


GENOTYPE REPORT ANALYSIS SUPPORT GUIDE



This guide can be used to better understand your genetic results, by showing you how each of the genes we test for can affect a person's body. Please feel free to pass this document on to your personal trainer or coach so they can use your genetic information to help you reach your goals easier and quicker!



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POWER & ENDURANCE GENES

	Analysis of gene results		
AGT Long name: Angiotensinogen Associated with: Vasoconstriction and blood pressure control Sports Connection: Power	CC (Thr/Thr)(Thr/Thr) Associated with power, strength and speed sports. Carriers may achieve a higher than average physical improvement in strength, speed and power with training programmes. Carriers can have a greater susceptibility to high blood pressure and left ventricular hypertrophy. Monitor heart rate and adapt length of strenuous activity. Effect increased in carriers of ACE D allele	TC (Met/Thr) A more moderate form of CC: a power-based combination and susceptibility to high blood pressure and left ventricular hypertrophy, but not as much as CC.	TT (Thr/Thr) Not associated with power or endurance. Fewer problems with blood pressure, in fact regular exercise has been reported to have long term positive effects on age-related blood pressure
	ACE Long name: Angiotensin Converting Enzyme Associated with: Controlling blood pressure and the fluid (water)/sodium balance in blood. This is the most researched gene in relation to sporting performance. Sports Connection: Power and Endurance (depending on gene configuration).	II Endurance sports and high repetition weight training programmes recommended. Carriers have an increased volume of slow twitch muscle fibres and have greater aerobic efficiency and VO2max.	ID Mixture of power and endurance based training recommended.
VEGF Long name: Vascular Endothelial Growth Factor Associated with: New blood vessel growth to support exercise activities. Regular exercise and progressive training programmes can create a 4-fold increase in levels of VEGF. Sports Connection: Endurance	CC Likely to respond well to endurance training. C-allele carriers produce a greater amount of VEGF. Good muscle efficiency and VO2max, and can potentially adjust well to altitude training.	GC Moderate form of CC: an endurance-based combination with good muscular efficiency, but not as much as CC.	GG Contributes to a lower response to endurance training (overall response of an individual will depend on the combined effects of several genes).
	BDKRB2 Long name: Bradykinin Receptor B2 Associated with: Vasodilation and blood pressure control. Efficiency of muscular contraction and cell hydration. Sports Connection: Endurance	TT (DD) Contributes to positive response to endurance training. Positive for increased muscle efficiency especially in conjunction with ACE I-allele. This genotype is more frequent in endurance athletes	CT (ID) A more moderate form of TT: an endurance-based combination with good muscular efficiency and cell hydration, but not as much as TT.



POWER & ENDURANCE GENES

	Analysis of gene results		
	CC (RR)	CT (RX)	TT (XX)
<p>ACTN3</p> <p>Long name: Alpha Actinin 3</p> <p>Associated with: Major structural component of the fast twitch fibres of skeletal muscles. Only present in fast twitch muscle fibres.</p> <p>Sports Connection: Power/Endurance</p>	<p>Strength, speed and power gene combination (found in sprint athletes). Likely to increase benefit from explosive style training.</p>	<p>Expected to be good at strength, speed and power activities, but less so than RR.</p>	<p>Not associated with power. More frequent in endurance athletes – very rare in elite power athletes</p>
<p>ADRB2 (Arg16Gly)</p> <p>Long name: Beta 2 Adrenergic Receptor</p> <p>Associated with: Regulation of adrenalin release and the control within the central nervous system. Also involved in mobilisation of the carbohydrate, fat and protein in cells for fuel during exercise.</p> <p>Sports Connection: Endurance</p>	<p>Reports from studies include: Likely to respond well to endurance training, including good increases in VO2max. Good blood pressure responses to aerobic exercise. May have a slightly slower recovery from exercise.</p>	<p>A more moderate form of AA: an endurance-based combination with good increases in VO2max, but not as much as AA.</p>	<p>Likely to be less responsive to endurance training, although they may have a slightly quicker recovery from exercise.</p>
<p>ADRB2 (Gln27Glu)</p> <p>Long name: Beta 2 Adrenergic Receptor</p> <p>Associated with: Regulation of adrenalin release and the control within the central nervous system. Also involved in mobilisation of the carbohydrate, fat and protein in cells for fuel during exercise. Same gene as above (so same role) but the SNP is at a different position on the gene.</p> <p>Sports Connection: Endurance</p>	<p>Contributes to positive response to endurance training, including good increases in VO2max. With regards to weight management, studies show increased fat oxidation with exercise</p>	<p>A more moderate form of CC: an endurance-based combination with moderate fat burning responses to exercise.</p>	<p>Contributes to a reduced response to endurance training. Associated with an increased sensitivity to refined carbohydrates, may benefit from reduction</p>
<p>NRF-2</p> <p>Long name: Nuclear Respiratory Factor 2</p> <p>Associated with: Improving respiratory capacity and energy mobilisation in cells</p> <p>Sports Connection: Endurance</p>	<p>Not associated with improved endurance training.</p>	<p>Associated with VO2max and endurance including response to training. AG genotype is rare in sprinters and more common in endurance (e.g. 2% vs. 12%)</p>	<p>The GG genotype is very rare</p>



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	Analysis of gene results		
<p>PPARGC1A</p> <p>Long name: Peroxisome Proliferator-Activated Receptor Gamma Coactivator-1</p> <p>Associated with: Regulation of energy homeostasis, including production of mitochondria, fat and carbohydrate burning and conversion of muscle fibres to slow twitch type.</p> <p>Sports Connection: Endurance</p>	GG	AG	AA
	Contributes to positive responses to endurance training and activity	In various studies the A (Serine) allele has been associated with lower VO2max, endurance performance and exercise efficiency.	In various studies the A (Serine) allele has been associated with lower VO2max, endurance performance and exercise efficiency
<p>PPARA</p> <p>Long name: Peroxisome Proliferator-Activated Receptor Alpha</p> <p>Regulates genes responsible for skeletal and heart muscle fatty acid oxidation and is a main regulator of energy metabolism</p> <p>Sports Connection: Endurance and Power</p>	GG	GC	CC
	G allele is associated with endurance sports. May have higher levels of slow twitch muscle fibres. These carriers may increase fatty acid mobilisation with training.	Associated with both power and endurance attributes.	Associated with lower amounts of PPARA expression which may contribute to increases in response to power training. Greater susceptibility to high blood pressure, which should be monitored.
<p>TRHR</p> <p>Long name: Thyrotrophin Releasing Hormone Receptor</p> <p>Associated with: Regulating of the metabolic rate, mobilising fuels during exercise and also growth of lean body tissue.</p> <p>Sports Connection: Power</p>	CC	CA	AA
	CC homozygotes are more likely to achieve favourable improvements in lean body mass and muscle growth with strength training programmes.	CA and AA genotypes comprise >90% of the population – not associated with specific contributions to lean body mass and muscle strength	CA and AA genotypes comprise >90% of the population – not associated with specific contributions to lean body mass and muscle strength
<p>VDR</p> <p>Long name: Vitamin D Receptor (Taq 1)</p> <p>Associated with: Vitamin D3 levels in the blood - Vitamin D3 is involved in maintaining appropriate calcium and phosphorous levels in the blood and providing immune support.</p> <p>Sports Connection: Power</p>	CC	CT	TT
	Carriers may achieve favourable muscle growth and bone density with strength training programmes. Studies have associated this genotype with higher glucose levels in sedentary individuals – exercise was shown to normalise this	A more moderate form of CC	Associated with normal responses to exercise
<p>IL-6</p> <p>Long name: Interleukin-6 - a pro-inflammatory cytokine</p> <p>Associated with: Stimulates the immune response to training and is involved in the inflammatory repair process.</p> <p>Sports Connection: Power</p>	GG	GC	CC
	Associated with lower levels of inflammation after hard training sessions, leading to quicker recovery times. This genotype has been independently associated with performance in power sports.	Associated with slightly higher inflammatory response due to exercise, especially strenuous, may increase recovery times	May experience higher levels of inflammation after strenuous exercise. A longer rest period between training sessions may be required compared to GG.



POWER & ENDURANCE GENES

Analysis of gene results			
CRP Long name: C-Reactive Protein Associated with: An acute phase protein which rises in response to inflammation in the body. High CRP is assoc with low VO2MAX. Diet and physical activity can reduce CRP levels (although intense exercise can cause short term local increases in CRP). Sports Connection: Endurance / VO2max	AA Associated with lower levels of CRP which is associated with better VO2max response to training	AG Intermediate CRP levels and some benefits in VO2max response to training	GG May experience higher levels of inflammation (and CRP) after strenuous exercise. A longer rest period between training sessions may be required compared to AA.
	COL5A1 Long name: Collagen 5 Alpha 1 Associated with: alpha-1 chain of type V collagen	CC No specific impact of this genotype on either power or endurance performance	CT No specific impact of this genotype on either power or endurance performance

INJURY & RECOVERY GENES

Analysis of gene results			
GDF5 Long name: Growth Differentiation Factor 5 a bone morphogenetic protein involved in joint formation Associated with: Central Nervous System expression and the healing of skeletal, joint and soft tissues.	CC No increased tendinopathy risk associated with this genotype	CT Moderately raised risk of tendinopathy and osteoarthritis. Undertake prehabilitative exercises relevant to the sport and consider nutritional support for connective tissue.	TT Increased risk of tendinopathy and osteoarthritis. Undertake prehabilitative exercises relevant to the sport and consider nutritional support for connective tissue.
	COL1A1 Long name: Collagen 1 Alpha 1 Associated with: Type 1 Collagen, the main collagen found in connective tissues, including tendons, ligaments and cartilage.	TT No reported association with increased risk of ligament injuries in sport. However, it may be associated with increased risk of osteoporosis.	GT Moderately raised risk of tendon and ligament injuries in sport. Undertake prehabilitative exercises relevant to the sport and consider nutritional support for connective tissue.
COL5A1 Long name: Collagen 5 Alpha 1 Associated with: alpha-1 chain of type V collagen	CC Associated in various studies with moderately reduced risk of tendinopathies and linked to better range of motion (ROM)	CT Studies reported T-allele contribution to moderate increased risk of tendinopathies	TT Studies reported T-allele contribution to moderate increased risk of tendinopathies



INJURY & RECOVERY GENES

	Analysis of gene results		
CRP Long name: C-Reactive Protein Associated with: An acute phase protein which rises in response to inflammation in the body. It is stimulated by IL-6 and is often used as a marker for inflammation in blood tests.	AA	AG	GG
	Associated with lower levels of inflammation after hard training sessions, leading to quicker recovery times.	May experience moderately increased levels of inflammation after strenuous exercise. A longer rest period between training sessions may be required compared to AA.	May experience higher levels of inflammation after strenuous exercise. A longer rest period between training sessions may be required compared to AA.
IL-6 Long name: Interleukin-6 Associated with: Stimulates the immune response to training and is involved in the inflammatory repair process.	GG	GC	CC
	Associated with lower levels of inflammation after hard training sessions, leading to quicker recovery times.	May experience moderately increased levels of inflammation after strenuous exercise. A longer rest period between training sessions may be required compared to GG.	May experience higher levels of inflammation after strenuous exercise. A longer rest period between training sessions may be required compared to GG.
TNF Long name: Tumour Necrosis Factor Associated with: Regulation of immune cells; able to induce fever, inhibit tumour growth and viral replication and is involved in inflammation.	GG	GA	AA
	Associated with lower levels of inflammation after hard training sessions, leading to quicker recovery times.	May experience increased levels of inflammation after strenuous exercise. A longer rest period between training sessions may be required compared to GG.	May experience higher levels of inflammation after strenuous exercise. A longer rest period between training sessions may be required compared to GG.
SOD2 Long name: Super Oxide Dismutase 2 Associated with: Scavenging of free radicals in the cells, especially within the mitochondria. It is therefore an antioxidant protector of cellular health.	TT	TC	CC
	Associated with good levels of antioxidant protection during hard training sessions, leading to quicker recovery times.	Associated with moderately reduced levels of antioxidant protection during hard training sessions. A longer rest period between training sessions may be required compared to TT.	Associated with reduced levels of antioxidant protection during hard training sessions. A longer rest period between training sessions may be required compared to TT.
GSTM1, GSTT1 Long name: Glutathione S-transferase M1 and T1 Associated with: the removal of toxins, metabolic by-products, and free radicals created during the detoxification process.	I	D	
	I allele = "insertion" the gene is present in full and functioning normally	D = "deletion" – a part of the gene is missing rendering the whole non-functional and no protein is made. The absence of this enzyme can lead to greater levels of free radicals, increased fatigue and slower recovery from exercise. Your body has other enzymes that assist in these detoxification processes. Studies have shown that consuming cruciferous vegetables such as broccoli, cauliflower and other members of the cabbage family can promote the activity of these enzymes.	



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