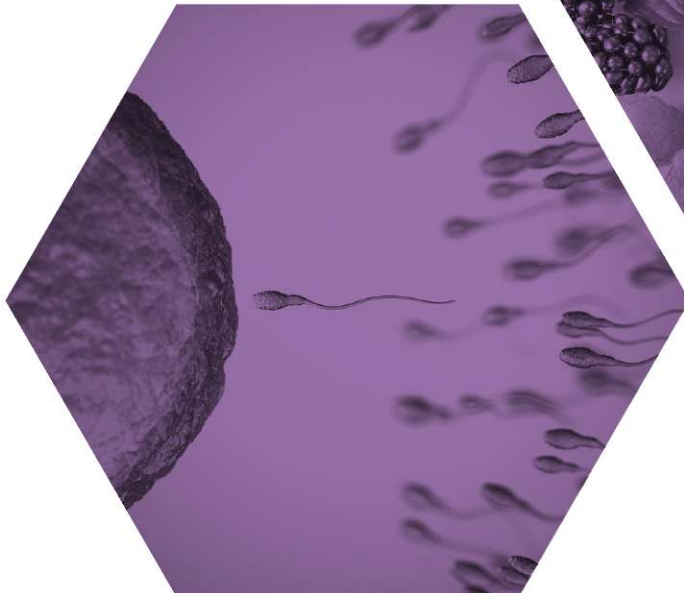




# FertilityHealth™

YOUR HEALTH & WELLBEING FOCUS ON  
PRECONCEPTION AND REPRODUCTIVE HEALTH

Women's Health  
Male and Female Fertility  
Hormones and Thyroid



GENETIC PROFILE ID # 0000000

POWERED BY  fitgenes

Name: Sample Client  
Kit: 0-000-000-0

## Your Personal Genetic Profile



In this report, you will identify key genes which may influence your preconception and reproductive health. In particular, we detail your genetic variants that influence your metabolism of folate and homocysteine, choline, vitamins B6, A and C, zinc, other nutrients, hormones (estrogen, progesterone and testosterone and other key reproductive hormones), thyroid function, and melatonin signalling, with genotype-specific interventions. This information, combined with other assessments, can be used by an accredited health practitioner to design more personalised and targeted dietary and other lifestyle recommendations.

In order to simplify the results, the genes tested as part of your personal profile have been grouped in the following categories:

1. Folate and Homocysteine
2. Choline
3. Vitamin B6
4. Vitamin A
5. Zinc
6. Vitamin C
7. Other Nutrients
8. Estrogen Metabolism
9. Progesterone Metabolism
10. Testosterone Metabolism
11. Other Key Reproductive Hormones
12. Thyroid Function
13. Melatonin Signalling

For each gene or grouping, you can have three different results, as shown by the figure below.



For categories that have multiple genes, your risk for a particular condition will be increased with the more orange (slightly increased) or red (further increased) results you have. Similarly, if you only have green results, your risk will not be increased based on the genes included in this report.

If you have any worry or concern about a particular category or result, or if there is anything you do not understand, we encourage you to speak to your health practitioner.

**Scientific Note:** when comparing results from Fitgenes with other sources, it is important to take into account whether testing was done on the forward or reverse strand. For this reason, it is possible that results do not completely match, but they are still the same (C=G, A=T). Caution should be taking with complementary changes (C>G, A>T).

**Disclaimer and limitations:** all genes and variants presented in this report, with their corresponding implications for your health, have gone through extensive scientific literature review. Nevertheless, genetic research is rapidly increasing, and our understanding of the information included in this report will increase over time, and so the content of future reports may vary from this one.



## Preconception and Reproductive Health

The role of genetics influencing fertility in both men and women is becoming better understood as research continues evolving, ranging from rare genetic disorders causing infertility to genetic factors influencing embryo competence. Genetic factors, known and unknown, have been reported to be the cause of approximately 50% of all infertility cases.



Nutrition plays a key role in fertility, and a balanced diet with the adequate supplements can improve fertility. In turn, nutritional deficiencies can impair fertility. Pregnancy is one of the life stages that strongly demands healthy diets with the right nutrients, and on occasion micronutrients supplementation. In fact, when women experience excessive or sudden weight loss, negatively impacting their nutritional status, one of the first consequences is the decrease in the production of hormones needed for healthy ovary function and egg integrity. Additionally, nutritional status and hormone levels relevant for fertility may be influenced by genetic variation, which in turn provides an opportunity to address fertility issues by using nutrigenetics and nutrigenomics.

Some sections below are likely to be relevant for both men and women's fertility, while other sections are more sex-specific, as indicated in the text and our separate **Fertility Support Document** available from your Practitioner on request. For the purpose of general health and wellness beyond fertility, all sections (except hormone metabolism) are relevant for both men and women. The relevance of each section beyond fertility is also detailed in the introductory text.

### FOLATE AND HOMOCYSTEINE ♀♂

Folate, often supplemented in its folic acid form, is a B-group vitamin important for many body functions, including reproductive health. This molecule is necessary for a healthy pregnancy and to prevent birth defects known as neural tube defects. During pregnancy, there is an increased maternal requirement of folate which is why this is a period of increased risk of folate deficiency.

Intake of folate and its plasma levels are inversely associated with plasma homocysteine levels. During the methylation process, folic acid promotes the remethylation of homocysteine and improves the metabolic homocysteine clearance. Homocysteine levels fluctuate during pregnancy, and are usually much lower than those in non-pregnant women. Disturbance of homocysteine metabolism during pregnancy producing high homocysteine levels has been associated with an increased risk of fetal neural tube defects, pre-eclampsia, abruption, and recurrent pregnancy loss. This disturbance has also been associated with male infertility.

| Gene (variant)      | Description of the encoded molecule                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Your Result |                                                                                       |                                                                                       |  |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|
| MTHFR-1 (rs1801133) | Converts folic acid to the active form of folate, 5-methyltetrahydrofolate. Orange dot and particularly red dot indicate increased risk of low folic acid and high homocysteine levels due to decreased enzyme activity. Genetic variation in MTHFR-1 has also been associated with an increased risk of recurrent pregnancy loss in women and infertility (azoospermia) in men. MTHFR-1 leads to a higher decrease in enzyme activity than MTHFR-2. The combination of MTHFR-1 and MTHFR-2 genotypes have a stronger impact than either alone. | CC          |  |                                                                                       |  |
| MTHFR-2 (rs1801131) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CA          |                                                                                       |  |  |

→ **General Interventions:** If you have any of these orange or red variations, consider taking folate, active folate or folic acid supplementation according to your practitioner's discretion. Please note that this has been shown to be beneficial to achieve a healthy pregnancy in carriers of MTHFR variations but also non-carriers.

Other genes in the Health and Wellbeing report have results relevant to folate and homocysteine due to their involvement in the methylation pathway, including **MTR, MTRR, BHMT, SHMT1, and CBS (Methylation)**.

## CHOLINE ♀

Choline is a vitamin-like essential nutrient and a methyl donor involved in many physiological processes. Like folate, this nutrient promotes the remethylation of homocysteine.

During pregnancy, choline requirements are particularly high because it assists with healthy fetal development, and improves several pregnancy-related outcomes, particularly placental abruption and neuro-development.

In addition to fertility, choline is also especially important for **cardiovascular and brain health**.

| Gene (variant)     | Description of the encoded molecule                                                                                                                                                                                                                                                         | Your Result |                                                                                     |  |                                                                                     |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|
| PEMT (rs7946)      | Choline-metabolising enzyme that modulates the levels of homocysteine. Orange dot and particularly red dot indicate increased risk of altered choline metabolism due to decreased enzyme activity. Genetic variation in PEMT has also been associated with increased risk of preterm birth. | TT          |                                                                                     |  |  |
| MTHFD1 (rs2236225) | Involved in folate metabolism and choline requirements. Orange dot and particularly red dot indicate higher choline requirements and increased risk of folate deficiency-associated conditions.                                                                                             | GG          |  |  |                                                                                     |

→ **General Interventions:** If you have any of these orange or red variations, consider increasing your choline intake (for example, with diet or supplementation) following advice from your healthcare professional, exercising care to stay within recommended or prescribed ranges.

## VITAMIN B6 ♀♂

Vitamin B6 is an essential nutrient naturally found in many foods as well as added to foods and supplements. This vitamin has been related to fertility mostly based on its ability to make the uterus more receptive to the factors of pregnancy and regulating the production of reproductive hormones in men and women.

In addition to fertility, vitamin B6 is also especially important for the **immune response, central nervous system and brain health**.

| Gene (variant)     | Description of the encoded molecule                                                                                                                                                                                                                                                                                                                                                                                                                                                | Your Result |                                                                                       |                                                                                       |  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--|
| NBPF3 (rs4654748)  | This gene is a member of the neuroblastoma breakpoint family, and it is located near the ALPL gene. It is believed that its association with vitamin B6 is mediated by ALP, which is the major enzyme involved in the clearance of vitamin B6. Orange dot and particularly red dot indicate higher risk of reduced vitamin B6 levels due to increased clearance of vitamin B6 from the body.                                                                                       | TC          |                                                                                       |  |  |
| ALPL-1 (rs1256335) | This gene encodes an enzyme called tissue-nonspecific alkaline phosphatase, which is important in the growth and development of bones and teeth. Release of vitamin B6 from the cells depends on vitamin B6-specific phosphatase. Genetic variants in ALPL have been shown to be strong markers of vitamin B6 levels in multiple studies. Orange dot and particularly red dot indicate higher risk of reduced vitamin B6 which might be due to ineffective release from the cells. | TC          |                                                                                       |  |  |
| ALPL-2 (rs1697421) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | GG          |  |                                                                                       |  |

→ **General Interventions:** If you have several of these orange or red variations, consider increasing your vitamin B6 intake (for example, diet or supplementation) following advice from your healthcare professional, exercising care to stay within recommended or prescribed ranges.

## VITAMIN A ♀♂

Vitamin A (retinol) is fat-soluble and naturally present in many foods. This vitamin is essential for producing male and female hormones necessary for fertility. It is particularly important for gamete development, progesterone production and menstrual cycle regularity. Maintaining recommended levels of vitamin A is important for the fetal immune system, and also for maternal immunity and tissue repair. However, it should be emphasised that excessive doses can have negative general health outcomes, including organ, bones, skin and central nervous system damage, as well as negative pregnancy outcomes which may include fetal abnormalities and liver toxicity.

In addition to fertility, vitamin A is also especially important for a **healthy thyroid function, immune response, normal vision, and growth and development.**

| Gene (variant)    | Description of the encoded molecule                                                                                                                                                                                                                                                                                             | Your Result |                                                                                     |  |  |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|--|--|
| BCMO1 (rs7501331) | Enzyme beta-carotene monooxygenase, main enzyme involved in vitamin A metabolism, converting beta-carotene into retinal and biologically active retinoic acids. Orange dot and particularly red dot indicate increased risk of altered vitamin A metabolism due to reduced conversion ability, leading to low vitamin A levels. | CC          |  |  |  |

→ **General Interventions:** If you have this orange or red variation, consider increasing your vitamin A intake (for example, diet or supplementation) following advice from your healthcare professional, exercising significant care to stay within recommended or prescribed ranges.

## ZINC ♀♂

Zinc is an important component for regulating female germ cell growth, fertility, and pregnancy. During ovarian follicle development, zinc is critical for oocyte maturation as it regulates the initial stage of meiosis until the germ cell is ready to proceed with maturation. It also improves overall male fertility.

In addition to fertility, zinc is also especially important for the **immune response, skin health, and wound healing.**

| Gene (variant)       | Description of the encoded molecule                                                                                                                                                                   | Your Result |                                                                                       |                                                                                       |                                                                                       |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| SLC39A14 (rs4872479) | Zinc importing protein with a role in glucose homeostasis. Orange dot and particularly red dot indicate increased risk of low zinc levels.                                                            | GG          |                                                                                       |                                                                                       |  |
| CA-1 (rs1532423)     | Carbonic anhydrases are zinc-containing enzymes that account for nearly all the zinc in erythrocytes. Orange dot and particularly red dot indicate increased risk of low zinc levels.                 | CT          |                                                                                       |  |                                                                                       |
| PPCDC (rs2120019)    | Part of the coenzyme A synthesis pathway. Reported to affect zinc status through its effect on vitamin B5 metabolism. Orange dot and particularly red dot indicate increased risk of low zinc levels. | TT          |  |                                                                                       |                                                                                       |
| NBDY (rs4826508)     | Human microprotein that interacts with the mRNA decapping complex. Orange dot and particularly red dot indicate increased risk of low zinc levels.                                                    | TC          |                                                                                       |  |                                                                                       |

→ **General Interventions:** If you have several of these orange or red variations, consider increasing your zinc intake (for example, diet or supplementation) following advice from your healthcare professional, exercising care to stay within recommended or prescribed ranges.



## VITAMIN C ♀♂

Vitamin C is a water-soluble with strong antioxidant properties vitamin naturally present in some foods. Vitamin C improves overall reproductive hormone homeostasis beneficial for fertility, and has been reported to have a positive effect in healthy ovarian function (including ovulation and egg quality), as well as increasing sperm count, motility, and morphology.

In addition to fertility, vitamin C is also especially important for the **immune response, skin health, heavy metal clearance, iron absorption, stress support, brain health, and antioxidant status.**

| Gene (variant)       | Description of the encoded molecule                                                                                                                          | Your Result |                                                                                     |  |                                                                                     |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|
| SLC23A1 (rs33972313) | Key transporters involved in the absorption of vitamin C into the body. Orange dot and particularly red dot indicate increased risk of low vitamin C levels. | CC          |  |  |                                                                                     |
| SLC23A2 (rs6053005)  | Key transporters involved in the absorption of vitamin C into the body. Orange dot and particularly red dot indicate increased risk of low vitamin C levels. | CC          |                                                                                     |  |  |

→ **General Interventions:** If you have any of these orange or red variations, consider increasing your vitamin C intake (for example, diet or supplementation) following advice from your healthcare professional, exercising care to stay within recommended or prescribed ranges.

## OTHER NUTRIENTS: VITAMIN D, VITAMIN B12, OMEGA-3, COENZYME Q10 ♀♂

There are other genes in the Health & Wellbeing report whose results are relevant to preconception and reproductive health, particularly affecting metabolism of vitamin D, vitamin B12, omega-3, and coenzyme Q10/oxidative stress, as explained below:

| Gene (variant)   | Description of the encoded molecule                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Your Result |                                                                                       |                                                                                       |                                                                                       |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| VDR (rs1544410)  | It is well-known that vitamin D has benefits for many areas of human health, including fertility and healthier pregnancy. Some studies have shown a link between vitamin D deficiency and infertility in both men and women. Orange dot and particularly red dot indicate risk of low vitamin D levels, and therefore other associated health issues.                                                                                                                                                                                                           | GG          |                                                                                       |                                                                                       |  |
| VDR-2 (rs731236) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | TT          |                                                                                       |                                                                                       |  |
| TCN2 (rs1801198) | Involved in vitamin B12 metabolism. Some studies have shown a link between low vitamin B12 levels and infertility, and that B12 can help enhance fertility in both men and women. Orange dot and particularly red dot indicate risk of poor intestinal absorption of B12, and therefore other associated health issues.                                                                                                                                                                                                                                         | CC          |  |                                                                                       |                                                                                       |
| FUT2 (rs602662)  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | AA          |  |                                                                                       |                                                                                       |
| FADS1 (rs174537) | Essential gene in lipid metabolism, in which variation affects the levels of physiologically critical long chain polyunsaturated fatty acid-containing lipids. Omega-3 polyunsaturated fatty acids are essential fatty acids, and research has shown a role in improving sperm quality, oocyte maturation, and the chances of natural conception. Orange dot and particularly red dot indicate risk of low omega-3 levels.                                                                                                                                      | TG          |                                                                                       |  |                                                                                       |
| NQO1 (rs1800566) | Coenzyme Q10 (CoQ10) can boost the function of the mitochondria and has been shown to improve egg quality and so fertility. NQO1 has a key role in detoxification by converting CoQ10 to its active form. On the other hand, oxidative stress is a demonstrated causative factor for female and male infertility, hence inclusion of MnSOD, GPX1 and CAT, whose activity also correlates with CoQ10 levels. Orange dot and particularly red dot indicate decreased enzyme activity and altered CoQ10 metabolism and well as increased risk of oxidative stress. | CT          |                                                                                       |  |                                                                                       |
| MnSOD (rs4880)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | TC          |                                                                                       |  |                                                                                       |
| GPX1 (rs1050450) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | TT          |                                                                                       |                                                                                       |  |
| CAT (rs1001179)  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | GA          |                                                                                       |  |                                                                                       |

→ **General Interventions:** If you have any of these orange or red variations, consider increasing your intake of the relevant nutrient (for example, diet or supplementation) following advice from your healthcare professional, exercising care to stay within recommended or prescribed ranges.

## ESTROGEN METABOLISM ♀

Estrogen is one of the major sex hormones in women, along with progesterone, produced mostly by the ovaries, and also adrenal glands and fat tissue. Estrogens are also present in men but generally at lower levels, and have a role in sexual function.

Maintaining adequate estrogen homeostasis is critical for a fertile menstrual cycle. During the menstrual cycle, estrogen levels rise during the follicular cycle, and drop during ovulation, then rise again during the luteal phase and drop after ovulation if there are no fertilised eggs. Adequate estrogen levels are especially important to create the necessary conditions for a possible pregnancy, preparing the uterus for implantation. Low levels can lead to an irregular menstrual cycle or prevent ovulation, while high levels can negatively impact endometrial receptivity. Estrogen levels usually drop during perimenopause. Research has found that the regulation of estrogen levels is a critical determinant that specifies the duration of the window of uterine receptivity for implantation, with excessively high levels closing this window earlier.

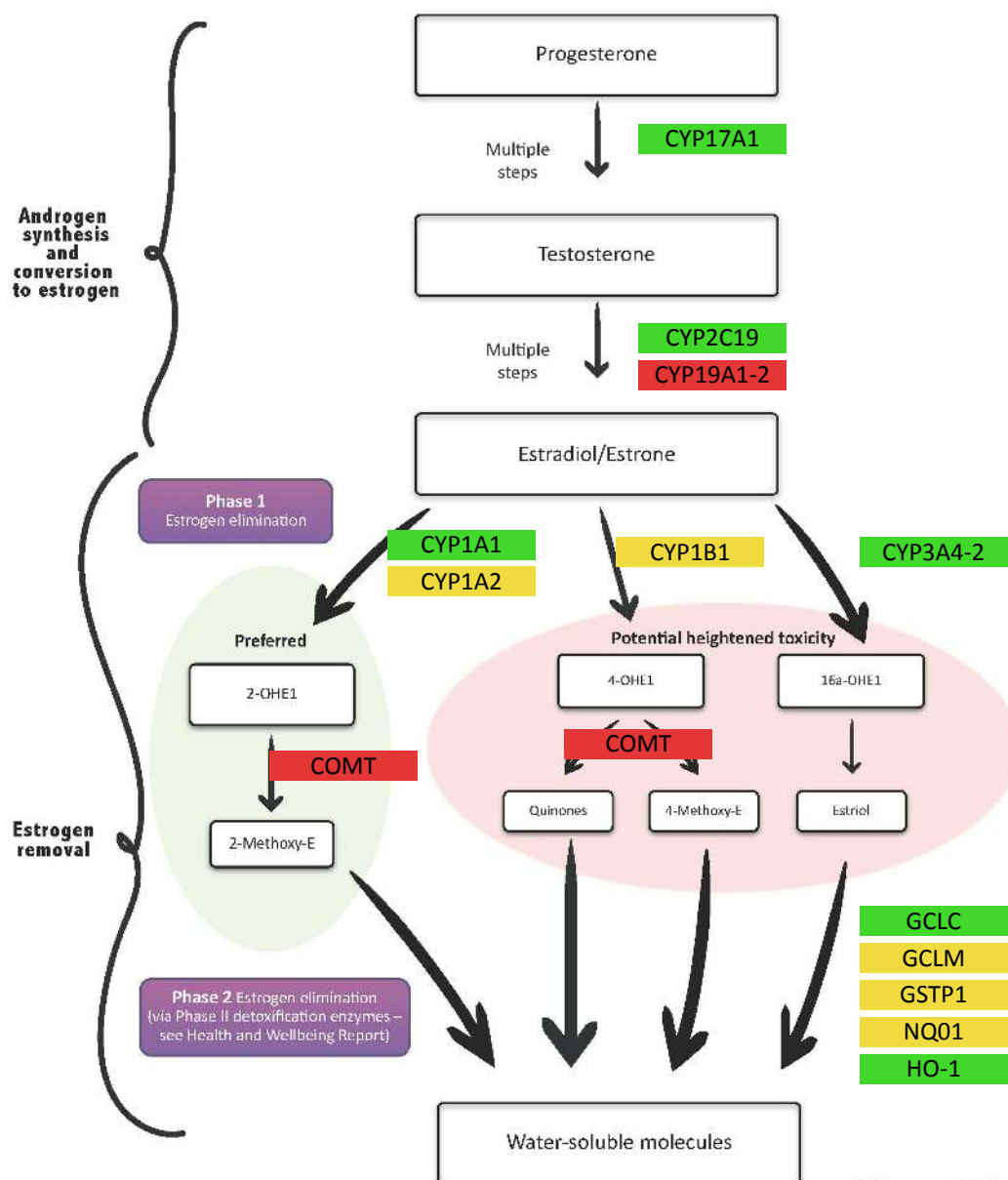
| Gene (variant)       | Description of the encoded molecule                                                                                                                                                                                                                                                                                                                                                                                                                        | Your Result |                                                                                       |                                                                                       |                                                                                       |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| CYP1A1 (rs1048943)   | This enzyme is one of the major phase I drug metabolism enzymes that catalyse the hydroxylation of estrogens. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to increased enzyme activity.                                                                                                                                                                                                                 | AA          |   |                                                                                       |                                                                                       |
| CYP1A2 (rs762551)    | This enzyme is responsible for the metabolism of 17β-estradiol after initial conversion to estrone, and is also the primary driver of caffeine metabolism. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to decreased enzyme inducibility. Genetic variation in CYP1A2 has also been associated with increased risk of low serum estradiol levels during the luteal phase of the menstrual cycle.         | CA          |                                                                                       |  |                                                                                       |
| CYP1B1 (rs1056836)   | This enzyme is one of the major phase I drug metabolism enzymes that catalyse the hydroxylation of estrogens. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to increased enzyme activity.                                                                                                                                                                                                                 | GC          |                                                                                       |  |                                                                                       |
| CYP3A4-2 (rs2740574) | Hepatic cytochrome enzyme involved in the metabolism of estradiol and metabolism of many medications. It assists with estradiol breakdown and clearance from the body. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to increased enzyme activity.                                                                                                                                                        | AA          |  |                                                                                       |                                                                                       |
| CYP2C19 (rs4244285)  | This enzyme participates in the estrogen conversion process to estradiol. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to decreased enzyme activity. Genetic variation in CYP2C19 has also been associated with increased risk of endometriosis.                                                                                                                                                         | GG          |  |                                                                                       |                                                                                       |
| CYP17A1 (rs743572)   | This gene is involved in the formation of steroid hormones including estrogen. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to increased enzyme activity. Genetic variation in CYP17A1 has also been associated with increased risk of polycystic ovarian syndrome.                                                                                                                                      | AA          |  |                                                                                       |                                                                                       |
| CYP19A1-2 (rs10046)  | Aromatase is an enzyme encoded by the CYP19A1 gene responsible for conversion of androgens to estrogens. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to decreased enzyme activity. Genetic variation in CYP19A1 has also been associated with increased risk of miscarriage.                                                                                                                            | CC          |                                                                                       |                                                                                       |  |
| COMT (rs4680)        | This enzyme catalyses the transfer of a methyl group from the S-adenosyl-L-methionine to the m-hydroxy group of catechol compounds, making the catechol estrogens more water soluble. Orange dot and particularly red dot indicate increased risk of altered estrogen metabolism due to decreased enzyme activity. Genetic variation in COMT has also been associated with risk of excessively high estrogen levels and risk of premature ovarian failure. | AA          |                                                                                       |                                                                                       |  |

→ **General Interventions:** If you have several of these orange or red variations, consider strategies to optimise your estrogen metabolism (for example, diet rich in elements such as cruciferous vegetables, omega-3 fatty acids, and B-vitamins, as well as supplements, exercise, managing stress) following advice from your healthcare professional.

## ESTROGEN METABOLISM ♀ – PATHWAY DIAGRAM

Below you can find a simplified overview of the estrogen metabolism pathway, divided into two main sections: Androgen Synthesis and Conversion to Estrogen, and Estrogen Removal. The diagram illustrates the key genes involved in these processes, with each gene highlighted in different colors according to your results. This visual representation helps to understand the pathway and the genetic variations affecting estrogen metabolism.

### Estrogen Metabolism: Simplified Pathway



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## PROGESTERONE METABOLISM ♀

Progesterone is one of the major sex hormones involved in the menstrual cycle, pregnancy, and embryogenesis, produced by the ovaries. It is usually known as the “hormone of pregnancy” due to its function in maintaining pregnancy. The main role of progesterone is to prepare the endometrium for implantation. If conception does not occur, progesterone levels decrease and the endometrium sheds leading to menstruation. If conception does occur, progesterone increases to support pregnancy, and has a function in decreasing the maternal immune response to suppress responses to fetal antigens and prevent over inflammatory responses. Progesterone production also decreases as women enter menopause. In men, progesterone is produced in the adrenal glands and testes to produce testosterone.

| Gene (variant)    | Description of the encoded molecule                                                                                                                                                                                                                                                                                                                                      | Your Result |                                                                                     |                                                                                     |  |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
| PGR-2 (rs1042838) | Progesterone receptor (PGR). This protein is a member of the steroid receptor superfamily and mediates the physiologic effects of progesterone. Orange dot and particularly red dot indicate increased risk of altered progesterone metabolism due to increased enzyme activity. Genetic variation in PGR has also been associated with increased risk of preterm birth. | GG          |  |                                                                                     |  |
| PGR-3 (rs471767)  |                                                                                                                                                                                                                                                                                                                                                                          | AG          |                                                                                     |  |  |

→ **General Interventions:** If you have any of these orange or red variations, consider strategies to optimise your progesterone metabolism (for example, diet rich in elements such as fibre, healthy fats, zinc, magnesium, L-arginine, and vitamins B6 and C, as well as supplements, exercise, managing stress) following advice from your healthcare professional.

## TESTOSTERONE METABOLISM ♂

Testosterone is the primary male sex hormone. Low testosterone can decrease male fertility. Appropriate levels of testosterone and functioning of the testosterone/androgen receptor signalling pathway are necessary for maintaining spermatogenesis. Otherwise, spermatogenesis does not proceed beyond the meiosis stage. Risk factors for low testosterone include aging, obesity and diabetes, and excessive alcohol consumption. Note that the use of exogenous testosterone can also further lower sperm count. While testosterone is also helpful to grow, maintain and repair female reproductive tissues, the effects on fertility of the genetic variants included in this section have been analysed in gene-association studies using male participants only, therefore their effect on female fertility is unclear.

| Gene (variant)     | Description of the encoded molecule                                                                                                                                                                                                                                                      | Your Result |                                                                                       |                                                                                       |                                                                                       |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| SHBG (rs6258)      | Sex hormone-binding globulin (SHBG). This protein transports androgens and estrogens in blood regulating their access to target tissues. Orange dot and particularly red dot indicate increased risk of low testosterone levels due to decreased SHBG binding affinity for testosterone. | CC          |  |                                                                                       |                                                                                       |
| FAM9B (rs5934505)  | Novel meiosis-related protein localised in the spermatocytes in meiosis I. Orange dot and particularly red dot indicate increased risk of low testosterone levels.                                                                                                                       | CT          |                                                                                       |  |                                                                                       |
| LIN28B (rs7759938) | This gene is highly expressed in testis and regulates transcription. Orange dot and particularly red dot indicate increased risk of low testosterone levels.                                                                                                                             | CC          |                                                                                       |                                                                                       |  |

→ **General Interventions:** If you have several of these orange or red variations, consider strategies to optimise your testosterone metabolism (for example, diet rich in elements such as protein, omega-3 fatty acids, D-aspartic acid, L-arginine, and vitamins D and E, as well as supplements, exercise, managing stress) following advice from your healthcare professional.

## OTHER KEY REPRODDUCTIVE HORMONES

In addition to the key sex hormones mentioned before, there are other reproductive hormones with significant functions for sexual development and reproduction, as detailed below for the Description of each gene.

| Gene (variant)     | Description of the encoded molecule                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Your Result |                                                                                       |  |                                                                                     |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|--|-------------------------------------------------------------------------------------|
| FSHB (rs10835638)  | Follicle-stimulating hormone beta-subunit (FSHB). This hormone essential for regulation of granulosa cells and ovarian follicular growth as well as initiation of spermatogenesis. Orange dot and particularly red dot indicate increased risk of low FSH levels due to decreased gene transcriptional activity, an indicator of reduced reproductive capacity in both men and women.                                                                                                                        | TT          |                                                                                       |  |  |
| FSHR (rs6166)      | Follicle-stimulating hormone receptor (FSHR). This receptor is necessary for the functioning of FSH. FSHR is expressed in granulosa cells and regulates the maturation of ovarian Graafian follicles, granulosa cell proliferation and estrogen production, as well as normal spermatogenesis. Orange dot and particularly red dot indicate increased risk of relative resistance to FSH and lower FSH sensitivity. These variations have been reported as a biomarker of infertility in both men and women. | AA          |    |  |                                                                                     |
| LHCGR (rs13405728) | Luteinizing hormone/chorionic gonadotropin receptor (LHCGR). Luteinizing hormone is important for ovulation, while chorionic gonadotropin is also produced during pregnancy to help maintain conditions necessary for the pregnancy to continue. Orange dot and particularly red dot indicate increased risk of slow ovarian response. Genetic variation in LHCGR has also been associated with increased risk of polycystic ovarian syndrome.                                                               | AA          |  |  |                                                                                     |

→ **General Interventions:** If you have any of these orange or red variations, and fertility concerns, consider discussing with your healthcare professional about further testing and/or strategies to manage your reproductive health.



## THYROID FUNCTION ♀♂

The thyroid is a gland that secretes thyroid hormones with a major role in regulating the body's metabolic rate, growth and development. Thyroid hormones affect the maintenance of a normal menstrual function. Hypothyroidism is one the main types of thyroid disease, characterized by a failure to secrete enough thyroid hormones, which interferes with ovulation. Hypothyroidism is also associated with reduced sperm morphology. Further, other autoimmune or pituitary disorders associated with hypothyroidism can impair fertility.

In addition to fertility, decreased thyroid function can also impact **elimination of cholesterol and cardiovascular health**.

| Gene (variant)     | Description of the encoded molecule                                                                                                                                                                                                                                                  | Your Result |  |                                                                                     |  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--|-------------------------------------------------------------------------------------|--|
| FOXE1-1 (rs965513) | FOXE1 gene is a specific thyroid transcription factor which is expressed during embryologic development and plays an important role in morphogenesis of the thyroid gland. Green dot indicates an increased protective effect on hypothyroidism in comparison to orange and red dot. | AG          |  |  |  |
| FOXE1-2 (rs925489) |                                                                                                                                                                                                                                                                                      | CT          |  |  |  |

→ **General Interventions:** If you have any of these orange or red variations, consider strategies to optimise your thyroid function (for example, diet rich in elements such as iodine, vitamin D, iron, and cruciferous vegetables, as well as supplements, exercise, managing stress) following advice from your healthcare professional.

## MELATONIN SIGNALLING ♀♂

Melatonin is a hormone produced by the brain in response to darkness which helps regulate night and day cycles or sleep–wake cycles. This hormone also plays an important role in oocyte maturation, fertilization, regular ovulation, and embryonic development, as well as sperm maturation and function. It can also decrease insulin secretion lowering insulin levels in the context of diabetes.

In addition to fertility, melatonin is also especially important for **sleep health, energy metabolism, and your immune response**.

| Gene (variant)      | Description of the encoded molecule                                                                                                                                                                                                                                                                    | Your Result |                                                                                       |  |  |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------|--|--|
| MTNR1B (rs10830963) | Melatonin receptor 1B (MTNR1B). This gene encodes one of the two high-affinity receptors for melatonin. Orange dot and particularly red dot indicate increased risk of altered melatonin signalling. Genetic variation in MTNR1B has also been associated with increased risk of gestational diabetes. | CC          |  |  |  |

→ **General Interventions:** If you have this orange or red variation, consider strategies to balance your melatonin levels (for example, diet, sleep, sunlight, exercise, managing stress) following advice from your healthcare professional. Please speak to your healthcare professional before considering taking any melatonin supplements.

## Your Personal Genetic Profile Summary

**GENETIC PROFILE ID: 0-000-000-0**

This report has been designed to identify any of your variants in key genes that may influence your preconception and reproductive health. We encourage you to speak to your health practitioner if you have any concern about a particular category.

### Beneficial

One or both of the alleles in the gene pair contribute to the normal healthy functioning of the gene product.

### Less Beneficial

One of the alleles in the gene pair is contributing to a situation that impairs the healthy functioning of the gene product.

### Least Beneficial

Both of the alleles in the gene pair are contributing to a situation that impairs the healthy functioning of the gene product.

| #                       | Gene     | rsID       | Your Result |
|-------------------------|----------|------------|-------------|
| Folate and Homocysteine |          |            |             |
| 1                       | MTHFR-1  | rs1801133  | CC          |
| 2                       | MTHFR-2  | rs1801131  | CA          |
| Choline                 |          |            |             |
| 3                       | PEMT     | rs7946     | TT          |
| 4                       | MTHFD1   | rs2236225  | GG          |
| Vitamin B6              |          |            |             |
| 5                       | NBPF3    | rs4654748  | TC          |
| 6                       | ALPL-1   | rs1256335  | TC          |
| 7                       | ALPL-2   | rs1697421  | GG          |
| Vitamin A               |          |            |             |
| 8                       | BCMO1    | rs7501331  | CC          |
| Zinc                    |          |            |             |
| 9                       | SLC39A14 | rs4872479  | GG          |
| 10                      | CA-1     | rs1532423  | CT          |
| 11                      | PPCDC    | rs2120019  | TT          |
| 12                      | NBDY     | rs4826508  | TC          |
| Vitamin C               |          |            |             |
| 13                      | SLC23A1  | rs33972313 | CC          |
| 14                      | SLC23A2  | rs6053005  | CC          |
| Other Nutrients         |          |            |             |
| 15                      | VDR      | rs1544410  | GG          |
| 16                      | VDR-2    | rs731236   | TT          |
| 17                      | TCN2     | rs1801198  | CC          |
| 18                      | FUT2     | rs602662   | AA          |
| 19                      | FADS1    | rs174537   | TG          |
| 20                      | NQO1     | rs1800566  | CT          |
| 21                      | MnSOD    | rs4880     | TC          |
| 22                      | GPX1     | rs1050450  | TT          |
| 23                      | CAT      | rs1001179  | GA          |

| #                       | Gene      | rsID       | Your Result |
|-------------------------|-----------|------------|-------------|
| Estrogen Metabolism     |           |            |             |
| 24                      | CYP1A1    | rs1048943  | AA          |
| 25                      | CYP1A2    | rs762551   | CA          |
| 26                      | CYP1B1    | rs1056836  | GC          |
| 27                      | CYP3A4-2  | rs2740574  | AA          |
| 28                      | CYP2C19   | rs4244285  | GG          |
| 29                      | CYP17A1   | rs743572   | AA          |
| 30                      | CYP19A1-2 | rs10046    | CC          |
| 31                      | COMT      | rs4680     | AA          |
| Progesterone Metabolism |           |            |             |
| 32                      | PGR-2     | rs1042838  | GG          |
| 33                      | PGR-3     | rs471767   | AG          |
| Testosterone Metabolism |           |            |             |
| 34                      | SHBG      | rs6258     | CC          |
| 35                      | FAM9B     | rs5934505  | CT          |
| 36                      | LIN28B    | rs7759938  | CC          |
| Other Key Hormones      |           |            |             |
| 37                      | FSHB      | rs10835638 | TT          |
| 38                      | FSHR      | rs6166     | AA          |
| 39                      | LHCGR     | rs13405728 | AA          |
| Thyroid Function        |           |            |             |
| 40                      | FOXO1-1   | rs965513   | AG          |
| 41                      | FOXO1-2   | rs925489   | CT          |
| Melatonin Signalling    |           |            |             |
| 42                      | MTNR1B    | rs10830963 | CC          |

ALL GENE-SPECIFIC REFERENCES CAN BE FOUND IN PRACWARE

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