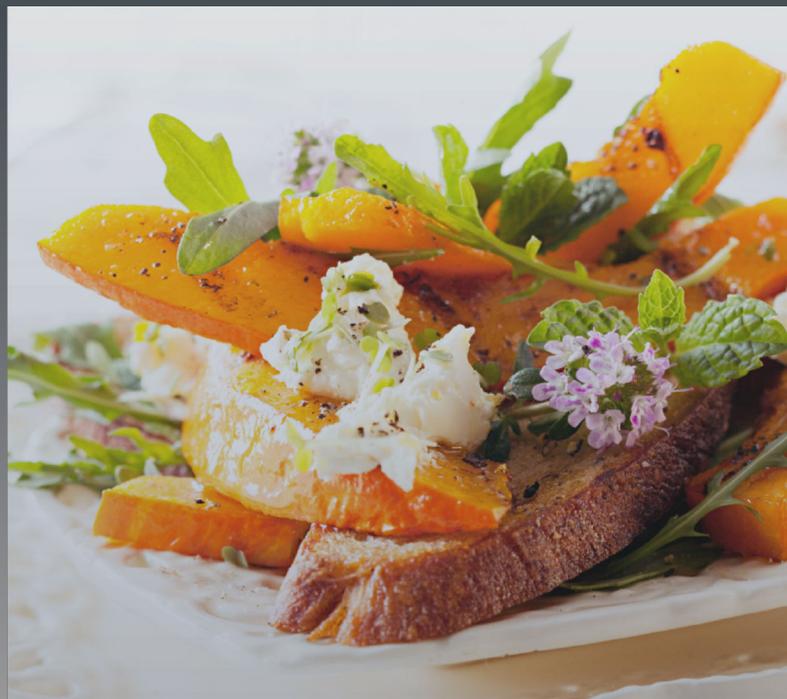




# Nutrition Genotype Report

Client Name: Sample Client





# HUNGER & SATIETY

## GENETIC DATA

GENE	GENO TYPE
ADIPOQ (1)	GG
ADIPOQ (2)	GG
FTO	AA
MC4R	TT
ANKK1	GG
COMT	AA
DRD2	AG
NMB	TT
FTO	AA
HTR2C	CC
GSHR(1)	CC
GSHR(2)	GG
POMC	AG
LEP	n/a
LEPR(2)	AG
LEPR(1)	AA
MTHFR 1298	TG

Appetite is a combination of hunger response and satiety. Many scientific studies have been undertaken to identify genomic variations that contribute to these aspects of eating. What we have discovered is that it is a complex interaction between many systems:

- Brain neurotransmitters (dopamine & serotonin)
- Intestinal peptides
- Signals from fat cells
- Appetite hormones

All components of this network require coordination in central sensing mechanisms of the brain in order to create your response.

### INTERPRETATION



HUNGER



SATIETY

### RECOMMENDATIONS





# INSULIN RESISTANCE

## GENETIC DATA

GENE	GENO TYPE
FABP2	GG
GCKR	GG
LIPC	TT
PPARD	AG
IRS1	
VDR FOK1	AA
CRY2	CC
FADS1	TC
PROX1	TC
ADCY5	AA
MTNR1B	GG
SLC30A8	TC
TCF7L2	CC
G6PC2	TC
MADD	AT
ADRA2A	GG
GLIS3	AA

HIGH  
RISK

Insulin resistance is a state where the body requires greater and greater amounts of insulin in order to drive down blood sugar levels. It is usually associated with diabetes or the pre-diabetic state.

Studies have demonstrated that some individuals actually possess a greater predisposition towards insulin resistance and this predisposition can be predicted based on genetic variations. Individuals that carry greater risk tend to have higher, though frequently normal, fasting blood sugar levels and insulin levels. These higher fasting blood glucose levels also promote accelerated rates of aging in the body.

Individuals with a greater propensity towards insulin resistance often report greater difficulty losing weight than others that follow similar diets despite aggressive adherence to the diet.

Insulin Resistance Score (IRS)

67%

INTERPRETATION:

RECOMMENDATIONS



# DAIRY

## GENETIC DATA

GENE	GENO TYPE
MCM6(1)	GG
MCM6(2)	n/a
APOA2	AA

TYPICAL

SENSITIVITY

TYPICAL

DAIRY FAT

SENSITIVITY

Dairy genes relate to the processing of the sugar and the fat in dairy products.

Lactose is a sugar found in milk. Some individuals have deficiencies in the enzyme or lack the enzyme lactase that is required to fully digest the sugar. The actual gene involved is LCT but the MCM6 is a regulator of the LCT expression. Variants of the MCM6 gene only indicate a PROPENSITY toward lactose intolerance.

Certain genotypes will also express a greater propensity toward weight gain and obesity when consuming high fat dairy.

INTERPRETATION:

RECOMMENDATIONS



# GLUTEN

## GENETIC DATA

GENE	GENO TYPE
HLA-DQA1	CC
HLA-DQA2	GG
HLA-DRA	TT
HLA-DQB1	TT

LOW  
RISK

Gluten is a mixture of proteins found in wheat and related grains. It is also found in many food preparations because it provides elasticity and chewiness to many prepared foods. There is a difference between allergy and sensitivity, these genes relate to potential for developing allergy. See the section relating to grain sensitivity for more information. These genetics related to gluten are based on predisposition and are only suggestive of susceptibility to developing reactions to gluten in foods. This is not a diagnostic test.

### INTERPRETATION:

### RECOMMENDATIONS



# GRAIN SENSITIVITY

## GENETIC DATA

GENE	GENO TYPE
GAD1(1)	GG
GAD1(2)	TC
GAD1(3)	GG
GAD1(4)	GG
GAD1(5)	AA

INCREASED

RISK

## HIGH GLUTAMIC ACID SOURCES

- Wheat and Grains
- Soy
- Dairy
- Eggs
- Chicken & Turkey
- Seeds
- MSG

Glutamic acid decarboxylase is an enzyme responsible for the conversion of glutamate into GABA. GAD1 is only present in the brain and helps us to convert the excitatory neurotransmitter, glutamate, into the inhibitory neurotransmitter GABA.

The GAD1 genes relate to the handling of glutamic acid containing foods and the potential for creation of an imbalance between excitatory and inhibitory neurotransmitters in the brain. Certain variations can lead to decreased activity of this enzyme and a tendency toward higher glutamate and lower GABA levels in the brain. This can lead to anxiety, agitation, and difficulty sleeping.

Many grains are high in glutamic acid and frequently people will misinterpret a negative response to grains as a negative response to gluten.

When these variations are significant and the symptoms are expressed, it is important to reduce exposure to glutamic acid and make sure that B6 levels remain healthy since it is required for the enzyme to work optimally

INTERPRETATION:

RECOMMENDATIONS



# SWEETS & SNACKING

## GENETIC DATA

GENE	GENO TYPE
FTO(1)	AA
LEPR	AA
MC4R	TT
FTO(3)	CC
FGF21	AG
ANKK1	GG
COMT	AA
DRD2	AG
SLCA2	GG
SLC2A2	n/a
TAS1R2	TG
TAS1R3	CC
TAS2R38	AG
MTHFR <sup>1298</sup>	TG

INCREASED

SWEET PERCEPTION

TYPICAL

SNACKING DRIVE

TYPICAL

ADDICTION RISK

Many people perceive that snacking behaviors and the inability to stop eating sweets are willpower based. While this may be true at times, much of the drive toward snacking and sweets is coded in our DNA. The snacking gene variations that we analyze have been applied in clinical practice for several years and there is an extremely high correlation between genetic variations and client reported snacking behaviors. The same holds true for sweets, there are genes that code for perception of sweet taste where each person can have a different perception of sweetness based on their gene variations.

There are also genes that code for the way our brains respond when we taste something sweet.

INTERPRETATION:

RECOMMENDATIONS



# CARBOHYDRATES

## GENETIC DATA

GENE	GENO TYPE
KCDT10	GG
MMAB	GC
PLIN1	TC
UCP1	CC
TCF7L2(1)	CC
TCF7L2(2)	TG
TCF7L2(3)	CC
TCF7L2(4)	CC
CEBPA	GG
ABCG4	AA
VLDLR	AG
IGF1R	AA
LPIN(2)	TT
AGER	CC
FTO(4)	AA
GIPR	CC

TYPICAL

OPTIMAL INTAKE

MODERATE

OPTIMAL FIBER

Carbohydrates are frequently praised or villainized in dietary recommendations, but the one aspect that we have identified in the genomic data is that there is no right answer that fits every person.

Carbohydrates are a very individualized component of the diet and using the current scientific literature and our experience with genomics in clinical practice, the relevant and highest impact genes have been identified.

This is especially relevant when it comes to ideal body composition as some people will do better on lower carbohydrate intake while others tend to burn fat in the flame of a carbohydrate.

Be mindful of the fact that much of this response can be modified through epigenetics. Review your past experience and your food preferences with your coach.

INTERPRETATION:

RECOMMENDATIONS:



# TOTAL FATS

## GENETIC DATA

GENE	GENO TYPE
APOE (1)	TT
APOE (2)	CC
APOE (3)	..
PPARG	CC
FABP2	GG
APOA2	AA
APOB	GG
ADIPOQ	GG
TFAP2B	AA
FTO	AA
TNF	GG
LIPC	AA

MODERATE

OPTIMAL INTAKE

Primary fats of the human diet:

- Saturated fats (SFA)
- Monounsaturated fats (MUFA)
- Polyunsaturated fats (PUFA)

Depending on the source of the advice, you will hear about which ones are good for you and which ones are bad. The problem with this advice is two-fold; first, fats are a macronutrient that our bodies require for optimal health so there is no strict classification of good and bad. Second, there are significant individual differences in how each person responds to the different types of fat.

When using genetic variations to provide guidance on fat intake, it is important to understand that many of the studies used did not differentiate the types of fat. This section provides guidelines for planning the ideal percentage of calories from fat in your daily diet.

INTERPRETATION:

RECOMMENDATIONS:



# SATURATED FATS

## GENETIC DATA

GENE	GENO TYPE
APOE (1)	TT
APOE (2)	CC
APOE (3)	..
PPARG	CC
APOA2	AA
APOB	GG

**MODERATE**

**OPTIMAL INTAKE**

### Dietary Sources of Saturated Fat:

- Pork (bacon, sausage)
- Red meats
- Cheeses
- Potato chips/fries
- Butter
- Coconut oil
- Chocolate

Saturated fats (SFA) represent one of the most debated aspects of human nutrition today. Various studies go back and forth regarding whether it is healthy or not healthy. The Atkins and Paleo movements have brought saturated fat into the forefront of discussions.

Bottom line is that saturated fats are needed for healthy human function. Saturated fat makes up 50% of the membrane fats in every cell of our body and is essential for healthy immune function. Our brain is 60% fat and is predominantly saturated fat and cholesterol. Despite this, there can be something to getting too much of a good thing.

Each individual carries genetic variations that can change the way they respond to saturated fats from a health and wellness standpoint. The algorithm used in this profile is based on leading scientific studies into genome wide associations as well as from our extensive experience in applying this in clinical practice.

Even with moderate intake recommendations it is best for most individuals to keep saturated fat intake to less than 10% of total calories.

**INTERPRETATION:**



**RECOMMENDATIONS:**





# POLYUNSATURATED FATS

## GENETIC DATA

GENE	GENO TYPE
APOA5	AA
BDNF	CC
TNF	GG
FADS1	TG
ELOVL2	GG
PTGS2	AA
COX-2	TT
IL-1B	AG

MODERATE

OMEGA-6 INTAKE

MODERATE

OMEGA-3 NEED

Polyunsaturated fatty acids (PUFA) have a role in many physiological processes, including energy production, modulation of inflammation, and maintenance of cell membrane integrity.

Polyunsaturated fats (PUFAs) include the omega-6 and omega-3s, essential for life and there are health benefits to consuming both in the appropriate ratios.

Research has been focused on omega-6/omega-3 ratios and there is a clear benefit to keeping this ratio at 4:1 or less. While this is the beneficial zone, most people consume these fats in a 10:1 ratio. Many in the industrialized world are reaching levels as high as 25:1. These large ratios in favor of omega-6 are unhealthy and lead to significant inflammation and increased risk for detrimental health effects.

Several GWAS studies have looked at the genetic variations that impact serum levels of PUFAs in the population. Certain variations correlate with rate limiting enzyme activity in the conversion to beneficial forms while others can predict weight loss response to percentages of PUFAs in the diet.

INTERPRETATION:

RECOMMENDATIONS:



# MONOUNSATURATED FATS

## GENETIC DATA

GENE	GENO TYPE
ADIPOQ(1)	GG
ADIPOQ(2)	GG
APOA5	AA
BDNF	CC
TNF	GG
FAAH	AC
LPL	TC
IL-1B	AG

MODERATE

MUFA INTAKE

There are currently no strict recommendations on MUFA intake but suggestions range from 12-25% of total calories.

Monounsaturated fatty acids (MUFA) have a long list of studies in the scientific literature supporting the health benefits. Reported health benefits include; decreased inflammation, decreased cancer rates, decreased heart disease, and weight loss.

MUFA is suspected to be the major health benefit of the Mediterranean diet where some traditionally consume as much as 40% of their total calories from olive oil, a major source of MUFA.

MUFA are mainly omega-9 fatty acids but also includes the omega-7 fatty acids. The main sources of MUFA in our diets include; oils, nuts, meats, salmon, and avocado.

### MUFA SOURCES:

- Olive oil
- Macadamia nut oil
- Avocado Almonds
- Macadamia nuts
- Beef
- Salmon
- Pumpkin seeds
- Chicken

### INTERPRETATION:

### RECOMMENDATIONS:



# PROTEIN

## GENETIC DATA

GENE	GENO TYPE
FTO(1)	AA
FTO(2)	AA
LPIN1	AG
BDNF-AS	AA
TFAP2B	AA

MODERATE

OPTIMAL INTAKE

Consider the biologic value of proteins. The biologic value is a measure of the proportion of absorbed protein from a food which becomes incorporated into the proteins of the body.

Protein is an important macronutrient that provides the amino acid building blocks for structures, enzymes, antibodies, and hormones. There are 20 amino acids that the body uses to create millions of different proteins and of those, ten are considered essential, meaning that we are not able to make them and we must consume them in our diets.

There are many GWAS that look at how our mix of macronutrients can affect our gene expression to create a specific response. Most of these studies have focused on body composition. This means that we can look at certain genetic variations that correlate with an outcome of changing the way certain genes are expressed that relate to obesity, fat storage, and body composition.

Some people will respond better to a diet with a higher percentage of calories from protein, while other do better with a lower percentage. This is a complex network of gene interactions and there are ways to epigenetically shift the expressions of these genes to achieve desired outcomes.

INTERPRETATION:

RECOMMENDATIONS



# PLANT STEROLS

## GENETIC DATA

GENE	GENO TYPE
ABCG8 (1)	GG
ABCG8 (2)	TT
ABCG8 (3)	CC
CETP	AG
ABCG5(1)	GG
ABCG5(2)	CG

HIGH

PLANT STEROL  
RISK

SUGGESTED

PLANT STEROL  
BENEFIT

Plant sterols have been reported to lower LDL and triglycerides.

Plant sterols is the term for phytosterols and phytostanols, regardless of biological source. These are cholesterol-like molecules found in all plant foods, with the highest concentrations occurring in vegetable oils. They are absorbed only in trace amounts in normal circumstances, but some individuals possess the genetics to absorb greater amounts. Plant sterols work by inhibiting the absorption of intestinal cholesterol basically through competition for receptors and uptake. This also happens if they get absorbed into our blood stream. This can increase cardiovascular risk.

Generally, the amount of plant sterols taken in through dietary sources are tolerable but excess amounts are a potentially harmful. Supplement sources can come in a variety of forms; sterols, stanols, phytosterols, beta-sitosterol, campesterol and stigmasterol.

INTERPRETATION:

RECOMMENDATIONS:



# METABOLISM

## GENETIC DATA

GENE	GENO TYPE
GCKR	TC
LEPR	n/a
PPARGC1A	TC
MC4R	TT
UCP2	CC
FTO(4)	GG
UCP2(2)	GG
FTO(6)	GG

LOW

ESTIMATED RMR

In this report, we look at genetic variations and how they tend to affect resting metabolic rate (RMR). RMR is a complex combination of genetics and environment and the genetics can be modified through epigenetic influences.

The basal metabolic rate calculators (BMR) are rough estimates and should only be used as guides. In fact, the weight variable in the equation adds even more variability since it is most accurate when using the fat free mass (FFM), and FFM can be very different even for individuals that weigh the same in total body weight.

The BMR calculators are reported in some studies to be as much as 700 kcal off even when using FFM. BMR does not take into account the number of calories burned in daily activity, only resting.

INTERPRETATION:

RECOMMENDATIONS



# MACRONUTRIENT WORKSHEET

## CLIENT DEMOGRAPHIC:

Height: inches

Gender:

Weight: lbs

Age:

## MACRONUTRIENT DAILY GOALS:

Carbohydrates  grams/day

Protein  grams/day

Fats  grams/day

## BASAL METABOLIC RATE:

(estimated)

Calories/Day

Probability Based on

Genetic Data

CARBS: 35%

FATS: 30%

PROTEIN: 35%

Recommended calorie mix is based on a combination of genetics and your lifestyle evaluation

Recommended

Calorie Mix

CARBS:%

FATS:%

PROTEIN:%

TOTAL DAILY CALORIE GOAL: CALORIES/DAY



# RECOMMENDATIONS



# Genomic Supplementation Report

Client: Sample Client





# VITAMIN B12

GENE	GENO TYPE
FUT2 (1)	AG
FUT2 (2)	AG
FUT(3)	AG
MTR	AA
VDR taq	AA
COMT	AA
TCN1	AG
MTRR A66G	AA
MTHFR 677T	AG

Since your body can't make vitamin B12, you should get it either from supplements or food sources. Foods that contain vitamin B12 are all animal products or have been fortified with B12. See end of report for foods high in B12.

## TYPICAL

## SUPPLEMENTATION NEED



It's estimated that 40 percent of American's don't get enough vitamin B12. Vitamin B12 is absorbed through the stomach lining typically in the form of animal-based foods.

### *Benefits of Vitamin B12*

B12 deficiency can contribute to fatigue and brain fog.

Benefits to increasing your vitamin B12 intake, include

- Increased energy – Because your body needs B12 to convert carbohydrates into glucose, it increases your overall energy and reduces fatigue.
- Improved brain function – Vitamin B12 helps make DNA and keep your nervous system healthy by reducing depression, stress levels, and reducing brain shrinkage.
- Healthy digestive system – B12 helps the gut and prevents heart disease by curbing cholesterol levels, protecting against stroke, and high blood pressure.

### INTERPRETATION:



### RECOMMENDATIONS





# VITAMIN B6

GENE	GENO TYPE
NBPF3 ALPL(1) ALPL(2)	TT CC AA

If you'd like to increase your vitamin B6 intake, you can do so naturally by adding certain foods to your diet. Foods that are notably high in B6 are listed at the end of this report. B6 is involved in over 100 metabolic processes.

TYPICAL

SUPPLEMENTATION  
NEED

Vitamin B6, also called pyridoxine, helps your body turn food into energy, supports adrenal function, maintains a healthy nervous system, is important in metabolic processes, and supports the healthy development in babies' brains during pregnancy and breastfeeding.

Considered one of the most common vitamin deficiencies, vitamin B6 is consumed through diet or supplements.

Common symptoms of low vitamin B6 are irritability, depression, and anxiety. Some scientists believe that the levels for considering someone vitamin B6 deficient should be increased.

## *Benefits of Vitamin B6*

- **Adrenal function** – Through regulating hormones, B6 helps you battle stress, stabilize your mood, and stay happy.
- **Metabolism** – Crucial to your hundreds of metabolic processes, B6 helps your body turn food into energy.
- **Healthy nervous system** – Vitamin B6 is often referred to as the happy vitamin because it helps make serotonin and norepinephrine, which impact your mood.
- **Digestive support** – B6 helps maintain healthy digestive processes.

INTERPRETATION:

RECOMMENDATIONS





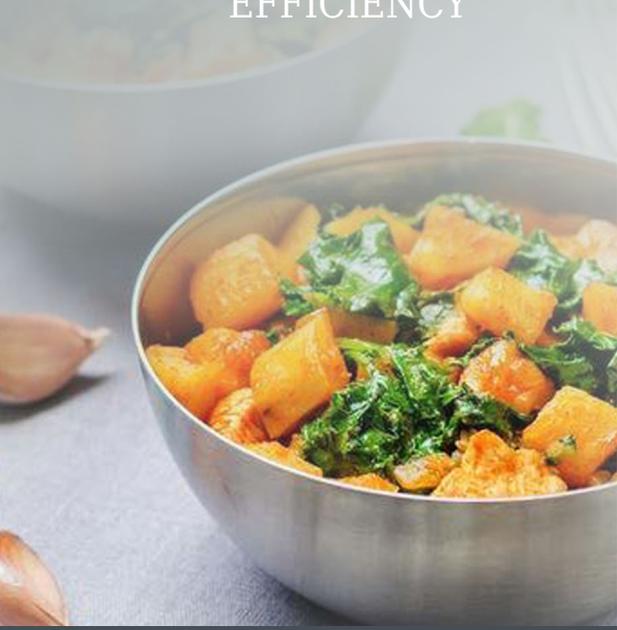
# VITAMIN A

GENE	GENO TYPE
BCMO1(1)	CC
BCMO1(2)	TA
BCMO1(3)	AG
BCMO1(4)	AG
BCMO1(5)	TG
BCMO1(6)	TG

Vitamin A is a nutrient that is easy to add to your diet with both supplements and food. Some of the best food sources are listed at the end of this report, add to your meals for a boost in skin, eye, and teeth health.

VERY LOW

CONVERSION  
EFFICIENCY



Vitamin A is also called beta-carotene or retinoic acid. When it's found in food it's in the form of beta-carotene. In supplements, vitamin A can be in either form or both. Beta-carotene is the naturally occurring form that is converted by the body into retinoic acid, which is its usable version.

The gene BCMO1 is what the body relies to properly convert beta-carotene into its usable form. Your body relies on this conversion of vitamin A for healthy maintenance of the heart, kidneys, lungs, and eyes.

## *Benefits of Vitamin A*

**Improved immune system** – Boosts the immune system and helps fight infection by increasing the lymphocytic responses against antigens. It also helps mucus membranes stay moist, which helps strengthen white blood cell activity

**Healthy skin** – With the ability to trap free radicals and toxins, vitamin A keeps your skin supple & healthy.

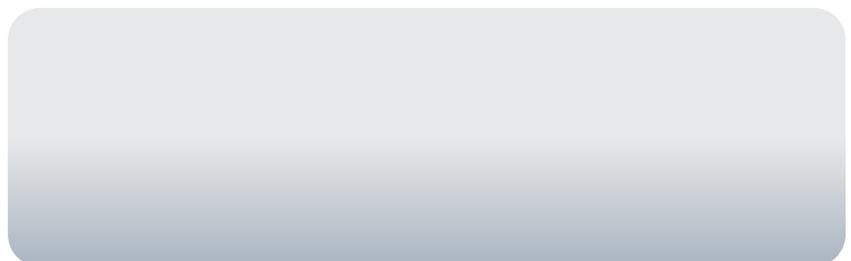
**Increased tooth strength** – Through forming a hard material just beneath the surface of your teeth called dentin, vitamin A keeps your teeth strong.

**Eye health** From moisture to macular health, it supports your eyes.

INTERPRETATION:



RECOMMENDATIONS





# SELENIUM

GENE	GENO TYPE
GPx1	AG
SEPP1	CC
AGA	CC
BHMT	TC
MST1	AG
DMGDH	CC

While you can add selenium to your diet with a supplement, there are several foods that are naturally high in selenium. Some of these selenium-rich foods are listed at the end of this report.

## TYPICAL

## SUPPLEMENTATION NEED



Selenium is an antioxidant, meaning it protects your body from harmful free radicals and oxidative stress. This delays cell damage and helps protect your body from oxidizing agents caused by many diseases and pollutants.

As an immunomodulator, Selenium is a more potent antioxidant than vitamins A, C or E. It's nutritionally essential for everyone, supports thyroid hormone metabolism, and protects against infections.

### *Benefits of Selenium*

**Thyroid support** – Selenium is an important cofactor for three of the four thyroid hormone deiodinases, which activate and deactivate thyroid hormones and metabolites.

**DNA repair** – By neutralizing free radicals, selenium protects DNA, preventing serious damage.

**Metal detoxification** – Studies have shown that organic selenium supports the excretion of the harmful element mercury.

**Reproductive health** – Selenium is vital for both male and female reproductive health. In men, it enables sperm movement. In women, low selenium can negatively impact fertility and fetal development.

## INTERPRETATION

## RECOMMENDATIONS

# MAGNESIUM

GENE	GENO TYPE
CNNM2	GG
MUC1	CC
DCDC5	TC
Shroom3	GG
TRPM6(1)	TT
TRPM6(2)	CC

Magnesium is found in both plants and animalbased foods, making it easy to add to your diet. Foods that are rich in magnesium are listed at the end of this report.

There are a lot of delicious foods that contain magnesium so increasing your intake shouldn't be a problem. Though, if you think you are magnesium deficient you can also take it in supplement form.

INCREASED  
SUPPLEMENTATION  
NEED

Magnesium one of the seven macronutrients that is needed by your body in relatively high amounts. It's recommended that you consume at least 100 milligrams per day.

Magnesium is vital to over 300 enzymatic reactions in your body including metabolism, transmission of nerve impulses, and synthesis of fatty acids and proteins. It impacts several bodily systems and can even affect your mood.

Too much magnesium can cause diarrhea and upset stomach.

## *Benefits of Magnesium*

**Bone strength** – Magnesium helps assimilate calcium into your bones by activating vitamin D in your kidneys.

**Healthy metabolism**– Essential co-factor in many metabolic processes especially carbohydrate processing.

**heart health** – Magnesium is responsible for keeping your heart muscles healthy and strong. It also helps with the transmission of electrical signals throughout the body. Proper magnesium levels have shown to lower artery calcification, hypertension, and atherosclerosis (fatty buildup on artery walls).

**Anxiety** – Low magnesium levels have been shown to increase anxiety.

**Gut** – Magnesium works as a stool softener and can relieve constipation naturally.

## INTERPRETATION:

## RECOMMENDATIONS



# CHOLINE

GENE	GENO TYPE
BHMT	AG
CHDH	TT
MTHFD1	GG
PENT	TT
CHKA	AC

our liver produces choline, but not in sufficient quantities. Add choline to your diet through food or through supplements. Both vegetables and animal products contain choline. Not surprisingly, beef liver is the highest source of choline. Foods high in choline are listed at the end of this report.

Increasing your intake of these food or adding choline to your diet through a supplement can improve overall health.

TYPICAL  
SUPPLEMENTATION  
NEED

Your body can produce choline, although, it doesn't produce sufficient quantities of this essential nutrient to maintain optimal health and less than 10 percent of adults get enough choline in their diet.

Some risks of choline deficiency include muscle damage, anxiety, brain fog, and fatty liver.

People that are at risk for choline deficiency include:

- Pregnant women
- Choline depleted diets (plant based diets)
- People with genetic variations

\*\*It's particularly important for pregnant women and babies to get enough choline to ensure healthy brain development.

## Benefits of Choline

**Cell structure** – Your body relies on choline to make the fats that help maintain the structural integrity of all cell membranes.

**Cell messaging** – Choline assists with the production of compounds that act as cell messengers.

**Fat transport and metabolism** – Insufficient choline levels can cause fatty liver.

**DNA synthesis** – Choline, vitamin B12, and folate are three vital nutrients in DNA synthesis.

**Nervous system health** – Acetylcholine, a neurotransmitter involved in memory, muscle movement, and regulating heartbeat, is derived from choline.

## INTERPRETATION:

## RECOMMENDATIONS



# VITAMIN C

GENE	GENO TYPE
SLC23A1(1)	AA
SLC23A1(2)	TT
SLC23A2	AA

Citrus foods, such as oranges, are known to have high vitamin C levels but there are many foods that have high concentrations of vitamin C. These are listed at the end of this report. By adding these fruits and vegetables to your diet or increasing your intake you can generally not require supplementation.

**INCREASED**  
SUPPLEMENTATION  
NEED



Also known as ascorbic acid, vitamin C is a nutrient that plays several key roles in bodily functions. Vitamin C is a powerful antioxidant, trapping free radicals and preventing the harmful effects of toxins. It isn't produced by the body naturally and must be consumed in the form of fruits and vegetables.

People at risk for inadequate levels of vitamin C are those with particular lifestyle habits, genetics, or diets lacking in vitamin C.

## *Benefits of Vitamin C*

**Collagen synthesis** – Vitamin C helps repair and regenerate tissues. Maintains healthy skin and connective tissue.

**Protection against heart disease** – Through increasing the body's level of glutathione, vitamin C protects the arteries.

**Iron absorption** – Assists iron absorption, vitamin C prevents anemia.

**Cholesterol and triglyceride reduction** – Vitamin C reduces the risk of heart attack and stroke.

**Blunts oxidative stress** – In diseases states, vitamin C has shown to help reduce cellular damage by free radicals.

## INTERPRETATION:

## RECOMMENDATIONS



# VITAMIN E

GENE	GENO TYPE
CD36	TC
SCARB1	AG
ZPR1	CC
GSTP1	AG
TNF	GG
IL10	TT

Vitamin E is relatively easy to add to your diet in plant-based forms. Foods that are high in Vitamin E are listed at the end of this report.

TYPICAL  
SUPPLEMENTATION  
NEED

HIGH  
INFLAMMATION RISK

Vitamin E is a fat-soluble antioxidant that plays a vital role in many aspects of your health.

Vitamin E is a term that includes eight compounds in two subgroups (tocopherols and tocotrienols) that each vary in biological activity. Alpha-tocopherol is the only form of the eight that is readily absorbed and used by your body.

Your liver is primarily responsible for using the alpha-tocopherol form of vitamin E taken in through food, supplements, and by converting it from other vitamin E forms.

## *Benefits of Vitamin E*

**Helps store vitamins A, K, iron, and selenium** – Vitamin E helps maintain sufficient levels of many essential nutrients.

**Supports the formation of red blood cells** – Red blood cells rely on vitamin E to strengthen their interior lining, which is another way it toughens the immune system.

**Keeping skeletal, cardiac, and smooth muscles healthy** – Vitamin E is important for both the structural functional and maintenance of these.

**Prevent eye damage** – Studies have suggested that relatively high vitamin E intake may reduce the risk of macular degeneration and cataracts in elderly individuals.

## INTERPRETATION

## RECOMMENDATIONS



# VITAMIN D

GENE	GENO TYPE
GC	TT
CYP2R1	AG
CYP2R1(2)	AG
DHCR7	CC
VDR fok	AA
CYP27B1	TT
CYP24A1	GG
Klotho	TT
VDR bsm	CC
VDR taq	AA
VDR apal	AC

Vitamin D is not just a matter of getting it from food. Sunlight is needed to adequately convert Vitamin D to usable forms.. It is important to consume foods which are high in vitamin D, listed at the end of this report.

TYPICAL

SUPPLEMENTATION  
NEED

YES

SUNLIGHT BENEFIT

NO

TESTING CAUTION

Vitamin D is a fat-soluble nutrient that is not readily found in many foods. An estimated 70 percent of the population is thought to be vitamin D deficient. This is concerning because it's a nutrient that's responsible for regulating over 1000 genes in the human genome.

From a genetic standpoint, people tend to vary in their ability to process vitamin D. This means that there's a difference in the baseline amount needed to maintain healthy vitamin D levels from person to person.

## *Benefits of Vitamin D*

**Bone health** – Through increasing calcium and phosphorus absorption, vitamin D strengthens bones.

**Prevention of diabetes** – Studies have shown that vitamin D can decrease your risk of getting both Type 1 and Type 2 diabetes.

**Heart health** – Studies have shown vitamin D deficiency as a risk factor for congestive heart failure and heart attacks.

**Mood regulator** – Vitamin D is thought to reduce or prevent depression.

**Muscle growth** – Vitamin D has been shown to aid in muscle growth and retention in both adults and the elderly.

## INTERPRETATION

## ECOMMENDATIONS



# VITAMIN K

GENE	GENO TYPE
APOE(1) APOE(2)	TT CC

INCREASED  
SUPPLEMENTATION  
NEED

Vitamin K includes a family of compounds, including vitamin K1 and vitamin K2. Also known as phylloquinone, vitamin K1 is found in plants, mostly leafy green vegetables. Vitamin K2 or menaquinones, is usually of bacterial origin and can be found in some animal-based and fermented foods but is mostly converted by the large intestine or liver from vitamin K1.

Many people get an adequate amount of vitamin K through their diet. It's also present in most multivitamin supplements. Genetics can be an active player in this process and can be predictive of absorption and conversion.

## *Benefits of Vitamin K*

**Bone health** – In a study in the Netherlands, vitamin K2 was three times more effective in raising osteocalcin than K1, which is important to bone metabolism.

**Blood clotting** – Vitamin K is essential to blood clotting. In fact, in studies of severe vitamin K deficiency, clotting was almost impossible.

**Supporting the efficacy of vitamin D** – Vitamin K improves the impact of vitamin D when they are taken in combination.

## INTERPRETATION

## RECOMMENDATIONS





# FOLATE

GENE	GENO TYPE
MTHFR 677T	AG
MTHFR 1298C	TG
DHFR(1)	TT
FOLR1	GG
DHFR(2)	ID
SLC19A1	CC

## TYPICAL SUPPLEMENTATION NEED

Note that there is a difference between folate and folic acid when you look at supplements or fortified foods. Folic acid is a synthetic form that requires the body to convert to usable form - folate. Certain genetic variants can create a risk of potential adverse outcomes with excess folic acid.

Folate or vitamin B9 is a water-soluble nutrient that is available in many foods and typically found in multivitamin supplements. Getting enough folate is important to cognitive function, cardiovascular disease, cancer, birth defects, and depression.

While it's difficult to get too much folate from food, it's possible to take too much folic acid in the form of supplements or fortified foods.

Crucial parts of your body – your brain, heart, and all the way down to your DNA – rely on sufficient folate levels for optimal health.

### *Benefits of Folate*

**DNA synthesis and repair** – Functioning as a coenzyme, folate helps with the synthesis of DNA and RNA and the metabolism of amino acids.

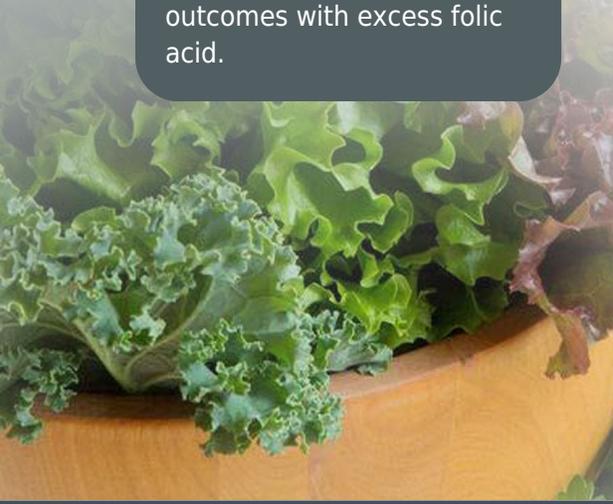
**Tissue growth** – Folate's role in synthesis makes it essential to tissue and cell growth.

**Cardiovascular health** – Studies have shown that folate encourages normal cholesterol levels.

**Neurological health** – Most observational studies show that higher folate levels correlate with low Alzheimer's disease and dementia.

## INTERPRETATION

## RECOMMENDATIONS





# THIAMINE

GENE

GENO  
TYPE

SLC19A3

TC

## TYPICAL

### SUPPLEMENTATION NEED

Thiamine deficiency can cause difficulty digesting carbohydrates. In severe deficiencies this allows a substance called pyruvic acid to build up in the bloodstream, causing a loss of mental alertness, difficulty breathing, and potentially heart damage.

Thiamine is a vitamin that is also referenced as vitamin B1. Thiamine is essential to many body functions, including nervous system integrity, muscle function, digestion, and carbohydrate metabolism. Very little thiamine is stored in the body and depletion can occur quickly when not supplied through diet or supplementation. It is sometimes called an "anti-stress" vitamin because it can strengthen the immune system and improve the body's ability to withstand stressful conditions.

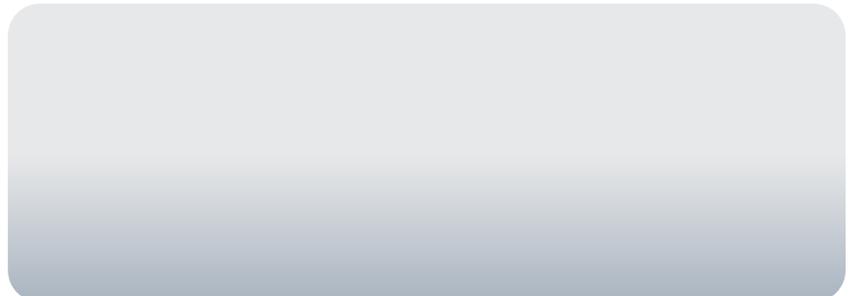
### *Benefits of Thiamine*

- **Energy production** - B1 is responsible for converting sugar into energy. The vitamin acts as a co-enzyme in oxidizing sugar to produce energy for the smooth functioning of the body organs, especially the heart, brain, lungs, and kidneys.
- **Improves brain function** - It ensures smooth functioning of the brain and helps improve memory and concentration. Vitamin B1 helps relieve stress and also helps strengthen the nerves.

### INTERPRETATION



### RECOMMENDATIONS





# COPPER

GENE

GENO  
TYPE

SELENB1  
ATP7B

TG  
GG

TYPICAL

SUPPLEMENTATION  
NEED

Copper is a micronutrient that is involved in many processes in the body and can easily become deficient due to the lack of intake in even a healthy diet. The body cannot produce copper on its own so it requires intake in the diet or through supplementation. It is also a micronutrient that has a narrow range of safety - very common to be deficient and easy to become toxic if over-supplemented. Most whole food sources are very low in copper.

## *Benefits of Copper*

**Cognitive function** - Too little or too much copper can have a negative impact on the brain. Ideal levels promote growth and development of brain pathways.

**Thyroid health** - An important cofactor in promoting optimal thyroid levels and a healthy thyroid is important in keeping adequate absorption of copper from the gut.

**Long-term health** - Copper is a requirement for ongoing maintenance & repair DNA.

**Bone** - Copper is important in maintenance and repair of bone and cartilage. Deficiencies can lead to low bone density.

**Blood** - Lack of copper can also lead to anemia.

**Skin & hair** - Copper is involved in the production of melanin, a pigment responsible for skin and hair color.

## INTERPRETATION



## RECOMMENDATIONS





# ZINC

GENE	GENO TYPE
CA1	GG
PPCDC(1)	TC
PPCDC(2)	TC

TYPICAL

SUPPLEMENTATION  
NEED

Zinc is considered an essential trace element and is involved in assisting at least 100 different enzymes in the human body. It is also a common micronutrient deficiency. Deficiencies can lead to many health issues and optimal levels are essential to thrive. Plant based sources of zinc generally provide significantly lower bioavailability than animal based food sources.

## *Benefits of Zinc*

**Immunity** -Zinc is an essential nutrient for our immune system..

**Cognitive function** - Essential for optimal communication between neurons in the brain.

**Common cold** - Zinc has been shown to lessen the severity and duration of the common cold.

**Wound healing** - From decreasing inflammation and reducing bacterial growth to helping maintain skin integrity.

**Taste & smell** - The taste and smell are reliant on zinc for proper function and has been shown to heighten these senses.

**Weight loss** - Deficiencies can lead to overeating. It works through the appetite hormone ghrelin to decrease the urge to overeat.

## INTERPRETATION



## RECOMMENDATIONS



# IRON

GENE	GENO TYPE
TMPRSS6	AA
TF	GG
TFR2	AC
HFE(1)	CC
HFE(2)	AG

INCREASED  
SUPPLEMENTATION  
NEED

TYPICAL  
RISK FOR EXCESS

Iron is essential mineral and is the world's most common nutritional deficiency disease. Deficiency is most prevalent among children and women of childbearing age. Almost 10% of women in developed countries are iron deficient.

Fatigue, insomnia, hair loss, and ice crunching are common signs of deficiency. Inadequate intake of vitamin C can contribute to iron malabsorption. Plant based iron is not incorporated as well as heme-iron from animal sources.

## ***Benefits of Iron***

**Hemoglobin production** - Dietary iron is a critical component in the formation of hemoglobin and oxygen transport.

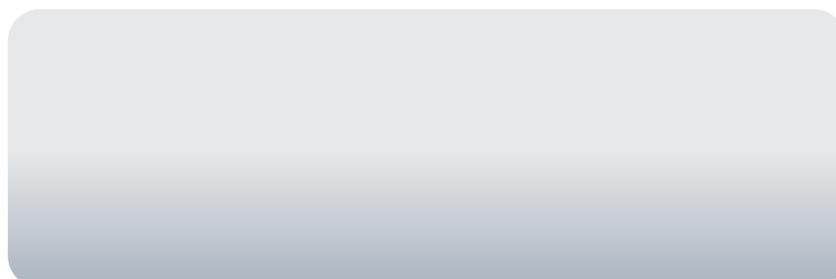
**Oxygen transport** - A form of hemoglobin found in muscle cells is myoglobin. Myoglobin carries oxygen from hemoglobin and diffuses it throughout muscle cells.

**Muscle function** - Iron is critical for oxidative metabolism in the brain and it is a co-factor in the synthesis of neurotransmitters. Insufficient iron in the diet is associated with decreased brain iron and with changes in behavior and cognitive functioning.

## INTERPRETATION



## RECOMMENDATIONS





# NITRIC OXIDE

GENE	GENO TYPE
NOS1(1)	CC
NOS1(2)	GG
NOS2	AG
NOS3(1)	AA
NOS3(2)	TT
NOS3(3)	GG

## TYPICAL

## SUPPLEMENTATION NEED

Nitrates have had a negative connotation over the years due to the suspicion of causing health problems such as stomach cancer. This was due to their association with the nitrosamines that could be found in cured and smoked meats as well as fermented foods. In many countries the amount of nitrates in processed meats has been substantially reduced and they add vitamin C which reduces the chances of nitrosamine formation during high heat cooking.

Our bodies are capable of producing nitric oxide but some genetic variants can alter that ability. Nitrates are the natural forms of nitric oxide that the body can utilize.

Kale and spinach will generally have substantially more nitrate content than a hot dog or bacon.

80% of the nitrates in our diet come from vegetables. Interestingly, organic vegetables have less nitrates than conventionally farmed food due to reduced use of nitrogen based fertilizers.

### *Benefits of Nitric Oxide*

**Cardiovascular** – Nitric oxide, endogenously produced or from nitrates can lower blood pressure and dilate blood vessels.

**Exercise** – Nitrates have been shown to decrease oxygen requirements of muscles during exercise and lead to greater time to fatigue.

**Brain** – Nitric oxide is a potent antioxidant in the brain and it serves a function as a neurotransmitter.

**Immunity** – Nitric oxide is used by our immune cells to kill invading bacteria.

## INTERPRETATION

## RECOMMENDATIONS



# SODIUM

GENE	GENO TYPE
ADD1	GG
ACE del	AG
NEDD4L	AG
WNK1	TG

LOW

SENSITIVITY RISK

It is an incorrect assumption that other forms of salt (something other than table salt) might be better for you. Salt as a chemical is sodium chloride and we are talking about sodium sensitivities here so table salt and sea salt or mineral salt will all still contain sodium. There are some benefits to some of the exotic salts in that they contain additional minerals but they are still basically sodium.

Sodium or salt is another nutrient that has had its share of bad press. Sodium balance is one of the most exquisitely monitored systems in the body. Because sodium is so important to the maintenance of health, it is finely tuned to a very narrow and precise level. Taking excess sodium for most people will not result in health problems, assuming the body is functioning well.

One aspect to keep in mind is the genetics we possess may impart an increased risk for taking excess sodium in the diet. There are genetic variations that can result in an alteration in the processing pathways which can create potential adverse reactions to too much salt in the diet.

## *Types of Sodium:*

**Table salt:** sodium chloride and iodine

**Sea salt:** slightly lower sodium plus calcium, potassium, iron oxide (pink color)

**Himalayan salt:** slightly lower sodium plus calcium, potassium, iron oxide (pink color)

**Celtic salt:** slightly lower sodium and trace minerals

## INTERPRETATION



## RECOMMENDATIONS



# CAFFEINE

GENE	GENO TYPE
CYP1A2(1)	AA
CYP1A2(2)	CC
AHR	CC
ADORA2A	TC
ADA	CC

HIGH

METABOLISM

LOW

ANXIETY RISK

Metabolism - How well do we metabolize caffeine? The half-life of caffeine is 5.7 hours.

Anxiety - How does your brain respond to caffeine? Brain wave patterns can have variable responses to caffeine depending on your individual genetics.

Sleep - Caffeine can assist some people with shaking off a night's sleep and clearing up the brain fog; while others will experience sleeplessness from even small doses of caffeine.

Caffeine is one of the most researched substances in the history of science. Good or bad? The answer may actually reside in your genetics. The interactions of caffeine in our body is a complex process and requires a full systems look to see if it is truly good or not so good for each individual.

## *Benefits of Caffeine*

**Energy** - Caffeine can improve daily energy by interfering with a substance called adenosine.

**Fat burning** - Caffeine is one of only a handful of natural substances that has been proven to improve fat loss.

**Physical performance** - Caffeine is a true performance enhancing substance.

**Reduced risk of neurodegenerative diseases** - Coffee itself has been linked to reduced risk of cognitive decline.

## INTERPRETATION

## RECOMMENDATIONS

# INTERPRETIVE NOTES:

# VITAMIN FOOD SOURCES:

## *Vitamin B12:*

- Liver • Salmon • Milk • Yogurt • Tuna • Mackerel • Sardines • Red meat • Raw cheese • Eggs

## *Vitamin B6:*

- Brewer's yeast • Bananas • Milk • Cheese • Eggs • Fish • Sunflower seeds • Carrots • Spinach • Peas • Legumes • Potatoes

## *Vitamin A:*

- Fish liver oil • Cream • Egg yolk • Beef liver • Cheddar cheese • Butter • Sweet potato • Carrots • Broccoli • Mango • Spinach • Pumpkin • Apricot • Peach • Papaya • Collard greens

## *Selenium:*

- Brazil nuts • Tuna • Halibut • Beef liver • Turkey • Sardines • Sunflower seeds • Pork • Mushrooms

## *Magnesium:*

- Dark leafy greens • Sesame seeds • Brazil nuts • Mackerel • White beans • Quinoa • Avocados • Yogurt • Bananas • Dark chocolate

## *Choline:*

- Beef liver • Eggs • Chicken breast • Cauliflower • Broccoli • Mushrooms • Soybeans • Dark leafy greens • Shellfish • Asparagus • Brussel sprouts • Bok choy • Cod

## *Vitamin C:*

- Bell peppers • Guava • Dark leafy greens – especially turnip greens • Kiwi • Broccoli • Strawberries • Tomatoes • Peas • Papaya • And of course, citrus fruits – oranges, grapefruits, lemons

## *Vitamin E:*

- Almonds • Sunflower seeds • Swiss chard • Pine nuts • Broccoli • Mustard greens • Avocado • Spinach • Turnip greens • Kale • Plant oils • Hazelnuts

## *Vitamin D:*

- Fatty fish – Tuna, mackerel, salmon • Beef liver • Cheese • Egg yolks • Cod liver oil • Fortified drinks – Milk and sometimes orange juice • Fortified foods – Cereals and grains

## *Vitamin K:*

- Spinach • Kale • Turnip greens • Collards • Swiss chard • Mustard greens • Parsley • Romaine • Brussel sprouts • Broccoli • Cauliflower • Cabbage

## *Folate:*

- Beef liver • Spinach • Broccoli • Bananas • Strawberries • Oranges • Beans • Avocado • Tomatoes • Beets • Celery • Asparagus • Legumes • Yeast • Cereal • Mushrooms • Fish • Eggs

## *Nitric Oxide:*

- Spinach • Kale • Beets • Carrots • Legumes • Celery • Eggplant • Ham • Bacon • Pastrami • Salami • Hot dogs • Sausages

## *Thiamine:*

- Beef • Brewer's yeast • Legumes (beans, lentils) • Milk • Nuts • Oats • Oranges • Pork • Rice • Seeds • Wheat • Whole-grain cereals • Yeast • In industrialized countries, food made with white rice or white flour is often enriched with thiamine.

## *Iron:*

- Legumes • Lentils • Soy beans • Whole grains • Green leafy vegetables • Cereals • Bread • Spinach • Turnip • Fish • Eggs • Meat (especially high in red meats) • Sprouts • Broccoli • Dry fruits



# Sleep Genotype Report

Client Name: Sample Client





# CIRCADIAN PROPENSITY

## GENETIC DATA

GENE	GENO TYPE
PER2(1)	n/a
PER2(2)	CC
PER3(1)	AA
PER3(2)	CC
AANAT	GG
CSNK1D	n/a
GNB3	
ARNTL	CC

MORNING

YOUR CHRONOTYPE



Humans are a diurnal species. We are active during the day and sleep at night. Many of us feel more awake, alert and capable of our best work effort in the morning. However, there are those at the opposite end of the spectrum who prefer to stay up late and sleep well into the daytime hours. These individuals find themselves most alert in the evening.

The circadian rhythm is a cycle that signals our bodies when to sleep, rise and eat. Individual circadian variations are governed by the internal circadian clock network. This internal biological clock network resides in the brain and regulates the timing of functions such as appetite, hormone release, and metabolism. Our perception of this clock is the basic sleep-wake process.

Recent research has revealed that the circadian clock is not as basic as we once suspected. While we have tendencies toward a basic rhythm, what determines our desire to wake early or stay up late, is influenced by the same system that regulates the cycling of many bodily functions. Forcing the body to fit into a sleep-wake cycle that does not match our genetics, can lead to circadian dysynchronization

INTERPRETATION:

RECOMMENDATIONS



# SLEEP ONSET

## GENETIC DATA

GENE	GENO TYPE
NPSR1	AA
CLOCK(3)	AA
PER3(1)	AA
PER3(2)	CC
AANAT	GG
CACNA1C(1)	TA
CACNA1C(2)	AA
COMT	AA

## TYPICAL

## PROPENSITY

Normal sleep latency, the time from lying down to the first stages of sleep, is approximately 15-20 minutes. Falling asleep faster indicates a degree of sleep deprivation. Often, individuals with a genetic propensity for later sleep, try to force themselves into a different chronotype (circadian rhythm) which can result in significant sleep onset delays

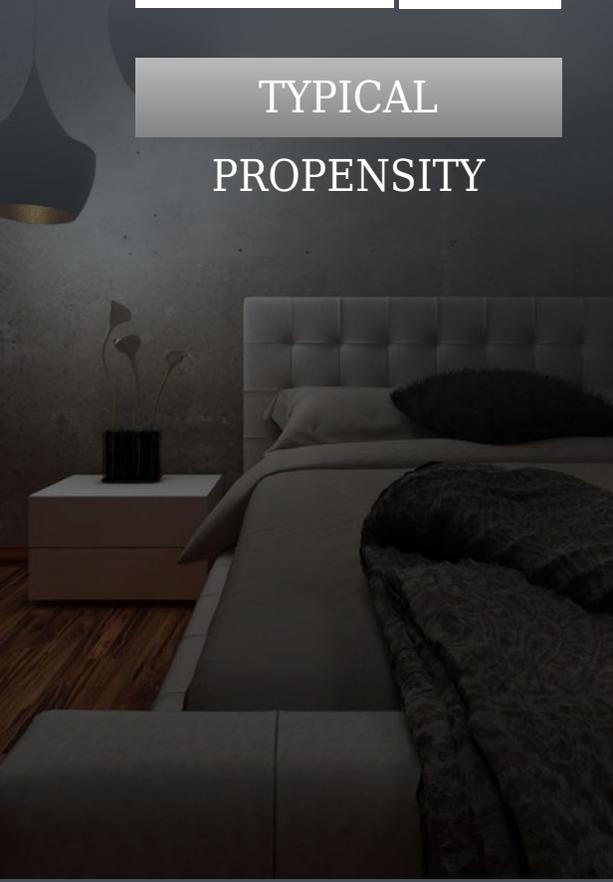
Individual genetics play a large role in the prediction of longer or shorter periods of sleep onset. Despite possessing a propensity for delayed sleep onset, identifying the genetic components that are most impactful to the process allows a much more directed and personalized approach to optimal sleep interventions.

Normal time to onset of sleep is about 15-20 minutes. Onset of sleep outside of this range usually indicates either a genetic or lifestyle component

- 0-5 minutes = severe sleep deprivation
- 6-15 minutes = moderate sleep deprivation
- 15-20 minutes = normal
- >20 minutes = probable genetic or environmental

### INTERPRETATION:

### RECOMMENDATIONS:





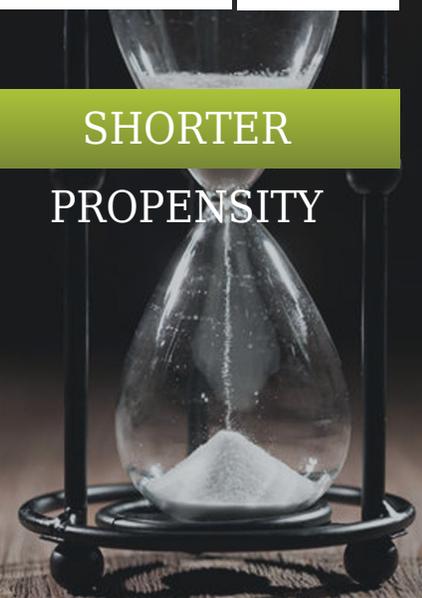
# SLEEP DURATION

## GENETIC DATA

GENE	GENO TYPE
NPSR1	AA
CLOCK(1)	AA
CLOCK(2)	AA
PER2(1)	n/a
GNB3	CC
ADA	CC
ABCC9	n/a
GRIA3(1)	AC
ABCC9	n/a
CLOCK(4)	AG
DEC2	GG
COMT	AA

SHORTER

PROPENSITY



When we don't get the sleep we need, we experience surges of stress hormones which disrupt our cognition and ability to regulate emotions. 90% of adults require 7 - 9 hours of sleep a night.. Lost sleep reduces brain power and productivity, diminishes concentration and impairs memory. It lowers creativity, reduces the ability to communicate, impairs motor skills and increases stress and anxiety

Studies have demonstrated that just two hours of sleep deprivation (5 - 6 hours of sleep) results in a vigilance level equivalent to the consumption of two alcoholic drinks. Interestingly, while there is a detrimental decline in vigilance our perceived level of vigilance will be normal.

Many factors contribute to how long we sleep. Assessing your genetic sleep variations and establishing effective sleep strategies are essential steps in the process of sleep optimization.

Sleep requirements:

Teens 9-10 hours

Adults 7-9 hours

INTERPRETATION:

RECOMMENDATIONS:



# DISRUPTION OF SLEEP

## GENETIC DATA

GENE	GENO TYPE
TNFa	GG
BDNF	CC
MTNRB	CC
PPP2R4	GG
ADORA2A	TC
GRIA3(1)	AC
COMT	AA
ARNT	GC
FABP7	CC
GNB3	CC

HIGH

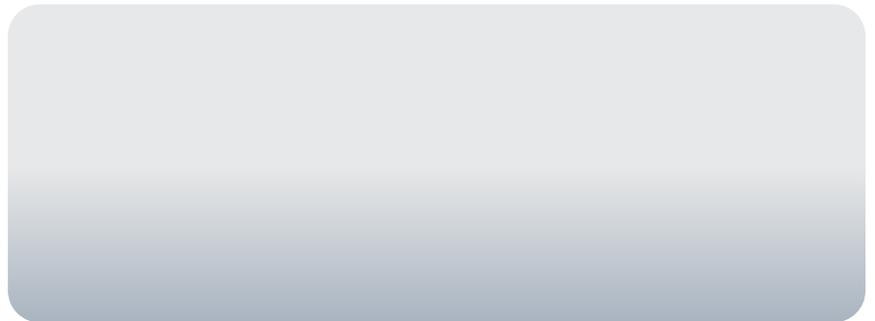
PROPENSITY FOR  
DISRUPTED SLEEP



Sleep Matters. It is the single most important thing you can do to improve performance in life. Sleep quality is determined by a complex network of interacting physiological processes which are strongly influenced by lifestyle. The quality of our sleep is influenced by the amount of deep sleep, the number and duration of waking episodes and the number of REM episodes. When our lifestyle is not in sync with our chronotype, sleep quality can be significantly impacted.

Genetic predispositions can evaluate variables such as melatonin production and response, excitatory versus inhibitory neurotransmitters and responses to our environment - light, caffeine, etc. Once a genetic variable is identified, a directed approach can be taken to improve the underlying issue. It is important to first get sleep patterns matching before addressing sleep quality.

### INTERPRETATION



### RECOMMENDATIONS





# NARCOLEPSY RISK

## GENETIC DATA

GENE	GENO TYPE
HLA-DRB1	GG
TRCA	TT
P2RY11	AG

TYPICAL  
RISK

Narcolepsy is a long-term neurological disorder that involves a decreased ability to regulate sleep-wake cycles. It has been estimated that 1 in 2000 people are affected by narcolepsy.

There are two types of narcolepsy:

### Type 1

Irrepressible need to sleep or daytime lapses into sleep occurring for  $\geq 3$  months.

Cataplexy (paralysis of motor control)

Cataplexy is absent

Spinal fluid hypocretin-1 concentration  $\leq 110$  pg/mL.

### Type 2

Daily periods of irrepressible need to sleep occurring for  $\geq 3$  months

A mean sleep latency of  $\leq 8$  minutes and  $\geq 2$  sleep-onset REM periods.

Cataplexy is absent

Spinal fluid hypocretin-1 concentration  $>110$  pg/mL

INTERPRETATION:

RECOMMENDATIONS:



# RESTLESS LEG

## GENETIC DATA

GENE	GENO TYPE
MEIS1	GG
BTBD9(1)	TT
BTBD9(2)	AA
MAP2K5(1)	AG
MAP2K5(2)	AG
PTPRD	GG

INCREASED  
PROBABILITY



Excessive sleep movement is a condition that can disrupt not only your sleep but also the sleep of your bedmate. This is sometimes referred to as restless leg syndrome (RLS) and describes a condition that causes a strong urge to move one's legs. It is characterized by an overwhelming need to move the legs and symptoms tend to be worse at night. Spontaneous movements are triggered by rest, relaxation, or sleep.

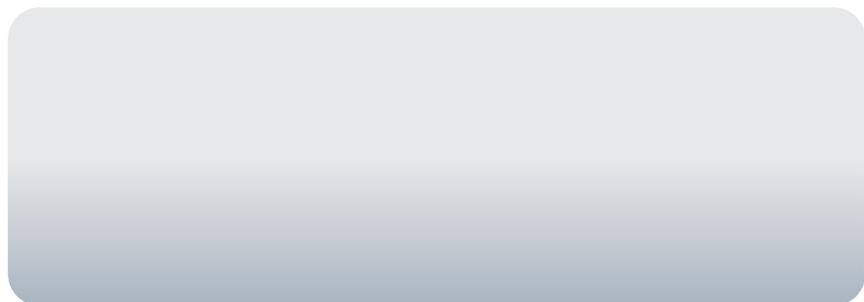
Potential causes include iron deficiency, genetic predisposition, brain neurotransmitter imbalances and increased brain glutamate. There are no specific tests to confirm this condition.

Carrying genetic predispositions does not suggest that it is present, this is solely based on probability. There will be many people that have the symptoms without a genetic predisposition as well. The genetic variations can provide a guide to designing interventions that will have a higher probability of mitigating the symptoms.

INTERPRETATION:



RECOMMENDATIONS





# RECOMMENDATIONS