Client Name:	John Smith
Client DOB:	1/1/1900
Vial Number:	Sample Report
Client Sex:	Male
Referring Account:	Chad Yarbrough, DC
Sample Received:	11/2/2018
Report Date:	8/7/2019

Consult with a licensed healthcare professional before making changes based upon any information contained within this report. These recommendations and explanations are based upon clinical observation by MaxGen Labs and current medical research. These results are for educational purposes only and not intended to diagnose, treat, or cure any disease or condition. The use of this test and its recommendations have not been approved by the FDA. MaxGen Labs and its staff are not responsible for how this test is used or any damages resulting from its use.

Genetics Basic

DNA

DNA can be described as your own personal cookbook. Full of recipes that create you as a human being, each page contains specific details about every cellular process in your body.

Proteins

Proteins are created by a series of amino acids that all code for specific functions in cells, tissues, and organs.

Genes

Genes should be considered the recipes of your cookbook. Each recipe is designed to produce a fully functional product. In this case, your product is a protein. You inherit your genes from your parents.
Your recipes need the appropriate ingredients. In this case, ingredients are called alleles.

Variations

Variations (or single nucleotide polymorphism – SNP) in allele pairing create regulatory issues within the body. Variations can be considered slight changes to your ingredients in the recipe. When you inherit genes from your parents, your alleles may join in a specific pattern. We call these patterns wild type, heterozygous, and homozygous. Wild type simply means that the pairing is most commonly found in nature. Heterozygous means you have one variation from a parent (different alleles). Homozygous means you have two variations (the same allele) from both parents.

Alleles

Alleles are the nitrogenous bases: adenine (A), thymine (T), cytosine (C), and guanine (G). When sequenced together correctly, they create the final product: proteins. Alleles also determine the visual expression of your genes. For example: curly hair, green eyes, etc. This is known as your phenotype.

Epigenetics

Epigenetics is the study of how the environment influences genetic expression. While we may have variations in our genetic code, our environment controls whether our genes are switched on or off. Our test does not account for environmental influences. We report genetic variations only. Work with a trained provider if you need help understanding the epigenetic influences.

Vitamin D & Your Genetics

Vitamin D is a fat-soluble vitamin that must be converted in the liver and kidneys. Limited foods supply Vitamin D, so substantial exposure to sunlight or specific supplementation can be used when a deficiency is present. Vitamin D is crucial for calcium concentrations, bone growth, immune function, and the reduction of inflammation.

For daily use, both D2 and D3 forms of Vitamin D are beneficial, but D3 (cholecalciferol) should be used for therapeutic dosing during a deficiency. Supplements between 5,000 IU and 10,000 IU are ideal for daily therapeutic dosing. Daily intake should be between 1,000 – 2,000 IU of Vitamin D or cod liver oil for general wellness.

Ideally, Vitamin D should be absorbed from natural sunlight exposure. Between the hours of 10am – 3pm, UV rays should hit the face, neck, arms, and shoulders for 10-30 minutes at least twice a week (avoid skin burns).

The three VDR SNPs in this test are from a physician poll of the most common SNPs needed in clinical practice. For blood work, practitioners tend to look at 25(OH) D by itself, while other practitioners also look at 1,25(OH)2D. The 1,25-dihydroxyvitamin D is formed from 25(OH)D in the kidneys under the influence of Parathyroid Hormone and specific enzymes; whereas, 25(OH)D is converted in the liver.

Vitamin D Foods

Cod Liver Oil
Swordfish
Salmon
Beef Liver
Egg Yolks
Cheese

Vitamin D Testing

1,25 OH Vitamin D may be helpful in some complicated cases. Your Doctor may order the following tests.:
25-hydroxy (OH) vitamin D
1,25 dihydroxyvitamin D

Health Conditions

Rickets
Osteoporosis
Cancer
Inflammatory Bowel Disease
Multiple Sclerosis
Type I and II Diabetes

VDR-BSM	VDR-TAQ	VDR-FOK
No Variant Detected	No variant detected.	You have a heterozygous variation in VDR-FOK. Consider watching your Vitamin D levels and consuming foods high in Vitamin D.

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

B12 & Your Genetics Report

Do you get enough vitamin B12? Do you take the right form of B12? Since your body does not produce B12, it is important to make sure you get adequate amounts of it in the correct form. B12 is important for a number of processes in the body, especially the production of neurotransmitters, energy, and blood cells. People often feel better switching to the correct form of B12 based on genetics and/or increasing their consumption. Consider yearly micronutrient testing.

B12 Blood Levels

Many genes are associated with decreased serum B12 levels. Increasing supplementation or using dermal or injectable B12 can help bypass a possible genetic issue.

You have a mild risk for low serum Vitamin B12 levels. Consider discussing supplementation with your practitioner.

Methy-B12 Need

Produced by the enzyme MTRR, Methylcobalamin is the main form of B12 used for detoxification and neurotransmitter production. It is more bioactive than other forms like cyanocobalamin.

You have one of the two genetic markers that indicate needing additional supplementation of Methyl-B12. Consider homocysteine testing.

Adenosyl-B12 Need

Adenosylcobalamin is mainly used to produce energy within the mitochondria. Many people report increased energy with Adeno-B12 supplementation.

There are no genetic indications that you need Adeno-B12 supplementation. Adeno-B12 could be used in cases of fatigue.

Methyl-B12-Sensitivity

Some people report sensitivities to methylated B12, including increased aggression and hyperactivity. We can occasionally predict these sensitivities by looking at other variations.

There are no genetic indications for Methyl-B12 sensitivity.

Low B12 Symptoms

- Anxiety
- Pale Skin
- Smooth Tongue
- Constipation
- Diarrhea
- Heart Palpitations
- Fatigue
- Poor Balance
- Memory loss
- Neuropathy
- Tingling feet
- Depression

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

Folate & Your Genetics

Folate, or B9, is a vitamin required for numerous processes in the body. DNA replication, neurotransmitter production and degradation, detoxification, and prevention of cardiovascular disease are just a few. It is found naturally in uncooked leafy green vegetables.

Folate - MTHFR

The MTHFR enzyme processes dietary folates into methyl-folate, crucial for methylation and over 200 processes in the body. Low levels of methylfolate have been associated with numerous symptoms and diseases. There are two main variants: C667T and A1298C.

Since MTHFR creates methylfolate, you can supplement with oral methylfolate. This can speed up the methylation cycle, returning detoxification and neurotransmitter production back to normal. This testing and approach has become common in fertility and psychiatric practices.

It is important to start slow and titrate up when using methyl folate. 400mcg is a common starting point for adults. Some research points to benefits from 400mcg to 15mg; however, many people do very well on doses under 2mg. Please see a practitioner for help with dosing.

MTHFR Symptoms

Depression
Anxiety
ADD/ADHD
Miscarriage
Cardiovascular Disease
Blood Clots
Bipolar
Schizophrenia
Cancer
Midline defects
And More

Your MTHFR Results

Your Results

You have one copy of the MTHFR C677T variation. This can result in up to a 40% decrease in conversion of dietary folate into Methyl-Folate. Consider homocysteine or methylation testing.

Avoiding synthetic folic acid and possibly supplementing with methyl-folate could potentially improve symptoms. Please discuss supplementation with a trained practitioner.

Methylfolate Sensitivity

Some people can be sensitive to methylfolate. In this case, different forms of vitamin B9 may be used. Consider folinic acid and working with a practitioner.

There are no genetic indications for methyl-folate sensitivity.

Follow Up Testing

You have potentially low levels of methyl folate. Homocysteine, RBC Folate, and SAM/SAH ratio tests should be ordered by your doctor to confirm.

You have a heterozygous variation on two of the folate receptor genes. This can lead to low levels of folate inside the cell.

An RBC-Folate test can indicate low levels of folate inside your cells.

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

Vitamin A & Your Genetics Expanded

Vitamin A is essential for proper vision, growth, immune function, and gut health. There are two types of vitamin A: retinoids and carotenoids. Carotenoids are found in orange plants, such as carrots, and are precursors to retinoids (the bioavailable form). Retinol is the active form that is required for health.

Vitamin A - BCMO1

When most people think about increasing their vitamin A levels, they typically reach for a carrot or orange-colored vegetable. However, this is a carotenoid, not a retinoid or retinol. Our bodies have to convert carotenoids into retinoids by an enzyme called BCMO1. Some people have issues in BCMO1 that slow down their ability to form retinol from beta carotene. Your test checked for five different variations that might slow down retinal formation within your body.
Consider working with a provider to monitor your vitamin levels.

Low Vitamin A Symptoms

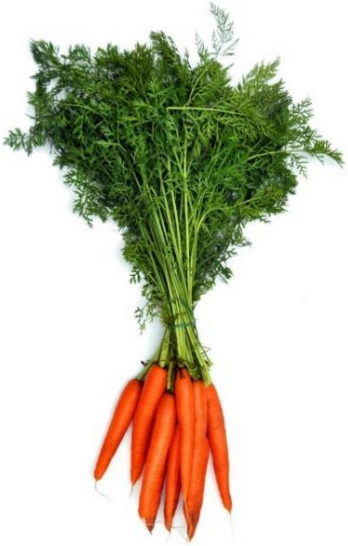
Vision issues
Infertility
Mood disorders
Skin problems
Thyroid dysfunction
Growth delays
Infections
Chronic Infections

Dietary Sources Of Retinoids

Free range eggs
Organic Heavy Cream
Shrimp
Cod-liver oil
Grass fed butter
Grass fed beef liver
Grass fed beef
Wild caught fatty fish

High Vitamin A Symptoms

Hair loss
Liver damage
Mental confusion



Your Results

You have multiple heterozygous variants on BCMO1. This has minimal impact on Vitamin A status.

Vitamin A Caution

Vitamin A is a fat soluble vitamin and there are studies that show excessive intake can lead to toxic levels. High levels of retinol might contribute to increased levels of heart disease and cancer. Please discuss supplementation with a trained provider and monitor blood retinol levels.

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

Inflammation & Your Genetics

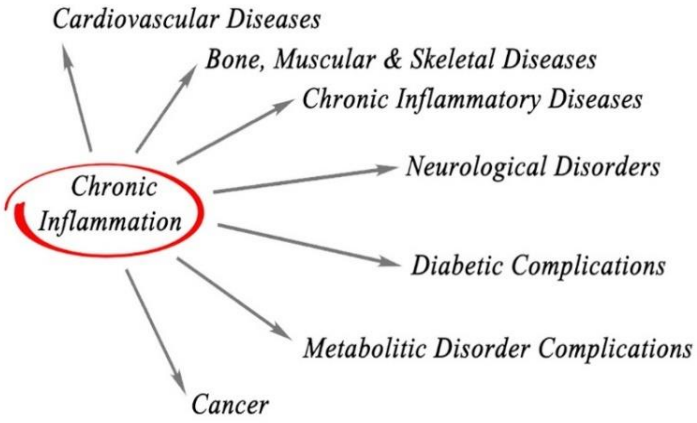
Inflammation is a natural part of our immune system that is used to protect us; however, it can become overactive. This increase in inflammation can cause many problems, such as cardiovascular, neurological, and autoimmune diseases. The Standard American Diet (SAD) is full of inflammatory foods and chemicals that add to this disease process. Your genes make you more susceptible to inflammation. Maintaining low levels of inflammation is the key to health.

Anti-Inflammatory Foods

- Blueberries
- Ginger/Turmeric
- Dark Chocolate
- Good fats
- Grass fed butter
- Free-range eggs
- Grass fed beef
- Wild caught fatty fish

Pro-Inflammatory Foods

- Sugar
- Vegetable oils
- Fried foods
- Wheat flour
- Dairy
- Bad fats
- Processed meats
- Trans fats
- Fast foods
- Conventional meats



Other Causes of Inflammation

- Lack of sleep
- Lack of exercise
- Lack of rest
- Over training
- Poor gut health
- Infection
- Toxic exposures
- Food Sensitivities

Labs Your Physician May Order

HS-CRP: High Sensitive C-Reactive Protein
ESR: Erythrocyte Sedimentation Rate
Omega 3/6 Ratios or Fatty Acid Tests
LPS: lipopolysaccharide

Generalized Inflammation

You are at a slight increased risk of inflammation. Fish oils, curcumin, and an anti-inflammatory diet should be considered. Pay close attention to gut health and any potential allergens or sensitivities.

Arachidonic Acid

You should have normal levels of the pro-inflammatory fatty acid, arachidonic acid. There may still be inflammation present.

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

Detoxification & Your Genetics

Every day, we are exposed to hundreds of toxic chemicals in our environment. Our bodies also make toxic metabolic waste that has to be filtered hourly. Many of these pathways can be slowed down by different genetic variations. This section will break down some of your variations.

Insecticide Sensitivity

Organophosphate insecticides are one of the most toxic substances on the planet. They can cause diarrhea, PDD, autism, depression, aggression, and other emotional conditions. Children exposed to these have twice the risk of autism and PDD. Children tend to be more susceptible to insecticides.

You have a mild increased sensitivity to pesticides. Consume organic foods, use a water filter, and avoid pesticides.

Acetaminophen

Due to the prevalence of acetaminophen use, knowing your genetic potential for toxic side effects is crucial. It has been associated with liver conditions, asthma, autism, GI issues, acidosis, blood cancers, and immune system depression. These are due to lowered glutathione levels and liver involvement.

You have a mild increased risk of toxic responses to acetaminophen. Consider natural alternatives.

Glutathione

Glutathione is our master antioxidant and detoxifying molecule. Oxidative stress and toxic exposures can cause low levels of glutathione. Those with genetic predisposition to low levels may be more susceptible to the effects of environmental toxins. MTHFR and methylation SNPs can also affect glutathione levels.

You have an average risk for low levels of the anti-oxidant, glutathione. Toxins and oxidative stress can still cause decreased glutathione levels.

In women, excessive levels of estrogen can lead to many conditions, including anxiety, fertility issues, and cancer. There are certain genetic situations that might limit someone's ability to remove estrogen from the body, which will increase estrogen levels.

Estrogen Levels

You have multiple heterozygous marker associated with conditions in estrogen metabolism. This is a mild risk for elevated estrogen.

4-OH Estradiol

You have an average risk of having elevations of a highly reactive form of estrogen.

MaxGen LABS

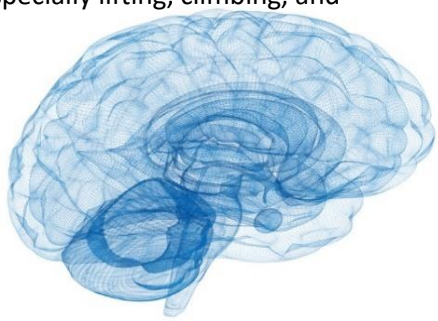
MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

APoE & Your Genetics

Apolipoprotein E (APOE) is a gene that codes for a transport lipoprotein that carries fats and cholesterol throughout the body. There are several E types, namely E2, E3, and E4. Both E1 and E5 exist; however, they are extremely rare. Most of the population carries the E3 status, and it is considered neutral for disease risk. Everyone has two E types (example: E2/E2, E3/E4, E4/E4, E3/E4 etc.), where one type is inherited from each parent. APOE status plays a role in cardiovascular disease and Alzheimer's risk. Exercise, especially lifting, climbing, and movement-based exercises are beneficial for all types.



Determining APOE Status

APOE status is technically defined by these two SNPs, rs429358 and rs7412.

e1 = rs429358(C or +) & rs7412 (T or +)
e2 = rs429358(T or -) & rs7412(T or +)
e3 = rs429358(T or -) & rs7412(C or -)
e4 = rs429358(C or +) & rs7412(C or -)

E4 Risk Factors

Intermittent Fasting
Mediterranean, Low fat, or Paleo Diets
Avoid alcohol & saturated fat
Limit Seafood that is high in mercury
Limit cholesterol intake
Consider Iodine supplementation
Consider regular sauna visits

E2 Risk Factors & Benefits

Alzheimer's Disease
Faster progression of MS
Traumatic Brain Injury
Cardiovascular disease
Unable to detoxify heavy metals

E4 Diet Recommendations

Mediterranean Diet
Low Glycemic Diet
Intermittent Fasting
Avoid Refined Carbs
Paleo Diet
Low Fat

E2 Diet Recommendations

Hyperlipoproteinemia Type III
Elevated Triglycerides & LDL
Insulin & Glucose Concerns
Less risk for Alzheimer's
Vertebral Fractures
Neuro-protective
Vascular disease
Psoriasis

Your APOE Status

Your results: E3/E3 This combination is what is found most often in the general population.

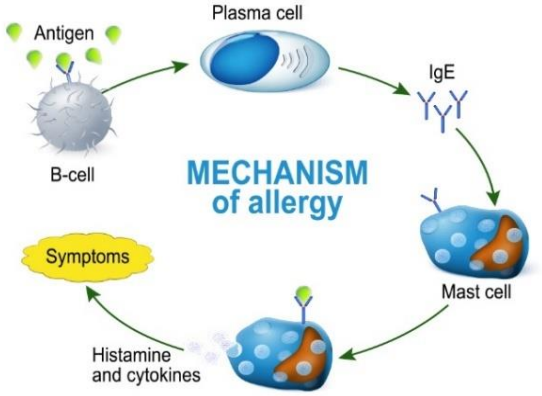
MaxGen LABS

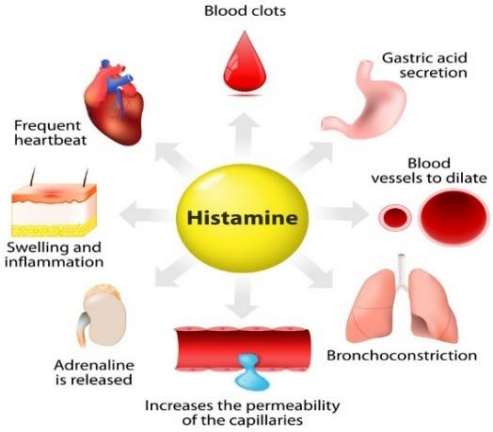
MaxFunction

Client Name:	John Smith	Referring Account:	Chad Yarbrough, DC
Client DOB:	1/1/1900	Sample Received:	11/2/2018
Vial Number:	Sample Report	Report Date:	8/7/2019
Client Sex:	Male		

Histamine & Your Genetics

Histamine is commonly known as an immune system chemical that is released during mast cell degranulation or when exposed to allergens. However, it is also a neurotransmitter in the brain and plays a role in digesting food in the stomach. In humans, histamine is broken down by two main pathways, Histamine N-Methyltransferase (HNMT) and Diamine Oxidase (DAO/AOC1). Excessive histamine can cause numerous issues in the body, and there are some genetic predispositions that enhance these issues.





High Histamine Foods

Alcohol/Ferments	Walnuts	Bananas
Citrus Fruits	Cashews	Wheat
Dried Fruits	Peanuts	Strawberries
Soured Foods	Spinach	Beans
Smoked Meats	Eggplant	Chocolate
Aged Cheese	Shellfish	Food Dyes
Tomatoes		Food Additives

High Histamine Symptoms

- Headaches/Migraines
- Nasal Congestion
- Fatigue/Adrenal Fatigue
- Irregular Menstrual Cycles
- Digestive Issues
- Anxiety
- Blood Pressure Issues

DAO (AOC1)

The DAO Enzymes is responsible for breaking down dietary histamine and histamine outside of your cells. It requires adequate levels of copper and can be inactivated by certain drugs and curcumin.

You have one homozygous variant in the DAO(AOC1) gene. Consider trying a low histamine diet or supplemental DAO enzymes.

HNMT

HNMT is responsible for breaking down histamine inside of your cells and is common in asthma. This enzyme requires adequate levels of SAMe from the methylation cycle.

No variant detected. This is ideal.

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

MAO & Your Genetics

*Please see your physician before making nutritional changes.

Monoamine oxidase (MAO) has two types, A and B, and plays a role in the oxidation of neurotransmitters. MAOA is chiefly responsible for the oxidation of serotonin and norepinephrine, while MAOB oxidizes phenylethylamine. Both oxidize dopamine. Each genetic variation of MAO creates different outcomes of the enzyme. MAO is also found on the X chromosome, so males who inherit the variation are technically hemizygous. Our algorithm, however, reports it as homozygous since we do not know the sex of each person performing this test. If your results suggest you have decreased MAO activity, it is suggested that you avoid cheese and other fermented/aged foods that are high in tyramine.

MAO-A (RS6323)	MAO-A (RS72554632)	MAO-B
You have the slower form of the MAO-A Enzyme.	No variants detected.	You have a heterozygous variation. This may or may not create an issue.

Fast MAO

A fast MAO enzyme will significantly decrease neurotransmitter levels and create symptoms of deficiency. Depression, anxiety, and low mood are common symptoms. Your practitioner may want to try nutraceuticals like St. Johns Wort, 5-HTP, tyrosine, resveratrol, B vitamins, sun and light exposure to help support a healthy mood.

Slow MAO

A slow MAO enzyme will allow for greater levels of neurotransmitters and cause symptoms of excess. Increased aggression and lack of empathy are common. In general, it is recommended to avoid caffeine, smoking, and stress when possible. Utilizing meditation techniques, trying a low tyramine diet, and insuring proper B2, zinc and hormone levels are all possible options to support a healthy mood.

Low Serotonin

Anxiety / Depression
Insomnia
Loss of pleasure
Paranoia
Weight Issues
Inner rage
Support:
5-HTP & St. John's Wort

Low Dopamine

Depression / Hopelessness
Lack of Motivation
Brain Fog/ Fatigue
Weight Issues
Low Libido
GI Issues
Support: Tyrosine, Bacopa

High Serotonin

Headaches
Diarrhea
Muscle Twitching
Confusion
Seizures
High Blood Pressure
Support: B2, B5

High Dopamine

Excessive Energy
ADD/ADHD
Anxiety
Agitation
Insomnia
Addiction
Support: B2, Methylation & Vitamin C

Low Norepinephrine

Brain Fog
Depression
Low Blood Pressure
Adrenal Fatigue
Support: Vit. C, Copper Balancing, Tyrosine

Low PEA

Brain Fog
Depression
Difficulty Paying Attention
Incomplete Thoughts
Support: B6 DL-phenylalanine

High Norepinephrine

Anxiety
Heart Palpitations
Sweating
Constipation
Support:
Methylation & B2

High PEA

Mind Racing
Insomnia
Anxiety
Schizophrenia
Support: Methylation & L-Threonine

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

COMT & Your Genetics

*Please see your physician before making nutritional changes.

Catechol-O-methyltransferase (COMT) is a gene that creates an enzyme that breaks down dopamine, norepinephrine, epinephrine, and estrogen. These chemicals play a major role in mood, stress response, and productivity. Estrogen needs to be balanced and reduced appropriately to avoid issues. COMT does require the methylation cycle, with SAMe and magnesium being required in adequate amounts. It has been observed that individuals with slower COMT tend to be sensitive to methyl donors. In these cases, non-methylated vitamins like Folinic Acid and Hydroxocobalamin might be better options. People who are sensitive to these tend to have mood swings and anger issues. It has also been observed that carriers of the VDR-TAQ variation have additional risks.

COMT V158M	COMT H62H	VDR-TAQ
Heterozygous AG According to some research, this is ideal.	You have a heterozygous variant. This has minimal influence on COMT activity.	Possible increased dopamine sensitivity, which can worsen slow COMT and help fast COMT symptoms.

Fast COMT

Fast versions of the COMT enzyme are associated with decreased levels of neurotransmitters like dopamine. People with this have been shown to have higher pain thresholds, are capable of operating under adverse stress (The Warrior Gene), and have lower levels of anxiety.

Low Dopamine

Depression	Constipation	**Support**:
Lack of Motivation	GERD	Tyrosine
Fatigue	Muscle Cramps	Bacopa
Focus Issues		

Low Epinephrine

Depression	Migraines	**Support**:
Restless Leg	Sleep Disorders	Methionine
		Tyrosine

Low Norepinephrine

Focus Issues	Brain Fog	**Support**:
Depression	Low Blood Pressure	Tyrosine
		Vit. C
		Copper
		Balancing

Slow COMT

Slower versions of the COMT enzyme are associated with increased levels of neurotransmitters like dopamine. This has been shown to lower pain thresholds, increase a person's sensitivity to stress, and increase anxiety (The Worrier Gene). However, these individuals typically have an advantage at memory and attention based tasks.

High Dopamine

ADD/ADHD	Insomnia	**Support**:
Anxiety	Addiction	Riboflavin
Excessive Energy	Mania	Vit. C
		Methylation

High Epinephrine

Anxiety	Weight Loss	**Support**:
Sweating	Constipation	Adaptogens
Heart Palpitations		Phosphatidylserine

High Norepinephrine

Anxiety	Sweating	**Support:**
Heart Palpitations	Constipation	Methylation
		Riboflavin

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

Your Genetic Summary

B12 Levels	• You have a mild risk for low serum Vitamin B12 levels. Consider discussing supplementation with your practitioner.
Methyl-B12	• You have one of the two genetic markers that indicate needing additional supplementation of Methyl-B12. Consider homocysteine testing.
B12 Sensitivity	• There are no genetic indications for Methyl-B12 sensitivity.
Adeno-B12	• There are no genetic indications that you need Adeno-B12 supplementation. Adeno-B12 could be used in cases of fatigue.
Vitamin A	• You have multiple heterozygous variants on BCMO1. This has minimal impact on Vitamin A status.
Vitamin D	• There are no indications of a genetic Vitamin D metabolism issues.
Folate/MTHFR	• You have one copy of the MTHFR C677T variation. This can result in up to a 40% decrease in conversion of dietary folate into Methyl-Folate. Consider homocysteine or methylation testing.
Folate Sensitivity	• There are no genetic indications for methyl-folate sensitivity.
Dietary Histamine	• You have one homozygous variant in the DAO(AOC1) gene. Consider trying a low histamine diet or supplemental DAO enzymes.
Cellular Histamine	• No variant detected.
DHA Fish Oil	• No variant detected.
Phos-Choline	• You have an average risk for low levels of the beneficial lipid, Phosphatidylcholine.
Arachidonic Acid	• You should have normal levels of the pro-inflammatory fatty acid, arachidonic acid. There may still be inflammation present.
Inflammation	• You are at a slight increased risk of inflammation. Fish oils, curcumin, and an anti-inflammatory diet should be considered. Pay close attention to gut health and any potential allergens or sensitivities.
Estrogen levels	• You have multiple heterozygous marker associated with conditions in estrogen metabolism. This is a mild risk for elevated estrogen.
Bad Estrogen	• You have an average risk of having elevations of a highly reactive form of estrogen.
Pesticides	• You have a mild increased sensitivity to pesticides. Consume organic foods, use a water filter, and avoid pesticides.
Glutathione	• You have an average risk for low levels of the anti-oxidant, glutathione. Toxins and oxidative stress can still cause decreased glutathione levels.
Probiotic	• Based on your genetic results, you might benefit from probiotic strains like: Bifidobacterium infantis, Bifidobacterium longum, and Lactobacillus plantarum.
Secretor Status	• FUT2 Secretor. No further recommendations.

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

SNP Report

Gene	RS#	Result	Client	Minor	Short Description
AHCY-01	rs819147	-+ Heterozygous	CT	C	Possible low levels of homocysteine and glutathione. Consider labs.
APOE	rs429358	-- Wild Type	TT	C	If rs 7412 is T =E2 If rs7412 is C = E3 (normal)
APOE	rs7412	-- Wild Type	CC	T	If rs429358 is C = E4 If rs 429358 is T = E3 (Normal)
BCMO1	rs11645428	-+ Heterozygous	GA	A	Research is inconclusive. Possible risk for low retinal levels.
BCMO1	rs12934922	-+ Heterozygous	AT	T	Research is inconclusive. Possible risk for low retinal levels.
BCMO1	rs6564851	-- Wild Type	TT	G	Normal vitamin A levels.
BCMO1	rs7501331	-- Wild Type	CC	T	Normal vitamin A levels.
BCMO1	rs6420424	-- Wild Type	GG	A	Normal vitamin A levels.
CBS	rs28934891	-- Wild Type	CC	T	normal
CBS	rs4920037	-+ Heterozygous	GA	A	Possible slight reduction in CBS activity.
CBS	rs2851391	-+ Heterozygous	CT	T	Possible slight reduction in CBS activity.
CBS 360	rs1801181	-- Wild Type	GG	A	normal
CBS 699	rs234706	-+ Heterozygous	GA	A	Potentially a mild upregulation of CBS
COMT 61 P199P	rs769224	-- Wild Type	GG	A	Normal COMT status
COMT H62H	rs4633	-+ Heterozygous	CT	T	possible slight down regulation of COMT
COMT L136L	rs4818	-+ Heterozygous	GC	G	not clinically significant
COMT V158M	rs4680	-+ Heterozygous	GA	A	not clinically significant
CYP1B1 L432V	rs1056836	-+ Heterozygous	CG	G	Potential elevation of 4-OH estradiol.
CYP2E1 *6	rs6413432	-+ Heterozygous	AT	A	Possible NAPQI toxicity from Acetaminophen. (Avoid Tylenol)
DAOA/DAAO	rs3741775	-+ Heterozygous	CA	C	potentially a mild issue with the DAAO enzyme
DAO (AOC1)	rs10156191	++ Homozygous	TT	T	Significantly reduced DAO enzyme activity, consider low histamine diet.
DHFR	rs1643649	-+ Heterozygous	CT	C	Risk of low tetrahydrofolate. Avoid Bactrim, EGCG,and grape seed extract.
Factor 5	rs6025	-- Wild Type	CC	T	no variant detected.
FADS1	rs174548	-- Wild Type	CC	G	no variant detected.
FADS1(MYRF)	rs174537	-- Wild Type	GG	T	Lower Arachidonic acid. Lower prostate cancer & Diabetes risks
FADS2	rs1535	-- Wild Type	AA	G	No variant detected. (Higher IQ)
FOLR2	rs651933	-+ Heterozygous	GA	A	possible low levels of intracellular folate. Avoid folic acid.
FUT2	rs602662	-+ Heterozygous	GA	A	Possible b12 issues, consider testing and supplementation
FUT2	rs492602	-+ Heterozygous	GA	G	Possible b12 issues, consider testing and supplementation
FUT2 W143X	rs601338	-+ Heterozygous	GA	A	Possible b12 issues, consider testing and supplementation
G6PD	rs1050828	-- Wild Type	CC	T	no variant detected.
G6PD	rs1050829	-- Wild Type	TT	A	no variant detected.
G6PD	rs5030868	-- Wild Type	GG	A	no variant detected.
GPX1	rs1050450	-- Wild Type	GG	A	no variant detected.
GSTP1	rs1138272	-- Wild Type	CC	T	no variant detected.
GSTP1	rs1695	-- Wild Type	AA	G	no variant detected.
HFE	rs1799945	-+ Heterozygous	CG	G	Carrier, likely unaffected
HFE	rs1800562	-- Wild Type	GG	A	No variant detected. Increased risk of Iron anemia.
HFE	rs1800730	-- Wild Type	AA	T	No variant detected. Increased risk of Iron anemia.
HNMT	rs1050891	-- Wild Type	AA	G	no variant detected.
LRRK2	rs34637584	-- Wild Type	GG	A	no variant detected.

MaxGen LABS

MaxFunction

Client Name: John Smith
Client DOB: 1/1/1900
Vial Number: Sample Report
Client Sex: Male

Referring Account: Chad Yarbrough, DC
Sample Received: 11/2/2018
Report Date: 8/7/2019

Gene	RS#	Result	Client	Minor	Short Description
MAOA T1410C	rs1137070	-- Wild Type	CC	T	Potentially reduced MAO activity, elevated serotonin levels
MAOA	rs6323	-- Wild Type	TT	G	Potentially reduced MAO activity, elevated serotonin levels
MAOA	rs72554632	-- Wild Type	CC	T	no variant detected.
MAOB	rs1799836	-+ Heterozygous	CT	C	possible slight decrease in MAO activity. Studies inconclusive.
**Notice: MAO is a X linked gene and is only passed down from the maternal line. Male Children are technically "hemizygous."					
MAT1A R264H	rs72558181	-- Wild Type	CC	T	no variant detected.
MMAB	rs2287182	-- Wild Type	CC	T	no variant detected.
MTHFS	rs6495446	-+ Heterozygous	CT	T	Possible mild folinic acid sensitivity.
MTHFD1	rs2236225	++ Homozygous	AA	A	Possibly low levels of 5,10 methylenetetrahydrofolate, MTHFR's substrate.
MTHFR A1298C	rs1801131	-- Wild Type	TT	G	no variant detected.
MTHFR C677T	rs1801133	-+ Heterozygous	GA	A	40% reduction in enzyme activity. Consider methylfolate and methyl testing.
MTR	rs1805087	-- Wild Type	AA	G	no variant detected.
MTRR	rs1801394	++ Homozygous	GG	G	Reduced Levels of Methyl-B12 and increased homocysteine.
MTRR A66G	rs1532268	-+ Heterozygous	CT	T	possible low levels of methyl-b12 and elevated homocysteine
MUT	rs1141321	-- Wild Type	CC	T	no variant detected.
MUT	rs9369898	-+ Heterozygous	GA	G	Possible benefit to using Adeno-B12
NOS3	rs1799983	-- Wild Type	GG	T	no variant detected.
NOS3	rs2070744	-+ Heterozygous	CT	C	Conflicting studies. Less likely an endurance athlete.
NQO1	rs1800566	-+ Heterozygous	GA	A	will cause an increase in oxidative stress and potentially certain cancers.
PEMT	rs4244593	-- Wild Type	GG	T	no variant detected.
PEMT	rs4646406	-+ Heterozygous	TA	A	Possible low phosphatidylcholine levels. Consider supplementation.
PEMT	rs7946	-+ Heterozygous	CT	T	Possible low phosphatidylcholine levels. Consider supplementation.
PON1 Q192R	rs662	-+ Heterozygous	CT	C	Slight insecticide Sensitivity and increased artery disease. Increase olive oil use.
Prothrombin (F2)	rs1799963	-- Wild Type	GG	A	no variant detected.
SHMT1	rs1979277	-- Wild Type	GG	A	no variant detected.
SLC19A1	rs1051266	-+ Heterozygous	CT	T	Possible cellular folate issue. Consider RBC Folate test.
SOD1	rs2070424	-- Wild Type	AA	G	normal levels of SOD1
SOD1	rs4998557	-- Wild Type	GG	A	no variant detected.
SOD2	rs2758331	++ Homozygous	AA	A	increased chance of oxidative stress. Consider SOD supplementation.
SOD2	rs4880	-- Wild Type	GG	A	Normal levels of mitochondrial SOD2
SOD3	rs1799895	-- Wild Type	CC	G	normal levels of plasma SOD3
SUOX(A628C)	rs7297662	++ Homozygous	GG	G	Sulfite oxidase deficiency. Consider molybdenum supplementation
SUOX(S370S)	rs773115	-- Wild Type	CC	G	no variant detected.
TCN1	rs526934	-- Wild Type	AA	G	no variant detected.
TCN2	rs1801198	-- Wild Type	CC	G	no variant detected.
TNF	rs1800629	-+ Heterozygous	GA	A	Potentially elevated inflammation levels
VDR TAQ	rs731236	-- Wild Type	AA	G	no variant detected.
VDR-BSM	rs1544410	-- Wild Type	CC	T	no variant detected.
VDR-FOK	rs2228570	-+ Heterozygous	AG	A	Diabetes risk, consider monitoring 1,25 and 25-oh vitamin D.

Client: Your genotype. Minor: The genotype that is found least in nature.
Wild Type: The genotype that is found most often in nature, this is reported as green. This isn't always ideal.
Homozygous: This means you tested for both copies of the minor type allele. This typically has more severe issues.
Heterozygous: : This means you tested for one copy of the minor allele and one copy of the wild type allele.

SNP Information

AHCY-01

rs819147	-+ Heterozygous

Adenosyl homocysteinase
This enzyme is responsible for the breakdown of the amino acid, methionine. Health risk with this gene mutation is hypermethioninemia, which is associated with a short stature, low homocysteine, and low glutathione. Consider testing.

APoE

rs429358	-- Wild Type
rs7412	-- Wild Type

Your results: E3/E3 This combination is what is found most often in the general population.

The APoE gene codes for a protein responsible for moving cholesterol and fat around the body. Issues here can result in cardiovascular conditions and is a risk factor for Alzheimer's and dementia. APoE status is technically defined by these two SNPs, **rs429358** and rs7412.

e1 = rs429358(C or +) & rs7412 (T or +)
e2 = rs429358(T or -) & rs7412(T or +)
e3 = rs429358(T or -) & rs7412(C or -)
e4 = rs429358(C or +) & rs7412(C or -)

E1 is extremely rare.
E2's have a greater risk for vascular disease and hyperlipoproteinemia, cholesterol and triglyceride levels can be 2x to 3x higher, and is implicated in Parkinson's disease. E2's tend to respond well to high carb, low fat diets.
E3's is the neural type and is found in humans around 78% of the time.
E4's is implicated in Alzheimer's disease, impaired cognitive function, reduced hippocampal volume within the brain, faster progression of MS and associated with higher levels of Vit. D. E4's tend to respond well to hormone replacement therapy and high carb, low fat diets. Discuss this mutation with your PCP or cardiologist.

BCMO

rs11645428	-+ Heterozygous
rs12934922	-+ Heterozygous
rs6564851	-- Wild Type
rs7501331	-- Wild Type
rs6420424	-- Wild Type

beta-carotene oxygenase 1

The BCMO gene codes for the enzyme responsible for creating Vitamin A from dietary carotenoids. SNP's here can slow down the conversion of beta carotene from the diet into Vitamin A. These individuals can have low vitamin A levels while eating a diet rich in carotenoids. Interesting enough, this SNP can cause someone's skin to turn orange if they eat a large amount of beta carotene.

These SNPs may lead someone to needing Retinyl Palmitate to bypass this conversion problem. This becomes increasingly useful during times of sickness because of the necessity for vitamin A for the immune system. Discuss Vitamin A supplementation with your physician or nutritional consultant.

CBS

rs28934891	-- Wild Type
rs4920037	-+ Heterozygous
rs2851391	-+ Heterozygous
rs1801181 (360)	-- Wild Type
rs234706 (699)	-+ Heterozygous

cystathionine beta-synthase
CBS is a gene that encodes the enzyme cystathionine beta-synthase, which is responsible for using vitamin B6 to convert the amino acids homocysteine and serine to cystathionine. Health conditions associated with this gene include homocystinuria. When homocysteine levels are affected, we see skeletal abnormalities, cognitive issues, eye problems, and abnormal blood clotting. It is important to get your homocysteine levels checked yearly, especially if this mutation is present. It is not a common practice for physicians to order homocysteine levels, so one must ask for it. Also, consider getting your B6 levels checked yearly.
CBS SNPs are typically considered to slow down the CBS enzyme, potentially causing elevated homocysteine and low levels of the master antioxidant glutathione. However, many consider RS1801181 (CBS 360) and RS234706 (CBS 699) to be up regulated SNPs. If CBS is truly upregulated it can cause excess ammonia levels and sulfite levels. Gut health becomes paramount in ammonia removal. Many products on the market are designed to increase butyrate within the colon. Butyrate helps remove ammonia from the body and is commonly assessed on extensive stool testing. As well in the case of a CBS upregulation, the neurotoxic chemical, sulfite can increase. Sulfite is broken down by the enzyme SUOX. Maximized Genetics is one of the only labs who look at SNPs within the SUOX gene. These SNPs could potential increased sulfite levels even further.
CBS upregulations is also clinically seen with toxic compounds and when the body's glutathione levels become low. Focusing on lowering toxin exposure and gut health should be highly considered.

COMT

rs769224	-- Wild Type
rs4633	-+ Heterozygous
rs4818	-+ Heterozygous
rs4680	-+ Heterozygous

COMT is a gene (with multiple forms) that codes for the enzyme catechol-O-methyltransferase, which is specifically used to break down neurotransmitters in the brain, kidneys, liver, and blood. These neurotransmitters play an important role in the pre-frontal cortex of the brain, where impulsivity, planning, short term memory, and emotions are controlled. Dopamine and norepinephrine levels are particularly affected by mutations in this gene.
Health concerns related to this gene mutation generally revolve around mental health disorders. Particularly, schizophrenia has been related to a mutation in the COMT V158M snp. Other disorders that may be related are bipolar disorder, eating disorders, OCD, panic disorders, and anxiety.
Research suggests that this gene can be used to choose various medications related to ADHD.
Pain response may also be related to this mutation.
If this gene mutation is present, note that stress is a driver for inflammation and disease. Work with your functional medicine practitioner to discuss lowering inflammation throughout the body by creating a healthy diet and lifestyle. Also, consider an organic acids test to look for neurotransmitter levels.

CYP1b1

rs1056836	-+ Heterozygous

Cytochrome P450 family 1 subfamily B member 1
This gene encodes for an enzyme that is responsible for detoxing drugs and fats.
Mutations in this gene may lead to early onset glaucoma.
Estrogen is also broken down by this enzyme. RS1056836, when ++ is an upregulation of it's ability to produce the estrogen metabolite 4-oh-E2. This metabolite is associated

CYP2E1

rs6413432 (*6)	-+ Heterozygous

Cytochrome P450 family 2 subfamily E member 1.
This gene encodes for an enzyme that is responsible for detoxifying drugs like acetaminophen (Tylenol), ethanol, chlorzoxazone, and sevoflurane. These two SNPs, *5b and *6, increase the activity of the CYP2E1 enzyme. This enzyme speeds up conversion of acetaminophen into a toxic metabolite, NAPQI. Numerous studies show the connection between acetaminophen and liver damage, mitochondrial conditions, depletion of glutathione, neuronal death, ADHD, asthma, autism, kidney failure, gastroschisis, blood cancers, and numerous other conditions. Based upon current research, acetaminophen should be used with caution. Persons with these two mutations, could be at increased risk for oxidative/toxic damage from acetaminophen.

DAOA/DAAO

rs3741775	-+ Heterozygous

Oxidase and breaks down D-Amino acids, especially targeting D-Serine. The DAO(AOC1) enzyme targets extracellular histamine and is a completely different gene.

The DAAO SNP is assumed to be an upregulation, meaning the enzyme is faster than normal. This creates an issue with lack of D-Serine. D-Serine is a NMDA receptor agonist and this SNP can result in a less NMDA activity which has been associated with schizophrenia. There can also be disruptions in glutamate receptor stimulation as well. And lastly, it's believed that SNPs here can potentially increase oxalate production. If symptoms of high oxalates are present you may want to consider a low oxalate diet.

People with DAAO sometimes respond favorably to Piracetam (500mg 2x a day), Vitamin C, and SAMe. And once again, do not get this SNP confused with AOC1.

DAO(AOC1)

rs10156191	++ Homozygous

DAO/AOC1 is an enzyme that degrades extracellular histamine. The SNP tested is assumed to downregulate of the activity of DAO, per current research. This can result in increased levels of histamine and excess histamine symptoms. The DAO enzyme is commercially available for supplementation and should be considered if laboratory histamine ranges are elevated along with this SNP.
DAO supplementation has the potential to created ammonia and hydrogen peroxide. Consider catalase and butyrate supplementation if this becomes a problem. DAO is a copper and B6 dependent enzyme so these should be evaluated as well.
Finally, a low histamine diet should be discussed with a physician or nutritional expert.

DHFR

rs1643649	-+ Heterozygous

Dihydrofolate reductase
This gene mutation is associated with megaloblastic anemia, which can cause seizures and learning difficulties. Avoid the use of folic acid and the antibiotic Bactrim. Folinic acid can help bypass this enzyme SNP.

Factor 5

rs6025	-- Wild Type

Factor 5
Mutation in this gene leads to possible venous thromboembolism. Warning: tamoxifen used for breast cancer treatment in a female with this gene mutation may lead to thromboembolism.

FADS1

rs174548	-- Wild Type
rs174537	-- Wild Type
rs1535	-- Wild Type

FADS1 (rs174548, rs174537)
This gene is used to create fatty acid unsaturation. If present, low levels of phosphatidylcholine may be present. Phosphatidylcholine is needed as a precursor to acetyl-choline, which is extremely important for neurological function. Choline, in general, is considered beneficial for memory, motivation, and muscle function. As an essential part of every cell membrane, people with this gene mutation may want to consider supplementation of phosphatidylcholine.
A second FADS1 gene (rs174537) is considered crucial in heart disease. If this gene is present, avoid consumption of Omega 6 fatty acids, as they will increase inflammation. Examples of Omega 6 fatty acids include vegetable oils (canola, sunflower, soy, corn), and grains

FADS2 (RS1535)
This is a gene to create fatty acid unsaturation. It is associated with lower DHA (Omega 3) levels. It is also connected to higher IQ in breastfed babies and hyperactivity in children. If this gene mutation is present, consider taking a high quality fish oil, specifically DHA.

FOLR2

rs651933	-+ Heterozygous

FOLR2
Folate receptor beta
This gene codes folate receptors on the cell membrane. It has a high affinity for folic acid, which can block the reduction of bioavailable folate. Research is currently limited about this SNP, but some cite its association to neural tube defects, rheumatoid arthritis, and cerebral folate transport deficiency. FOL2 receptors are found in high quantity within the placenta.

FUT2

rs602662	-+ Heterozygous
rs492602	-+ Heterozygous
rs601338	-+ Heterozygous

FUT2
fucosyltransferase 2
This gene is associated with vitamin B12 levels. When this mutation is present, a person may have a deficiency or an increase in B12. If a person specifically has a mutation in rs601338, he/she may be immune from Norovirus, but it creates potential gut dysbiosis. Consider B12 deficiency testing and supplementation with methylcobalamin.

G6PD

rs1050828	-- Wild Type
rs1050829	-- Wild Type
rs5030868	-- Wild Type

glucose-6-phosphate dehydrogenase
The enzyme that is encoded from this gene helps protect the red blood cell from oxidative stress. Mutations in this gene create glucose-6-phosphate dehydrogenase deficiency, which can lead to hemolytic anemia and/or neonatal jaundice. Fava beans and IV vitamin C and Hydrogen Peroxide (H202) need to be avoided with this mutation. Discuss this with your physician to see if certain medications will make this worse.

GPX1

rs1050450	-- Wild Type

glutathione peroxidase 1
With a mutation in this SNP, one has the potential for glutathione deficiency. Glutathione is protective against oxidative cellular damage, but when deficient, multiple diseases can occur. Research states that the following diseases can be linked to this gene mutation: brain tumors, breast cancer, osteoporosis, selenium deficiency induced osteoporosis, and cardiovascular risk associated with diabetes. Consider glutathione

GSTP1

rs1138272	-- Wild Type
rs1695	-- Wild Type

Glutathione S-Transferase Pi 1 is a gene responsible for the pi class of enzymes responsible for detoxification of xenobiotics in the body. With a mutation in this gene, a person may be more susceptible to cancers. Consider glutathione testing and supplementation.

HFE

rs1799945	-+ Heterozygous
rs1800562	-- Wild Type
rs1800730	-- Wild Type

This class of genes is responsible for hereditary hemochromatosis, which causes difficulty with iron metabolism. This gene creates hepcidin, which regulates iron. Symptoms of hemochromatosis include issues with joints, skin, liver, heart, thyroid, and reproductive organs. People with this gene mutation may not notice issues until their 40's or later. Check iron levels, liver enzymes, and other standard lab work on a regular basis.

HNMT

rs1050891	-- Wild Type

Histamine N-Methyltransferase
This gene encodes for the enzyme histamine n-methyltransferase, which is found in cytosol and uses a major methyl donor. In the brain, histamine is a major neurotransmitter, and in the gut is controlled by DAO. Health conditions associated with a mutation in this gene include asthma and mental retardation. In ADHD children, certain food additives can be troublesome, including all food dyes and sodium benzoate.

LRRK2

rs34637584	-- Wild Type

This gene is associated with the development of Parkinson's. If this gene is present, research suggests a 15% chance of developing Parkinson's by age 60, 21% by age 70, and 32% chance by age 80. A high fat, low carb diet may provide some protection. We suggest getting nutrient levels tested on a yearly basis, and pay close attention to B-vitamin levels. Work with a provider who can come up with a specific diet plan, and order the Nutrigenomic Panel to understand other genetic risks involved.

MAO-A

rs1137070	-- Wild Type
rs6323	-- Wild Type
rs72554632	-- Wild Type

MAO-B

rs1799836	-+ Heterozygous

MAOA & MAOB
Monoamine Oxidase A and B are enzymes involved in the breakdown of neurotransmitters (serotonin, dopamine, norepinephrine, etc.). When this gene mutation is present, a person may have monoamine oxidase deficiency (aka Brunner Syndrome), which causes a build of neurotransmitters in the brain. This can lead to symptoms such as impulsivity, aggression, depression, and other psychiatric issues. Considered a male issue, boys tend to be diagnosed as autistic or ADHD. Other concerns related to this gene mutation include weak muscles, repetitive hand movements, behavioral and/or developmental delays, and panic disorders (especially in females). Cheese appears to make symptoms worse. Research suggests that these genes may be connected to Parkinson's as well. If this gene mutation is present, consider organic acid testing, neurotransmitter testing, and nutrient deficiency testing on a yearly basis. The gut-brain axis needs to be monitored closely.
We report the G allele for rs 6263 as the minor allele per dbsnp and the research we reviewed indicated the G allele as being the minor and more problematic allele (increases the MAO activity). This is a highly researched SNP and some other reporting and testing companies for some reason report the opposite for this SNP.

MAT1A

rs72558181	-- Wild Type

Methionine Adenosyl transferase 1A gene mutations may create hypermethioninemia, a condition that can have significant neurological delays. Symptoms include muscle weakness, liver problems, delay in motor skills, and a cabbage smell from breath and sweat. With a mutation in this gene, diets high in protein cause a build up in the amino acid, methionine. Many people may not even realize they have this condition. Consider a lower protein diet as it relates to the rest of your genetic profile.

MMAB

rs2287182	-- Wild Type

A gene mutation here causes methylmalonic academia, which is a condition that creates difficulty in breaking down proteins and lipids. Adenosylcobalamin is the active mitochondrial form of B12 needed to create the enzyme methylmalonyl CoA mutase. Motor and other developmental delays may be of immediate concern with this genetic mutation, and long term mitochondrial issues may occur. Consider taking Adenosylcobalamin for your B12 needs.

MTHFS

rs6495446	-+ Heterozygous

Methenyltetrahydrofolate Synthetase
People with this gene mutation should avoid folinic acid.

MTHFD1

RS2236225	++ Homozygous

methylenetetrahydrofolate dehydrogenase, cyclohydrolase and formyltetrahydrofolate synthetase 1
If a mutation in this gene is present, a person may have low serum levels of folate (vitamin B9). Folic acid should be avoided. Health risks include neural tube defects and colorectal cancer. Levels are made worse with additional MTHFR mutations.

MTHFR

rs1801131 A1298C	-- Wild Type
rs1801133 C677T	-+ Heterozygous

methylenetetrahydrofolate reductase
The MTHFR gene is responsible for coding the enzyme that processes amino acids, namely homocysteine and methionine, through the conversion of various forms of folate (vitamin B9).
Several conditions have been associated with mutations in the MTHFR gene: homocystinuria, anencephaly, spina bifida, glaucoma, high blood pressure, heart disease, psychiatric disorders, and various cancers. Research in varied and conflicting as it relates to MTHFR mutations and their impact on disease. While one can find many associations between the gene and certain conditions, reproducibility of such research is virtually non-existent.
When homocysteine levels are affected, we see skeletal abnormalities, cognitive issues, eye problems, and abnormal blood clotting. This alone may be attributed to a link between MTHFR and health conditions. It is important to get your homocysteine levels checked yearly, especially if this mutation is present. It is not a common practice for physicians to order homocysteine levels, so one must ask for it.
As a part of the methylation cycle, MTHFR mutations can affect hundreds of chemical conversions throughout the body. Multiple nutrients are involved in this cycle, but close attention is given to Folate (B9), Cobalamin (B12), P5P (B6), and Riboflavin (B2). It is important to check nutrient status yearly as well. Work with a practitioner who is proficient in both serum and intracellular lab work.
Currently, attention is given to the two main forms of MTHFR, 677 and 1298, with significantly more importance being placed on 677. There are many more forms of MTHFR, but they have no clinical significance yet. The type of mutation, both by rsid and whether it is homozygous or heterozygous, determines the effects one has. However, keep in mind that a genetic mutation does not have to be present to have difficulties with methylation or any named health condition. Attention must be given to diet and lifestyle, as well as environmental factors.
If a MTHFR mutation is present in your report, there are several things you should do:
1. Receive yearly blood work that checks homocysteine, methionine, folate, B12, B6, B2, and glutathione levels.
2. Avoid folic acid, which is the synthetic form of folate. This is common in supplements and packaged foods.
3. Talk with your physician or functional medicine doctor about supplementation.
4. Consider how this mutation works as a whole with the rest of your genetic data. Rarely does it act alone.
5. Monitor your diet and lifestyle, as this plays a larger role in your overall health than your genetic makeup.

MTR

rs1805087	-- Wild Type

5-methyltetrahydrofolate-homocysteine methyltransferase
This gene encodes for the enzyme, methionine synthase, which is needed for the metabolism of methionine, and amino acid. It requires the use of methylcobalamin (an active form of B12). This gene mutation can lead to homocystinuria. When homocysteine levels are affected, we see skeletal abnormalities, cognitive issues, eye problems, and abnormal blood clotting. It is important to get your homocysteine levels checked yearly, especially if this mutation is present. It is not a common practice for physicians to order homocysteine levels, so one must ask for it. This genetic mutation has also been suggested in Down Syndrome formation.

MTRR

rs1801394	++ Homozygous
rs1532268	-+ Heterozygous

5-methyltetrahydrofolate-homocysteine methyltransferase reductase
This gene encodes for the enzyme, methionine synthase reductase, which is needed for the metabolism of methionine synthase. This gene mutation can lead to homocystinuria. When homocysteine levels are affected, we see skeletal abnormalities, cognitive issues, eye problems, and abnormal blood clotting. It is important to get your homocysteine levels checked yearly, especially if this mutation is present. It is not a common practice for physicians to order homocysteine levels, so one must ask for it. This genetic mutation has also been suggested in Down Syndrome formation.

MUT

rs1141321	-- Wild Type
rs9369898	-+ Heterozygous

methylmalonyl CoA mutase
This gene encodes for an enzyme that is responsible for breaking down lipids and proteins for energy use in the mitochondria. With a mutation here, methylmalonic acidemia is a concern. Symptoms occur in early infancy and include failure to thrive, lethargy, vomiting, weak muscle tone, and fatigue. If severe, survival expectation is low. Long term effects may be pancreatitis, kidney disease, and intellectual disabilities. Consult an expert geneticist for official diagnosis. MUT mutations can benefit from

NOS3

rs1799983	-- Wild Type
rs2070744	-+ Heterozygous

Nitric Oxide Synthase 3 is an enzyme that allows for the production of nitric oxide from L-arginine. Nitric oxide is needed for vasodilation of arteria vessels and plays a major role in heart health. With this gene mutation, deficiencies in nitric oxide may be a concern. This can lead to ischemic stroke, myocardial infarction, essential hypertension, pre-eclampsia, and Alzheimer's. Consider getting your NO levels checked and/or supplement with L-arginine. Talk with your functional medicine provider before using supplementation. Be sure to have full cardiometabolic lab work done twice a year.

NQO1

rs1800566	-+ Heterozygous

NAD(P)H Quinone Dehydrogenase 1
Mutations in this gene have been associated with breast cancer, lung cancer, tardive dyskinesia, and Alzheimer's.

PEMT

rs4244593	-- Wild Type
rs4646406	-+ Heterozygous
rs7946	-+ Heterozygous

Phosphatidylethanolamine N-Methyltransferase
Mutations in this gene may lead to deficiencies in phosphatidylcholine, a phospholipid needed for cell membrane integrity. Health concerns related to this class of gene mutations include: endometriosis, orofacial clefts, and non-alcoholic fatty liver disease. Phosphatidylcholine is the precursor to Acetylcholine, a neurotransmitter responsible for memory formation. Clinically we have observed increased memory retention and function with Phosphatidylcholine supplementation with these SNPs.
Discuss supplementation with your practitioner.

PON1

rs662	-+ Heterozygous

paraoxonase 1 gene
This gene allows for the breakdown of toxic chemicals, especially pesticides, medications, and heavy metals. Mutations in this gene allow for susceptibility to heart disease, diabetes, atherosclerosis, and pesticide poisoning. This is especially critical for microvascular issues related to eyesight in diabetes. Make sure you are choosing organic food sources and avoiding pesticide use. Some advanced laboratories offer pesticide and

Prothrombin

rs1799963	-- Wild Type

Coagulation factor II, thrombin
This gene is needed for proper blood coagulation. Mutations in this gene lead to an increase of thrombosis, loss of pregnancy, and cerebral stroke. Follow an anti-inflammatory, Mediterranean Diet. Discuss testing options with your physician.

SHMT

rs1979277	-- Wild Type

Serine Hydroxy methyltransferase 1
RS1979277 SNPs can reduce the function by up to 50%. Research suggests this gene is associated with Adult Acute Lymphocytic Leukemia and cardiovascular disease. SNPs here can lower glycine levels in the body resulting in decreased glutathione and cartridge production. Consider increasing glycine containing foods. As well, this can SNP can increase Uracil levels and is potentially implicated in some cancers. B6 in the P-5-P form may be beneficial to helping SHMT function.

SLC19A1

rs1051266	-+ Heterozygous

This gene regulates the transport and levels of intracellular folate. Consider RBC folate testing and supplementation. This gene is associated with methotrexate metabolism difficulty and colorectal cancer. Synthetic Folic acid should be avoided.

SOD1

rs2070424	-- Wild Type
rs4998557	-- Wild Type

superoxide dismutase 1
This gene encodes for superoxide dismutase, and enzyme that binds with copper and zinc to break down free radicles. Mutations in this gene are associated with amyotrophic lateral sclerosis (ALS), which is a disease characterized by muscle weakness and wasting. It is thought that this mutation increases the chance of oxidative stress on the motor

SOD2

rs2758331	++ Homozygous
rs4880	-- Wild Type

Superoxide dismutase 2
Mutations of this gene have been linked to idiopathic cardiomyopathy, premature aging, cancer, and sporadic motor neuron disease. Consider SOD supplementation.

SOD3

rs1799895	-- Wild Type

Superoxide dismutase 3
This gene is associated with riding the body of free radicals and oxidative stress; however, this mutation is linked to an increase of oxidative stress. This gene mutation is associated with copper and folate pathways. Consider SOD supplementation.

SUOX

rs7297662	++ Homozygous
rs773115	-- Wild Type

Sulfite oxidase
This gene encodes for an enzyme that is needed in the final stages of degradations of sulfur containing amino acids, cysteine and methionine. Specifically the degradation of Sulfite into sulfate. Mutations in this gene are linked to early childhood neurological conditions, especially seizures and sulfite sensitivities. Consider molybdenum supplementation to help improve SUOX activity.

TCN1/2

rs526934	-- Wild Type
rs1801198	-- Wild Type

Transcobalamin 1
This gene is necessary for the transportation of vitamin B12. With a mutation here, consider testing and supplementation with methylcobalamin. Research suggests difficulty with digestion and stomach acid. With a mutation in this gene, B12 levels may be low. Peripheral neuropathy is common with this deficiency. Consider intracellular nutrient testing and B12 supplementation.

TNF

rs1800629	-+ Heterozygous

Tumor necrosis factor
This gene is responsible for creating a pro-inflammatory cytokine that has a number of duties, including cell proliferation and differentiation, apoptosis, and lipid metabolism. A mutation here can lead to cancer, autoimmune disease, and insulin resistance. It has been specifically connected to rheumatoid arthritis, juvenile idiopathic arthritis, migraines, asthma, and narcolepsy. Follow a low-inflammatory diet and work with a functional medicine provider to reduce autoimmune chances.

VDR

rs731236	-- Wild Type
rs1544410	-- Wild Type
rs2228570	-+ Heterozygous

VDR
This gene encodes for the receptor site of vitamin D, which is responsible for regulating calcium and phosphate. Health concerns that are directly connected to a mutation in this gene include intervertebral disc disease and rickets. Consider testing vitamin D levels and

Client: Your genotype.
Minor: The genotype that is found least in nature.
Wild Type: The genotype that is found most often in nature, this is reported as green. This isn't always ideal.
Homozygous: This means you tested for both copies of the minor type allele. This typically has more severe issues.
Heterozygous: : This means you tested for one copy of the minor allele and one copy of the wild type allele.
Gene: This is the specific gene we are looking at for variations.
RS#: This is the specific variation within the gene. There are multiple locations within a gene for potential variations, all of which can indicate a different issue or severity.