Practitioner Detailed Appendix

TOOLBOX GENOMICS

Health Enrichment

October 1, 2019

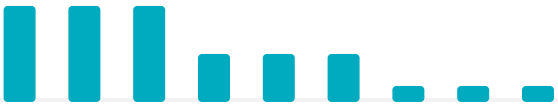
Demo Client

Kit #1234ABCD5678

Practitioner Report Key

1 Trait Impact Summary

A high level overview of which traits have the biggest impact based on our proprietary algorithm.



Impact Score	A potential impact of a variant type.
HIGH	Likely a large clinical impact
MEDIUM	Likely a slightly elevated clinical impact
LOW	Likely a low clinical impact

2 Variant Type

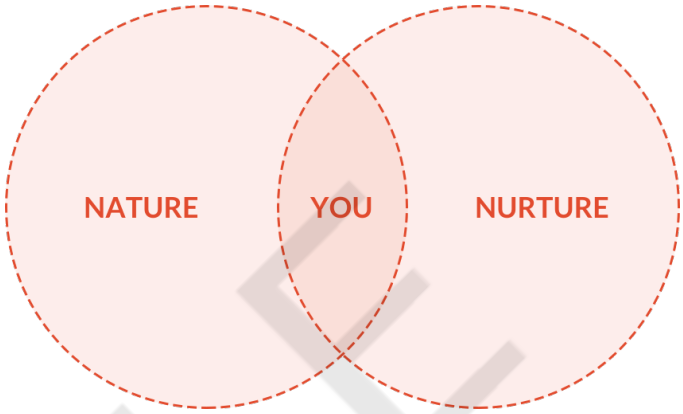
Genetic variants are the differences that make each person unique. In this report, variant refers to Single Nucleotide Polymorphisms (SNPs). + is the risk allele and - is the non-risk allele.

Variant Type	Definition
+/+	Both risk alleles present
+/-	One risk allele present
-/-	No risk allele present
+/U or -/U	Indeterminable allele
NR	Not Reportable, unable to determine variants present in the sample

3 Research Grade

The strength of the research after assessing for number of published studies, sample size of the population studied, degree of study replication, biological mechanism, and other factors.

Research Grade	Definition
***	High Research Validity
**	Medium Research Validity
*	Low Research Validity



UNDERSTANDING THE GENES

DNA is a long, ladder-shaped molecule. Each rung on the ladder is made up of a pair of interlocking units, called bases, that are designated by the four letters in the DNA alphabet - A, T, G and C. 'A' always pairs with 'T', and 'G' always pairs with 'C'.

Basic unit of heredity that is made of DNA and acts as instructions to make all body proteins. Humans have between 20,000 - 25,000 genes, half of which come from one's mother and the other half from one's father.

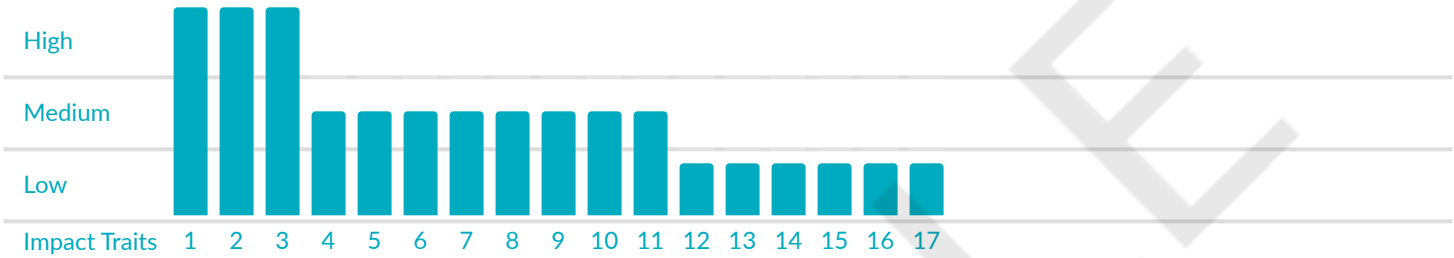
A SNP is a Single Nucleotide Polymorphism. DNA consists of 4 main building blocks (Adenine (A), Thymine (T), Guanine (G), and Cytosine (C)). In certain locations within DNA, one person may have an A, whereas another may have a G. This difference is often called a variant. This variant is a SNP. The rs number is a unique identifier used by researchers and databases to refer to specific SNPs. It stands for Reference SNP cluster ID.

Clinical Significance is the clinical or practical importance of a given SNP. Having a risk variant (+) for a particular SNP, increases one's predisposition to this clinical significance.

Disclaimer - This test is performed via DNA sequencing. As with all genetic testing with the highest possible standards, the data generated during the laboratory process will have a <99% sensitivity and specificity.

How These Traits Affect Your Client

This page provides a high-level snapshot of the clinical significance of each trait within this panel. The results are in two categories: traits that are ranked high, medium or low impact as well as traits for which there is an explicit result (i.e. categorical such as "yes" or "no"). At the end of this page are a summary of any non-reportable (NR) traits. The results for these traits are unable to be determined from the sample submitted. Recommendations are made for traits with high or medium impact only.



Impact Traits	Impact
1 Calcium	HIGH
2 Heart Health	HIGH
3 Injury Risk - Disc Degeneration	HIGH
4 Aging	MEDIUM
5 Folate	MEDIUM
6 Motivation to Exercise	MEDIUM
7 Obesity Predisposition	MEDIUM
8 Saturated Fat Response	MEDIUM
9 Stress Response	MEDIUM
10 Vitamin B12	MEDIUM
11 Vitamin D3	MEDIUM
12 Blue Light Sensitivity	LOW
13 Exercise & Fat Loss	LOW
14 Lactose Intolerance	LOW
15 Response to Endurance Training	LOW
16 Sleep Impairment	LOW
17 Yo-Yo Dieting	LOW

	Categorical Traits	Result	Learn More
1	Caffeine-Related Anxiety	Increased	
2	Iron	Normal	
3	Caffeine Metabolism	Slow	
4	Muscle Fiber Type	Slow Twitch	

Practitioner Detailed Appendix: Health Enrichment

Below is a summary of the genetic data that we test for in this Health Action Plan. Recommendations are given for traits with Medium and High Impact.

Traits are listed in order of trait impact. Please look at the Trait Impact Summary Report for more information.

Trait	Gene	SNP/RSID	Clinical Significance	Variant Type	SNP Impact Score	Research Grade	References (PMID)
Calcium	CASR	rs1801725	*Increased risk of calcium deficiency*	+/+	High	***	20705733, 25886283
Calcium	CASR	rs17251221	*Increased risk of calcium deficiency*	+/+	High	**	20705733
Heart Health	APOC3	rs5128	*Associated with increased risk for dyslipidemia and coronary artery disease*	+/+	High	***	17357073, 19424489
Injury Risk - Disc Degeneration	CILP	rs2073711	*Increased risk of disc degeneration*	+/+	High	***	27359356, 27757442
Aging	MTR	rs2275565	*Associated with decreased homocysteine levels and inflammation*	+/+	High	**	21533266, 23824729
Aging	MTHFR	rs1801133	*Associated with increased inflammation and shorter telomere length*	+/-	Medium	***	22792358, 25987236
Aging	BHMT	rs3733890	*Altered epigenetic regulation of gene expression and increased risk of shortened telomere length*	+/-	Medium	**	22792358, 23446900
Aging	MTHFR	rs1801131	*Associated with increased inflammation, stress, and shorter telomere length*	NR	Not Reportable	***	22792358, 24967710
Folate	FOLH1	rs61886492	*Increased risk of impaired folate metabolism*	+/+	High	**	18842806, 22918695

Trait	Gene	SNP/RSID	Clinical Significance	Variant Type	SNP Impact Score	Research Grade	References (PMID)
Folate	MTHFR	rs1801133	*Increased risk of impaired folate metabolism*	+/-	Medium	***	7647779, 19759169
Folate	MTHFR	rs1801131	*Increased risk of impaired folate metabolism*	NR	Not Reportable	***	20078877, 29644956
Motivation to Exercise	BDNF	rs6265	*Increased risk for decreased intrinsic motivation towards exercise*	+/+	High	**	24613654, 24805993
Obesity Predisposition	FTO	rs9939609	*Increased risk of obesity*	+/+	High	***	27659330, 28384342
Obesity Predisposition	FTO	rs1121980	*Increased risk of obesity*	+/+	High	***	18159244, 22355368
Obesity Predisposition	ADIPOQ	rs17300539	*Increased risk of obesity*	+/+	High	*	2699942, 25223469
Obesity Predisposition	ADIPOQ	rs266729	*Increased risk of obesity*	+/-	Medium	*	25223469, 27388775
Obesity Predisposition	ADIPOQ	rs1501299	*Increased risk of obesity*	+/-	Medium	***	25223469, 28416193
Obesity Predisposition	MC4R	rs17782313	*Increased risk of obesity*	-/-	Low	***	18454148, 28384342
Obesity Predisposition	PPARG	rs1801282	*Increased risk of obesity*	-/-	Low	***	23666678, 28090739
Saturated Fat Response	FTO	rs9939609	*Increased risk for higher BMI or obesity with high fat diet*	+/+	High	***	22049296, 22457394
Saturated Fat Response	FTO	rs1121980	*Increased risk for higher BMI or obesity with high fat diet*	+/+	High	***	22049296, 30021629
Saturated Fat Response	TCF7L2	rs7903146	*Increased risk for higher BMI or obesity with high fat diet*	+/-	Medium	***	21543200, 23497168
Saturated Fat Response	STAT3	rs8069645	*Increased risk for higher BMI or obesity with high fat diet*	-/-	Low	**	19776189
Saturated Fat Response	STAT3	rs744166	*Increased risk for higher BMI or obesity with high fat diet*	-/-	Low	**	19776189

Trait	Gene	SNP/RSID	Clinical Significance	Variant Type	SNP Impact Score	Research Grade	References (PMID)
Saturated Fat Response	APOA2	rs5082	*Increased risk for higher BMI or obesity with high fat diet*	-/-	Low	***	19901143, 24108135
Saturated Fat Response	STAT3	rs1053005	*Increased risk for higher BMI or obesity with high fat diet*	-/-	Low	**	19776189
Saturated Fat Response	MC4R	rs12970134	*Increased risk for higher BMI or obesity with high fat diet*	-/-	Low	***	27186233, 28081251
Stress Response	COMT	rs4680	*Higher cortisol, depression and PTSD in response to stress*	+/-	Medium	***	23799032, 25068285
Stress Response	BDNF	rs6265	*Higher cortisol, depression, and anxiety in response to life stress*	-/-	Low	***	24433458, 25419135
Stress Response	HTR2C	rs6318	*Higher cortisol levels, increased risk of depression and eating dysregulation in response to life stress*	-/-	Low	***	21967853, 25457638
Vitamin B12	FUT2	rs1047781	*Increased risk of vitamin B12 deficiency*	+/+	High	**	22367966
Vitamin B12	FUT2	rs602662	*Increased risk of vitamin B12 deficiency*	+/-	Medium	***	28334792, 29445423
Vitamin B12	FUT2	rs601338	*Increased risk of vitamin B12 deficiency*	+/-	Medium	***	19744961, 28334792
Vitamin B12	TCN1	rs526934	*Increased risk of vitamin B12 deficiency*	+/-	Medium	***	25948668, 27901035
Vitamin B12	CUBN	rs1801222	*Increased risk of vitamin B12 deficiency*	-/-	Low	**	25948668
Vitamin D3	CYP2R1	rs10741657	*Increased risk of Vitamin D3 deficinecy*	+/+	High	***	20541252, 30120973
Vitamin D3	GC	rs4588	*Increased risk of Vitamin D3 deficinecy*	+/-	Medium	***	20541252, 27625044

Trait	Gene	SNP/RSID	Clinical Significance	Variant Type	SNP Impact Score	Research Grade	References (PMID)
Vitamin D3	GC	rs2282679	*Increased risk of Vitamin D3 deficinecy*	+/-	Medium	***	20541252, 29937467
Vitamin D3	DHCR7	rs12785878	*Increased risk of Vitamin D3 deficinecy*	-/-	Low	***	20541252, 29937467
Blue Light Sensitivity	OPN4	rs1079610	*More sensitive to blue light*	+/-	Medium	*	23555953, 24119231
Exercise & Fat Loss	FTO	rs8050136	*Less fat loss in response to exercise training*	+/+	High	*	19543202, 27260224
Lactose Intolerance	MCM6	rs4988235	*Increased risk for lactose intolerance*	-/-	Low	***	11788828, 15114531
Lactose Intolerance	MCM6	rs182549	*Increased risk for lactose intolerance*	-/-	Low	**	11788828, 15114531
Response to Endurance Training	AMPD1	rs17602729	*Associated with decreased aerobic capacity and cardiorespiratory gains in response to exercise*	-/-	Low	***	12783984, 26716680
Sleep Impairment	CLOCK	rs2070062	*Shorter sleep duration*	+/+	High	*	28645331
Sleep Impairment	DRD2	rs17601612	*Shorter sleep duration*	+/-	Medium	**	26464489, 30299516
Sleep Impairment	CLOCK	rs12649507	*Shorter sleep duration*	-/-	Low	*	25527757
Yo-Yo Dieting	ADIPOQ	rs17300539	*More likely to regain weight after weight loss*	+/+	High	*	18949681
Caffeine-Related Anxiety	ADORA2A	rs5751876	*Increased risk of anxiety with caffeine consumption*	+/+	High	***	21876539, 22012471
Iron	TMPRSS6	rs855791	*Normal risk of iron deficiency*	+/+	High	***	19820699, 29167213
Iron	HFE	rs1800562	*Normal risk of iron deficiency*	+/+	High	***	15858186, 29167213
Iron	HFE	rs1799945	*Normal risk of iron deficiency*	+/-	Medium	***	15858186, 26597663

Trait	Gene	SNP/RSID	Clinical Significance	Variant Type	SNP Impact Score	Research Grade	References (PMID)
Caffeine Metabolism	CYP1A2	rs762551	*Decreased rate of caffeine metabolism, may be more sensitive to caffeine*	+/-	Medium	***	10233211, 23167834
Muscle Fiber Type	PPARA	rs4253778	*Increased predisposition to have slow twitch muscle fibers*	+/+	High	***	16506057, 25761120
Muscle Fiber Type	PPARGC1A	rs8192678	*Increased predisposition to have slow twitch muscle fibers*	+/+	High	***	25886402, 27601773
Muscle Fiber Type	ACTN3	rs1815739	*Increased predisposition to have fast twitch muscle fibers*	+/-	Low	***	22645169, 29345962