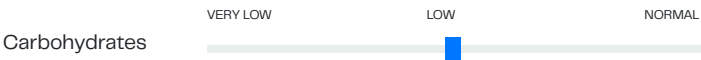




# DNA METHYLATION REPORT



### Carbohydrate Requirements



Your carbohydrate intake range is based on the latitude of your ancestors and whether a hunter-gatherer diet or modern agricultural diet made a larger imprint on your genes.

- Your genotype combination is associated with a slightly lower recommended carbohydrate intake, ranging from 30% to 40% of total calories from carbohydrates
- For a 2,000 calorie diet, this comes to 150–200 grams of carbohydrates per day

### Carbohydrate Requirements



The differences between responses in individuals to refined carbohydrates have been linked to a genetic adaptation occurring during the agricultural age.

- Your genotype is associated with an adaptation for lowering the sensitivity to refined carbohydrates



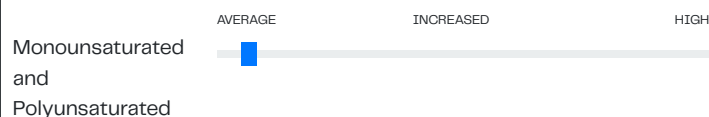
## Fat Requirements



The NIH has set the recommended intake of omega-3's from 1.1 to 1.6 grams per day from a combination of ALA, EPA and DHA. Omega-3 fatty acids are essential for brain, eye, and cardiovascular health.

- Due to improved conversion of ALA to EPA, you can include more plant-based ALA to reach your daily omega-3 target
- ApoE e2 and e3 carriers can benefit from non-phospholipid fish oil intake, however, e4 carriers should use phospholipid-based EPA and DHA as found in fish and fish roe

## Fat Requirements



Traditional total fat intake ranges based on latitude, with as low as 25% consumed in countries closer to the equator, and up to 55% of total calories from fat being consumed in northern latitudes.

- Genetic testing can show which fats to focus on, but total fat will range based on your climate and health goals
- Your genotypes are associated with an average requirement for monounsaturated and polyunsaturated fats from olive oil, avocados, poultry, nuts and seeds

## Fat Requirements



The 2020 Dietary Guidelines in the U.S. recommends limiting calories from saturated fats to less than 10% of the total calories you eat and drink each day. That's about 200 calories for a 2,000 calorie diet. Traditionally, saturated fat intake from animal foods ranged based on the season and the geographical location, with higher latitudes and more mountainous regions consuming more.

- Based on your genotype combinations, you should aim to get less saturated fat in your diet from red meat
- Limit your red meat consumption to once a week

## Fat Requirements



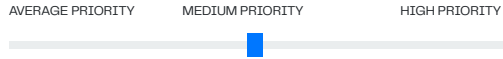
The 2020 Dietary Guidelines in the U.S. recommends limiting calories from saturated fats to less than 10% of the total calories you eat and drink each day. That's 200 calories for a 2,000 calorie diet.

- Your genotype combinations are associated with improved metabolism of saturated fat from dairy



## Hormone Support

Adiponectin

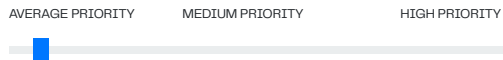


ADIPOQ encodes for adiponectin, a protein secreted by fat cells that affect insulin and glucose metabolism. Low levels of adiponectin play a role in obesity, insulin resistance and Type 2 diabetes.

- Your genotype is associated with lower adiponectin levels, which can negatively effect insulin, glucose metabolism and body weight
- Decreased levels of adiponectin have been found in people with obesity, Type 2 diabetes, heart disease and ADHD
- Strategies to increase adiponectin include coffee, omega-3 fatty acids, blueberries, almonds, strawberries, rose hip tea, chili peppers, ginger and turmeric

## Hormone Support

Ghrelin

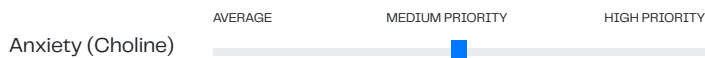


Variants in genes related to ghrelin levels and dopamine receptor density have been shown to create a larger appetite and the potential for overeating in multiple populations.

- Your genotypes are not associated with higher ghrelin levels
- You are at a decreased risk for overeating and abdominal weight gain



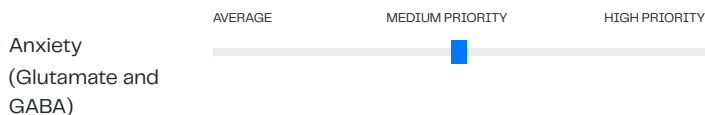
## Mental Health and Cognitive Performance



The PEMT gene is associated with your required choline intake to support memory, anxiety and REM sleep.

- Your PEMT genotype is associated with a higher need for choline (550mg or more) to support memory, anxiety and REM sleep
- Research has shown that uridine, DHA, and choline combined increases levels of phosphatidylcholine in the brain more than each on their own
- Foods high in choline include:
  - Liver (356mg) for 3 oz.
  - Egg (294mg) for 2 eggs
  - Beef top round (234mg) for 6 oz.
  - Chicken breast (144mg) for 6 oz.
  - Chicken thigh (120mg) for 6 oz.
  - Edamame (107mg) for 1/2 cup

## Mental Health and Cognitive Performance



Anxiety is linked to altered levels of one or multiple neurotransmitters. Understanding the genetic link to specific levels of neurotransmitters can help you be precise in your approach to reduce anxiety.

- Your genotype combination is associated with a reduced modulation of glutamate levels that could cause high glutamate and low GABA that could lead to anxiety
- Too much sugar and caffeine can create a high glutamate and low GABA mental state
- Cardio exercise, HIIT training and yoga have all been found to balance glutamate and GABA levels
- B6 and magnesium help convert excess glutamate to GABA (the calming neurotransmitter)
- Increase prebiotic intake to increase GABA levels and slow down an overactive mind at night to assist sleep

## Mental Health and Cognitive Performance



The FAAH gene is associated with anandamide levels, correlated with a heightened fear response to potential threats, while BDNF variants affect the ability to extinguish the fear response.

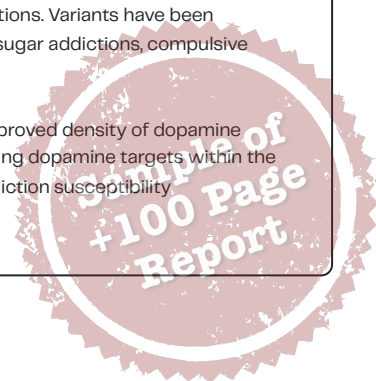
- Your genotype combination is associated with a heightened fear response that may affect your ability to extinguish fear memories
- Getting 30 minutes or more of aerobic exercise per day (especially in altitude), CBD, and hops help increase anandamide – known as the "bliss molecule" – to reduce the fear response

## Mental Health and Cognitive Performance



ANKK1 modulates the density of dopamine receptors in the brain and is the most-studied genetic variant related to addictions. Variants have been associated with alcoholism, opioid addiction, sugar addictions, compulsive eating, obesity and Internet addiction.

- Your genotype is associated with a improved density of dopamine receptors for the ANKK1 gene, increasing dopamine targets within the striatum of the brain and reducing addiction susceptibility



## Toxin Sensitivity



The International Agency for Research on Cancer has classified formaldehyde as carcinogenic to humans. Sources of formaldehyde in the home include building materials, smoking, household products, gas stoves, kerosene space heaters, as a food preservative, permanent-press clothes, and draperies, as a component of glues and adhesives, and as a preservative in some paints and coating products. Variants in the XRCC3 DNA repair gene have been associated with higher DNA damage from formaldehyde.

- Your genotype is not associated with an increased sensitivity to formaldehyde

## Toxin Sensitivity



Benzo(a)pyrene is a carcinogenic compound produced from the burning of wood or trash, tobacco smoke, asphalt, coal, diesel exhaust, charred meat, and gas cooking.

- Your genotype combinations are associated with decreased detoxification of benzo(a)pyrene
- It is recommended to increase your intake of cruciferous vegetables, vitamin C, vitamin E, vitamin A, resveratrol, curcumin, green tea, and white tea to protect and detoxify benzo(a)pyrene

## Toxin Sensitivity



Aromatic amines are found in cigarettes, rubber factories, hair dyes that contain 4-aminobiphenyl, and meat cooked at high temperatures.

- Your genotype combinations are associated with a slightly below average detoxification ability of aromatic amines
- If your exposure is higher to aromatic amines, increase cruciferous vegetable intake, carotenoids, vitamin C, and use marinades for meat when barbecuing

## Toxin Sensitivity



Sources of benzene include cigarette smoke, gasoline, exhaust, fires, industrial emissions, paint, detergent, glue, furniture wax, building materials, paint, petrochemical manufacturing, oil storage tanks, urban-industrial areas, service stations, certain foods, certain creams, groundwater contamination, and underground gasoline leaks.

- Your genotype is associated with an average sensitivity to benzene



DNA Protection & Repair



GPX1 activity is considered to be the most important antioxidant enzyme defense mechanism in the skin.

- Your genotype is associated with improved antioxidant protection for the skin

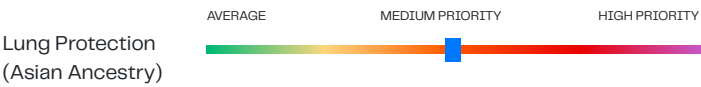
DNA Protection & Repair



Variants in the GSTP1 gene have been associated with lower antioxidant support in the lungs when exposed to environmental pollution.

- Your genotype is associated with increased lung protection against environmental pollutants

DNA Protection & Repair



Glutathione levels and pro-inflammatory cytokines, such as TNF- $\alpha$ , are found in airways and environmental pollutants are known to induce inflammatory responses.

- Your genotype combination is associated with reduced lung protection against environmental pollutants
- It is recommended to increase your intake of cruciferous vegetables, vitamin C, vitamin E, vitamin A, milk thistle, resveratrol, curcumin, green tea, and white tea to target the GSTM1 gene
- Additional support includes cold water immersion, breathing exercises, cordyceps, and ginger to target the TNFA gene

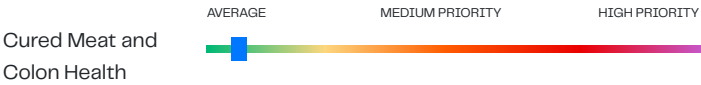
DNA Protection & Repair



The MLH1 gene codes for a DNA repair enzyme linked to colon health.

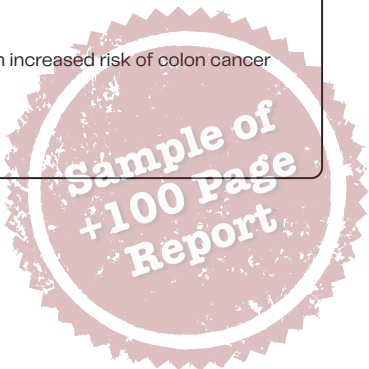
- Your genotype is associated with improved DNA protection for colon health

DNA Protection & Repair



A large-scale genome-wide analysis of over 18,000 people from the U.S., Canada, Australia and Europe found that variants in GATA3 were associated with an increased risk of colon cancer for those eating processed meat compared to those with the normal genotype.

- Your genotype is not associated with an increased risk of colon cancer from cured meat consumption



Cardiovascular Health



Variants in the ABCG2 gene have been associated with elevated uric acid levels and an increased risk of gout in Asians, Europeans, African Americans, Mexican Americans, and American Indians. Epidemiological studies have shown that uric levels are positively correlated with gout, hypertension, atherosclerosis, atrial fibrillation, and heart failure.

- Your genotype is associated with increased uric acid levels
- The association with your genotype and elevated uric acid levels is significantly stronger in men, postmenopausal women, and hormone therapy users
- Your genotype increases your sensitivity to sugar, alcohol intake, high-purine foods like liver, and dehydration with the development of gout
- Avoid refined sugar, increase water intake, parsley, quercetin, kaempferol, olive oil and vitamin C

Cardiovascular Health



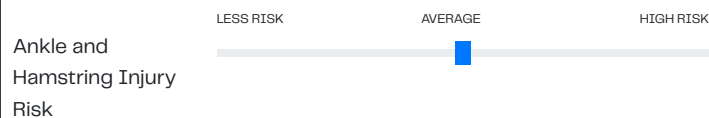
A homozygous HFE C282Y may lead to an iron overload due to increased iron absorption and disrupted metabolism. People who are homozygous for the HFE C282Y gene mutation comprise 85 to 90 percent of those with hemochromatosis in whites of western European descent.

- Your wild-type HFE genotype is associated with a reduced likelihood of genetically linked hemochromatosis





## Exercise



The ACTN3 gene is linked to increased or decreased risk of ankle and hamstring injuries.

- Your ACTN3 genotype is associated with an average risk of ankle and hamstring injuries

## Exercise



The ACTN3 gene is associated with a lower or higher adaptation rate to cold endurance.

- You have the ACTN3 RX genotype, associated with an average adaptation rate to cold endurance

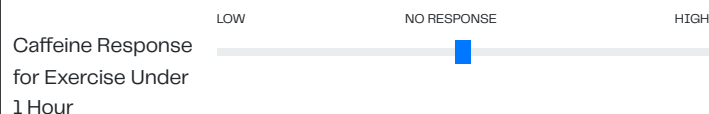
## Exercise



VO2 max is measurement for oxygen capacity and endurance training. The most recent research has shown that 97 genes predicted VO2 max trainability. The phenotype is dependent on several of these variants combined together, which may contribute to approximately 50% of an individual's VO2 max trainability.

- Research has shown that your genotypes for multiple genes are associated with a higher VO2 max training response

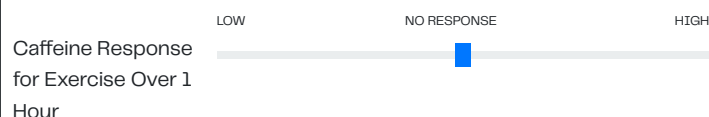
## Exercise



The CYP1A2 gene is associated with caffeine response for improving or decreasing exercise performance.

- Caffeine was not found to improve or decrease exercise performance for your CYP1A2 genotype

## Exercise



The CYP1A2 gene is associated with caffeine response for improving or decreasing exercise performance.

- Caffeine was not found to improve or decrease exercise performance for your CYP1A2 genotype



## METHYLATION

- **Folate-MTHFR 1298** - Your genotype is associated with improved BH4 levels and neurotransmitter function. Healthy BH4 levels assist in the management of cardiovascular health, mental health, and digestive health.
- **Folate-MTHFD1 G1958A** - Your genotype is associated with improved metabolism for folinic acid, the second most common type of folate after methylfolate.
- **Folate-DHFR** - Your genotype is associated with an improved breakdown of synthetic folic acid at the beginning of the folate cycle. However, variants in MTHFR 677 can also affect folic acid metabolism.
- **B12, B2 and Zinc-MTR** - You may have improved MTR function, assisting homocysteine metabolism.
- **B12-MTRR** - Your genotype is associated with improved gene function, assisting B12 and homocysteine metabolism.
- **B12-TCN2** - Your genotype is associated with improved B12 transportation.
- **B6-CBS** - Your genotype is associated with improved homocysteine and hydrogen sulfide levels, assisting gut repair and brain health.
- **Arsenic-CBS** - Your genotypes are associated with improved arsenic metabolism and detoxification for the CBS genes.

## HORMONE SUPPORT

- **Testosterone-Men** - If you are male, your genotype is associated with improved total and free testosterone levels for the SHBG rs6258 gene.
- **Thyroid-DI02** - Your genotype is associated with average T3 and T4 thyroid function in the brain for the DI02 gene. However, other factors can affect T3 and T4 levels including thyroid surgeries.
- **Estrogen Metabolism-CYP1A1** - Your CYP1A1 wild-type genotype is improved for the beginning phase of estrogen metabolism. Please review all genes involved in estrogen metabolism for a complete picture of the process.
- **Estrobolome-FUT2** - Your heterozygous genotype is associated with improved bifidobacteria gut bacteria, assisting the gut phase of estrogen detoxification.

## MENTAL HEALTH, NEUROTRANSMITTERS & COGNITIVE PERFORMANCE

- **Serotonin Receptor-Memory** - You have the wild-type genotype that is associated with an improved episodic memory, which is the ability to recall details regarding personal experiences, names of people, specific events, and what exactly occurred.
- **Dopamine, Adrenaline and Estrogen-COMT** - The heterozygous genotype for COMT V158M and H62H scored significantly higher on insight problem-solving tasks and had a greater ability for social facilitation and cooperativeness.
- **Dopamine Receptors-ANKK1** - Your genotype is associated with an improved density of dopamine receptors for healthy dopamine levels.
- **Glutamate Transport-SLC17A7** - Your genotype is associated with improved recovery from head injuries. However, your APOE and BDNF genotype should also be assessed because these all have a cumulative impact.



## HORMONE SUPPORT

- **Sex Hormone Binding Globulin** - If you are female, your genotype is associated with a sensitivity to oral contraceptives and hormone replacement therapy in relation to sex hormone binding globulin (SHBG) levels for healthy hormone levels. If you are male, higher SHBG levels could affect bone mineral density and SHBG may need to be tested. However, variants may also positively lead to higher testosterone levels.
- **Thyroid-DI01** - The homozygous AA genotype for the DI01 gene is associated with higher T4 levels and a sensitivity to organochlorine pesticides and PCBs. You may have a higher need for selenium and zinc if you have elevated T4 and low T3 levels.
- **Vitamin D-CYP2R1** - Your genotype is associated with low circulating vitamin D levels that can affect immunity, breast health in women, and testosterone levels in men. Check your vitamin D levels and make sure you are in range.
- **Estrogen Metabolism-CYP2C19** - Individuals with the CC genotype for CYP2C19\*17 are considered the normal metabolizer phenotype, which may lack the estrogen metabolism benefits of the ultra-rapid metabolizer phenotype. Please review all genes involved in estrogen metabolism for a complete picture of the process.
- **Estrogen Metabolism-CYP1A2** - For men and women with the CYP1A2 AC intermediate caffeine metabolism genotype, coffee intake was found to be less protective for breast and prostate health compared to the AA fast metabolizer.
- **Estrogen Metabolism-COMT** - For estrogen metabolism and detoxification, those with the intermediate AG COMT V158M genotype may have an increase in harmful estrogen metabolites that can cause DNA damage. To reduce the risk of these metabolites, you should avoid xenoestrogens, manage stress levels, maintain gut health, increase magnesium intake, and consume green tea polyphenols.
- **MTNR1B-Melatonin** - You have the CG MTNR1B genotype, which is associated with delayed melatonin release, a longer duration of morning melatonin levels, and less insulin release during late night and early morning feeding. It is recommended to eat dinner early, avoid late night snacking and consume breakfast later in the morning for better glycemic control.



## DETOXIFICATION

- **Liver Enzyme-CYP1A2** - You have the AC genotype for CYP1A2 that is associated with an increased sensitivity to heterocyclic amines (fried meat) when combined with the homozygous GSTM1 null genotype or slow acetylator NAT2 genotype. Marinades, unfiltered fermented drinks (Kombucha, beer, wine), cruciferous vegetables, parsley, and spinach have all been found to reduce the carcinogenic effect of heterocyclic amines.
- **Liver Enzyme-CYP1B1** - You have the GG genotype that is associated with reduced detoxification of polycyclic aromatic hydrocarbons (highest in vegetable oils), oral contraceptives, cigarette smoke, an increased sensitivity to excessive sun exposure, and high-dose biotin supplementation. You can assist CYP1B1 with seaweed, celery, berries, rooibos tea, red wine, and dark roast coffee.
- **Liver Enzyme-CYP2D6** - Your genotype is associated with reduced clearance of certain drugs associated with CYP2D6 rs1065852. However, more CYP2D6 SNPs are needed for a complete panel. Please talk to your doctor about further testing for CYP2D6 and drug metabolism.

## DNA DAMAGE, PROTECTION AND REPAIR

- **Prostate-ESR2** - For men with the ESR2 rs2987983 homozygous GG genotype, your genotype is associated with an increased need for foods high in apigenin (celery, parsley), phytoestrogens (berries, beans, sourdough bread), milk thistle, and iodine (sea vegetables) for prostate health. All genes related to prostate health should be analyzed to better determine the cumulative value for prostate protection.
- **DNA Repair-TP53** - You have the heterozygous CG genotype that may be advantageous for fertility in cold climates, but also increases the need for selenium, zinc, vitamin C, reishi, and niacin for DNA repair against chemical toxicity to the thyroid gland and skin.

## CARDIOVASCULAR HEALTH & EXERCISE

- **Muscle Injury-COL1A1** - You have the wild-type CC genotype that is associated with an increased need for dietary collagen for healthy skin, tendons, corneas, lungs, and bones. Vitamin C, zinc, copper, glycine, proline, lysine, and B6 are all precursors to collagen production.
- **Pesticides, HDL and LDL-PON1** - Your genotype is associated with decreased PON1 gene activity and reduced pesticide detoxification that could affect LDL oxidation. Elevated mercury levels and high homocysteine can further negatively affect PON1. There are numerous strategies to improve PON1 including choosing organic foods, adequate calcium and magnesium, pomegranates, broccoli sprouts, high-quality olive oil, and a glass of red wine.
- **Potassium and Magnesium-ADD1** - If you have Asian ancestry, your genotype is associated with an increased risk of a higher sodium intake causing elevated blood pressure. Increasing potassium, vitamin D, magnesium, calcium, garlic, and omega-3's all lower blood pressure.
- **Phytoestrogens-TMPRSS2** - You have the GG genotype that is associated with a higher expression of the TMPRSS2 gene and could increase the susceptibility to viral infections and prostate issues (men). To decrease TMPRSS2 expression, increase your intake of phytoestrogens, curcumin, and lycopene.

