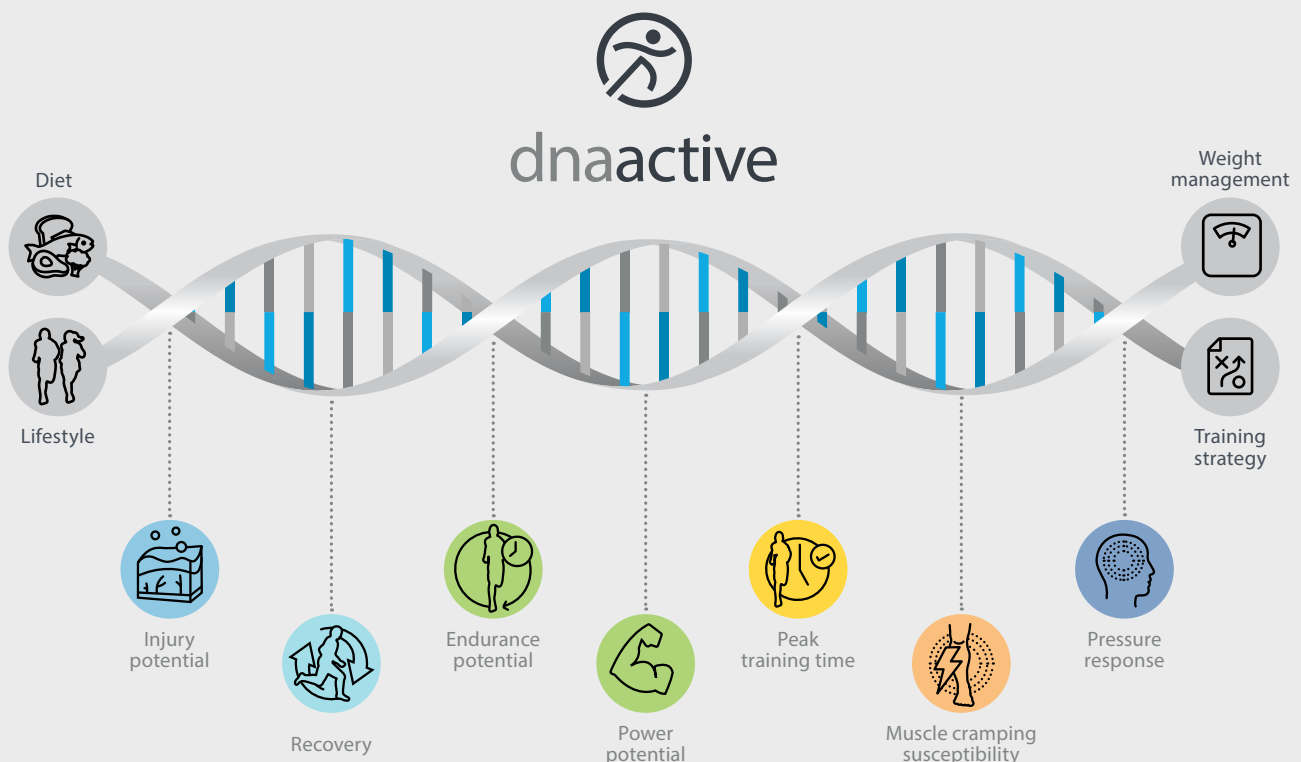


### VARIANT GENE

Genotype for increased performance potential

## Personalised medicine and your performance goals

Think of this report as your handy reference guide to weight management, exercise responsiveness, nutrient requirements, and a host of other factors that will combine to help you reach your performance goals. There is a lot to take in but don't worry; your genes never change and so you can refer to this report at any time.



## Outcomes: Exercise

## Outcomes: Weight management

[illegible]

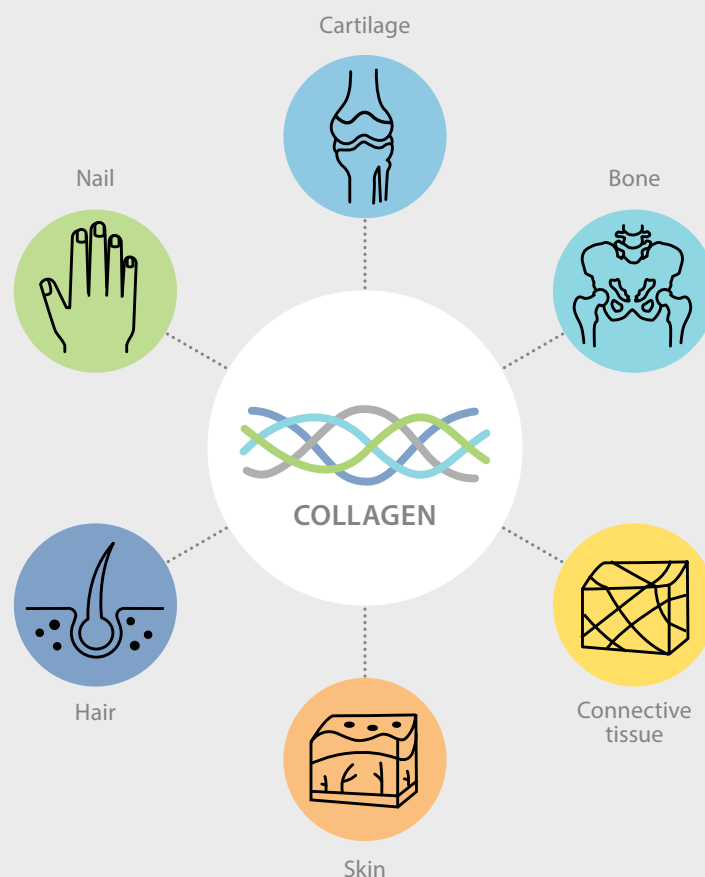
# Gene results and personalised recommendations: Exercise



## Injury potential

In order to optimize performance in sport, athletes must maximize the stiffness of the musculoskeletal system. This stiffness is directly related to the individual's movement economy. In other words, the greater the musculoskeletal stiffness, the better the performance. However, when the tendon is stiffer than the muscle is strong, the protective effect of the tendon is lost and the chance of an injury increases.

Genes involved in the structural integrity and remodeling of soft tissues such as tendons and ligaments can be implicated in the risk of injury. These soft tissues are made up predominantly of collagen which has many important functions in the body, including providing your skin with structure and strengthening your bones. Collagen also helps maintain the integrity of your cartilage, which is the rubber-like tissue that protects your joints.



If you focus on a particular sport, you could be prone to more sport-specific injuries, for example, runners are prone to any number of injuries including Achilles tendinopathy, calf or hamstring strains and IT band syndrome; cyclists are prone to knee, back and neck pain; swimmers are prone to swimmers' shoulder and breast-stroke knee. Consider setting up a practice of sport-specific conditioning exercises, taking specific advice from a coach or exercise professional who specializes in your event.

## Recommendations



### Injury potential



Gene variation	Result
COL1A1 G>T	GG
COL5A1 C>T	CT
GDF5 C>T	TT



### Recommendations

Resistance training, plyometrics, Pilates, yoga, sport-specific conditioning, vit C, iron, protein, possible hydrolysed collagen supplement

Your genetic results indicate that you have an increased injury potential. This means that you will need to be careful, ensuring that your training volumes and intensities are appropriate to your fitness level and that you engage in regular conditioning exercises that will improve your soft tissue function.

Tendons produce more collagen and become stronger when they are exercised intermittently. Small range-of-motion exercises, two or more times a week, targeted to a specific area with very light weight are effective at increasing collagen synthesis and connective tissue function.

It is important to ensure adequate intake of vitamin C, iron and protein in your diet. Without enough dietary vitamin C, the body is not able to produce and hydroxylate collagen. Increase your vitamin C intake by adding citrus fruits, broccoli, cauliflower, kale, red, green or yellow peppers and sweet potatoes to your diet.

After intense training sessions look to take in a good quality protein source for amino acid building. Dietary collagen is found in the connective tissues of animals. Thus, foods like chicken skin, pork skin, beef, and fish are good sources of collagen. If you are exercising regularly at moderate and high intensities, you may consider supplementing your diet with hydrolysed collagen or even using a bone broth.



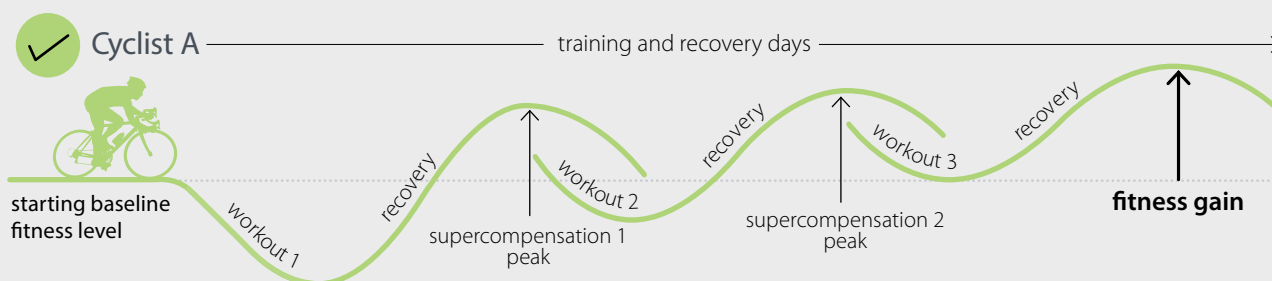


## Recovery

There are limits to how much stress the body can tolerate before it breaks down and risks injury. Doing too much work, too quickly will result in injury or muscle damage, but doing too little, too slowly will not result in any improvement. Building recovery time into any training program is important to let the body adapt to the stress of exercise. Recovery also allows the body to replenish energy stores and repair damaged tissues.

When you go for a run, lift weights, or play football, any discomfort tells the body that it needs to be better equipped to deal with the situation. The response: it becomes stronger, bigger, or more efficient – this is called supercompensation and it is why we exercise.

### Proper training: supercompensation



### Incorrect training



This process is natural and normal, but it is easy to disrupt it with too much exercise. The ability to sustain many intense training sessions comes from a mixture of good genetics and slowly building a training foundation over the course of many years. If you have already been training at a high level for some years, take this as an indication that your body can theoretically handle high loads of exercise under ideal conditions. Otherwise, it is suggested that you build up to this level slowly.

## Recommendations



### Recovery



Gene variation	Result
IL6 G>C	GG
IL6R A>C	CC
CRP G>A	GG
TNFA G>A	AG
SOD2 C>T	CC
eNOS G>T	GT



### Recommendations

Hydrate, stretch, ice bath,  
massage, active recovery,  
avoid alcohol and smoking,  
sleep  $\pm$  8 hrs

From a genetic perspective, you recover at a slow rate from strenuous exercise. You should follow planned recovery strategies to gain the best returns from your training and optimise performance.

Recovery is classically considered as the time between sessions. According to training theories, we require 2-3 days between hard training sessions. Because you have a slow rate of recovery, once a training base is established you can expect to hit 2 hard sport-specific sessions per week. Other 'steady' recovery and conditioning sessions can be built around these 2 big sessions. If you are a seasoned athlete, you could potentially progress to a once a day training routine. Always allow one full day off per week. Recreational athletes with other commitments might wish to max out at a total of 5 sessions per week.




Exercise progress is as much concerned with eating correctly as it is with what you do in the gym. Ensure that you are eating enough calories to recover and that you have your macronutrients balanced properly. Because inflammation and oxidative stress influence recovery rates, you should look to consume mostly anti-inflammatory and antioxidant foods in your diet and avoid those that are pro-inflammatory. Focus on fruits and vegetables of many different colours; green leafy vegetables and cruciferous vegetables have particularly good antioxidant properties. Also, look to include fish in your diet.

Consuming carbohydrate-based beverages during prolonged exhaustive exercise can help to reduce levels of inflammatory cytokines following exercise. Consumption of a mixed protein and low GI carbohydrate meal after exercise is also known to decrease inflammation and assist recovery.





## Anti-inflammatory diet

FOODS TO AVOID 	FOODS TO MODERATE 	BENEFICIAL FOODS 
<ul style="list-style-type: none"><li>• Smoked food</li><li>• Processed meats &amp; sausages</li><li>• Alcohol</li><li>• Nicotine</li><li>• Sugar</li><li>• Chocolate</li><li>• Confectionery</li><li>• Food preservatives</li><li>• Recreational drugs</li></ul>	<ul style="list-style-type: none"><li>• Dairy (including cheese)</li><li>• Animal fats</li><li>• Red meat</li><li>• Coffee &amp; tea</li><li>• Dark chocolate</li><li>• Chargrilled meat</li><li>• Grains (especially wheat)</li><li>• Eggs</li><li>• Red wine</li></ul>	<ul style="list-style-type: none"><li>• Green leafy vegetables</li><li>• Other vegetables</li><li>• Fruit, nuts &amp; seeds</li><li>• Extra virgin olive oil</li><li>• Sea vegetables</li><li>• Fish (including their oils)</li><li>• Green tea</li><li>• Herbs and spices (especially turmeric, ginger, cinnamon &amp; nutmeg)</li></ul>







## Exercise for performance

### Power versus endurance training

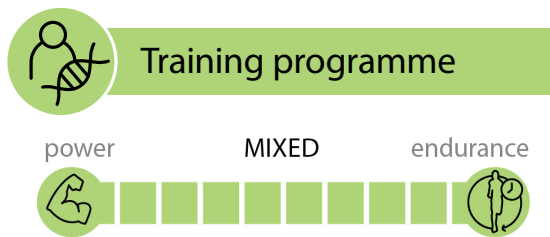
Have you ever noticed that some people respond better to specific exercises than others? This is because our unique genetic profile can affect physiological process that impact the amount of benefit we each get from power or endurance training. Power involves using strength to overcome resistance, while endurance refers to sustained effort with no reduction in performance.

Generally, power-based activities are of short length with high intensity. Power or anaerobic exercise is any activity that breaks down glucose for energy without using oxygen. The idea is that a lot of energy is released within a small period, and your oxygen demand surpasses the oxygen supply. Examples of power sports include Olympic lifting, long jump and shot put. These are all events that require a huge amount of explosive force.


In contrast, endurance type activities are for example long distant runners or cyclists. Aerobic exercise or endurance training is sometimes known as “cardio” – exercise that requires pumping of oxygenated blood by the heart to deliver oxygen to working muscle. Aerobic exercise stimulates the heart rate and breathing rate to increase in a way that can be sustained for the entire exercise session. Examples of aerobic exercises may include cardio machines, cycling, running, swimming, walking, hiking, aerobics classes, dancing, cross country skiing, and kickboxing.

When deciding on what type of exercise to focus on, consider your genetic results in the context of your current health and performance goals and tailor appropriately, keeping in mind the importance of sport-specific training.

## Training ratio



Gene variation	Result
AGT T>C	TT
ACE I>D	ID
BDKRB2 C>T	TT
VEGF C>G	CG
NRF2 A>G	GG
PPARGC1A G>A	GG
PPARA G>C	CC
ADRB2 Arg16Gly A>G	AG
ADRB2 Gln27Glu C>G	CC
TRHR C>T	CC
ACTN3 R>X	XR
VDR T>C	TT



### Recommendations

Running, swimming, aerobic classes, interval training, free weights, plyometrics

You are likely to have enhanced performance benefits from a well-balance ratio of both long duration endurance-style exercises as well as high intensity, short duration power exercises. The types of aerobic training to include are running, cycling, swimming, or similar types of moderate cardio exercise of long duration, at a steady pace, as well as short duration interval and sprint training, enhancing your power potential. Sessions can vary from 30-60 minutes at a steady pace, 5 x 4-minute repeats at a very hard pace or 10 x 20 second efforts flat out. Remember to include a warmup, as well as cooling down sufficiently afterwards.

Your strength focused weight training may include conventional free weights, machines or even weightlifting movements. Power-based plyometric exercises are also important for individuals wanting to develop explosive strength and speed. With weight training, it is important to develop basic muscular strength first, before building up to heavy weights in order to avoid injury. Low intensity weight training can be used to improve muscle contraction efficiency. This involves doing multiple repeats with relatively light weights (30 – 40% of maximum). You do have the potential to progress to high intensity weight training; low number of repeats with relatively heavy weights (60 – 70% of maximum).

As someone who has mixed endurance and power potential, we recommend a range of activities that include endurance efforts at Zones 1 -3 of the Cardio Zones Training Table as well as speed and interval training at levels 4 and 5. Your core sessions should be moderate duration interval sessions at levels 3 and 4.





## Cardio zone training table

If you are training with a heart rate monitor, use it to stay within range of the suggested heart rate percentages.

### Calculating your target heart rate:



Maximum heart rate =  $220 - \text{age}$



Heart rate reserve = maximum heart rate – resting heart rate



Target heart rate =  $(\text{heart rate reserve} \times \text{training \%}/100) + \text{resting heart rate}$

If you are not training with a heart rate monitor, choose which zone you think you are in by assessing how you feel during the workout. Does it seem quite light and can you keep a conversation going? Or are you gasping for air throughout the entire session?

ZONE	HEART RATE (target heart rate)	EFFORT / FEEL	BENEFITS
1	95 - 114 (50 - 60%)	Very light	<b>Improved overall health:</b> body fat decreases, blood pressure and cholesterol are lowered, muscle mass increase, and helps recovery.
2	114 - 133 (60 - 70%)	Light	<b>Improved basic endurance:</b> gain muscle and lose fat mass, strengthen heart muscle, fat utilization zone.
3	133 - 152 (70 - 80%)	Moderate	<b>Improved aerobic fitness:</b> increase in the number and size of blood vessels, increased lung capacity and respiratory rate, as well as an increase in size and strength of the heart muscle.
4	152 - 171 (80 - 90%)	Hard	<b>Increased maximum performance capacity:</b> high total calories burned during exercise. Large amount of carbohydrates used for energy production. Improved lung capacity and higher tolerance for more strenuous exercises.
5	171 - 190 (90 - 100%)	Very hard	<b>Develops maximum performance and speed:</b> Highest total calories burned, but lowest percentage of fat calories. Spending too much time in this zone, even for elite athletes can be painful, cause injuries and lead to over training.





## Peak training time

CLOCK is an essential element of the human biological clock and is involved in metabolic regulation. Your biological clock can influence the time of day you are likely to achieve your best performance.

Gene variation	Result
CLOCK3111 T>C	TC

**Your result indicates that you are unlikely to have an activity time preference.**

Your result indicates that you may have a tendency toward:

**NO PREFERENCE**



It is, however, also important to take into account the time of day of your competition or event when deciding on your training times as you would ideally like to become accustomed to activity during that time.



## Muscle cramping susceptibility

Muscle cramps are sudden, involuntary contractions that occur in various muscles. A sudden, sharp pain, lasting from a few seconds to 15 minutes, is the most common symptom of a muscle cramp. In some cases, a bulging lump of muscle tissue beneath the skin can accompany a cramp. Muscle cramps have several causes. Some cramps result from overuse of your muscles during exercise. Muscle injuries, poor circulation and dehydration can also trigger cramps. Low levels of any of the following minerals that contribute to healthy muscle function may also cause muscle cramps: calcium, potassium, sodium or magnesium.

### Recommendations



#### Risk of muscle cramping

MODERATE



According to your genetic profile, you have a moderate susceptibility to suffer from muscle cramps.

If, however, you do experience the occasional muscle cramp, we have provided a few recommendations to keep in mind that may help prevent further cramps.

Gene variation	Result
AMPD1 G>A	AG



#### Recommendations

Stretch, warm-up sufficiently, lower caffeine intake, stay hydrated, increase calcium, potassium and magnesium



## Caffeine metabolism

Moderate doses of caffeine have been known to improve both sprint and endurance performance. However, a moderate to high intake of caffeinated beverages, such as more than two cups of coffee per day, is associated with an increased risk of heart disease if you are a slow caffeine metabolizer.

### Recommendations



#### Caffeine response

FAST



CYP1A2 is the main enzyme that metabolizes caffeine. An AA result indicates that you are able to metabolize caffeine at a fast rate.

You may want to consume caffeine 30 minutes to an hour before a race or event in order to benefit from the effects. Depending on how long your race/event is you could take in caffeine during the race as well.

Gene variation	Result
CYP1A2 C>A	AA



## Pressure response

Your ability to respond to increased pressure and adapt to stressful situations, whether in competitive sport or your personal or professional life, may affect the quality of your performance.

A poor response to pressure or stress can lead to a drop in both physical and mental capability. However, awareness of your pressure response can assist you in improving stress management and train yourself to endure high pressure situations without a decline in performance.

### Recommendations



#### Pressure response

HIGH



Gene variation	Result
COMT 472 G>A	AA

According to your genetic results, your likely increased levels of dopamine enable you to have high executive functioning and a competitive edge.

You do however also have a high vulnerability to stress.

Practice stress management techniques such as focused breathing or meditation and avoid intake of alcohol and high amounts of caffeine.

Regular low moderate intensity exercise (for example, Yoga) is also beneficial for stress management.

# Gene results and personalised recommendations: Weight Management



## Saturated fats

Saturated fats are a type of dietary fat which is typically semi-solid at room temperature. Foods high in saturated fat include. include baked goods, fried foods, animal fats including fatty or processed meats, whole-fat dairy products and fats like coconut oil, palm or palm kernel oils found in packaged foods.

## Recommendations



### Impact

MODERATE



According to your gene results, decreasing saturated fat intake is a moderate priority for you, meaning that a high intake of saturated fat may possibly lead to slower weight loss outcomes.

Many processed foods that are high in saturated fats are also low in nutrients and have added calories from sugar.

Try to avoid or cut back on these foods.

Gene variation	Result
FABP2 Ala54Thr G>A	GG
ADIPOQ -11391 G>A	GG
PPARG Pro12Ala C>G	CG
APOA2 265 T>C	CT
TCF7L2 C>T	CT
FTO T>A	AA
APOA5 1131 T>C	TT
PLIN 11482 G>A	GG
MC4R V103I T>C	CC
TNFA -308 G>A	GG





## Carbohydrates

A high carbohydrate intake has often been associated with an increased risk for obesity and insulin resistance, meaning that a high intake of carbohydrate may hinder your ability to lose weight.

### Recommendations



#### Impact

MODERATE



According to your gene results, you scored in the moderate priority range for carbohydrate responsiveness.

By managing the amount of carbohydrate in your diet, you will improve your weight loss outcomes and help prevent weight regain. Moderate your total carbohydrate intake.

Gene variation	Result
ADIPOQ -11391 G>A	GG
ADBR2 Gln27Glu C>G	CC
DRD2 C>T	TC
TAS1R2 Ile191Val G>A	AA
SLC2A2 Thr110Ile C>T	CC

Remember that there is a difference between “good” carbohydrates and “bad” carbohydrates. Try focusing on good carbohydrates: all vegetables, whole fruit, legumes and whole grain products like oats, brown rice or quinoa. Try to avoid refined carbohydrates: sugar sweetened beverages, fruit juices, pastries, white bread, white pasta or white rice. Refined carbohydrate foods are usually lacking in fibre and other essential nutrients. They are “empty” calories.



## Exercise for weight management

Many people believe that if they are doing some sort of exercise and eating relatively healthy, they will lose weight. In theory this is correct, but our genes tell a bit of a different story. Surprisingly, the amount and intensity of exercise you do, can play an essential role on whether your weight loss journey will be successful.

### Recommendations



#### Optimal intensity

MODERATE INTENSITY



Gene variation	Result
ADBR2 Arg16Gly C>G	AG
ADBR2 Gln27Glu C>G	CC
ADRB3 Trp64Arg T>C	TC
FTO T>A	AA
PPARG Pro12Ala C>G	CG



#### Recommendations

Running/Jogging (8km/h), Mountain climbing, Rowing/Cycling (150+ watts), Swimming, Circuit training, Tennis

In order to gain the most value from exercise in terms of weight loss, a MODERATE-INTENSITY exercise programme of 3 x 60-minute sessions a week is suggested for you. These can be broken down into 6 x 30-minute sessions or other possible variations.

One of the most important elements is the intensity of your workout. But how do you know if you're working at a moderate intensity level? There's no precise definition, but there are ways to monitor how hard you're working: for example, if you are working at a moderate intensity level, you should be short of breath and not able to speak more than one sentence at a time. If you can hold a steady conversation during your training, you have not reached the desired moderate intensity. The energy expenditure will be different for every single person as it depends on a multitude of factors such as age, gender, body composition and current level of fitness. Something that might seem very easy for you, may be much more difficult for someone else.



## Mono-unsaturated fats

Mono-unsaturated fats are a type of unsaturated fat that have significant health benefits; these can be found in olive oil, avocados and certain nuts. Particular gene variants have been associated with lower body weight when there is a higher intake of mono-unsaturated fats in the diet (approximately >13% of total calories). Benefits are seen if mono-unsaturated fats replace saturated fats or carbohydrates in the diet - i.e. replacing other calories, rather than adding extra calories to your diet.

### Recommendations



#### Benefit

LOW



According to your genetic results, this is a low priority for you, and standard guidelines for mono-unsaturated fat intake are recommended.

Gene variation	Result
FABP2 Ala54Thr G>A	GG
ADIPOQ -11391 G>A	GG



## Poly-unsaturated fats

Genetic variants in certain genes have been associated with a lower body weight in individuals when there is a higher intake of poly-unsaturated fats in the diet, with a focus on omega 3 fatty acids. Poly-unsaturated fats are essential for brain function and managing inflammation. The best source of omega-3 fatty acids is fatty fish like salmon, sardines or pilchards. Other sources include pine nuts, walnuts and flax- and sunflower seeds.

### Recommendations



#### Benefit

MODERATE



According to your genetic results, this is a moderate benefit for you and you may have a beneficial response with weight management when there is a higher ratio of poly-unsaturated fats to saturated fats in the diet. Replace a majority of your saturated fat intake with poly-unsaturated fats such as various fish and seeds.

Gene variation	Result
PPARG Pro12Ala C>G	CG
FTO T>A	AA



## Protein

Our body needs dietary protein to supply amino acids for the growth and maintenance of our cells and tissues. There are a total of 20 amino acids, 9 of which are essential, meaning that the body cannot make them and they need to be consumed through the diet. Different protein sources are considered better quality, if they include more of these essential amino acids. Typically, animal proteins provide more of these essential amino acids. This does not mean that you are unable to consume sufficient protein if you do not eat animal products, but instead you may have to eat greater quantities and a greater variety of plant proteins or consider supplementation. Good sources of protein include lean ground beef, chicken breasts, salmon, whole eggs, chickpeas, lentils, soy such as tofu, and red kidney beans.

### Recommendations



Benefit

HIGH



According to your genetic results, protein intake is a high benefit for you.

You may have a beneficial weight management response when there is a higher protein intake in your diet.

Remember to replace calories, and not add calories.

Gene variation

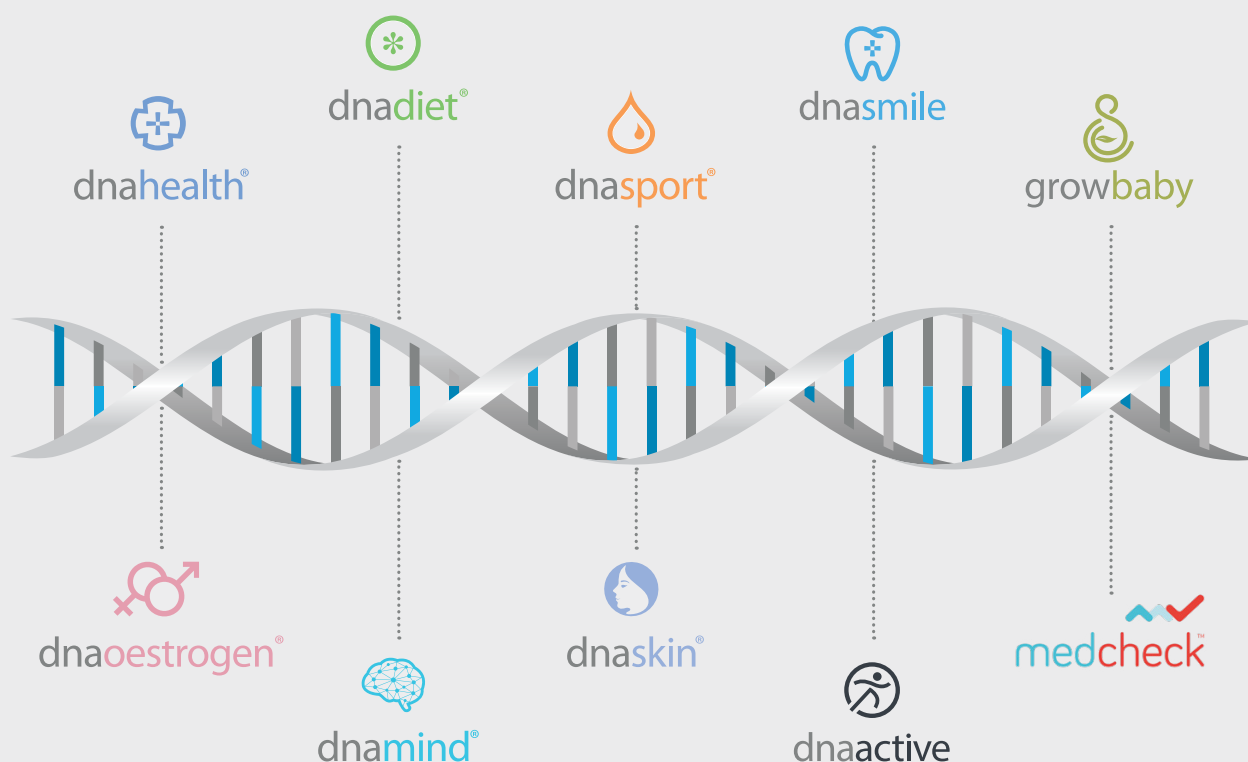
Result

FTO T>A

AA

# A lifetime of optimal health awaits you

Your genes do not change, which means our laboratories will only ever need one cheek swab sample from you. Throughout your life, as your health goals and priorities change, we can continue to provide valuable health insights from this single cheek swab to support your unique health journey.



From the laboratories of:



**Approved by:**

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**Risks and Limitations:**

DNALysis Biotechnology has a laboratory with standard and effective procedures in place for handling samples and effective protocols in place to protect against technical and operational problems. However as with all laboratories, laboratory error can occur; examples include, but are not limited to, sample or DNA mislabelling or contamination, failure to obtain an interpretable report, or other operational laboratory errors. Occasionally due to circumstances beyond DNALysis Biotechnology's control it may not be possible to obtain SNP specific results.

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