DIYgenomics Athletic Performance Report

Interpretation: green indicates the favorable genotype for athletics, red is the normal genotype
Some athletes work to improve areas of predisposed excellence, others tailor workouts to improve areas of lower inherent ability
Sample data is blank when the variant is not present in the underlying genotyping data file
NOTE: This information is a compilation of available genome-wide association studies by non-medical professionals. Please consult a doctor for advice.

1. Power and speed

1.1 Endurance is important to any athlete but especially for those training for marathons triathlons and any distance sport. Top-performance athletes often have what are called the Marathon genes.

Category	Locus	Gene	Variant	23andMe	DIYgenomics	dbSNP Values	Sample data
Endurance	5q32	ADRB2	rs1042713		1,3,19	G/A	AG
Endurance	8p12	ADRB3	rs4994		1,17	T/C	AA
Endurance	9q34.3	COL5A1	rs12722		15	T/C	
Endurance	11q13.2	ACTN3	rs1815739	2,6,7,8,9,10,11,1 3,18,20,21	21	C/T	CC
Endurance	12p13.31	GNB3	rs5443		1,4	C/T	CC
Endurance	14q32.2	BDKRB2	rs1799722		19	C/T	CT
Endurance	17q23.3	ACE	rs1799752		5,12,14,16	I/D	II

1.2 Energy is the body's regulation of energy metabolism mitochondrial biogenesis and skeletal muscle fiber-type conversion to help achieve peak performance.

Category	Locus	Gene	Variant	23andMe	DIYgenomics	dbSNP Values	Sample data
Energy	4p15.2	PPARGC1A	rs8192678		4,6,7,8,9	G/A	CT
Energy	14q23.2	HIF1A	rs11549465		1,3,5	C/T	
Energy	14q23.2	HIF1A	rs17099207		2	A/G	

1.3 Power is about the ability to exert maximum muscular contraction instantly in an explosive burst of movement kind of like a rocket taking off into space. The two components of power in terms of athletics are strength and speed. Power athletes are physically different in their abilities from endurance athletes and genes are partially involved in this difference.

Category	Locus	Gene	Variant	23andMe	DIYgenomics	dbSNP Values	Sample data
Power	1q42.2	AGT	rs699		1,3	T/C	AG
Power	11q13.2	ACTN3	rs1815739	2,4,5,6,7,8,9,11, 14,15,16	16	C/T	CC
Power	17q23.3	ACE	rs1799752		3,10,12,13	I/D	II

2. Musculature

2.1 Delayed onset muscle soreness (DOMS) describes a phenomenon of muscle pain muscle soreness or muscle stiffness that is felt 12-48 hours after exercise particularly at the beginning of a new an exercise program after a change in sports activities or after a dramatic increase in the duration or intensity of exercise.

Category	Locus	Gene	Variant	23andMe	DIYgenomics	dbSNP Values	Sample data
Muscle fatigue	8p22	NAT2	rs1208		1	A/G	AG
Muscle fatigue	20	HNF4A	rs1885088		2	G/A	GG
Muscle fatigue	20	HNF4A	rs745975		2	G/A	CT

2.2 Muscles are important to all aspects of exercise and fitness. After exercise a muscle needs anywhere from 24 to 48 hours to repair and rebuild and working it again too soon simply leads to tissue breakdown instead of building.

Category	Locus	Gene	Variant	23andMe	DIYgenomics	dbSNP Values	Sample data
Muscle repair	2q13	IL1B	rs1143634		1,2	C/T	GG
Muscle repair	2q13	IL1B	rs16944		1,2	G/A	GG

2.3 Strength includes strength exercise selection frequency of strength training sessions the number of sets performed and the number of repetitions performed per set.

Category	Locus	Gene	Variant	23andMe	DIYgenomics	dbSNP Values	Sample data
Strength	6p22.2	HFE	rs1799945		2,9,10,11	C/G	CC
Strength	6p22.2	HFE	rs1800562		2,9	G/A	GG
Strength	12q23.2	IGF1	rs35767		5,12	C/T	AG
Strength	14q23.2	HIF1A	rs11549465		1,3,4,8	C/T	
Strength	chr2	MSTN GDF-8	rs1805086		6,7,10,11	A/G	

3. Heart and lung capacity

3.1 Heart function directly impacts exercise and vice-versa. While research has proven that regular exercise enlarges the heart and strengthens the chambers some individuals may have genes that give them better heart capacity allowing for better endurance and strength in exercise. Heart capacity diminishes as our body ages so it is especially important to maintain and monitor our heart's condition.

Category	Locus	Gene	Variant	23andMe	DIYgenomics	dbSNP Values	Sample data
Heart capacity	2q33.3	CREB1	rs2253206		5	G/A	AG
Heart capacity	7p15.3	NPY	rs16139		2,3	A/G	TT
Heart capacity	7q36.1	NOS3	rs2070744		2,4	C/T	

Heart capacity	10p11.22	KIF5B	rs211302	1,5	G/C	

3.2 The intake of oxygen is important during exercise. Lung capacity affects the body's ability to take in oxygen and distribute it to cells providing energy for exercise and training.

Lung capacity	7q32.2	NRF1	rs2402970	3,4	C/T	CC
Lung capacity	7q32.2	NRF1	rs6949152	3,4	A/G	AA
Lung capacity	10q25.3	ADRB1	rs1801253	1,2	C/G	CC
Lung capacity	19q13.32	APOE	rs429358	1,5,6	T/C	
Lung capacity	19q13.32	APOE	rs7412	1,5,6	C/T	CC

4. Metabolism, recovery, and other

4.1 Metabolism involves a complex set of enzymes and hormones that that convert food into fuel. Individuals with higher metabolisms often burn fuel more efficiently. Many factors affect metabolism including: diet exercise age and genetic code.

Metabolism	1p13.1	AMPD1	rs17602729	5,7	G/A	GG
Metabolism	6p21.31	PPARD	rs2016520	3,8	A/G	TT
Metabolism	6p21.31	PPARD	rs2267668	6,7	A/G	AA
Metabolism	11q23.3	APOA1	rs5070	2	A/G	GG
Metabolism	22q13.31	PPARA	rs4253778	1,4,7	C/G	

4.2 How our muscles and bodies heal and recover after workouts is as important as how our bodies react during workouts. Genes too are involved in the body's ability to recover.

Recovery	7p15.3	IL6	rs1800795	1,2	C/G	CG
Recovery	19q13.32	CKMM/CKM	rs1803285	3,4,5	A/G	

4.3 Propensity to exercise is the motivation that drive us to exercise - something that gets us moving. This can be a combination of genetic environmental physiological and mental factors.

Propensity to exercise	2q33.1	DNAPTP6	rs12612420	1,2	G/A	GG
Propensity to exercise	10q23.2	PAPSS2	rs10887741	1,2	T/C	
Propensity to exercise	18p11.32	C18orf2	rs8097348	1,2	A/G	

5. Ligaments and tendons

5.1 The Achilles tendon is the largest tendon in the body. It connects the calf muscle to the heel bone and is used for walking running or jumping. An Achilles heel injury can be a incredible hindrance to any athlete's performance and can often take months to heal.

Achilles tendon strength	9q34.3	COL5A1	rs3196378	3,5	A/C	
Achilles tendon strength	11q22.2	MMP3	rs591058	4	C/T	TT
Achilles tendon strength	11q22.2	MMP3	rs650108	4	G/A	GG
Achilles tendon strength	11q22.2	MMP3	rs679620	4	A/G	TT
Achilles tendon strength	17q21.33	COL5A1	rs12722	3,5	C/T	
Achilles tendon strength	17q21.33	COL1A1	rs1800012	1	G/T	AC
Achilles tendon strength	20q11.22	GDF5	rs143383	2	T/C	AA

5.2 Ligaments are designed to passively stabilize joints. Strong tendons and ligaments promote healthier joints and minimizes injuries. Those with the favorable allele may have stronger ligaments than the general population allowing for better performance and less risk of injury.

Ligament strength	7p15.3	NPY	rs16139	1	A/G	TT
Ligament strength	7q36.1	NOS3	rs2070744	1	C/T	
Ligament strength	17q21.33	COL5A1	rs13946	4	C/T	
Ligament strength	17q21.33	COL1A1	rs1800012	2,3	G/T	AC

Research references:

Achilles tendon strength	*1. Collins M et al; The COL1A1 gene and acute soft tissue ruptures; Br J Sports Med; 2010 Jun 11.*
Achilles tendon strength	*2. Posthumus M et al; Components of the transforming growth factor-{beta} family and the pathogenesis of human Achilles tendon pathology--a genetic ass*
Achilles tendon strength	*3. Posthumus M et al; The COL5A1 gene is associated with increased risk of anterior cruciate ligament ruptures in female participants; Am J Sports Med; 2*
Achilles tendon strength	*4. Raleigh SM et al; Variants within the MMP3 gene are associated with Achilles tendinopathy: possible interaction with the COL5A1 gene; Br J Sports Med*
Achilles tendon strength	*5. September AV et al; Variants within the COL5A1 gene are associated with Achilles tendinopathy in two populations; Br J Sports Med; 2009 May;43(5):35*
Endurance	*1. Buxens A et al; Can we predict top-level sports performance in power vs endurance events? A genetic approach; Scand J Med Sci Sports; 2010 Mar 10.*
Endurance	*2. Clarkson PM et al; ACTN3 genotype is associated with increases in muscle strength in response to resistance training in women; J Appl Physiol; 2005Ju*
Endurance	*3. Defoor J et al; The CAREGENE study: polymorphisms of the beta1-adrenoceptor gene and aerobic power in coronary artery disease; Eur Heart J; 2006*
Endurance	*4. Eynon N et al; The guanine nucleotide binding protein beta polypeptide 3 gene C825T polymorphismis associated with elite endurance athletes; Exp Phy*
Endurance	*5. Gomez-Gallego F et al; The C allele of the AGT Met235Thr polymorphism is associated with power sports performance; Appl Physiol Nutr Metab; 2009 D*
Endurance	*6. Lucia A et al; ACTN3 genotype in professional endurance cyclists; Int J Sports Med; 2006 Nov;27(11):880-4.*
Endurance	*7. MacArthur DG et al; A gene for speed? The evolution and function of alpha-actinin-3; Bioessays; 2004 Jul;26(7):786-95.*
Endurance	*8. MacArthur DG et al; An Actn3 knockout mouse provides mechanistic insights into the association between alpha-actinin-3 deficiency and human athletic*
Endurance	*9. MacArthur DG et al; Loss of ACTN3 gene function alters mouse muscle metabolism and shows evidence of positive selection in humans; Nat Genet; 200*
Endurance	*10. Mills M et al; Differential expression of the actin-binding proteins, alpha-actinin-2 and -3, in different species: implications for the evolution of functional r*
Endurance	*11. Moran CN et al; Association analysis of the ACTN3 R577X polymorphismand complex quantitative body composition and performance phenotypes inac*
Endurance	*12. Muniesa CA et al; World-class performance in lightweight rowing: is it genetically influenced? A comparison with cyclists runners and non-athletes; Br J*
Endurance	*13. Niemi AK et al; Mitochondrial DNA and ACTN3 genotypes in Finnish elite endurance and sprint athletes; Eur J Hum Genet; 2005 Aug;13(8):965-9.*
Endurance	*14. Ostrander EA et al; Genetics of athletic performance; Annu Rev Genomics Hum Genet; 2009;10:407-29.*

Endurance	*15. Posthumus M et al.; The COL5A1 Gene: A Novel Marker of Endurance Running Performance; Med Sci Sports Exerc; 2010 Aug 23.*
Endurance	*16. Ruiz JR et al; Is there an optimum endurance polygenic profile?; J Physiol; 2009 Apr1;587(Pt 7):1527-34.*
Endurance	*17. Santiago C et al.; Trp64Arg polymorphism in ADRB3 gene is associated with elite endurance performance; Br J Sports Med; 2010 Jun 11.*
Endurance	*18. Santiago C et al; ACTN3 genotype in professional soccer players; Br J Sports Med; 2008 Jan;42(1):71-3.*
Endurance	*19. Tsianos GI et al; Associations of polymorphisms of eight muscle- or metabolism-related genes with performance in Mount Olympus marathon runners; J*
Endurance	*20. Vincent B et al; ACTN3 (R577X) genotype is associated with fiber type distribution; Physiol Genomics; 2007 Dec 19;32(1):58-63.*
Endurance	*21. Yang N et al; ACTN genotype is associated with human elite athletic performance; Am J Hum Genet; 2003 Sep;73(3):627-31.*
Energy	*1. Collins M et al; The COL1A1 gene and acute soft tissue ruptures; Br J Sports Med; 2010 Jun 11.*
Energy	*2. Posthumus M et al; Components of the transforming growth factor-{beta} family and the pathogenesis of human Achilles tendon pathology--a genetic ass*
Energy	*3. Posthumus M et al; The COL5A1 gene is associated with increased risk of anterior cruciate ligament ruptures in female participants; Am J Sports Med; 2*
Energy	*4. Raleigh SM et al; Variants within the MMP3 gene are associated with Achilles tendinopathy: possible interaction with the COL5A1 gene; Br J Sports Med*
Energy	*5. September AV et al; Variants within the COL5A1 gene are associated with Achilles tendinopathy in two populations; Br J Sports Med; 2009 May;43(5):35*
Heart capacity	*1. Argyropoulos G et al.; KIF5B gene sequence variation and response of cardiac stroke volume to regular exercise; Physiol Genomics; 2009 Jan 8;36(2):7*
Heart capacity	*2. Buxens A et al; Can we predict top-level sports performance in power vs endurance events? A genetic approach; Scand J Med Sci Sports; 2010 Mar 10.*
Heart capacity	*3. Kallio J et al; Enhanced exercise-induced GH secretion in subjects with Pro7 substitution in the prepro-NPY; J Clin Endocrinol Metab; 2001 Nov;86(11):5*
Heart capacity	*4. Ostrander EA et al; Genetics of athletic performance; Annu Rev Genomics Hum Genet; 2009;10:407-29.*
Heart capacity	*5. Rankinen T et al.; CREB1 is a strong genetic predictor of the variation in exercise heart rate response to regular exercise: the HERITAGE Family Study;*
Ligament strength	*1. Buxens A et al; Can we predict top-level sports performance in power vs endurance events? A genetic approach; Scand J Med Sci Sports; 2010 Mar 10.*
Ligament strength	*2. Collins M et al; The COL1A1 gene and acute soft tissue ruptures; Br J Sports Med; 2010 Jun 11.*
Ligament strength	*3. Posthumus M et al.; Genetic risk factors for anterior cruciate ligament ruptures: COL1A1 gene variant; Br J Sports Med; 2009 May;43(5):352-6.*
Ligament strength	*4. Posthumus M et al; The COL5A1 gene is associated with increased risk of anterior cruciate ligament ruptures in female participants; Am J Sports Med; 2*
Lung capacity	*1. Buxens A et al; Can we predict top-level sports performance in power vs endurance events? A genetic approach; Scand J Med Sci Sports; 2010 Mar 10.*
Lung capacity	*2. Defoor J et al; The CAREGENE study: polymorphisms of the beta1-adrenoceptor gene and aerobic power in coronary artery disease; Eur Heart J; 2006 J*
Lung capacity	*3. He Z et al; NRF-1 genotypes and endurance exercise capacity in young Chinese men; Br J Sports Med; 2008 May;42(5):361-6.*
Lung capacity	*4. Ostrander EA et al; Genetics of athletic performance; Annu Rev Genomics Hum Genet; 2009;10:407-29.*
Lung capacity	*5. Thompson PD et al.; Apolipoprotein E genotype and changes in serum lipids and maximal oxygen uptake with exercise training; Metabolism; 2004 Feb;5*
Lung capacity	*6. Tsianos GI et al; Associations of polymorphisms of eight muscle- or metabolism-related genes with performance in Mount Olympus marathon runners; J*
Metabolism	*1. Ahmetov II et al; PPARalpha gene variation and physical performance in Russian athletes; Eur J Appl Physiol; 2006 May;97(1):103-8.*
Metabolism	*2. Buxens A et al; Can we predict top-level sports performance in power vs endurance events? A genetic approach; Scand J Med Sci Sports; 2010 Mar 10.*
Metabolism	*3. Eynon N et al; Is there an interaction between PPARD T294C and PPARGC1A Gly482Ser polymorphisms and human endurance performance?; Exp Ph*
Metabolism	*4. Maciejewska A et al; Variation in the PPARalpha gene in Polish rowers; J Sci Med Sport; 2010 Jul 8.*
Metabolism	*5. Ruiz JR et al; Is there an optimum endurance polygenic profile?; J Physiol; 2009 Apr1;587(Pt 7):1527-34.*
Metabolism	*6. Stefan N et al; Genetic variations in PPARD and PPARGC1A determine mitochondrial function and change in aerobic physical fitness and insulin sensitiv*
Metabolism	*7. Tsianos GI et al; Associations of polymorphisms of eight muscle- or metabolism-related genes with performance in Mount Olympus marathon runners; J*
Metabolism	*8. Wackerhage H et al; Genetic research and testing in sport and exercise science: a review of the issues; J Sports Sci; 2009 Sep;27(11):1109-16.*
Muscle fatigue	*1. Buxens A et al; Can we predict top-level sports performance in power vs endurance events? A genetic approach; Scand J Med Sci Sports; 2010 Mar 10.*
Muscle fatigue	*2. Ruchat SM et al; Interaction between HNF4A polymorphisms and physical activity in relation to type 2 diabetes-related traits: results from the Quebec Fa*
Muscle repair	*1. Cauci S et al; Variable number of tandem repeat polymorphisms of the interleukin-1 receptor antagonist gene IL-1RN: a novel association with the athlete*
Muscle repair	*2. Johnsen AK et al.; A broad analysis of IL1 polymorphism and rheumatoid arthritis; Arthritis Rheum; 2008 Jul;58(7):1947-57.*
Power	*1. Buxens A et al; Can we predict top-level sports performance in power vs endurance events? A genetic approach; Scand J Med Sci Sports; 2010 Mar 10.*
Power	*2. Clarkson PM et al; ACTN3 genotype is associated with increases in muscle strength in response to resistance training in women; J Appl Physiol; 2005Ju*
Power	*3. Gomez-Gallego F et al; The C allele of the AGT Met235Thr polymorphism is associated with power sports performance; Appl Physiol Nutr Metab; 2009 D*
Power	*4. Lucia A et al; ACTN3 genotype in professional endurance cyclists; Int J Sports Med; 2006 Nov;27(11):880-4.*
Power	*5. MacArthur DG et al; A gene for speed? The evolution and function of alpha-actinin-3; Bioessays; 2004 Jul;26(7):786-95.*
Power	*6. MacArthur DG et al; An Actn3 knockout mouse provides mechanistic insights into the association between alpha-actinin-3 deficiency and human athletic*
Power	*7. MacArthur DG et al; Loss of ACTN3 gene function alters mouse muscle metabolism and shows evidence of positive selection in humans; Nat Genet; 200*
Power	*8. Mills M et al; Differential expression of the actin-binding proteins, alpha-actinin-2 and -3, in different species: implications for the evolution of functional re*
Power	*9. Moran CN et al; Association analysis of the ACTN3 R577X polymorphismand complex quantitative body composition and performance phenotypes inadc*
Power	*10. Muniesa CA et al; World-class performance in lightweight rowing: is it genetically influenced? A comparison with cyclists runners and non-athletes; Br J*
Power	*11. Niemi AK et al; Mitochondrial DNA and ACTN3 genotypes in Finnish elite endurance and sprint athletes; Eur J Hum Genet; 2005 Aug;13(8):965-9.*
Power	*12. Ostrander EA et al; Genetics of athletic performance; Annu Rev Genomics Hum Genet; 2009;10:407-29.*
Power	*13. Ruiz JR et al; Is there an optimum endurance polygenic profile?; J Physiol; 2009 Apr1;587(Pt 7):1527-34.*
Power	*14. Santiago C et al; ACTN3 genotype in professional soccer players; Br J Sports Med; 2008 Jan;42(1):71-3.*