Fertility Health Report

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Welcome to the future of health and human potential

ID:

Name:

DOB:

Barcode: NT4GH633

Date: 06/05/25

TEST METHODOLOGY AND LIMITATIONS

Recommendations in this report apply to all ages, however for any patient under 18 years, a guardian must purchase the test and be present for the report recommendations. The information in this report is not intended to treat, diagnose or cure any medical condition or disease.

Gene By Gene, a wholly owned subsidiary of myDNA, Inc., is a College of American Pathologists (CAP) accredited and Clinical Laboratory Improvement Amendments (CLIA) certified clinical laboratory qualified to perform high-complexity testing. This test was developed and its performance characteristics determined by Gene by Gene. It has not been cleared or approved by the FDA. FDA does not require this test to go through premarket FDA review. This test is used for clinical purposes. It should not be regarded as investigational or for research. Only the genomic regions listed below were tested; there is a possibility that the tested individual is a carrier for additional, undetected mutations. Although molecular tests are highly accurate, rare diagnostic errors may occur that interfere with analysis. Sources of these errors include sample mix-up, trace contamination, and other technical errors. The presence of additional variants nearby may interfere with mutation detection. Genetic counseling is recommended to properly review and explain these results to the tested individual.

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My Top Priorities

This is a summary of your entire report, highlighting only your highest impact results broken out by report section. Use this section to quickly identify your top priorities, understand what genes and genotypes are involved in each of our reports, and get context on how these genes impact your fertility.

Sperm Count

OMEGA-3 FATTY ACIDS

FADS2: GG

The FADS2 gene encodes for converting plant-based omega-3 fatty acid alpha-linolenic acid (ALA) to EPA. Omega-3 fats are considered to be the most critical component in sperm membranes because of their contribution to sperm motility, membrane fluidity, and the fertile potential of sperm.

ACTION PLAN

- Your FADS2 genotype combination is associated with a higher requirement of EPA and DHA
- Omega-3 fatty acids increase total sperm count
- Omega-3 fatty acids act to reduce the risk of asthenozoospermia, improving normal sperm morphology, increasing total sperm count, concentration, motility, and volume, and reducing sperm DNA fragmentation
- Lower ratios of omega-6 to omega-3 and saturated to unsaturated fatty acids are associated with better semen parameters, including sperm count
- We recommend 3,000mg total of EPA and DHA, with a target of 1500mg of DHA per day to improve sperm parameters

Sperm Concentration

CHOLINE

PEMT: CC

The PEMT gene controls the production of choline in the liver. Choline is a crucial factor in the regulation of sperm membrane structure and fluidity, and this nutrient plays an essential role in the maturation and fertilizing capacity of spermatozoa. The PEMT

rs12325817 774 GG genotype was associated with a higher sperm concentration than the PEMT 774 CG and 774 CC genotypes.

ACTION PLAN

- You have the CC genotype that is associated with a lower sperm concentration compared to the GG genotype
- We recommend that you get at least 550mg of choline per day from liver, pastured eggs, beef round, beef heart, chicken, and wild cod

Sperm Motility

OMEGA-3 FATTY ACIDS

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ACTION PLAN

- Your FADS2 genotype combination is associated with a higher requirement of EPA and DHA
- Omega-3 fatty acids act to reduce the risk of poor sperm motility
- Lower ratios of omega-6 to omega-3 and saturated to unsaturated fatty acids are associated with better semen parameters, including motility
- We recommend 3,000mg total of EPA and DHA, with a target of 1500mg of DHA per day to improve sperm parameters

Sperm Morphology

OMEGA-3 FATTY ACIDS

FADS2: GG

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component in sperm membranes because of their contribution to sperm motility, membrane fluidity, and the fertile potential of sperm.

ACTION PLAN

- Your FADS2 genotype combination is associated with a higher requirement of EPA and DHA
- Omega-3 fatty acids improve sperm morphology and reduce sperm DNA fragmentation
- Lower ratios of omega-6 to omega-3 and saturated to unsaturated fatty acids are associated with better semen parameters, including sperm morphology
- A randomized, double-blind study of men undergoing evaluation for infertility who were given 1,500 mg per day of DHA enriched oil over a 10-week period resulted in improvement in DHA and omega-3 fatty acid content in seminal plasma and a reduction in the percentage of spermatozoa with DNA damage
- We recommend 3,000mg total of EPA and DHA, with a target of 1500mg of DHA per day to improve sperm parameters

Oxidative Stress

GLUTATHIONE

GSTM1: AA

Glutathione S-transferase (GSTM1) belongs to a family of detoxification enzymes and deficiency in enzyme activity is due to a deletion of the GSTM1 gene. Several studies reveal a possible correlation between male infertility and GSTM1 polymorphisms.

ACTION PLAN

- You have the deletion in GSTM1
- We recommend taking extra precaution to avoid Bisphenol-A and phthalates, and increase sulforaphane from broccoli or 1 serving broccoli sprout powder daily

Sleep Support

SLEEP QUALITY

VDR FokI: GG

VDR is present in the testicular Leydig cells, epididymis, prostate, seminal vesicles, and

sperm, suggesting a need for vitamin D in such tissues for spermatogenesis and sperm maturation. Vitamin D increases intracellular calcium concentration in human spermatozoa through VDR and improves sperm motility. The VDR FokI rs2228570 gene is associated with male infertility and sleep quality.

ACTION PLAN

- You have the homozygous VDR FokI GG genotype that is more common in men experiencing infertility
- The VDR FokI GG genotype is associated with poor sleep quality, lower sperm count, motility, and sperm morphology
- Compared to men with night sleep duration of 7.5 to 8 hours a night, men who slept less than 6 hours had lower total sperm count, total motility, and progressive motility
- In a systematic review and meta-analysis of 9,397 participants, individuals with vitamin D deficiency had a significantly increased chance for sleep disturbances, poor sleep quality, and short sleep duration
- Vitamin D synthesizes serotonin and melatonin and lowers IL6
- The GG genotype may decrease the sensitivity to vitamin D and its effects on serotonin and melatonin synthesis, which can result in serotoninergic overactivity during the day and melatoninergic hypoactivity at night
- We recommend you test your vitamin D levels and supplement appropriately, include vitamin D co-factors including vitamin A, K2, magnesium, calcium, boron, and zinc, and optimize your sleep hygiene

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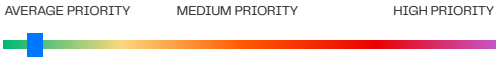
Sperm Count

Sperm Count

B1 (Thiamine)

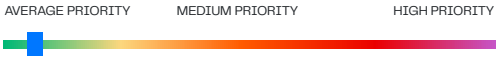


Variants in the TCF7L2 gene strongly predict future type 2 diabetes and are associated with increased pancreatic-cell TCF7L2 expression, decreased insulin secretion, and increased proinsulin:insulin ratio. Thiamine is essential for glucose oxidation, insulin production by pancreatic beta-cells, and cell growth.

- You have the wild-type CC TCF7L2 genotype, improving pancreatic beta-cell function
- Causes of thiamine deficiency include a refined grain-based diet, high alcohol intake, gastrointestinal disorders, and prolonged cooking of foods

Sperm Count

Folate

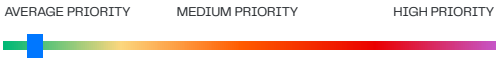


The MTHFR 677 gene encodes the MTHFR gene to convert folate into the active form, methylfolate. Low serum and seminal folate levels can result in high homocysteine levels, which may induce oxidative stress, sperm DNA damage, and apoptosis, lowering sperm counts.

- You have the wild-type GG MTHFR 677 that is associated with an average need for folate
- Folate supplementation has been positively associated with higher sperm density, overall higher semen quality, and is negatively associated with infertility

Sperm Count

B12

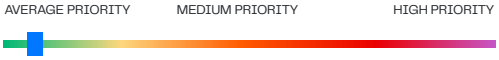


The FUT2 gene is responsible for vitamin B12 homeostasis and transport throughout the body. Variation in the FUT2 gene is associated with differing levels of circulating vitamin B12. The GG variant of FUT2 (rs602662) is linked to lower plasma vitamin B12 and has been observed in about 50% of the population.

- You have the homozygous AA FUT2 genotype that is associated with high B12 levels

Sperm Count

Zinc



The PPCDC gene is associated with serum zinc levels in the blood. Zinc deficiency causes a low quality of sperm, low testosterone, and male infertility.

- You have the wild-type TT PPCDC genotype associated with normal serum zinc levels
- The World Health Organization estimates that one-third of the world population has a zinc deficiency
- ACE inhibitors, antibiotics, diuretics, hormone replacement therapy, MAO inhibitors, oral contraceptives, and proton pump inhibitors deplete zinc
- High seminal zinc concentrations, however, have a suppressing effect on progressive motility of the spermatozoa (“quality of movement”), not on percentage of motile spermatozoa (“quantity of movement”)

Sperm Count

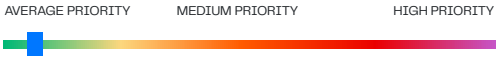
Vitamin A

Vitamin A plays a vital role in male reproductive health. Vitamin A circulates in two main forms in the body: beta-carotene (inactivated) and retinol (activated). The BCMO1 gene encodes the conversion rate from beta-carotene to vitamin A.

- Your BCMO1 genotype combination is associated with a 32% lower conversion rate of beta-carotene to vitamin A, making it important to include more animal-based vitamin A to hit your daily target
- Higher serum retinol has been observed in men with normal sperm compared to those with low sperm count and azoospermia (no sperm present)
- Vitamin A deficiency damages the seminiferous epithelium of the epididymis, prostate, and the seminal vesicle, which results in the termination of spermatogenesis
- Despite vitamin A deficiency leading to early cessation of spermatogenesis, one study found that long-term chronic excessive intake of vitamin A impairs sperm production, morphology, motility and viability in mice
- We recommend 900mcg to 3,000mcg as retinol daily

Sperm Count

Vitamin C

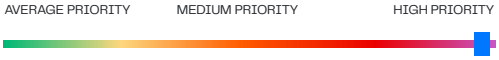


Polymorphisms in SLC23A1 are associated with reduced plasma vitamin C levels in the body. Vitamin C intake has been positively associated with healthy semen parameters, as dietary intake influences seminal ascorbic acid concentrations.

- You have the wild-type CC SL23A1 gene that is associated with normal serum vitamin C levels
- Vitamin C intake has been positively associated with healthy semen parameters, as dietary intake influences seminal ascorbic acid concentrations

Sperm Count

Omega-3 Fatty Acids



The FADS2 gene encodes for converting plant-based omega-3 fatty acid alpha-linolenic acid (ALA) to EPA. Omega-3 fats are considered to be the most critical component in sperm membranes because of their contribution to sperm motility, membrane fluidity, and the fertile potential of sperm.

- Your FADS2 genotype combination is associated with a higher requirement of EPA and DHA
- Omega-3 fatty acids increase total sperm count
- Omega-3 fatty acids act to reduce the risk of asthenozoospermia, improving normal sperm morphology, increasing total sperm count, concentration, motility, and volume, and reducing sperm DNA fragmentation
- Lower ratios of omega-6 to omega-3 and saturated to unsaturated fatty acids are associated with better semen parameters, including sperm count
- We recommend 3,000mg total of EPA and DHA, with a target of 1500mg of DHA per day to improve sperm parameters

Sperm Count

Lycopene

Lycopene is an antioxidant carotenoid frequently found in tomatoes and several red fruits. This molecule is a modulator of lipid peroxidation and antioxidant enzyme activities and has a positive effect on testicular mitochondrial function and sperm quality. Those with SOD2 variants benefit from increased lycopene intake.

- You have the heterozygous AG SOD2 genotype, indicating a higher need for lycopene
- In a meta-analysis of non-pharmaceutical interventions on sperm total motility, the top two interventions were acupuncture and lycopene
- Lycopene supplementation in human and animal studies significantly improves sperm count and viability and alleviates male infertility–lipid peroxidation and DNA damage
- Improvement of sperm parameters indicates a reduction in oxidative stress, and thus the spermatozoa is less vulnerable to oxidative damage, which increases the chances of a normal sperm fertilizing the egg
- Human trials have reported improvement in sperm parameters and pregnancy rates with supplementation of 4–8 mg of lycopene daily for 3–12 months

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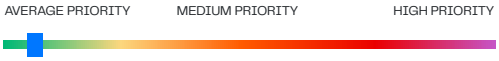
Sperm Concentration

Sperm Concentration

Folate

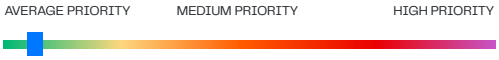


The MTHFR 677 gene encodes the MTHFR gene to convert folate into the active form, methylfolate. The ability of methylfolate to improve sperm concentration has been associated with the homozygous genotype in the MTHFR 677 gene.

- You have the wild-type GG MTHFR 677 that is associated with an average need for folate
- Folate supplementation has been positively associated with higher sperm density, overall higher semen quality, and is negatively associated with infertility

Sperm Concentration

B12

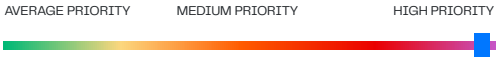


The FUT2 gene is responsible for vitamin B12 homeostasis and transport throughout the body. Variation in the FUT2 gene is associated with differing levels of circulating vitamin B12. The GG variant of FUT2 (rs602662) is linked to lower plasma vitamin B12 and has been observed in about 50% of the population.

- You have the homozygous AA FUT2 genotype that is associated with high B12 levels
- You may need to avoid high doses of supplemental B12

Sperm Concentration

Choline



The PEMT gene controls the production of choline in the liver. Choline is a crucial factor in the regulation of sperm membrane structure and fluidity, and this nutrient plays an essential role in the maturation and fertilizing capacity of spermatozoa. The PEMT rs12325817 774 GG genotype was associated with a higher sperm concentration than the PEMT 774 CG and 774 CC genotypes.

- You have the CC genotype that is associated with a lower sperm concentration compared to the GG genotype
- We recommend that you get at least 550mg of choline per day from liver, pastured eggs, beef round, beef heart, chicken, and wild cod

Sperm Concentration

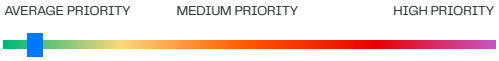
Vitamin A

Vitamin A plays a vital role in male reproductive health. Vitamin A circulates in two main forms in the body: beta-carotene (inactivated) and retinol (activated). The BCMO1 gene encodes the conversion rate from beta-carotene to vitamin A.

- Your BCMO1 genotype combination is associated with a 32% lower conversion rate of beta-carotene to vitamin A, making it important to include more animal-based vitamin A to hit your daily target
- Retinoic acid, the vitamin A metabolite, may play a role in male fertility via its influence on the regulation of sperm morphology and concentration
- Vitamin A deficiency damages the seminiferous epithelium of the epididymis, prostate, and the seminal vesicle, which results in the termination of spermatogenesis
- Despite vitamin A deficiency leading to early cessation of spermatogenesis, one study found that long-term chronic excessive intake of vitamin A impairs sperm production, morphology, motility and viability in mice
- We recommend 900mcg to 3,000mcg as retinol daily

Sperm Concentration

Vitamin C

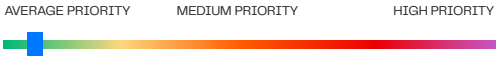


Polymorphisms in the gene are associated with reduced plasma vitamin C levels in the body. Vitamin C intake has been positively associated with healthy semen parameters, as dietary intake influences seminal ascorbic acid concentrations.

- You have the wild-type CC SL23A1 gene that is associated with normal serum vitamin C levels
- Vitamin C intake has been positively associated with healthy semen parameters, as dietary intake influences seminal ascorbic acid concentrations

Sperm Concentration

Vitamin E



Vitamin E status is affected by dietary vitamin E intake, absorption efficiency, and catabolism. Dietary vitamin E correlates with serum and seminal alpha-tocopherol levels, which are positively related to fertility and normal sperm parameters. The ability of a-tocopherol to affect IL-6 production is influenced by the GSTP1 rs1695 polymorphism.

- Your genotype for GSTP1 rs1695 is not associated with a higher requirement for alpha-tocopherol to increase antioxidant capacity and lower IL6
- People with the wild-type AA or heterozygous AG genotype in GSTP1 rs1695 should not supplement over 75 IU of alpha-tocopherol

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Sperm Motility

Sperm Motility

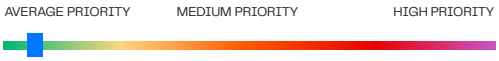
Vitamin B6

The NBPF3 gene is associated with serum vitamin B6 levels. Research has shown that men with reduced sperm motility have lower seminal plasma vitamin B6 levels compared to men with normal sperm motility.

- You have the heterozygous CT NBPF3 genotype, associated with lower serum vitamin B6 levels
- Heterozygotes have a 1.45 ng/mL lower Vitamin B6 blood concentration than the wild-type genotype
- A diet high in lean protein intake increases the need for B6
- Discuss with your doctor if you are taking any medications that deplete B6
- Vitamin B6 deficiency may trigger chemical toxicity to sperm, including hyperhomocysteinemia and oxidative injury
- We recommend 2mg to 5mg of B6 as pyridoxal-5-phosphate daily

Sperm Motility

B12

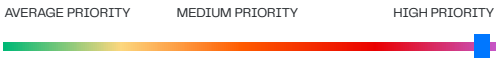


The FUT2 gene is responsible for vitamin B12 homeostasis and transport throughout the body. Variation in the FUT2 gene is associated with differing levels of circulating vitamin B12. The GG variant of FUT2 (rs602662) is linked to lower plasma vitamin B12 and has been observed in about 50% of the population.

- You have the homozygous AA FUT2 genotype that is associated with high B12 levels

Sperm Motility

Omega-3 Fatty Acids



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- Lower ratios of omega-6 to omega-3 and saturated to unsaturated fatty acids are associated with better semen parameters, including motility
- We recommend 3,000mg total of EPA and DHA, with a target of 1500mg of DHA per day to improve sperm parameters

Sperm Motility

Vitamin A

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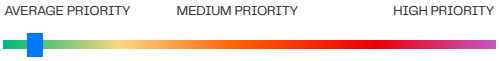
- Your BCMO1 genotype combination is associated with a 32% lower conversion rate of beta-carotene to vitamin A, making it important to include more animal-based vitamin A to hit your daily target
- Higher serum retinol has been observed in men with normal sperm compared to those with reduced sperm motility
- Vitamin A deficiency damages the seminiferous epithelium of the epididymis, prostate, and the seminal vesicle, which results in the termination of spermatogenesis
- Despite vitamin A deficiency leading to early cessation of spermatogenesis, one study found that long-term chronic excessive intake of vitamin A impairs sperm production, morphology, motility and viability in mice
- We recommend 900mcg to 3,000mcg as retinol daily

Sperm Motility

Vitamin C



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- You have the wild-type CC SL23A1 gene that is associated with normal serum vitamin C levels
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Sperm Motility

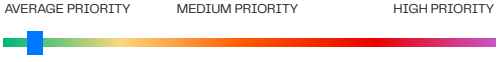
Vitamin D

To exert its biological functions, dietary and endogenous vitamin D must be activated to 1,25-hydroxyvitamin D by the enzyme vitamin D 25-hydroxylase, which is regulated partly by the CYP2R1 gene. Activated vitamin D is transported throughout the body by the vitamin D binding protein (DBP), which is encoded by the GC gene.

- Your genotype combination of CYP2R1 and GC is associated with lower circulating vitamin D
- Vitamin D modulates cholesterol and triglycerides in sperm head membranes, which are essential for the protection of sperm DNA and may potentially have an impact on sperm viability, motility, and fertilization capacity
- Vitamin D's role in maintaining calcium homeostasis may also contribute both to motility and to the acrosome reaction, which potentiates fertilization
- 1,25-dihydroxyvitamin D concentration may potentially have a stronger association with sperm parameters in comparison to circulating 25-hydroxyvitamin D
- Human studies analyzing circulating vitamin D and semen parameters are less common than rodent models, but some have shown that serum 25-hydroxyvitamin D concentrations correlate positively with sperm motility as well as circulating testosterone levels
- There appears to be a U-shaped relationship between serum vitamin D and androgen concentrations, where both deficiency and excess may be associated with adverse reproductive outcomes
- In a randomized clinical trial investigating the effects of dietary supplementation on sperm motility in men with idiopathic poor sperm motility, results found that after 3 months, the calcium/vitamin D group achieved pregnancy in 16.3% of cases, compared to 2.3% in the vitamin E/vitamin C group
- We recommend that you test your vitamin D levels and supplement based on your practitioner's recommendation to achieve optimal levels

Sperm Motility

Vitamin E



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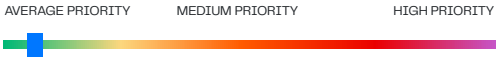
- Your genotype for GSTP1 rs1695 is not associated with a higher requirement for alpha-tocopherol to increase antioxidant capacity and lower IL6
- As an antioxidant and protector of sperm membrane lipids, vitamin E is important in promoting motility and proper morphology of sperm, as well as fertilization within the acrosome reaction
- People with the wild-type AA or heterozygous AG genotype in GSTP1 rs1695 should not supplement over 75 IU of alpha-tocopherol

Sperm Motility

Calcium



The GGCX gene is involved in calcium regulation through its role in the carboxylation of proteins and is dependent on vitamin K2. The GGCX rs699664 SNP has a significant association with reduced sperm motility and infertility.

- Your genotype for GGXC is not associated with poor sperm motility related to calcium
- Calcium has a positive effect on sperm maturation, motility, morphology, and overall function

Sperm Motility

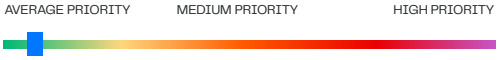
Vitamin K2

Variants in VOKRC1*2 may increase the need for vitamin K2 and sensitivity to the depletion of vitamin K from Warfarin.

- You have the heterozygous CT genotype for VOKRC1*2 that is associated with increased vitamin K2 requirements and a sensitivity to the depletion of vitamin K from Warfarin
- A lifelong decreased activity of the VKORC1 enzyme may increase the risk of vascular calcification that can affect fertility and could be further worsened by a reduced intake of vitamin K2
- Vitamin K2 is essential for epididymal sperm maturation, motility, and male fertility
- Researchers found that Warfarin works as a male contraceptive by depleting vitamin K and targeting GGCX-MGP, showing the importance of vitamin K2 for fertility
- We recommend 100mcg or more of vitamin K2 as MK-4 and MK-7

Sperm Motility

Magnesium



The GPX1 (Glutathione peroxidase 1) gene encodes a protein responsible for modulating and detoxifying hydroperoxides and hydrogen peroxide to protect the mitochondria and cytoplasm of cells against oxidative damage. Magnesium increases glutathione peroxidase activity and plays a role in spermatogenesis and sperm motility.

- You have the wild-type GG GPX1 genotype associated with regular activity and, therefore, may require an average intake of magnesium to maintain healthy GPX1 levels

Sperm Motility

Selenium

Research has shown that individual requirements for selenium will differ because of polymorphisms in seleno-protein genes. Selenium is a primary mineral needed for healthy GPX1 gene function and plays a significant role in male fertility.

- You have the wild-type GG GPX1 genotype that is associated with improved activity and an average selenium requirement

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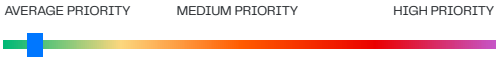
Sperm Morphology

Sperm Morphology

Folate

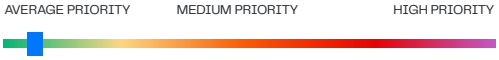


The MTHFR 677 gene encodes the MTHFR gene to convert folate into the active form, methylfolate. Low levels of serum and seminal folate can result in high levels of homocysteine, which may induce oxidative stress and sperm DNA damage.

- You have the wild-type GG MTHFR 677 that is associated with an average need for folate
- Folate supplementation has been positively associated with normal sperm morphology

Sperm Morphology

B12



The FUT2 gene is responsible for vitamin B12 homeostasis and transport throughout the body. Variation in the FUT2 gene is associated with differing levels of circulating vitamin B12. The GG variant of FUT2 (rs602662) is linked to lower plasma vitamin B12 and has been observed in about 50% of the population.

- You have the homozygous AA FUT2 genotype that is associated with high B12 levels
- You may need to avoid high doses of supplemental B12

Sperm Morphology

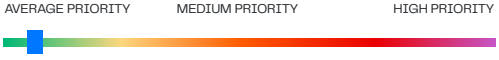
Vitamin A

Vitamin A plays a vital role in male reproductive health. Vitamin A circulates in two main forms in the body: beta-carotene (inactivated) and retinol (activated). The BCMO1 gene encodes the conversion rate from beta-carotene to vitamin A.

- Your BCMO1 genotype combination is associated with a 32% lower conversion rate of beta-carotene to vitamin A, making it important to include more animal-based vitamin A to hit your daily target
- Retinoic acid, the vitamin A metabolite, may play a role in male fertility via its influence on regulation of sperm morphology
- Vitamin A deficiency damages the seminiferous epithelium of the epididymis, prostate, and the seminal vesicle, which results in the termination of spermatogenesis
- Despite vitamin A deficiency leading to early cessation of spermatogenesis, one study found that long-term chronic excessive intake of vitamin A impairs sperm production, morphology, motility and viability in mice
- We recommend 900mcg to 3,000mcg as retinol daily

Sperm Morphology

Vitamin C



Polymorphisms in the gene are associated with reduced plasma vitamin C levels in the body. Vitamin C intake has been positively associated with healthy semen parameters, as dietary intake influences seminal ascorbic acid concentrations.

- You have the wild-type CC SL23A1 gene that is associated with normal serum vitamin C levels
- Vitamin C intake has been positively associated with healthy semen parameters, as dietary intake influences seminal ascorbic acid concentrations

Sperm Morphology

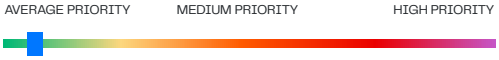
Vitamin D

To exert its biological functions, dietary and endogenous vitamin D must be activated to 1,25-hydroxyvitamin D by the enzyme vitamin D 25-hydroxylase, which is regulated partly by the CYP2R1 gene. Activated vitamin D is transported throughout the body by the vitamin D binding protein (DBP), which is encoded by the GC gene.

- Your genotype combination of CYP2R1 and GC is associated with lower circulating vitamin D
- 1,25-dihydroxyvitamin D concentration may potentially have a stronger association with sperm parameters in comparison to circulating 25-hydroxyvitamin D
- Human studies analyzing circulating vitamin D and semen parameters are less common than rodent models, but some have shown that serum 25-hydroxyvitamin D concentrations correlate positively with normal sperm morphology as well as circulating testosterone levels
- We recommend that you test your vitamin D levels and supplement based on your practitioner's recommendation to achieve optimal levels

Sperm Morphology

Vitamin E

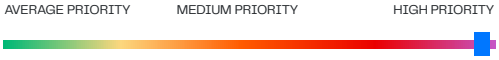


Vitamin E status is affected by dietary vitamin E intake, absorption efficiency, and catabolism. Dietary vitamin E correlates with serum and seminal alpha-tocopherol levels, which are positively related to fertility and normal sperm parameters. The ability of a-tocopherol to affect IL-6 production is influenced by the GSTP1 rs1695 polymorphism.

- Your genotype for GSTP1 rs1695 is not associated with a higher requirement for alpha-tocopherol to increase antioxidant capacity and lower IL6
- As an antioxidant and protector of sperm membrane lipids, vitamin E is important in promoting motility and proper morphology of sperm, as well as fertilization within the acrosome reaction
- People with the wild-type AA or heterozygous AG genotype in GSTP1 rs1695 should not supplement over 75 IU of alpha-tocopherol

Sperm Morphology

Omega-3 Fatty Acids



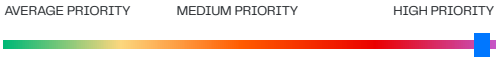
The FADS2 gene encodes for converting plant-based omega-3 fatty acid alpha-linolenic acid (ALA) to EPA. Omega-3 fats are considered to be the most critical component in sperm membranes because of their contribution to sperm motility, membrane fluidity, and the fertile potential of sperm.

- Your FADS2 genotype combination is associated with a higher requirement of EPA and DHA
- Omega-3 fatty acids improve sperm morphology and reduce sperm DNA fragmentation
- Lower ratios of omega-6 to omega-3 and saturated to unsaturated fatty acids are associated with better semen parameters, including sperm morphology
- A randomized, double-blind study of men undergoing evaluation for infertility who were given 1,500 mg per day of DHA enriched oil over a 10-week period resulted in improvement in DHA and omega-3 fatty acid content in seminal plasma and a reduction in the percentage of spermatozoa with DNA damage
- We recommend 3,000mg total of EPA and DHA, with a target of 1500mg of DHA per day to improve sperm parameters

Oxidative Stress

Oxidative Stress

Glutathione

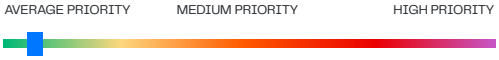


Glutathione S-transferase (GSTM1) belongs to a family of detoxification enzymes and deficiency in enzyme activity is due to a deletion of the GSTM1 gene. Several studies reveal a possible correlation between male infertility and GSTM1 polymorphisms.

- You have the deletion in GSTM1
- We recommend taking extra precaution to avoid Bisphenol-A and phthalates, and increase sulforaphane from broccoli or 1 serving broccoli sprout powder daily

Oxidative Stress

Catalase



The CAT enzyme, encoded by the CAT gene, plays a role in maintaining normal levels of ROS by converting H2O2 to H2O. Catalase plays a role in maintaining normal levels of ROS and protecting sperm from potentially toxic levels of ROS. Research has shown that catalase levels in infertile patients are significantly lower.

- You have the wild-type CC genotype for the CAT gene that is associated with improved catalase levels

Oxidative Stress

Superoxide Dismutase

Superoxide dismutase (SOD2) is manganese-dependent and protects the cell's mitochondria against superoxide. Several studies suggest an association between the SOD2 Val16Ala variant (rs4880) and male infertility. Variants in SOD2 increase the need for manganese and intracellular antioxidant protection.

- You have the heterozygous genotype for SOD2 that is associated with reduced SOD2 activity and mitochondrial production
- SOD activity in semen is positively correlated with sperm concentration and motility
- Avoid vegetable oils, high-fat diets, and high amounts of refined carbohydrates, get 2-5mg of manganese per day, review your requirements for vitamin A, C, E, and omega-3 fatty acids, and consider adding maitake, oyster, shiitake, and porcini mushrooms to your diet

Oxidative Stress

Glutathione Peroxidase

The GPX1 (Glutathione peroxidase 1) gene encodes a protein responsible for modulating and detoxifying hydroperoxides and hydrogen peroxide to protect the mitochondria and cytoplasm of cells against oxidative damage.

- You have the wild-type GG genotype for the GPX1 gene that is associated with improved glutathione peroxidase levels

Oxidative Stress

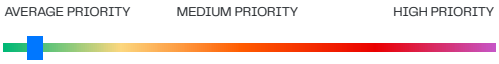
Lead

Heavy metal exposure has been conclusively linked with sperm oxidative damage. Both cadmium and lead increase testicular oxidative stress and a resultant increase in sperm DNA oxidation. The deletion in GSTM1 and variants in the GPX1 gene are associated with reduced protection against the oxidative stress of lead.

- Your genotype is associated with reduced detoxification and more toxic effects from elevated lead levels
- Lead may alter sperm quality in men
- The increase in infertility and miscarriage observed in the partners of welders and battery/paint factory workers may be due to oxidative damage to sperm DNA initiated by the inhalation of metal fumes
- Vitamin C lowers lead levels in the body while calcium blocks its uptake
- Avoid lead-containing cookware, check if your home has lead pipes, optimize iron levels, and get 1,000mg of calcium and 750mg of vitamin C daily to help block the update of lead and reduce blood lead levels

Oxidative Stress

Cadmium



Heavy metal exposure has been conclusively linked with sperm oxidative damage. Both cadmium and lead increase testicular oxidative stress and a resultant increase in sperm DNA oxidation. Variants in GSTP1 increase the sensitivity to the oxidative stress from cadmium.

- You have the wild-type CC genotype for GSTP1 that is associated with average detoxification of cadmium

Oxidative Stress

Pesticides

Paraoxonases (PON1) are a family of enzymes that break down chemicals, including several types of pesticides and pharmaceutical drugs. The rs662 SNP is the most clinically relevant for PON1. The C allele is also known as the “R” allele in research studies. A combination of PON1 and SOD2 variants have been found to increase the risk of male infertility.

- Your PON1 and SOD2 genotype combination that is associated with slightly decreased PON1 activity for pesticide detoxification
- Men working in agricultural regions and greenhouses that use pesticides have higher concentrations of common pesticides in their urine and a 60% decrease in sperm concentrations
- Avoid heavily sprayed fruits and vegetables, optimize calcium and magnesium intake, and consider adding black cumin seed oil, pomegranates, broccoli sprouts, high-quality olive oil, and a glass of organic red wine

Oxidative Stress

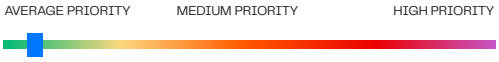
Glyphosate

Researchers have postulated that chronic exposure to food containing glyphosate-based herbicides could be related to unexplained fertility issues. Glyphosate has been shown to decrease catalase and superoxide dismutase.

- Your genotype combination for SOD2 and CAT is associated with more cellular damage from exposure to the herbicide glyphosate
- In vitro research at high concentrations that greatly exceed environmental exposures shows that glyphosate exerts toxic effects on sperm progressive motility but not on sperm DNA integrity
- The highest glyphosate levels have been found in non-organic wheat and non-organic pulses like beans, lentils, and peas
- Avoid non-organic wheat, beans, lentils, peas, wine, and beer, and optimize vitamin E intake to protect against glyphosate-induced oxidative stress

Oxidative Stress

Hemochromatosis



HFE C282Y is tested to determine hemochromatosis risk.

- You have the wild-type GG HFE C282Y genotype that is not associated with genetically linked hemochromatosis

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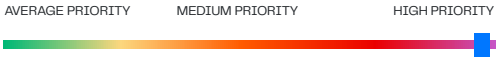
Sleep Support

Sleep Support



VDR is present in the testicular Leydig cells, epididymis, prostate, seminal vesicles, and sperm, suggesting a need for vitamin D in such tissues for spermatogenesis and sperm maturation. Vitamin D increases intracellular calcium concentration in human spermatozoa through VDR and improves sperm motility. The VDR FokI rs2228570 gene is associated with male infertility and sleep quality.

- You have the homozygous VDR FokI GG genotype that is more common in men experiencing infertility
- The VDR FokI GG genotype is associated with poor sleep quality, lower sperm count, motility, and sperm morphology
- Compared to men with night sleep duration of 7.5 to 8 hours a night, men who slept less than 6 hours had lower total sperm count, total motility, and progressive motility
- In a systematic review and meta-analysis of 9,397 participants, individuals with vitamin D deficiency had a significantly increased chance for sleep disturbances, poor sleep quality, and short sleep duration
- Vitamin D synthesizes serotonin and melatonin and lowers IL6
- The GG genotype may decrease the sensitivity to vitamin D and its effects on serotonin and melatonin synthesis, which can result in serotoninergic overactivity during the day and melatoninergic hypoactivity at night
- We recommend you test your vitamin D levels and supplement appropriately, include vitamin D co-factors including vitamin A, K2, magnesium, calcium, boron, and zinc, and optimize your sleep hygiene

Stress Management

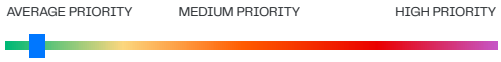
Stress Management

Pressure Response

COMT (catecholamine methyltransferase) is the gene for dopamine, estrogen, adrenaline and catecholamine metabolism. Studies have found that the A allele in COMT V158M (rs4680) results in a 40% decrease in COMT enzyme activity, leading to naturally higher dopamine and adrenaline levels.

- You have the heterozygous AG genotype that is associated with a decreased breakdown of dopamine levels and a reduced clearance of adrenaline in response to stress
- Men who experienced two or more stressful life events had a lower percentage of motile sperm and a lower percentage of morphologically normal sperm
- Weight lifting helps speed up the pathway responsible for clearing excess dopamine and adrenaline, and therefore is a useful tool for you to use for chronic stress
- We recommend weight lifting 3x a week, 400-500mg of magnesium daily, and minimizing catecholamine intake (coffee, green tea, chocolate, red wine)

Stress Management



BDNF

BDNF (brain-derived neurotrophic factor) has a protective effect on sperm oxidative stress, which can maintain sperm activity. Variants in the BDNF gene affect baseline BDNF levels.

- You have the wild-type CC genotype for BDNF that is associated with higher baseline BDNF levels

Background & Clinical Applications

Infertility affects 20–30% of women of reproductive age globally, with 50% ascribed to men due to defects in sperm quantity, quality, or motility. Research is now showing that nutritional patterns, body weight, oxidative stress, psychological and emotional stress, and inflammation play a monumental role in a high percentage of both female and male infertility cases.

In a meta-analysis of 223 studies across 53 countries, nearly 50 years of data on sperm count and concentration rates were analyzed from 1973 to 2018. The latest findings show a rapid global decline in sperm concentration across North America, Europe, Australia, South and Central America, Asia, and Africa. Even more alarming is that the researchers found that the rate of sperm concentration loss has been accelerating and doubled yearly starting after the year 2000.

Dietary factors and environmental exposures can impair spermatogenesis, reduce sperm concentration and motility, and increase sperm DNA damage. Exposure to pesticides, herbicides, heavy metals, phthalates, and BPA plastic is hypothesized to be a leading cause of the global decline in sperm count and concentration, poor motility, and morphology.

Dietary patterns for men that are high in sugar, processed red meat, refined carbohydrates, saturated fatty acids, and alternative sweeteners, and low in omega-3 fatty acids, monounsaturated fatty acids, antioxidants, fruits, and vegetables have all been shown to drastically impact fertility due to elevated oxidative stress levels.

During natural conception or routine IVF, oxidative damage to the sperm membrane can block fertilization, preventing the damaged paternal DNA from creating an embryo. The risk is even higher in obese men with diabetes, dyslipidemia, or metabolic syndrome.

Finally, men with poor semen quality are at a greater risk for testicular cancer, cardiovascular disease, and a reduced lifespan. Screening for poor semen quality from genetic susceptibilities and other fertility testing may not only serve as advanced tools for increasing fertility rates, but also for optimizing men's health and longevity.

Men's Fertility Panel Modules and SNPs

The Men's Fertility Panel has been designed to analyze SNPs that influence the most significant factors affecting male fertility including sperm production, motility, morphology, DNA integrity, hormone balance, and overall reproductive health.

Modules

- Sperm Count & Concentration

- Sperm Motility
- Sperm Morphology
- Sperm DNA Integrity
- Oxidative Stress Protection
- Hormone Balance
- Inflammation

Key Nutrients & Factors

- Vitamin C
- Vitamin E
- Zinc
- Folate
- Vitamin B12
- Vitamin D
- Selenium
- Omega-3 Fatty Acids
- Coenzyme Q10
- L-Carnitine
- Arginine
- Glutathione
- N-acetylcysteine
- Lycopene
- Antioxidants
- Oxidative Stress
- Inflammation
- Hormone Balance

Key Genes

- MTHFR
- SOD2
- CAT
- GPX1
- NRF2
- GST
- SHBG

Environmental Factors

- Pesticides
- Herbicides

- Heavy Metals
- Phthalates
- BPA
- Radiation
- Heat Exposure
- Electromagnetic Fields