Results Overview

Post-exercise recovery rate
Your optimal training frequency is 5-6 workouts per week.

High Frequency

Set range
You respond well to a moderate number of sets.

Moderate Number

Rep range
You respond well to a moderate number of reps.

Moderate Number

Rest between sets
You will respond well to moderate-long rest periods.

Moderate - Long

Rep tempo
You respond well to a moderate to fast tempo.

Moderate - Fast

Lactate clearance and building muscle (MCT1)
You carry gene variants linked to reduced lactate clearance and a need for longer recovery times.

Slightly Reduced Clearance

Nitric oxide and muscle growth
Your gene variants are not hindering your ability to build muscle.

Average muscle growth

Inflammation and muscle growth (IL6)
Your genetics are mildly impairing your ability to build muscle.

Mildly impaired muscle growth

Muscle growth (IGF-1)
You have gene variants linked to reduced IGF-1 levels, which may make it harder for you to increase muscle mass.

Lower Growth

Muscle hypertrophy (mTOR)
Your gene variants are linked to an intermediate baseline level of mTOR.

Average Growth

Resistance training response (VEGFA)
You are a high responder to traditional resistance training.

Higher Responder

Caffeine responsivity and building muscle
Your genes suggest you could benefit from caffeine, but may reap less benefit than fast metabolisers.

Average Responder

Protein powder
Your lifestyle factors suggest you require standard doses of protein powder.

Standard Dose

Creatine supplementation response (MYLK1)

You carry one copy of the 'A' variant associated with greater improvements in strength and power when supplementing with creatine monohydrate.

Enhanced responder

BCAA metabolism and muscle building

You do not carry gene variants linked to reduced BCAA breakdown, which is beneficial for muscle growth.

Lower Risk

Post-exercise recovery rate

Muscle Building

How much rest should you take between workout sessions? Whenever we exercise, we expose our body to physical stress. Our heart is forced to pump harder, our muscle fibres need to generate greater forces, and our cell energy systems become taxed. If we repeatedly exercise, our body begins to compensate by laying down adaptations to these stressors. For example, in response to increased demands of our energy systems, we develop more mitochondria in muscle tissue and grow new blood vessels to supply muscles with oxygen and nutrients. Rest and recovery after exercise is crucial for forming these adaptations. With adequate rest, our bodies become more adept at dealing with the stress of exercise and our performance improves. If we train too frequently, however, we can stress our bodies excessively, causing overtraining, fatigue, and a greater risk of injury.In this trait we look at various lifestyle and genetic factors that affect how well you recover after exercise. You'll find out how long to rest and how to enhance recovery.

Your result

- High Frequenc
- Low Frequency
- Medium Frequency

Your optimal training frequency is 5-6 workouts per week.

Recovery after exercise is important for the repair and rebuilding of muscles, replenishment of energy stores, and the laying down of training adaptations that improve performance.

Lifestyle factors, such as your training intensity, age, diet, sleep quality and duration, current body composition, and alcohol use all affect how well you recover after workouts.

Genes that affect exercise-induced muscle damage and your body’s inflammatory response to exercise (e.g. ACTN3, CKM and IL-6) also influence recovery.

Genetic and lifestyle factors that prolong an inflammatory response to exercise may mean you need longer recovery times between workouts.

Your combined genetic and lifestyle data suggest you have a higher recovery rate.

This means you can recover more easily from a training session and require less recovery time between workouts.

A higher recovery rate may allow for a higher training frequency - i.e. you can work out more times per week.

Despite your higher recovery rate, it is still important to get adequate rest after workouts to maximise training benefits and avoid overtraining.

Recommended Actions

Don't train more than 3 days consecutively before having a rest day. Although your recovery rate is quicker than others, you should still look to include a rest day after 3 days of exercising to allow your body to proper recover, and optimise your training adaptations.

For maximising muscle growth, try to train each muscle group twice a week. Using a body-part split to organise your training will allow you to optimally stress each muscle group for muscular adaptations, while still providing enough time to recover in between.

Do some low-intensity cardio and use bodyweight exercises prior to exercising. Including these in your warm up raise your body temperature and activate your muscles, helping minimise the risk of injuries or excessive muscle damage.

Make sure you drink plenty of fluids in the 4 hours after exercise. You need to drink one and a half times the amount of fluid lost during exercise to help you rehydrate adequately. Dehydration following exercise can impair your recovery.

Make your own rehydration drink by mixing 200ml squash with 800ml water and add a large pinch of salt. Replacing lost fluids and electrolytes, particularly after long duration or high intensity workouts, are vital for optimal recovery.

Take 300-500 mg of Ashwagandha in one dose, or spread throughout the day. Ashwagandha has been shown to benefit recovery and muscle adaptions to strength training, potentially through it's anti-inflammatory effects.

If you are training on consecutive days be sure to re-fuel with enough carbs and protein, consuming a 3-4:1 ratio (for example, a couple of rice crackers with some peanut butter) alongside fluids. This will have a positive effect on your recovery and subsequent sessions.

Set range

Muscle Building

A set is a group of repetitions (reps) performed in one bout before a short rest. For example, a set of stiff-leg deadlifts might involve 10 deadlifts reps performed in succession with a rest at the end. Sets, along with reps and the percentage of your 1 rep max you lift, ultimately derive the amount of work you do during a weight lifting workout. For hypertrophy, the optimal range of sets in a workout can depend on both your genetics and training experience, with some people being more responsive to higher or lower set numbers.

Your result

- High Number
- Higher Number
- **Moderate Number**
- High & Low
- Low Number
- No Data

You respond well to a moderate number of sets.

A set is a group of exercise reps. For example, if you perform a bench press 10 times, rest, and go through that cycle twice more, this is considered 3 sets of bench press. Sets, along with reps and the weight you lift, are a major contributing factor to exercise load, which is the key driver of muscle hypertrophy.

On average, meta-analysis results have shown that 10-20 sets per muscle group per workout is the sweet spot. However, your genetics, which can impact your muscle fibre type propensities and lactate clearance properties of your tissues, can be used to determine a more targeted range.

We recommend you perform an average number of sets per week. Aim to do 12-18 sets per muscle group. This will be more impactful if split over more than one workout session in the week.

Your genetic profile is linked to a greater ability to generate and recruit a mix of muscle fibre types. However, you are more susceptible to the burn caused by lactate acidosis and

H+ ion build-up. This means you respond better to an average number of reps and sets.

It is important when performing the reps during these sets to concentrate on form. Do not add additional body movements into the lifts and make sure you are using a weight that enables you to finish your reps, but additionally feels like you are having to push hard, particularly on the last few sets.

If you do not meet your optimal numbers, you will still be building muscle. In the studies that documented 10-20 set sweet spots, individuals who performed 5-9 weekly sets exhibited 80% of the growth observed in the optimised participants.

For larger muscle groups, such as your chest, back, and legs it is important to do sets of exercises that target the different regions of that muscle. For example, your 15-25 sets should be split amongst exercises that engage the upper, middle, and lower portions of the chest. Some smaller muscle groups are worked during larger lifts, such as the triceps during a bench press. For these muscle groups, these lifts can contribute towards the weekly set numbers.

Recommended Actions

Aim to do 12-18 sets per muscle group. This will be the optimum range for you to maximise your muscle growth.

Use circuit training, including 4-5 exercises for 3-4 rounds. This will allow you to reach the higher set recommendations per muscle group while also helping improve your ability to clear lactate.

Stick to no more than 6 sets per exercise. Studies have shown that a plateau in muscular adaptations to exercise may occur with greater than 6 sets.

Use the upper end of your set range on compound exercises that target multiple muscles. These multi-joint exercises benefit more from higher weekly sets compared to lower weekly sets.

Perform two exercises back-to-back with minimal rests in your resistance training workouts. This type of training is called 'supersets' and can help create more metabolic stress, stimulating greater muscle growth. It can also help reach higher numbers of sets in a shorter period of time.

Rep range

Muscle Building

The term ‘rep’ is short for 'repetition' and describes one complete movement of an exercise. For example, one rep of a bicep curl would involve lifting the dumbbell from a starting position and then lowering it back again.A rep is the core component of resistance exercise. It is essential for building strength, muscle mass and improving bone density. How many reps you can perform is based on how heavy the weight is you are lifting, and understanding the trade of between the weight you lift and how many times you lift it can help you better optimise your workouts. For any person, there is no ‘perfect’ rep range, however, your genetics can impact how you respond to different rep ranges and loads associated with hypertrophy protocols.

Your result

- High Number
- Higher Number
- **Moderate Number**
- High & Low
- Low Number
- No Data

You respond well to a moderate number of reps.

Your optimal rep range is a moderate rep range. This rep range will help find the right blend of mechanical tension and metabolic stress to elicit a strong hypertrophic response.

There are two key processes that cause hypertrophy: mechanical tension and metabolic stress. Mechanical tension is the stress applied to a muscle through the lifting of heavy weights, while metabolic stress relates to how weightlifting challenges the metabolic and energetic properties of the muscle.

The number of repetitions you perform (i.e. the number of times you lift a weight in a set) can therefore differentially impact how you stimulate mechanical tension and metabolic stress.

As a rule of thumb, mechanical tension is increased when the weight becomes heavier, while metabolic stress can be

increased by performing higher repetitions with a lower weight.

Your genetics will impact your response to different repetition numbers, with fibre type composition, lactate threshold, lactate clearance potential, and inflammatory processes all impacting your ability to deal with increased mechanical tension and metabolic stress.

Your ability to perform better at the lower ranges that utilise more mechanical tension will be impacted by your strength potential. Your ability to cope better with higher ranges will be impacted by your muscle endurance capability.

You have a genetic profile that is linked to a greater ability to generate and recruit a mix of muscle fibre types. Variants of individual genes, including ACTN3, ACE, AGTR2, HIFA, and VEGFR, have been linked to differences in muscle fibre composition. Higher rep ranges will better train Type I fibres, whilst still subjecting your Type II fibres (those associated with power) to the mechanical tension required for hypertrophy.

You may be more susceptible to the burn caused by lactate acidosis and H+ ion build-up. This is due to the presence of variants in the monocarboxylate transporters (MCTs) that reduce the clearance of these metabolites. This means that at the highest rep ranges you may feel more discomfort, potentially reducing the amounts of mechanical stress in each set.

Using your rep range as a guide will allow you to optimise your workouts and maximise the amount of hard work per workout you can manage each week. This will help reduce the risk of burnout, injury and fatigue so you can maintain resistance exercise as part of your long-term health regime.

Recommended Actions

Use 8-12 reps per set for the majority of your training. This is likely to be the most beneficial rep range for stimulating muscle growth for you.

Use a load that is greater than 30% of your 1RM (the maximum weight you can lift once). Studies have shown that loads at 30% 1RM can elicit similar results to loads of 80% 1RM within your recommended rep ranges.

Supplement with 5 g of creatine monohydrate post-workout. Creatine can help improve your lactate clearance and boost muscle growth.

Use 8-10 reps for compound exercises (squats, deadlifts, bench press for example) in one workout a week. This will allow you to stimulate increased muscle strength alongside muscle size.

Use 10-12 reps for a few exercises each week. This will allow you to stimulate increased muscular endurance alongside muscle size.

If using lower rep ranges in a workout, supplement with 1-3 g of HMB (Beta-Hydroxy Beta-Methylbutyrate), 60-30 mins before the workout. HMB has been shown to help improve recovery post-exercise by reducing markers of exercise-induced muscle damage - lower rep ranges are more likely to induce greater mechanical stress and muscle damage.

Rest between sets

Muscle Building

Inter-set rests are a key variable of resistance training as it can influence fatigue, muscle recovery, duration of training sessions, and the main goal of training whether that be hypertrophy, strength or muscular endurance. Having sufficient rest periods between sets allows for lactic acid to clear and oxygen to be replenished to your muscles. For hypertrophy, the optimal rest period between sets in a workout can depend on both your genetics and training experience, with some people being more responsive to shorter or longer recovery times.

Your result

- Shorter
- Short - Moderate
- **Moderate - Long**
- Moderate
- Mixture
- Longer
- No data

You will respond well to moderate-long rest periods.

You should use an average length rest period in your hypertrophy training. This will allow you to recover adequately between sets.

There are two key processes that impact the rest time you need to take after each set: volume and metabolic stress. Volume is the work performed when completing the sets. In essence, it is the weight lifted multiplied by the number of reps. Metabolic stress relates to how weightlifting challenges the metabolic and energetic properties of the muscle.

Shorter rest times can increase the metabolic stress in the muscle, as it increases lactate acidosis and H+ ion build-up. However, the build-up of these metabolites can make it harder to complete your reps or may lead you to opt for slightly lighter weights. These factors will lower training volume, reducing the hypertrophy impact.

Your genetic profile is linked to a greater ability to generate and recruit a mix of muscle fibre types. However, you are

more susceptible to the burn caused by lactate acidosis and H+ ion build-up. This means you respond better to an average number of reps and sets.

When performing your optimal workout, which involves heavier weights and moderate rep numbers, you should look to have a rest time of around 2-3 minutes after each set. Leave 3 minutes after larger compound exercises such as bench presses and squats, and around 2 minutes for smaller muscle groups.

As a rule of thumb, if you increase the percentage of your 1 rep max (1RM) you lift during your set (which will undoubtedly impact your rep number) you should also increase your rest time. For exercises that are over 80% of your 1RM, you should be looking at more of a range of 2-4 minutes.

Incorporating good rest times will allow you to optimise the time spent during your workouts and maximise the amount of hard work per workout you can manage each week. This will help reduce the risk of burnout, injury and fatigue so you can maintain resistance exercise as part of your long-term health regime.

Recommended Actions

For compound exercises like squats, rest for 3 minutes between sets. This will allow you to recover adequately to optimally perform your subsequent sets. This will help to induce greater muscle hypertrophy.

For small muscle groups, rest for 2 minutes between sets. This will allow you to recover adequately to optimally perform your subsequent sets. This will help to induce greater muscle hypertrophy.

If using a weight that is 80% or more of your maximum weight (1RM), use a rest period of 2-4 minutes between sets. Heavier weights will cause greater mechanical and neurological stress so longer rest periods are required to allow sufficient time for these aspects of your physiology to recover. This will minimise drops in performance in the following sets.

Try using cluster sets for a few exercises a week. Cluster sets involve interspersing a set with small inter-set rests. For example, complete 3 reps followed by 20 seconds rest, and then complete another 3 reps. Interspersing rest within your sets can help minimise the reduction in force output throughout the reps. This could be useful for you in particular as you have poorer lactate clearance but may benefit from higher rep ranges.

Try some mental imagery (visualising doing the exercise with the correct form) during your rest periods. This can help to mentally prepare you for your next set and also increase mind-muscle connections, which have been shown to improve muscle activation during exercises.

Avoid scrolling through your phone during your rest periods. This habit can lead to distractions that cause you to rest longer than required. It can also contribute to mental fatigue which could negatively impact performance in subsequent sets.

Use your rest periods to record and track your progress. Keeping a record of the weights you are using will allow for more efficient future workouts and facilitate progress. If you are going to grab your phone between sets, do it to note down what weight you're lifting!

If trying to lose weight, get walking during your rest periods. Instead of just sitting between sets, you could get in some steps to actively recover and help increase your energy expenditure.

Rep tempo

Muscle Building

Tempo is the speed at which you perform the repetition (rep) of an exercise. It is often described using 4 numbers – such as 2-0-1-0. The first number (2) describes the time in seconds of the eccentric portion of the exercise. This is the part of the exercise where the weight is lowered or in decent. The third number (1) describes the time in seconds of the concentric portion of the exercise. This is the part of the exercise where the weight is lifted or is being pushed. The second and fourth numbers are the pause times the 'bottom' and 'top' of the exercise. Although there is no evidence that any one particular tempo is more beneficial for hypertrophy, understanding how your biology impacts your muscle physiology and recovery can help to determine a good starting tempo that will set you up to get the most out of the reps, sets, and loads you are lifting.

Your result

- Slow - Moderate
- **Moderate - Fast**
- Slow - Fast
- No Data

You respond well to a moderate to fast tempo.

You will respond well to a range of tempos, however slightly faster tempos, such as 2-0-1-0, will enable you complete your full range of exercises and maximise muscle hypertrophy.

For a tempo of 2-0-1-0, you would lower the bar during a chest press or lower down during squats for 2 seconds. You would not pause at the bottom of the exercise and then drive the bar up for 1 second, before starting the next rep without a pause.

Along with reps and set numbers, your tempo can impact the time your muscles are under tension, impacting the mechanical tension and metabolic stresses that ultimately drive muscle hypertrophy. There are many ways tempo can be altered, however, someone's propensities to different fibre

type compositions or variations in lactate clearance potential can inform how best to structure your tempo.

Tempos that are too quick can limit the amount of time under tension, and cause you to lose form or stability during the lift. Tempos that are too slow lead to a build-up of metabolites such as lactate, and H+ ions, which can make completing all your reps difficult. Moreover, studies show that tempos over 6 seconds (4-0-3-0, for example) are generally suboptimal when the aim is hypertrophy.

You have a genetic profile that is linked to a greater ability to generate and recruit a mix of muscle fibre types (those associated with both power and endurance). A range of tempos can therefore be utilised to stimulate your Type I and Type II fibres.

As your lactate clearance is reduced, tempos that are too slow can increase the build-up of lactate, causing feelings of discomfort. This can lead you to fail to complete the desired rep number, reducing the required time under tension to optimally stimulate muscle growth. Studies have shown that tempos over 6 seconds are suboptimal for hypertrophy.

To maximise the impact of your workouts we recommend a slower movement in the eccentric phase of the exercise with a faster movement during the concentric phase of the lift.

Recommended Actions

Avoid repetitions lasting more than 6 seconds. Studies have shown that there appears to be no added benefits from prolonged repetitions, and they can limit reaching your recommended total reps and sets.

Use a tempo of 2-0-1-0 for the majority of your exercises. Slowing down the eccentric phase of exercises will benefit muscle growth, but not using too slow a tempo will be better for you due to slower lactate clearance.

Supplement with 5-10 g of BCAA 30 minutes before a workout. BCAA supplementation has been shown to help keep lactate levels lower, which can allow you to cope better with slower tempos.

Lactate clearance and building muscle (MCT1)

Muscle Building

Should you rest longer between sets?Lactic acid, the much-maligned byproduct of anaerobic respiration by muscles, is often thought to cause soreness, 'burning' feelings, and fatigue during intense exercise. This isn't strictly true: lactic acid quickly splits up into lactate and hydrogen ions, and it is the latter (rather than lactate) that can cause burning sensations and muscle fatigue if allowed to accumulate. Luckily, our muscle fibres have specialised transport proteins, known as monocarboxylate transporters (MCTs), which help to remove hydrogen ions (along with lactate) out of the bloodstream. This prevents muscle fatigue and allows lactate to be reused as an energy source by muscles. The rate at which we clear hydrogen ions and lactate, however, affects how quickly our muscles fatigue during intense exertion. This, in turn, influences how long we should rest between sets.In this trait, we look at variants of a gene encoding one particular monocarboxylate transporter, MCT1, with one variant linked to reduced lactate clearance and longer recovery times.

Your result

Slightly Reduced Clearanc

You carry gene variants linked to reduced lactate clearance and a need for longer recovery times.

Reduced Lactate Clearance

Increased Lactate Clearance

No Data

During intense exercise, levels of lactate and acidic hydrogen (H+) ions rise in the bloodstream. This can create an acidic (low pH) environment for muscle cells, leading to muscle fatigue and reductions in strength and power.

MCT1 is a protein that removes lactate and H+ ions from the bloodstream, thereby regulating pH and preventing muscle fatigue. MCT1 also shuttles lactate back into slow-twitch

muscle fibres to be reused for energy, helping muscle performance.

The Asp (A) (rs1049434) variant of the MCT1 gene is associated with a 60-65% reduction in lactate clearance, leading to higher blood lactate concentrations during resistance exercise. This can lead to quicker muscle fatigue and the need for greater rest periods.

Endurance, sprint, and resistance exercise are all shown to increase MCT1 production by between 18 and 90%. Your training levels therefore affect the rate at which you can clear lactate.

You carry one copy of the Asp (A) variant linked to reduced lactate clearance and higher blood lactate levels during exercise. Your MCT1 genotype is Asp/Glu (AT).

Some small studies have shown that men with your genotype (Asp/Glu) have moderately higher blood lactate concentrations (compared to non-carriers of the Asp variant) during circuit training exercises at 70% of 15RM (15-rep-max).

Slightly higher blood lactate levels may mean you need more recovery time in between exercise bouts.

Your lifestyle data suggest you are physically active. This can help compensate for your MCT1 genotype by increasing MCT1 protein production in muscle and enhancing lactate clearance.

Lactate in the bloodstream may also act as a stimulus for hypertrophy. Slightly higher blood lactate concentrations in your genotype may therefore possibly assist longer term muscle gains.

Recommended Actions

Use moderate rest periods of 60-90 seconds between sets. As you clear lactate slightly slower, you will need more time between sets to recover to avoid impairment of subsequent performance.

Add some core stability exercises into your cool down such as bird dogs and glute bridges. Studies have found that including these at the end of a high-intensity workout helps increase lactate removal, either through increased blood flow or enhanced lactate uptake by the core muscles.

Cool down following high-intensity sessions using some low-intensity activity and stretching. Keeping the body moving but at a lower intensity will allow more lactate to be removed, and reduce feelings of fatigue.

If wanting to maximise metabolic stress, add some supersets into your workouts. Supersets - completing two exercises back-to-back with minimal rest - will increase lactate production and activate hypertrophic signalling, leading to muscle growth.

Slow down the eccentric (lowering) portions of some exercises during a workout. Slowing down this part of the movement will increase time under tension, and can increase the metabolic stress experienced by the muscle to induce greater hypertrophic signalling.

Consider supplementing with creatine when training. Creatine has been shown to help with lactate clearance and is also known to help increase muscle strength.

Consider adding kefir to your diet. Kefir has been found to help reduce the production of lactic acid after exercise and accelerate recovery.

Nitric oxide and muscle growth

Muscle Building

Bigger muscles are one of the more conspicuous and sought-after adaptations to sustained exercise training, particularly resistance exercise. In response to mechanical and metabolic stress caused by regular activity, our muscle fibres increase their cross-sectional area and produce more contractile proteins, becoming larger and stronger. Larger and stronger muscles, however, also have higher energy demands. They require greater amounts of oxygen and nutrients to generate more forceful or prolonged contractions. Accordingly, a less outwardly noticeable adaptation to training is improved blood supply to muscles. In addition to increasing the number of blood capillaries supplying a trained muscle, our body also becomes more adept at dilating arteries (vasodilation) to enhance blood flow to muscles during and after exercise. A key molecule involved in both these adaptations is nitric oxide (NO). Our genetics can influence how effectively we produce NO, which, in turn, may affect our potential to gain muscle mass and improve blood flow to exercising muscle. In this trait we look at NOS3 gene variants that affect the activity of eNOS, one of the enzymes that produces NO. Based on your result, we give you recommendations on how to improve NO production to optimise muscle growth and blood supply.

Your result

Reduced muscle growth

Average muscle growth

Enhanced muscle growth

No Data

Your gene variants are not hindering your ability to build muscle.

Nitric oxide (NO) is a signalling molecule released from nerves and the lining of blood vessels. It acts to dilate arteries and improve blood flow to muscles.

Nitric oxide (NO) also stimulates increases in muscle size and strength (hypertrophy). This is because NO activates satellite

cells, which multiply and then fuse with muscle fibres, causing fibres to enlarge and become stronger.

The 'C' variant (rs2070744) of the NOS3 gene causes lower production of NO from blood vessel linings. This may reduce NO-signaling in muscle, potentially leading to lower muscle gains in response to training.

By contrast, the 'T' variant causes relatively higher NO production, which may enhance muscle growth. Studies have found that the 'T' variant is more frequently carried by elite power and strength athletes.

Variants of the NOS3 gene have also been shown to affect how well you dilate blood vessels in response to resistance vs endurance training.

You carry one copy of the 'T' variant linked to higher NO production and potentially greater muscle growth. Your NOS3 (rs2070744) genotype is CT.

Your genotype may be beneficial for power activities involving sprinting, jumping, and throwing. One study of Spanish athletes found that power athletes were more likely to carry the 'T' variant compared to endurance athletes and non-athletic controls.

You may have better baseline blood flow to muscles. One study found your genotype (CT) to have greater dilation of blood vessels supplying the forearm during a handgrip exercise.

Resistance training in particular may improve blood flow to your muscles. One study found that people with your genotype (CT) tended to improve blood flow with resistance exercise rather than endurance training. This may be due to a relatively greater capacity to increase NO production and dilate blood vessels in response to higher blood pressures

generated during resistance exercise, rather than the forces (shear stress) of increased blood flow during endurance exercise.

Recommended Actions

Consume 400 mg of nitrates a day to enhance resistance exercise performance. Studies have shown some promising effects of regularly consuming nitrate containing foods or drinks such as beetroot juice, potentially through the increase in nitric oxide activity.

Add more beetroots and radishes to your meals. These vegetables are rich natural sources of nitrates which will help to increase your nitric oxide levels, and benefit your ability to build muscle.

Treat yourself to a piece of dark chocolate (at least 70% cocoa) every now and again. Flavanols, found in dark chocolate can increase nitric oxide bioavailability. As little as 6.3 g of dark chocolate a day has been shown to increase nitric oxide levels.

Add spinach to your curries, stews and sandwiches. Spinach is a rich natural source of nitrate which helps to boost your nitric oxide levels.

Aim to perform 1-2 high intensity interval training (HIIT) workouts a week. High intensity exercise has been shown to increase the bioavailability of nitric oxide which will benefit your ability to build muscle.

Perform 5-10 minute bodyweight workouts such as 8-10 reps of squats and lunges, to break up your day. Low intensity resistance exercise like bodyweight based activities have been shown to be an effective way to increase resting nitric oxide levels.

Eat tomatoes, broccoli, peppers and kale. These are great food sources of Vitamin C. Vitamin C has been shown to help boost nitric oxide availability.

Add a handful of blueberries to your breakfast. Blueberries are rich in polyphenols which can help boost nitric oxide bioavailability as well as reduce the risk of high levels of inflammation which can impair the benefits of nitric oxide.

Have a cup of green tea in the morning. Extracts of green tea have been shown to increase nitric oxide production in human blood vessel cells.

If you don't eat a lot of meat/fish, you may wish to supplement with L-arginine. L-arginine is an amino acid that helps to make protein and form nitric oxide. Supplementing L-arginine will help to increase nitric oxide levels and protein to aid muscle building.

Make sure to get the recommended amount of iron each day (around 8 mg for men and 18 mg for women). This can be gained through foods such as spinach, dark chocolate and soybeans. Iron deficiency can lead to a reduction in NOS activity.

Try whey protein for your post-workout drink. Whey protein may increase nitric oxide production and bioavailability and can promote muscle/strength gain.

Inflammation and muscle growth (IL6)

Muscle Building

Gaining strength is all about stress, or more accurately, the right amount of stress. Whenever we perform a deadlift, bicep curl, or push up, we subject our muscles to mechanical and metabolic stress. In response, specialised stem cells in our muscles, known as satellite cells, become activated, multiply in number, and then fuse into muscle fibres, making larger and more laden with contractile proteins. The result: increased muscular strength.One of the key molecules to activate satellite cells and stimulate muscle growth is interleukin-6 (IL-6). This signalling molecule is secreted by skeletal muscle during exercise and, in addition to stimulating satellite cells to repair, remodel, and develop muscle tissue, acts to suppress inflammation, creating a beneficial cell environment for muscle growth.IL-6, however, can also promote chronic inflammation in some contexts, which can impair muscle growth. Chronic inflammation caused by high resting levels of IL-6, which is also secreted by immune cells, blood vessel walls, and fat tissue, subjects our muscle cells to excessive metabolic stress over time. This, in turn, leads to breakdown of muscle tissue, creates a poorer environment for muscle growth, and limits potential strength gains.In this trait, we look at variants of your IL-6 and IL-6 receptor genes. By altering the balance of satellite cell activation and inflammation, these gene variants can affect your propensity to gain strength in response to training.

Your result

Severely impaired muscle growth

Moderately impaired muscle growth

Your genetics are mildly impairing your ability to build muscle.

Interleukin-6 (IL-6) is a myokine: a signalling molecule released by skeletal muscle. It plays a role in regulating inflammation and muscle growth after exercise.

- **Mildly impaired muscle growth**
- Impaired muscle growth
- Mildly enhanced muscle growth
- Average muscle growth
- Enhanced muscle growth
- No Data

In young, healthy individuals, activity of IL-6 during and shortly after exercise may enhance muscle growth. This is because IL-6 stimulates the development of satellite cells, which help to repair, remodel, and enlarge muscle fibres.

Higher resting levels of IL-6 over time, however, can promote chronic inflammation, which can lead to breakdown of muscle tissue and impaired muscle growth. This is particularly true in those with risk factors for chronic inflammation (e.g. low levels of physical activity, high BMI, older age and smoking).

Variants of the IL-6 and IL-6 receptor genes can either enhance or impair muscle growth, by influencing both IL-6 activity during exercise and IL-6 levels at rest.

Your combined IL6 and IL-6 receptor (IL6R) gene variants are likely to mildly impair muscle growth.

You carry the 'C' variant (rs2228145) of the IL-6R gene, which has been linked to higher resting IL-6 levels. This can promote chronic inflammation and impair muscle growth.

Furthermore, your combined gene variants do not significantly enhance repair and remodelling of muscle tissue by promoting IL-6 activity during and after exercise.

The effect of your IL6 and IL6R variants on muscle growth strongly depend on your lifestyle. Being inactive, gaining excess fat tissue, and smoking can all further impair muscle growth by elevating resting IL-6 levels and promoting chronic inflammation.

By contrast, a healthy lifestyle is widely shown to reduce resting IL-6 levels and chronic inflammation, which can help improve muscle growth.

Recommended Actions

If performing aerobic and strength training on the same day, do your aerobic exercise at the start of the day and your strength training later in the day. 'Interference' caused from performing aerobic exercise after strength training can lead to impaired satellite cell activation, which can reduce muscle growth.

If wanting to stimulate greater IL-6 levels following exercise, add on an extra exercise to your strength workout. Studies have shown IL-6 levels are influenced by exercise duration so you may need to train longer to get an increase in IL-6 that can trigger increased muscle growth.

Make sure to get enough zinc in your diet (11 mg for men and 8 mg for women per day) through foods such as shellfish, seeds and legumes. Zinc deficiency can increase resting IL-6 levels so making sure you are consuming enough zinc can prevent chronic inflammation and aid muscle building.

Take 5 g of creatine monohydrate post-workout. Creatine has been extensively shown to help increase muscle strength when combined with resistance training, with studies also demonstrating reductions in inflammation from its supplementation.

Train at higher intensities by lifting heavier loads or having less rest between exercises. Exercise intensity has a significant impact on IL-6 levels; for shorter workouts focus on keeping the intensity high.

Perform two exercises back-to-back with minimal rests within your resistance training. This type of training is called 'supersets' and can help build greater metabolic stress, stimulating greater muscle growth through a different pathway to the acute increases in IL-6.

Consume 20 g of protein (for example, a scoop of protein powder or 3 eggs) in your post-exercise meal to maximise satellite cell activation. Activating satellite cells in the muscle will drive muscle growth and repair following exercise.

Finish your strength workouts with 4-6 minutes of high intensity activity like battle ropes. This can help extend the duration of your workout but also adds elements of high intensity which can elevate IL-6 levels further.

Muscle growth (IGF-1)

Muscle Building

IGF-1 (insulin-like growth factor 1) is a hormone that promotes the growth of muscle, bone and other tissue. This trait analyzes your circulating levels of IGF-1, which influences how effectively you build muscle and improve body composition in response to exercise. Your circulating levels of IGF-1, which are partly affected by variants of your IGF-1 gene, also play a role in ageing, longevity of cells and your tissues' sensitivity to insulin.

Your result

- Higher Growth
- **Lower Growth**
- Above Average
- Average Growth

You have gene variants linked to reduced IGF-1 levels, which may make it harder for you to increase muscle mass.

Insulin-like growth factor (IGF-1) is a hormone that mediates the effects of growth hormone (GH). It therefore has a very important role in the growth of the cells in the body, including muscle cells.

IGF-1 level is tightly controlled during development and through life. Having high or low levels can have both positive and negative effects, depending on your lifestyle and goals.

You have genetic variants that predispose you to having reduced IGF-1 levels

Reduced IGF-1 level will make it harder for you to increase muscle mass and strength. These issues can be mitigated, as IGF-1 levels can be increased by following your actions.

Lower IGF-1 is linked to increased longevity. This relationship is complex, and to benefit you should always look to reduce body fat and stress.

IGF-1 also is known to reduce with age. Boosting levels is therefore very important if you are over 50.

Recommended Actions

Ensure that you are consuming enough dietary protein. Adequate protein consumption increases serum levels of IGF-1.

Eating in a calorie deficit for a prolonged period of time can decrease IGF-1 levels. To increase IGF-1 levels take in an adequate amount of energy (calories) in relation to how much you expend each day.

Eat foods high in selenium, such as brazil nuts, shellfish, eggs and mushrooms. Selenium levels have been shown to have a positive association with IGF-1 serum levels.

Try taking a daily collagen supplement. Some research has found increased IGF-1 levels with collagen intake - this may be beneficial when combined with resistance training to increase muscle strength.

Moderate your alcohol intake, and opt for low-alcohol alternatives. Too much alcohol can negatively influence your IGF-1 levels, particularly consumption around training days.

Try occasionally having a 30-minute dry sauna session. Increasing your body temperature in this way has been shown to increase IGF-1 levels.

Eat foods high in antioxidants, such as berries, tea and soybeans. Antioxidants are molecules that can prevent certain types of cell damage and lower inflammation.

Improve your sleep hygiene to help improve IGF-1 expression. The highest levels of IGF-1 are at night during your deep sleep phase, aim to get 7-9 hours of quality sleep each night.

Perform regular bouts of strength and sprint training with progressing levels of intensity. Strength and sprint training influences the increase of IGF-1 production.

Muscle hypertrophy (mTOR)

Muscle Building

Protein synthesis is the process by which cells in our body produce new proteins. When muscles generate new proteins at a greater rate than they break them down, they increase in size. We call this “hypertrophy”. Protein synthesis is therefore extremely important if you're looking to build muscle. This trait focuses on a key molecule that regulates protein synthesis: mTOR. mTOR acts as a sensor of nutrient availability, growth factors and other cell conditions and switches on protein (and fat) production in response. mTOR also plays a role in the ageing process, by regulating the breakdown and renewal of damaged cell components.Variants of your MTOR gene, which encodes the mTOR protein, affect how effectively you build muscle and accumulate fat, as well as how quickly your cells age.

Your result

Higher Growth

Lower Growth

Average Growth

Your gene variants are linked to an intermediate baseline level of mTOR.

mTOR regulates protein synthesis in response to amino acid and glucose uptake. Protein synthesis is a cornerstone of cellular function and is essential for growth and metabolism.

You have a moderate baseline level of mTOR.

mTOR activity is very important for building muscle. However, it can also promote the build-up of fat, and reduce the activity of cellular processes that prolong lifespan.

How you think about mTOR depends very much on your goal. You should therefore look to optimize your level for each case.

With a moderate level, transiently increasing mTOR levels can help you optimize muscle building.

It is important, however, not to constantly activate mTOR; chronic activation is linked to metabolic issues and premature ageing.

Recommended Actions

Testosterone is a key hormone for muscle growth through protein synthesis. See your testosterone trait for the best actions for you to keep your level healthy.

Perform strength training at least 2 times a week. Strength training will utilise your high mTOR level allowing you to build muscle and strength more effectively.

Make sure to consume at least 0.8 g of protein per kg of body weight each day. For example, an individual who is 60 kg needs to have at least 48 g of protein each day. This will help optimise protein synthesis.

Consume foods rich in omega-3 at least twice a week. Oily fish such as salmon, mackerel and tuna contain EPA and DHA which can increase the activation of mTOR signalling having a positive impact on muscle protein synthesis.

Green tea can suppress mTOR activity, so if focusing on muscle growth, avoid taking near training. If not in conflict with other actions, still look to drink green tea at other times as it will assist in limiting a chronically elevated mTOR level.

Take 400 mg of curcumin, with 10 mg of piperine to aid absorption, daily. Curcumin inhibits mTOR activity which is beneficial for ageing.

Try intermittent fasting, with a fasting period of at least 12 hours. Periods of fasting will assist in limiting chronic elevations of mTOR which are associated with ageing and disease states.

Resistance training response (VEGFA)

Muscle Building

If you've ever looked closely at a cut of red meat, you'll have noticed that it is interwoven with white, fibrous or stringy tissue containing collagen and other structural proteins. This is connective tissue. Similarly, if you were to study your own skeletal muscles under a microscope, and then slowly zoom out, you'll see that your individual muscle fibres, fascicles (bundles of muscle fibres), and entire muscles are all wrapped in layers of connective tissue. These various layers of connective tissue, which are known as the extracellular matrix (ECM) of skeletal muscle, not only play an important role in the growth, development and regeneration of muscle fibres, but also help them to transmit force. It is thought that remodelling of connective tissue/ECM following resistance exercise allows our muscles to transmit greater forces, which contributes to gains in strength. Our capacity to remodel connective tissue and thereby gain strength after resistance training, however, differs from person to person. In this trait, we tell you whether you're likely to experience greater or lesser strength gains in response to resistance training based on variants of your VEGFA gene, a key gene involved in connective tissue remodelling.

Your result

Low responder

Higher Respond

No data

You are a high responder to traditional resistance training.

Some people respond better than others to resistance (strength) training. This variability in response is influenced by our genetics, which affect how effectively our muscles develop training adaptations.

People with the 'GG' genotype (rs2010963) of the VEGFA gene are 'high responders'. They show greater improvements in leg strength following resistance training compared to 'low

responders', who carry the 'C' variant (GC and CC genotypes).

High responders (GG genotype) also respond better to resistance training compared to endurance training. This difference, however, is not observed in low responders (GC and CC genotypes).

High responders may more effectively remodel connective tissue surrounding muscle in response to mechanical loading. This may lead to larger strength gains following resistance training.

You are a high responder to resistance training. Your VEGFA (rs2010963) genotype is GG.

You may experience greater strength gains in response to resistance training. One study found that high responders (GG genotype) improved their maximum knee extension strength roughly twice as much as low responders (GC and CC genotypes) following 4 weeks of resistance training.

You may more effectively remodel muscle connective tissue (extracellular matrix) in response to resistance training. Remodelling of connective tissue allows greater transmission of force by muscle fibres, contributing to strength gains.

You may find you are more responsive to resistance over endurance training. One cross-over study found that high responders (GG genotype) had relatively larger gains in strength following resistance training compared to improvements in VO2max after endurance training.

Your VEGFA genotype (GG) is not associated with elite endurance performance. By contrast, studies have found that the 'C' variant is overrepresented in elite endurance athletes.

Recommended Actions

Perform weight-bearing (resistance) exercise 3 times a week at a load of at least 75% of your 1-rep max (1RM). Studies have shown your genotype are more likely to respond to this structure of resistance training in terms of increased force production.

Perform exercises for at least 3 sets, and aim to complete 10 sets per week per muscle group (for example chest, shoulders, back, hamstrings). Hitting this minimum number of sets is needed to optimally induce muscle adaptations in response to resistance training.

Try some blood flow restriction training in 2 workouts a week, working at 20-50% 1RM. This training technique uses a cuff to reduce the amount of blood flow to a particular area while you carry out low-intensity exercise. This more advanced form of training can further enhance muscle growth.

Look to be close to failure when completing your reps each set. Your final reps should feel quite difficult. This will maximise the mechanical and metabolic stress on the muscle, to induce greater muscular adaptations.

Try the rest-pause method for your resistance training, where you train to failure with short rest periods. An example of this method is to perform a set at 80% of your 1RM to failure, have a 20-second rest interval then carry out another set until failure, repeating this until you reach 18 repetitions. The rest-pause method can maximise muscular endurance and hypertrophy.

Add some meat and shellfish to your diet. These are rich in zinc and protein, which are both important components in the process of remodelling connective tissue. This can further aid strength gains.

Bulk out your meals with lentils or chickpeas. These are rich sources of plant-based proteins which can aid the remodelling of connective tissue and help induce greater protein synthesis, leading to further increases in strength.

Caffeine responsivity and building muscle

Muscle Building

Could caffeine help you build muscle? Caffeine is a well-established ‘ergogenic aid’ - a substance that enhances physical performance. Predominantly by stimulating our central nervous system, caffeine helps to activate muscles (motor unit recruitment), reduce perceived effort so that exercise feels easier, and also lessen our feelings of muscle pain and fatigue. Depending on how we metabolise and respond to caffeine, however, some of us stand to gain greater strength-training benefits from taking caffeine than others. “Fast metabolisers”, who break down caffeine more quickly, may experience greater improvements in muscle strength and endurance compared to “slow metabolisers”. Sleep and psychological wellbeing, however, are also crucial for strength-training and building muscle. If you're highly sensitive to caffeine, any performance benefits of caffeinated drinks, gels, and chewing gums may be counteracted by feelings of anxiety and difficulty sleeping.In this trait, we look at variants of your CYP1A2 and ADORA2A gene that affect caffeine metabolism and sensitivity, respectively. You'll find out your optimal dose of caffeine, when to take it, when to avoid it, and other tips to get the most out of caffeine for your strength-training workouts.

Your result

Average Respond

Increased Responder

No Data

Your genes suggest you could benefit from caffeine, but may reap less benefit than fast metabolisers.

Caffeine, when taken pre-workout, has been shown to benefit muscular strength, endurance, and power.

The benefits of caffeine on strength training performance depend partly on how quickly we metabolise caffeine. This, in

turn, is strongly influenced by variants of our CYP1A2 gene.

Fast metabolisers (i.e those with CYP1A2 (rs762551) AA genotype) break down caffeine more quickly to generate paraxanthine - a caffeine metabolite that can enhance strength performance. Fast metabolisers may therefore reap greater training benefits from consuming caffeine.

Some of us, however, may be more prone to anxiety and insomnia when taking caffeine, which can impair strength training performance and recovery. Variants of our ADORA2A (adenosine A2A receptor) gene strongly affect our sensitivity to caffeine.

You are classified as an "intermediate metaboliser". This means you break down caffeine less quickly than fast metabolisers, but more quickly than slow metabolisers. Your CYP1A2 (rs762551) genotype is AC.

Some small studies suggest that you may experience less improvement in muscle endurance when taking caffeine. One study found that intermediate (and slow) metabolisers did not improve their number of bench press, leg press, shoulder press and seated cable row reps one hour after consuming caffeine (6 mg/kg bodyweight).

Some evidence suggests that you may also gain less benefit from caffeine on ballistic movements such as jumping and throwing. For example, a small study of handball players found that caffeine (3 mg/kg bodyweight) did not affect throwing velocity in intermediate and slow metabolisers.

You are classified as having "low sensitivity" to caffeine based on variants of your ADORA2A gene. This means that you are less susceptible to anxiety and insomnia when consuming caffeine.

Taken together, your CYP1A2 and ADORA2A variants suggest you could benefit from taking caffeine for building muscle, but may reap less improvements compared to fast metabolisers.

A dose of 3-6 mg / kg bodyweight of caffeine is widely shown to improve 1-repetition maximum (1RM), measures of isometric and isokinetic strength, and can help delay muscle fatigue.

Recommended Actions

Use 3-6 mg/kg of caffeine preworkout. Research has shown this range of dose before a resistance workout allows more sets to be completed, aiding muscle growth and strength.

Consume caffeine 60 mins before exercise. This is the ideal period for maximising performance benefits during your workout, based on ISSN guidelines.

Avoid caffeine at least 4 hours before going to sleep. Caffeine can negatively impact your sleep quality, and poor sleep can impair muscle adaptations from exercise.

Do not consume more than 9 mg/kg of caffeine per day. There is an increased risk of side effects such as insomnia and cardiovascular impacts when more than this amount is consumed daily.

Fill half your plate with vegetables like broccoli and kale. These are classed as 'Brassica' vegetables which have been shown to increase the rate at which caffeine is metabolised.

Before carrying out high intensity exercise, consider taking caffeine with a carbohydrate source. Caffeine co-ingested with carbohydrate has been shown to improve high intensity/sprint performance, which can lead to greater muscular benefits.

Combine caffeine and creatine supplementation preworkout. Caffeine alongside creatine has been shown to be even more effective than just taking creatine for high intensity performance.

Protein powder

Muscle Building

Protein powders are the world's most popular fitness supplement, with multiple types available. They are a convenient way to help you reach your daily protein requirement if you can't meet this through whole foods. Studies show that protein powders can enhance fitness gains from exercise.

Your result

Increased Dose

Standard Dose

Your lifestyle factors suggest you require standard doses of protein powder.

Protein powder is a convenient way to quickly consume protein post-workout which stimulates muscle growth/repair.

You need at least 0.24 g of protein powder per kg body weight to maximize your muscle building/recovery response post-workout.

Whey protein powders are best for you. They are quickly absorbed and are a complete protein i.e. whey contains all essential amino acids (EAAs) required by the body.

Get the majority of your daily protein intake from whole foods, but make use of the quick action of protein powders by consuming them immediately post-workout. This is useful for more effective recovery, building muscle and fuelling fat loss.

Fast acting protein powders, such as whey isolate and soy isolate, are ideal post-workout protein sources. Slow releasing proteins such as pea and casein are best to boost satiety and aid muscle recovery during sleep.

If working out at a high intensity and/or doing cardio for more than 45 minutes, combine carbohydrates with protein for your post-workout nutrition.

Recommended Actions

Use protein powders to increase your protein intake and to help boost your metabolism, maintain muscle and lose fat. Do not solely depend upon them, however: try to get the majority of your daily protein from foods such as meat, eggs and fish.

Use at least 15 g of whey protein to increase satiety (feelings of fullness), helping you to reduce your total food intake.

Aim to have either a complete protein (for example, whey or soy) or pair two incomplete protein powder sources (for example, rice, hemp and pea). Complete protein sources contain all 9 essential amino acids (EAAs). EAAs cannot be produced by the body and must be consumed from your diet.

For intense periods of working out, especially if losing fat, compliment your protein intake with BCAAs (Branched Chain Amino Acids), as these can stimulate muscle growth and delay fatigue.

Use 0. 24 g/kg body weight of protein powder around workouts, especially post-workout, as a convenient source of protein to boost your muscle building and repair.

Take creatine in addition to protein powder to help boost your muscle power capacity, aid recovery following a workout and increase muscle mass. An increase on average of 3 kg in lean muscle mass can be gained through long-term supplementation.

Creatine supplementation response (MYLK1)

Muscle Building

Creatine is one of the most popular dietary supplements, used by elite athletes and recreational gym-goers alike to improve workout performance. In conjunction with strength training, creatine supplementation has been shown to enhance hypertrophy of muscles, reduce the required recovery time between sets, promote leaner body composition, and improve performance of short duration, high intensity exercises such as weight lifting. The benefits of creatine supplementation, in particular creatine monohydrate, have been replicated across several studies. In fact, following a comprehensive review of the evidence base, the International Society of Sports Nutrition concluded that, “creatine monohydrate is the most effective ergogenic nutritional supplement currently available to athletes with the intent of increasing high-intensity exercise capacity and lean body mass during training.” The way our body responds to creatine supplementation, however, may differ from person to person depending on our genetic make-up. In this report, we look at a variant of MYLK1 (myosin light chain kinase 1) gene, which has been shown to affect gains in muscle strength and power in response to creatine.Video: Hear more about the science behind creatine supplementation response with Dr. Haran Sivapalan.

Your result

Enhanced responder

Normal responder

No data

You carry one copy of the 'A' variant associated with greater improvements in strength and power when supplementing with creatine monohydrate.

Energy for short (< 30 s) bursts of intense exercise, such as heavy lifting or sprinting, is generated by a muscle energy system called the 'phosphagen system'. This uses a stored

fuel source in our muscles called phosphocreatine (creatine phosphate) to rapidly generate ATP for muscle contraction.

During intense, short duration exercise, phosphocreatine is converted into another molecule, creatine, generating ATP. Creatine can then be recycled back into phosphocreatine and used to regenerate ATP.

Creatine supplements (e.g. creatine monohydrate) are shown to increase your muscles stored levels of phosphocreatine. This allows more rapid regeneration of ATP for muscle contraction by the phosphagen system, enabling someone to exercise at higher intensity and improve the quality of their workouts.

Various meta-analyses show that creatine supplementation can enhance gains in muscle strength, size, and power from resistance training, help increase lean body mass, and improve repeated sprint ability.

Variants of genes involved in muscle contraction may affect how we respond to creatine supplementation. A study of military recruits found that those carrying the 'A' variant (rs2700352) of the MYLK1 (myosin light chain kinase 1) gene showed slightly greater improvements in muscle strength and power following resistance training.

You carry one copy of the 'A' variant associated with greater improvements in strength and power when supplementing with creatine monohydrate. Your MYLK1 (rs2700352) genotype is: AG.

A study found that, relative to non-carriers, 'A' variant carriers had slightly greater improvements in countermovement jump height and countermovement jump leg power when taking 20 g of creatine monohydrate per day alongside training.

One study suggests people with your MYLK1 genotype (AG) are less susceptible to exercise-induced muscle damage (relative to those with the AA genotype) when performing unaccustomed eccentric exercise (i.e. muscle contractions where the muscle is lengthening).

In this study, individuals with your genotype (AG) had lower circulating markers of muscle damage (creatine kinase and myoglobin) following 50 maximal eccentric elbow flexion reps (relative to those with the AA genotype).

According to the International Society of Sports Nutrition, the most effective method to fully saturate muscle creatine stores is to take 5 g doses of creatine monohydrate four times daily (or 0.3 g per kg body weight per day), for a total of 5-7 days.

Once your muscles creatine stores are fully saturated, it typically takes between 4 - 6 weeks for stores to return to baseline. Most people can maintain high stores by taking 3-5 grams of creatine monohydrate per day.

Creatine monohydrate supplements at the recommended doses are widely shown to be safe, well tolerated, and not associated with kidney damage in healthy individuals. If you have pre-existing kidney disease, however, please consult a doctor before starting creatine supplementation.

Recommended Actions

Load with 20 g of creatine for 5-7 days, splitting into 5 g doses taken four times a day. Your genotype responds better to utilising a loading period with creatine, increasing your muscular power.

After the loading period, supplement with 3-5 g of creatine monohydrate per day. This will maintain muscle creatine content and help continual improvements in muscular power.

Ensure you are getting enough protein in your diet by adding chicken breast or turkey into your meals. Perhaps surprisingly, white meats such as turkey and chicken have the highest amount of protein per weight, with an 85 g (3-oz) serving containing approximately 24 g and 23 g of protein respectively. Getting enough daily protein will help with muscular strength and power improvements.

If you do not eat much meat, seitan or tofu are good vegetarian protein alternatives. A 100 g (3.5-oz) serving of seitan contains approximately 25 g of protein, while an equivalent amount of tofu contains approximately 20 g of protein. Including these in your meals will help ensure you are getting enough protein each day, which will help with muscular strength and power gains.

BCAA metabolism and muscle building

Muscle Building

Are BCAAs impairing your ability to build muscle?Branched-chain amino acids (BCAAs), which are found in meat, dairy, and various pre- and post-workout supplements, have been shown to stimulate muscle protein synthesis and suppress muscle protein breakdown. Consuming BCAAs can therefore be useful for enhancing muscle growth. However, excessively high levels of BCAAs can also worsen your sensitivity to insulin. As insulin is an anabolic hormone that promotes muscle growth, poor insulin sensitivity can impair your efforts to build muscle. People with genetic and lifestyle factors that contribute to reduced breakdown and higher circulating levels of BCAAs may therefore experience suboptimal muscle gains, particularly when taking supplements or following diets (e.g. the "keto" diet) that are high in BCAAs and saturated fat.This trait analyses your BCAA metabolism and tailors dietary and supplement strategies to optimise muscle building.

Your result

- Higher Risk
- Moderately Higher Risk
- **Lower Risk**
- No Data

You do not carry gene variants linked to reduced BCAA breakdown, which is beneficial for muscle growth.

Reduced breakdown of BCAAs can lead to higher circulating levels of BCAAs. This can impair muscle growth by disrupting insulin signalling and lowering insulin sensitivity.

Some gene variants (e.g. certain APOA2 alleles) are associated with reduced breakdown of BCAAs in response to high dietary intakes of saturated fat.

Lifestyle variables, including being overweight, carrying excessive amounts of visceral fat, or having poor insulin function, are also linked to reduced breakdown of BCAAs.

You do not carry gene variants linked to reduced breakdown and elevated circulating levels of BCAAs in response to high intakes of saturated fat.

Being overweight and having poor insulin function can also reduce BCAA breakdown and impair muscle building. Your latest lifestyle profile data suggest that you are not overweight, have a healthy waist circumference, and/or have normal fasting blood glucose levels.

Your ability to build muscle is less likely to be impaired when consuming BCAAs.

Moderate intake of BCAAs is less likely to interefere with the process of autophagy (the removal and renewal of damaged cell components) in your muscle cells. This can benefit muscle building.

BCAAs can have both anabolic (muscle-building) and catabolic (breaking down tissue) effects in the body. If you gain excessive amounts of visceral fat and develop poor insulin sensitivity, this can impair the anabolic effects of BCAAs on skeletal muscle tissue.

This trait uses both your genetic data and your latest lifestyle profile data. Updating your lifestyle profile data will ensure your results are accurate.

Recommended Actions

Stick to your recommended daily calories as much as possible. Overconsuming regularly can lead to impairments in BCAA catabolism, reduced insulin function and therefore, negatively impact on muscle building.

Aim to consume 0.4 g per kg bodyweight of protein each meal (around 20-40 g or 2/3 of a can of tuna). This will provide optimal amounts of the key BCAA, leucine, to build more lean muscle mass.

If not consuming meat, eggs or dairy; you could supplement with a protein powder to ensure you are getting enough BCAAs in your diet. Protein powders provide plenty of BCAAs to help you increase or maintain lean muscle mass in a convenient way.

You can use BCAA supplements even if following a high saturated fat diet. These can be used to help enhance muscle protein synthesis and fatigue during exercise as they should not negatively impact on your insulin function.