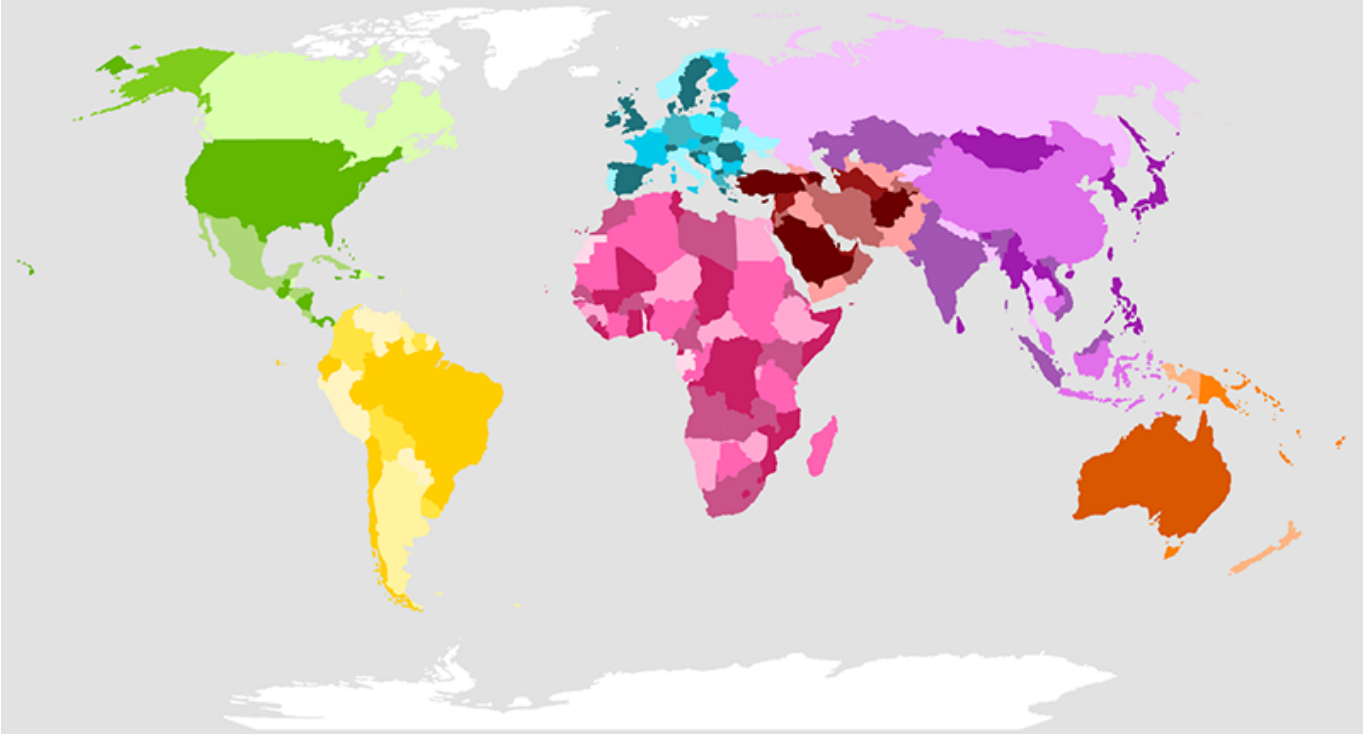
NUTRITION

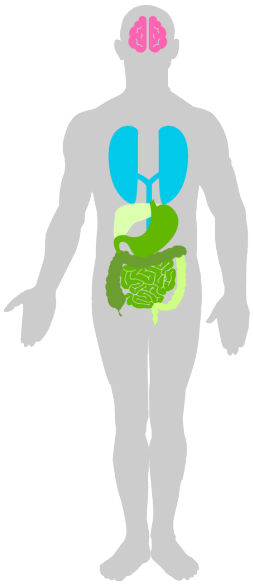
GENOME

GENETIC
REPORT

PATIENT OVERVIEW



YOUR ANALYSIS



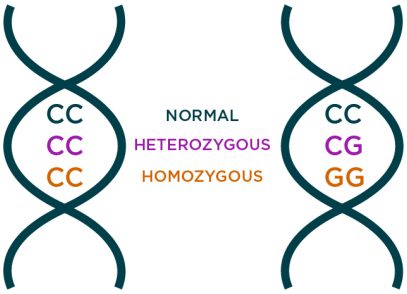
PATIENT NAME:Sample Report

DATE OF ANALYSIS:March 14, 2018

HOW TO READ THIS REPORT

The Nutrition Genome Report is a book on you using genetic testing, nutrigenomics, and epigenomics.

You will see letters next to your genes using the alleles (base pairs) A, C, G and T. Each gene is represented by two letters to determine a "genotype." You will read this in the table as Normal, Heterozygous or Homozygous. It is important to note that "Normal" is also known as the wild type, meaning the most common genotype in our current population. A "Normal" genotype does not necessarily indicate a better genotype. Most Normal variants will not come up in the tables unless they are relevant.



A heterozygous variant means you have 1 copy from your mother or father, while a homozygous variant means you have 2 copies, 1 from your mother and 1 from your father. Both a heterozygous and homozygous gene variant may affect enzyme function, increasing the sensitivity to deficiency or toxicity. The homozygous genotype is the most clinically relevant because it has the most impact on enzyme function. There are exceptions when multiple genes in a class are heterozygous and have a cumulative effect on enzyme function. It should be noted that there are many factors that can determine enzyme function, and therefore it is important to line up gene variants with symptoms, blood work, stress levels, exercise and family history. This is why it is recommended that you share your report with your health care practitioner.

On the next page, you will see a summary of your strengths and weaknesses. This is generated from your entire genetic analysis based on your gene variants and will tell you where the most focus is required.

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STRENGTHENING YOUR GENOME WITH NUTRITION

When you hear the word DNA, what comes to mind? Your first thought may be ancestry. DNA is your blueprint for where you have come from and how you are designed. It may have been a while since you heard the word deoxyribonucleic acid (DNA), but we will show you that there is much more to DNA than your family line.

Genes are segments of DNA that are organized by 23 pairs of chromosomes from your mother and father. DNA encodes for proteins, known as the "workhorses" of the cell responsible for all the functions necessary for life. Enzymes are proteins, and many enzymes require nutritional co-factors to make sure these horses are not moving too slow or too fast.

People have approximately 20,000-25,000 genes in their genome. Everyone has the same set of genes, but each one can vary by a few letters (called alleles – think of them as the horizontal segments that connect ladder-like strands of DNA) between people. Changes in these genes are referred to as "SNPs" or single nucleotide polymorphisms and gene variants. Differences in these gene variants help determine your nutritional requirements and sensitivities based on enzyme function.

SNPs have been inherited over many hundreds of thousands of generations due to the geography of your ancestors and epigenetic changes in your diet, environment, and lifestyle. SNP's instruct enzyme function and are directed by vitamins, minerals, amino acids, and compounds to do their job of keeping you healthy. Their function is affected by deficiency, toxicity, stress, drugs, and toxins. Optimizing enzyme function with the dietary co-factors may help lower inflammation, balance hormones, improve mental health, optimize digestion, increase athletic performance, and decrease the probability of disease.

Epigenetics is at the heart of understanding how to strengthen your genome. The "epigenome" is a term that describes a wide variety of chemical compounds that can tell your genome how to function by attaching to it (even turning genes on and off), and the epigenome remains flexible throughout your life (unlike your DNA, which remains fixed). These flexible epigenetic signals come from your stress levels, diet, environment, exercise, relationships and a sense of purpose. All of these factors determine the probability of certain hereditary susceptibilities being expressed, however, if we know where to focus, we can lower these probabilities.

Nutrigenomics is the study of how diet interacts with your genes and how individual genetic differences can affect the way you respond to vitamins, minerals, and compounds in the foods we eat. We believe that genes are not your destiny; they are your blueprint. Once you learn how to read the blueprint and make epigenetic improvements where there are weaknesses in the design, the foundation becomes healthier and more resilient; how we live can even influence the health of multiple future generations.

STRENGTHS

- Your MTHFR A1298C gene function is working well for BH4 levels and neurotransmitter function
- Improved intraceullular levels of folate
- Improved breakdown of synthetic folic acid
- Good B12 transportation due to normal TCN2 gene function
- You have improved PEMT function for phosphatidycholine levels for a healthy liver, memory, homocysteine levels and REM sleep
- Good catalase gene function for oxidative stress
- Good glutathione antioxidant protection in the lungs for GSTM1, increasing the probability of longevity
- Good glutathione antioxidant protection for breast or prostate health for GSTP1
- You have good antioxidant support for healthy eyes
- Good COQ2 gene function for a lower likelihood of statin drug induced muscle pain
- Improved DNA repair for sun damage for the MDM2 gene
- Good DNA repair for colon health
- Good muscle strength
- Improved stress response for heart health
- Good F5 gene function for a lower probability of deep vein thrombosis
- Improved levels of fibrinogen (reduced risk of blood clots) levels for the ESR2 gene
- Good Lp(a) function for the LPA gene
- Good VOKRC1*2 function for vitamin K2 unless gut function is compromised
- Lower levels of muscle inflammation post-workout, reducing the time needed for full muscle recovery and repair
- Normal adiponectin levels, linked to improved bodyweight, insulin and glucose levels
- Reduced likelihood of saturated fats causing weight gain for the APOA2 gene
- Good histamine breakdown in the digestive tract for APB1
- Lower probability of chronically elevated uric acid levels
- You have a good conversion of plant-based omega-3 ALA (walnuts, flax seeds, pumpkin seeds) to EPA and DHA
- You do not have the APOE E4/E4 genotype, improving cholesterol transport and the maintenance of brain neurons
- Normal levels of BDNF for improved glutamate modulation
- Good SHBG gene function for hormones

WEAKNESSES

- Higher need for riboflavin and methylfolate due to variants in MTHFR C677T
- Potentially higher sensitivity to antacids, antibiotics, proton pump inhibitors, Metformin, anticonvulsants, oral contraceptives and certain psychiatric medications due to homozygous MTRR gene
- More dietary antioxidant protection needed for the mitochondria due to variants in SOD2
- You have a higher sensitivity to the damage from foods fried in vegetable oils, mold and viruses due to an increased need for cell membrane support
- Potentially higher oxidative stress from statin drugs
- Higher inflammation from psychological stress due to variants in NOS1
- Unlikely to respond to Phenytoin (Dilantin), phenobarbital, omeprazole (Prilosec), Acetaminophen, codeine, ciclosporin (cyclosporin), diazepam, and erythromycin
- You have an increased need for folate to improve DNA repair for the ATM gene in relation to pancreatic and breast (females) health
- Higher need for strategies to increase oxygen capacity for aerobic exercise due to variants in PPARGC1A gene
- Higher probability of tendon and ligament injuries due to variant in COL1A1
- Higher catabolic effect on muscle and reduced performance from heavy training requiring more post-workout recovery support due to variant in TNFA gene
- Low circulating vitamin D levels due to variant in CYP2R1 gene
- You have a reduced PON1 gene function for pesticide detoxification, HDL and LDL oxidation
- Lower prebiotic production and bifidobacteria levels in the gut that may decrease B12 absorption and GABA production due to variants in the FUT2 genes
- Potentially elevated levels of histamine in the central nervous system, skin and bronchial tissue due to a variant in HNMT
- Reduced conversion of beta-carotene to vitamin A
- Increased probability of elevated blood sugar from refined sugar and grains due to variants in TCF7L2
- You have potentially lower levels of dopamine due to a lower density of dopamine receptors for variants in the ANKK1 gene
- Slower breakdown of dopamine, adrenaline and estrogen, increasing circulating levels in response to stress due to variants in the COMT genes
- You have a reduced glutamate to GABA conversion due to numerous variants in the GAD1 genes

VITAMINS, MINERALS AND OTHER COMPOUNDS

Your genetic report showed a higher focus for the following foods based on an increased need for certain vitamins, minerals, and compounds. These do not take into account any food sensitivities beyond gluten and lactose. Foods high in histamine may also need to be considered.

VITAMINS, MINERALS AND OTHER COMPOUNDS	FOODS TO EMPHASIZE
Folate	Broccoli, romaine lettuce, beets, liver, turnips, collard greens, spinach, hummus, pomegranates, sprouted lentils, parsley, potatoes, strawberries, oranges and unfiltered fermented drinks
B6	Wild salmon, wild cod, pistachios, avocados, Yukon gold or red potatoes, taro root, sweet potatoes, spinach, cauliflower and unfiltered fermented drinks
Flavonoids	Celery, parsley, cranberries, red onions, red wine, apples, cherries, tomatoes, broccoli, kale and citrus
Resveratrol	Red wine, peanuts, pistachios, blueberries, bilberries, cranberries, cacao and muscadine grapes
Selenium	Selenium varies widely in the soil based on geography. All seafood, crimini mushrooms and unfiltered beer are sources of selenium.
Carotenoids	Carrots, tomatoes, squash, corn, orange peppers, red peppers, yellow peppers, pumpkin, red beets, yellow beets, red onions, sweet potatoes and pastured eggs
Zinc	Beef, lamb, shellfish, liver and sprouted pumpkin seeds
B12	Pastured eggs, grass-fed meat, wild fish, and grass-fed dairy
Calcium	Gerolsteiner mineral water, spinach, kale, almonds, parsley, and grass-fed dairy
Lycopene	Watermelon, tomatoes and grapefruit
Narinigenin	Grapefruit, oranges, tomatoes with skin
Polyphenols	Celery, parsley, high-quality olive oil, cloves, peppermint, anise, rosemary, sage, blueberries, black elderberry, strawberries, apples, peppers, blackberries, cherries, wine, raw cacao, pistachios, and flax seeds
Omega-3's	Fish, fish oil and pastured eggs
Vitamin D	Cod liver oil, liver, eggs and lard
Glycine	Bone broth and chicken broth
CYP1A2 Foods	Carrots, parsnips, celery, dill, parsley, hops, cruciferous vegetables (especially fermented like sauerkraut), unfiltered beer, red wine, blueberries, blackberries, red grapes, kiwi, watermelon and spinach
Vitamin A	Pastured eggs, liver, cod liver oil, eel and grass-fed butter
Vitamin C	All freshly picked citrus, berries, broccoli, peppers and supplementation
Prebiotics	Pistachios, leeks, asparagus, radicchio, bananas, garlic, kiwi, onions, artichokes, Tiger nuts, chicory root and yacon syrup
Probiotics	Fermented drinks like Kombucha, fermented veggies like sauerkraut, yogurt and kefir

VITAMINS, MINERALS AND OTHER COMPOUNDS	FOODS TO EMPHASIZE
Magnesium	Spinach, Swiss chard, hemp seeds, Gerolsteiner mineral water, fish, sprouted nuts and seeds and supplementation (Mg is very low in water and soil in the US)

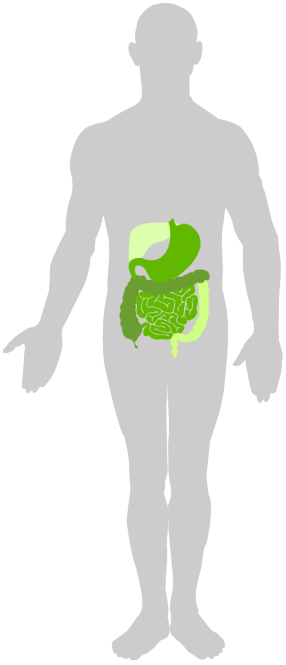
FOODS, DRINKS, TOXINS AND ADDITIVES TO MINIMIZE OR AVOID

FOODS, DRINKS, TOXINS AND ADDITIVES	MINIMIZE OR AVOID
CYP1B1 Foods to Avoid	Vegetable oils (soy, corn, canola, sunflower, safflower), grains, charbroiled/burnt meats, smoked foods, cigarette smoke, gasoline/exhaust exposure, plastic water bottles, plastic wrap, styrofoam cups, grain-fed meat and non-organic dairy, non-organic corn and soy, tap water, personal care and laundry products that contain parabens, artificial flavors and artificial sweeteners.
Food Dyes	FD&C Yellow No. 5, FD&C Red No. 2 and 3, Red 40, Yellow 5,Yellow 6 and Blue 1.
Sodium Benzoate	Citrus sodas and certain electrolyte tablets may contain it.
Pesticides	Non-organic US and French wine, heavily sprayed fruits (like strawberries) and vegetables, GMO corn and soy.
Nitric Oxide Antagonists	Refined sugar, high fructose corn syrup, and vegetable oils (especially fried food).
Acrylamide	French fries and fried chips.
DNA Damage	High fructose corn syrup, hydrogenated oils, phosphoric acid, benzoic acid, calcium propionate, food dyes, pesticides, herbicides, heavy metal toxicity, fluoride, chemical cleaners, glyphosate (Roundup) on GMO crops, polycystic aromatic hydrocarbons highest in (vegetable oils and grains), binge drinking, smoking, and BPA Plastic.
CYP1A2 Foods to Avoid	Fried meat, smoked meat and fish, non-organic grain-fed dairy, non-organic peanuts, oats, and Brazil nuts.

RECOMMENDED BLOOD TESTS

These are recommended routine blood tests based on your genetic results. These recommendations do not mean that these markers will be out of range, but may be relevant.

RECOMMENDED BLOOD TESTS	BLOOD WORK DETAILS
Homocysteine	Homocysteine should be between 7-9
B6	B6 levels may need to be tested
B12	If poor B12 status is suspected, methylmalonic acid (MMA) levels may be needed to accurately assess B12 status, absorption, and requirements
Vitamin D	Vitamin D should be between 35-50 ng/ml. Check both 25 and 1,25-dihydroxyvitamin D



DIGESTION

Lactose, Prebiotics, Probiotics, B12,
Protein, Fat and Carbohydrate Metabolism,
Vitamin A and Histamines

GENE	GENE FUNCTION	GENE RSID	NORMAL	HETEROZYGOUS	HOMOZYGOUS
LCT	LCT variants decrease the ability to breakdown lactose in dairy.				
		LCT-rs4988235		AG	
FUT2	FUT2 gene controls prebiotic production, B12 absorption and how much bifidobacteria you carry in your digestive tract. Bifidus also produces intestinal folate.				
		FUT2-rs492602		AG	
		FUT2-rs601338		AG	
		FUT2-rs602662		AG	
SLC22A5	L-Carnitine is responsible for shuttling fats into your cells, modulating your lipid profile, glucose metabolism, oxidative stress, fat loss and inflammatory responses in the mitochondria. 17 genes tested.				
Normal Variants Found					
		SLC22A5-rs17622208			AA
		SLC22A5-rs2073643			CC
		SLC22A5-rs274551			CC
		SLC22A5-rs274550			TT
		SLC22A5-rs274549			CC
ACSL1	Long-chain acyl CoA synthetase 1 (ACSL1) plays an important role in fatty acid metabolism and triglyceride synthesis. Disturbance of these pathways may result in dyslipidemia and insulin resistance, hallmarks of the metabolic syndrome.				
Normal Variants Found					
ACAT1-02	The ACAT gene converts protein and fat to ATP (energy) in the mitochondria, and plays an important role in cellular cholesterol homeostasis.				
Normal Variants Found					
ADIPOQ	ADIPOQ encodes for adiponectin, a protein secreted by fat cells that affects insulin and glucose metabolism. Low levels of adiponectin play a role in obesity, insulin resistance and Type 2 diabetes.				
Normal Variants Found					
APOA2	The APOA2 gene contains instructions for making a protein called apolipoprotein A-II, which is found in HDL cholesterol particles. The homozygous genotype has been linked to saturated fat intake and weight gain.				
Normal Variants Found					
APB1	APB1 is encodes for the DAO enzyme to breakdown histamines. 5 genes tested.				
Normal Variants Found					
		APB1-rs1049742		CT	
		APB1-rs1049793		CG	
HNMT	HNMT stands for histamine methyltransferase and requires a methyl group to breakdown histamine.				
		HNMT-rs1050891		AG	

GENE	GENE FUNCTION	GENE RSID	NORMAL	HETEROZYGOUS	HOMOZYGOUS
BCMO1 R267S	BCMO1 encodes the conversion rate from β-carotene to vitamin A. 2 genes (379V and 267S) tested.				
		BCMO1 R267S-rs12934922			TT
		BCMO1 A379V-rs7501331	CC		
ABCG2 (Q141K)	The ABCG2 (Q141K) gene is located at the membrane of kidney proximal tubule cells, where it mediates renal urate secretion. Variants in this gene are linked to reduced uric acid excretion.				
Normal Variants Found					
TCF7L2	TCF7L2 polymorphisms have been associated with low incretin hormones and impaired insulin secretion.				
		TCF7L2-rs7903146		CT	
FADS2	The FADS2 gene encodes the conversion of plant based omega-3 fatty acid alpha linolenic acid (ALA) to EPA.				
Normal Variants Found					

ANALYSIS DIGESTION

Prebiotics, Probiotics, B12

Improves FUT2 Gene Function: Prebiotics, probiotics, gelatin and B12.

Decreases Gene Function: Antibiotics, proton pump inhibitors, glyphosate, sucralose and Metformin.

Research: If you have heterozygous or homozygous variants in this FUT2 (rs602662, rs601338 and rs492602) you have an increased need for prebiotics, probiotics and B12. Gut flora plays a major role in **anxiety (GABA production), depression, type 2 diabetes, immunity and nerve health**.

People with homozygous (GG) and heterozygotes (AG) polymorphisms in the FUT2 gene have 15% lower vitamin B12 levels because it is not efficiently absorbed in their intestines.

Bifidobacteria is highly sensitive to glyphosate (a potent herbicide used on GMO corn and soy), and therefore choosing organic is important. Antibiotics, glyphosate and sucralose (Splenda) severely disrupt gut flora and increase the risk of salmonella and C-diff.

One study found that higher levels of indolepropionic acid produced by good bacteria due to a diet higher in prebiotic fiber-rich food decreased the risk of **Type 2 diabetes.**

Bifidobacteria are generally considered to synthesize folate (B9), biotin, thiamine, nicotinic acid, pyridoxine (B6), riboflavin (B2), and B12. The highest extracellular folate levels were produced by four strains of B. adolescentis and two of B. pseudocatenulatum. PABA is found in certain foods and also help probiotics colonize.

Drugs that deplete B12 include proton pump inhibitors, antibiotics and Metformin, and therefore may cause more B12 deficiency symptoms for those with variants in FUT2.

Histamines-HNMT

Improves HNMT Gene Function: Vitamin C, choline, folate and magnesium, chamomile, basil, stinging nettle, echinacea, fennel, ginger and wild oregano.

Decreases Gene Function: Poor gut flora, gluten sensitivity, too many fermented foods, food dyes, sodium benzoate, and deficiencies in vitamin C, choline, folate and magnesium.

Research: HNMT stands for histamine methyltransferase. HNMT is the primary enzyme responsible for histamine metabolism in the skin, bronchial epithelia and central nervous system. This gene requires adequate methyl donors from methionine and choline. If you do not have enough methyl groups available, you may more prone to high histamine levels and subsequent sensitivity to dietary histamines. Magnesium deficiency increases histamines and makes the DAO enzyme slower and copper increases the DAO enzyme. HNMT polymorphisms differ considerably between Chinese and American populations.

Signs of histamine intolerance are **heartburn, indigestion, itching, headaches, migraines, anxiety, arrhythmia, hypertension, diarrhea, hives, fatigue, abnormal menstrual cycle and nasal congestion**.

Histamines are highest in fermented foods, cured meats, vinegar based foods, dried fruit, peanuts, smoked foods, alcohol, canned foods, raw tomatoes, raw spinach and eggplant. Cooking reduces histamines.

Certain medications can also increase histamines in the body like NSAID's, which also deplete folate and vitamin C. Increasing folate, magnesium and choline along with vitamin C helps breakdown excess histamines.

In children with ADHD, the adverse effect of food dyes and sodium benzoate on ADHD symptoms was determined by histamine degradation in the rs1050891 HNMT polymorphism.

In women, estrogen promotes the release of histamine, and high estrogen/low progesterone levels can make seasonal allergies worse. Environmental estrogens (xenoestrogens) including BPA plastic and phthalates enhance allergic sensitization in animal models and may enhance development of disorders like asthma in humans.

Beta Carotene to Vitamin A Conversion Rate-BCMO1

Improves BCMO1 Gene Function: Vitamin A in the form of retinol and zinc.

Decreases Gene Function: Relying on beta-carotene for vitamin A requirements.

Research: If you are heterozygous or homozygous for BCMO1 A379V and you have a heterozygous or homozygous BCMO1 RS267S, this means that you have a reduced conversion rate of beta-carotene to vitamin A. Many nutrition labels will have beta-carotene listed as vitamin A, however this is not true vitamin A.

The normal conversion for beta-carotene (carrots, sweet potatoes) to retinol is 1:6 and 1:12 for other carotenoids. Female volunteers carrying the T variant of rs7501331 (379V) had a 32% lower ability to convert beta-carotene, and those carrying at least one T in both SNPs (379V and R267S) show a 69% lower ability to convert beta-carotene into retinol.

You want to make sure you consume animal based vitamin A (pastured egg yolks, wild salmon oil, cod liver oil, butter) along with zinc for **digestive lining repair, oral health, eye health, iron mobilization, mitochondria health, skin health (sunburns deplete vitamin A in the skin, and acne responds to vitamin A), healthy lung function, and increased immunity**.

Carbohydrates-TCF7L2

Improves Gene Function: A Paleolithic diet, omega-3 fatty acids, olive oil, turmeric, cinnamon, prebiotics, organic coffee, and cordyceps mushrooms.

Decreases Gene Function: Refined sugar and grains.

Research: The TCF7L2 gene has become the strongest indicator of **Type 2 diabetes and gestational diabetes** risk for multiple ethnicities in studies. A meta-analysis how also found an association with **breast, prostate and colon cancer** risk, all of which are connected to blood sugar levels and the risk is reduced by many of the same nutrients that improve this gene's function. Other genes and family history need to be assessed for cancer risk and prevention.

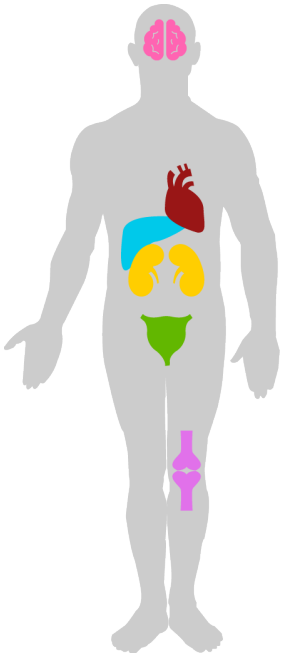
This gene is unique in its relation to Type 2 diabetes because people with variants in TCF7L2 may not exhibit risk signs like obesity. In fact, they may have a low body mass index (BMI) and low triglycerides. The increased risk is hypothesized to be due to the effect of TCF7L2 on the sensitivity of the pancreatic β-cells to incretins, not overall insulin sensitivity.

Incretins are hormones that are released from the gastrointestinal tract after a meal and regulate the amount of insulin secreted. The two most important incretin hormones are GLP-1 and GIP. Researchers believe that increasing incretin sensitivity may decrease the risk of type 2 diabetes.

One study found that the consumption of meals based on the Paleolithic diet (no grains or dairy) focusing on fish, polyphenol rich foods, fiber rich vegetables and spices high in phytochemicals resulted in significant increases in incretin and increased perceived satiety (feeling full). All three test meals were normalized to contain 50 grams of carbohydrates. Sufficient protein in particular shows promise in the management of type 2 diabetes by stimulating incretin, insulin secretion, and slowing gastric emptying.

Studies have demonstrated that turmeric significantly increases the secretion of the incretin GLP-1. Another study found that cinnamon lowers blood glucose usually within physiological levels without hypoglycemia and increases satiety, showing it may act by potentiating the effects of incretin hormones.

There is a progressive deterioration in β-cell function in patients with type 2 diabetes. In vitro studies demonstrated that pancreatic β-cell viability increased dramatically with cordyceps extract treatment, implying that cordyceps protects β cells. This is crucial for the TCF7L2 gene due to the communication between pancreatic β-cells and incretins. The researchers concluded “the potential ability of cordyceps to preserve beta-cell function may afford a promising therapy for diabetes.”



METHYLATION CYCLE

B12, Calcium, Lithium, B6 & FOLATE:
Heart Health, Reproductive Health, Brain Health, Pregnancy

CHOLINE:
Liver & Brain Health, Gallbladder, Pregnancy

ZINC:
Mental Health, Skin Health, Immune Health

MAGNESIUM & VITAMIN C:
Heart Health, Adrenal Health, Mental Health