



Comprehensive Reproductive
Immunology Assessment

IRMA Report

Report ID
WUM110985F-IRMA



Version 3.7
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TABLE OF CONTENTS

Medical History	3
Report Summary	4
Parental Test Results	
Parental Histocompatibility	6
Parental Chromosome Analysis	9
Patient Test Results	
Thrombophilia	10
Blood Count	13
Inflammation	14
Autoimmunity	17
Autoimmunity Predisposition	20
Thyroid Function	21
Metabolism	22
Nutrition	23
IRMA Prediction	26

IMPORTANT INFORMATION ABOUT THE IRMA REPORT

Pregmune Medical PA ("Pregmune Medical") is pleased to deliver this IRMA report to the patient and their ordering physician consistent with the terms and conditions within the Consent and Agreement previously executed by the patient, which can be found within the Patient Portal. The information presented in this report is complex and should be reviewed by the patient in conjunction with their physician. In connection with this report the patient acknowledges receipt of Pregmune Medical's Notice of Privacy Practices (located in the Patient Portal) which describes how information about the patient is used and disclosed by Pregmune Medical and consulting medical providers who are supported by business associates under contract to deliver services on their behalf consistent with HIPAA and the terms and conditions within the Consent and Agreement.

IMPORTANT INFORMATION ABOUT THE IRMA REPORT

Pregmune strives to promote social change and contribute to achieving gender equality. Because our reports are designed to be used by anyone seeking parenthood, we use the gender-neutral pronouns "they/them" and other language throughout the report to represent the diversity of people who we hope will benefit from this report.

Patient

Name _____ MELODY WU
 Patient ID _____ 1005526
 DOB _____ 1985-11-09
 Age _____ 38
 Height (in) _____ 64
 Weight (lbs) _____ 125
 BMI _____ 21.45
 Address _____ 1243 Rembrandt Drive
 City _____ Sunnyvale
 State _____ CA
 Zip _____ 94087
 Email _____ melodylikesblue@gmail.com
 Phone _____ 4255030017

Partner/sperm donor

Name _____ GEOFFREY BOWER
 Patient ID _____ 1005528
 DOB _____ 1983-08-10
 Age _____ 40
 Height (in) _____ 73
 Weight (lbs) _____ 165
 BMI _____ 21.77
 Address _____ 1243 Rembrandt Dr
 City _____ Sunnyvale
 State _____ CA
 Zip _____ 94087
 Email _____ gbower@gmail.com
 Phone _____ 8475293616

Patient Fertility and Medical History Summary

Type of infertility _____ Primary (never had a full pregnancy)
 Duration of infertility (months) _____ 42
 Number of pregnancies _____ 0
 RPL _____ NO
 Stillbirths _____ 0
 Live births _____ 0
 Miscarriages _____ 0
 Terminations for medical reasons _____ 0
 Terminations for personal reasons _____ 0
 Failed IVF transfers _____ 0
 Any medical/autoimmune conditions? _____ Bladder Pain, Dyspareunia, Dysmenorrhea, Pelvic Pain, Abdominal pain or digestive problems, Asthma, Endometriosis
 Any family medical/autoimmune conditions? _____ Abdominal pain or digestive problems (brother), High blood pressure, Joint pain or swelling, Abdominal pain or digestive problems (father)
 Is patient on fish oil or any medication? _____ Cabergoline (0.25 mg twice a week), Celecoxib (200 mg 2x/day), Percocet (5-325 mg every 4-6 hrs post surgery), Promethazine (12.5 mg as needed for chronic vertigo issues (not super often maybe a few times a year, but then up to a week at a time)), Tylenol (1000 mg 2x/day), EPA/DHA (2000 mg), Vitamin D (4000 IU), Coenzyme Q10 (200 mg), Folic Acid (1667 mg), Melatonin (3 mg)
 Known allergies to medications _____ Vicodin (dizziness/nausea), morphine (dizziness/nausea), surgical glue (blister/rash)
 Partner/sperm donor medical conditions? _____ None
 Embryos currently stored? _____ YES
 Number of embryos (if yes) _____ 2
 Number of genetically tested embryos _____ 2
 Number of genetically normal embryos _____ 1

→ CLICK THE SECTIONS TO NAVIGATE THE REPORT

	LOW RISK/ NORMAL	MEDIUM RISK/ BORDERLINE	HIGH RISK/ ABNORMAL
Parental Histocompatibility			
Fetal HLA-C and Maternal KIR Interaction			
HLA Mismatches			
HY Immunity			
HLA Antibodies			
Parental Chromosome Analysis			
Maternal Chromosomes			
Paternal Chromosomes			
Thrombophilia			
Prothrombin Factor II Alleles			
Leiden Factor V Alleles			
Plasminogen Activator Inhibitor Type I Alleles			
Homocysteine			
Blood Clotting Measurements			
Blood Count			
Cell Blood Count (CBC)			
Inflammation			
Total Immunoglobulin			
Complement Activity			
Th1/Th2 Helper T Cell Ratio			
Natural Killer Cell Cytotoxic Activity (NKA)			
Regulatory T Cells			
Autoimmunity			
Antinuclear Antibodies (ANAs)			
Antiphospholipid Antibodies (APAs)			
CCP Antibodies and Rheumatoid Factor			
Autoimmunity Predisposition			
HLA Autoimmune Disease Predisposition			N/A
Thyroid Function			
Thyroid Function			
Metabolism			
Insulin Resistance and PCOS Assessment			
Nutrition			
Vitamin D			
Folic Acid			
Fatty Acid Profile			
Leptin Levels			

Treatment Options

Every proposed line of therapy addresses a specific issue and all treatment options may have to be taken into consideration for full benefit.

Immunological/Fertility Treatment

ACOG/ESHRE standard recommendations

No recommendations

Other recommendations (Based on published clinical

The patient's uterine natural killer cells have a receptor (KIR AA) that may be less compatible with a significant proportion of their potential embryos; the patient may benefit from using G-CSF (Neupogen) to promote immune tolerance.

Hormonal/Metabolic Treatment

Hormonal

No recommendations

Nutritional Recommendations

Nutritional

The patient's fatty acid profile is low risk but they may still benefit from EPA/DHA (fish oil) supplementation. We recommend taking 3g per day as a maintenance dose.

Because the patient has a history of failed cycles, the patient may benefit from using antioxidant therapy (resveratrol, pycnogenol, and coenzyme Q10) to improve egg quality if they will pursue a natural pregnancy or plan on future egg retrievals.

Further Evaluation

Further

No recommendations

Additional Doctor Comments

No additional recommendations

DISCLAIMER

Immune therapy recommendations are based on guidelines published by The American Society of Reproductive Medicine (ASRM), The American College of Obstetricians and Gynecologists (ACOG), The European Society of Human Reproduction and Embryology (ESHRE) as well as peer-reviewed published articles including Cochrane studies. Please note that the list of our recommendations is not exhaustive and allows the practitioner to have some flexibility to select the adequate immune therapies. Please note that therapeutic guidelines of individual societies are not always in agreement. Therapeutic recommendations are intended to be part of physician-to-physician communication between the reviewing physician and the ordering physician. Some medications that are recommended fall within "off label" uses of an FDA-approved drug that are permitted at the direction of a physician. Please note that implementation of a therapeutic plan by a treating physician is the result of a complete evaluation of all the factors affecting a patient's condition including but not limited to those presented in the IRMA report.

Parental Histocompatibility

This section of the report examines the impact of human leukocyte antigens (HLAs) on pregnancy. HLAs are diverse proteins displayed on human cells like a barcode - unique for everyone. The immune system uses HLAs to differentiate “self” from “non-self.” This

section includes paternal test results because half of a developing embryo's HLAs come from their father. These compatibility tests are designed to determine how the patient's immune system will interact with the developing embryo and affect pregnancy.

Fetal HLA-C and Maternal KIR Interaction

RISK

Higher Risk

Maternal KIR

KIR A / KIR A

+

Maternal HLA-C

C1/C2

Paternal HLA-C

C2/C2

Fetal HLA-C

50% C1/C2

50% C2/C2

LEGEND

KIR A / KIR A

Poor C2 Compatibility

KIR A / KIR B -2DS1

Weak C2 Compatibility

KIR A / KIR B +2DS1

Good C2 Compatibility

KIR B / KIR B

Good C2 Compatibility

LEGEND

Higher C2

Fetal C2 > Maternal C2

Equal C2

Fetal C2 = Maternal C2

Lower C2

Fetal C2 < Maternal C2

WHY WE TEST THIS

A developing embryo's unique HLAs are recognized by the mother's uterine natural killer cells using receptors called killer immunoglobulin-like receptors (KIRs). Some maternal KIRs respond better than others to embryos displaying HLA-C2, which influences how much oxygen and nutrition is sent through the placenta (through spiral artery remodeling). Additionally, if the embryo has more (or in some cases the same number of) HLA-C2 alleles than the mother, this could also pose a risk. This test examines the patient's HLA-C2 content, the predicted embryo's HLA-C2 content, and whether the maternal KIRs are a good match for HLA-C2. [Learn more →](#)

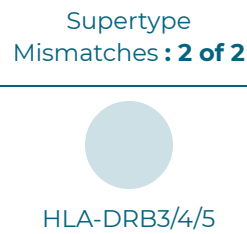
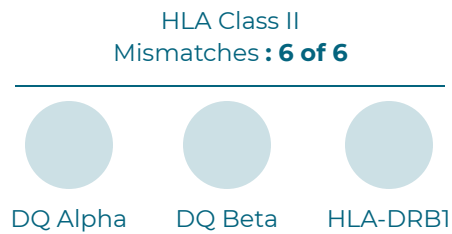
WHAT THESE RESULTS MEAN

There is a considerable compatibility concern between the patient's KIR genes and fetal HLA-C alleles. This could contribute to a weakened immune tolerance towards the embryo's HLAs and impaired spiral artery remodeling. The patient and their healthcare provider might want to explore the benefit of immune modulating treatments to help promote immune tolerance.

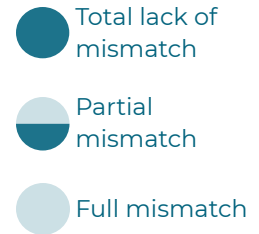
HLA Mismatches

RISK

Lower Risk



LEGEND



WHY WE TEST THIS

A mother's immune system needs to develop tolerance to the embryo to maintain a healthy pregnancy. Part of this process lies in recognizing that the embryo is genetically unique. However, if the embryo inherits paternal HLAs that are too similar to the maternal HLAs, the immune system might not develop a strong tolerance. This test determines if there are enough mismatches between the maternal and paternal HLA Class II alleles. [Learn more →](#)

WHAT THESE RESULTS MEAN

There are no concerns about a lack of HLA class II allele mismatching.

HY Immunity

RISK

Lower Risk

HY Restricting Alleles
0

Previous birth to a boy / XY baby
NO

WHY WE TEST THIS

Embryos with a Y chromosome have proteins called HY antigens (male specific minor histocompatibility antigen) on their cells. Occasionally, when a mother gives birth to a boy / baby with a Y chromosome, the mother's immune system can generate an immune response against these HY antigens and interfere with future pregnancies. The mother's HLAs are responsible for initiating this immune response, and some HLA alleles increase the likelihood of this happening. This test determines if the patient carries these higher-risk HY restricting alleles, which might put the patient at higher risk if they've previously given birth to a boy. (An allele is an alternate version of a gene at a specific location of the chromosome.)

[Learn more →](#)

WHAT THESE RESULTS MEAN

There are no concerns that the patient's HLAs put them at increased risk for generating an immune response against HY antigens as the patient does not have a previous live birth with a boy.

HLA Antibodies

RISK

Medium Risk

Partner-Specific HLA-C Antibodies
NO

Previous Full-Term Pregnancy
NO

Previous Blood Transfusion(s)
No

Previous Lymphocyte Immunization Therapy
No

HLA Class I Antibodies

Antibodies detected: **8**
High concentration (>4K MFI): **4**
Partner-specific antibodies: **0**



No partner specific Class I antibodies found, including HLA-C

HLA Class II Antibodies

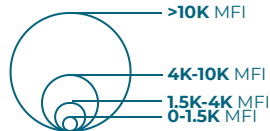
Antibodies detected: **0**
High concentration (>4K MFI): **0**
Partner-specific antibodies: **0**



No partner specific Class II antibodies found

LEGEND

Circle area: concentration



Circle color



Partner specific



Partner specific and HLA-C

WHY WE TEST THIS

Sometimes, a person's immune system can develop antibodies to HLAs. These antibodies can target HLAs from previous full-term pregnancies or blood transfusions, or they can specifically target a partner's HLAs - which the embryo will inherit. HLA antibodies are common and aren't necessarily a problem, but partner-specific HLA-C antibodies (a subtype of Class I antibodies) can pose a considerable risk and are associated with early miscarriages and secondary infertility. This test measures how much and what type of HLA antibodies a patient carries, if any. [Learn more →](#)

WHAT THESE RESULTS MEAN

Significant levels of HLA antibodies were detected but none were partner-specific. Although this does not present a high risk, the patient and their healthcare provider might discuss immune modulating treatments to help decrease antibody levels.

Parental Chromosome Analysis

Although many chromosomal abnormalities are debilitating or fatal, sometimes the only indication of a parent's chromosomal abnormality is reproductive difficulty. Abnormalities can include deletions, duplications, and genetic rearrangements where sections of chromosomes have been shuffled around. This section of the report uses cytogenetic analysis to visually examine the patient's and their partner's/donor's chromosomes.

Parental Chromosome Analysis		MATERNAL STATUS Normal	PATERNAL STATUS Normal
MATERNAL CHROMOSOME ANALYSIS		PATERNAL CHROMOSOME ANALYSIS	
Total Chromosomes 46		Total Chromosomes 46	
Sex Chromosomes XX		Sex Chromosomes XY	
Findings Normal female karyotype		Findings Normal male karyotype	
WHY WE TEST THIS Despite being otherwise healthy, parents with chromosomal abnormalities might have trouble producing eggs or sperm with a full set of normal chromosomes. This test visually examines the parents' chromosomes for any major structural anomalies. Please note that the visual nature of this test only detects large chromosomal changes containing multiple genes; it is not a genetic analysis that will detect gene-specific mutations. Learn more →		WHAT THESE RESULTS MEAN No chromosomal abnormalities were observed.	

Thrombophilia

While pregnant, a person's risk for blood clots in their veins (venous thromboembolism) increases 5- to 6-fold. If they have hereditary thrombophilia, that risk can increase more than 30-fold. Additionally, thrombophilia increases the chance of blood clots in the placenta,

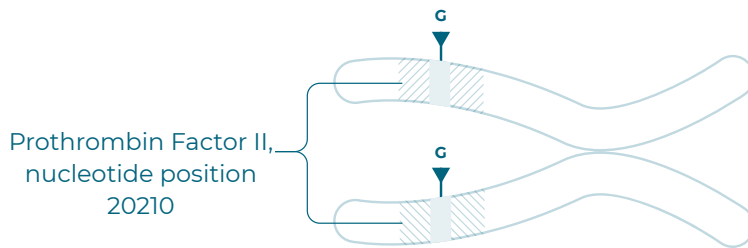
which increases the likelihood of pregnancy loss. These tests examine the patient's risk for thrombophilia to determine if anticoagulants could help improve chances for pregnancy success.

Prothrombin Factor II Alleles



RISK LEVEL

Lower Risk

High risk alleles: **0 out of 2**



LEGEND

-  A Allele - mutation
-  G Allele - no mutation

WHY WE TEST THIS

Prothrombin (blood coagulation factor II) has an important role in blood clot formation. The "A" allele of prothrombin increases a person's prothrombin levels, which then increases the risk of thrombophilia and pregnancy complications. This test determines if the patient carries the higher risk "A" allele. [Learn more →](#)

WHAT THESE RESULTS MEAN

Prothrombin factor II is not a concern.

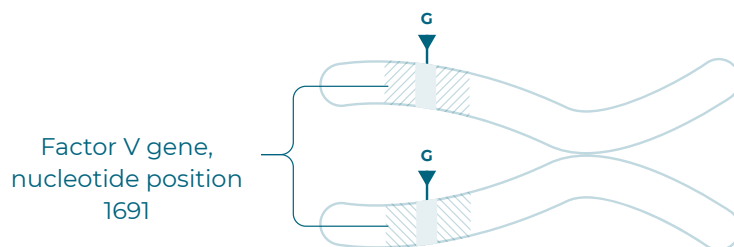
DISCLAIMER

Please note that this is not a complete thrombophilia assessment. Our limited thrombophilia panel is a combination of three genetic tests designed to provide evidence of inherited gene mutations that are associated with an increased risk for developing thromboembolism (blood clot formation) and experiencing recurrent pregnancy losses. Individuals who have inherited a pathogenic variant for one of these genes may have a predisposition to excessive blood clot formation and miscarriages. In addition, we test for both hyperhomocysteinemia as a risk factor for venous thrombosis and for bleeding disorder by assessing the patient's clotting factors.



Leiden Factor V Alleles

RISK LEVEL

Lower Risk

High risk alleles: **0 out of 2**

LEGEND

-  A Allele - mutation
-  G Allele - no mutation

WHY WE TEST THIS

Factor V has an important role in blood clot formation. The Leiden mutation, or "A" allele, causes factor V to remain active longer, which increases the risk of thrombophilia and pregnancy loss. This test determines if the patient carries the higher risk "A" allele. [Learn more →](#)

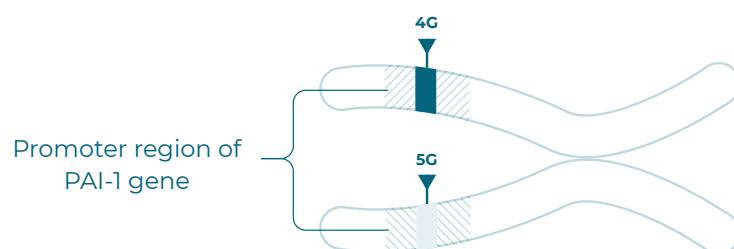
WHAT THESE RESULTS MEAN

Leiden factor V is not a concern.



Plasminogen Activator Inhibitor Type I (PAI-1) Alleles

RISK LEVEL

Medium Risk

High risk alleles: **1 out of 2**

LEGEND

-  4G Allele - mutation
-  5G Allele - no mutation

WHY WE TEST THIS

Plasminogen activator inhibitor type 1 (PAI-1) is a protein that inhibits a process that prevents blood clots. In other words, less PAI-1 equals better protection against thrombosis. The high risk 4G allele increases levels of PAI-1 and by doing so can increase a person's risk for blood clot and miscarriage. This test determines if the patient carries the higher risk 4G allele. [Learn more →](#)

WHAT THESE RESULTS MEAN

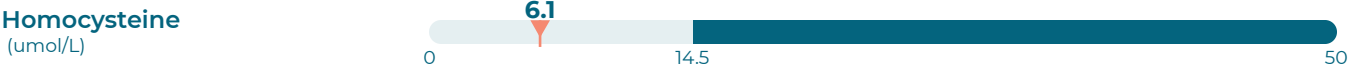
The patient has one high risk allele for PAI-1 which might put them at a slightly increased risk for thrombosis and miscarriage. The risk increases if combined with other high risk alleles in factor II or factor V.

Homocysteine

STATUS

Normal

normal abnormal



WHY WE TEST THIS

Homocysteine is a metabolic by-product. High homocysteine levels (hyperhomocysteinemia) can indicate a vitamin B12, B6, or folate deficiency, and is a risk factor for thrombosis and cardiovascular disease as well as adverse pregnancy outcomes. [Learn more →](#)

WHAT THESE RESULTS MEAN

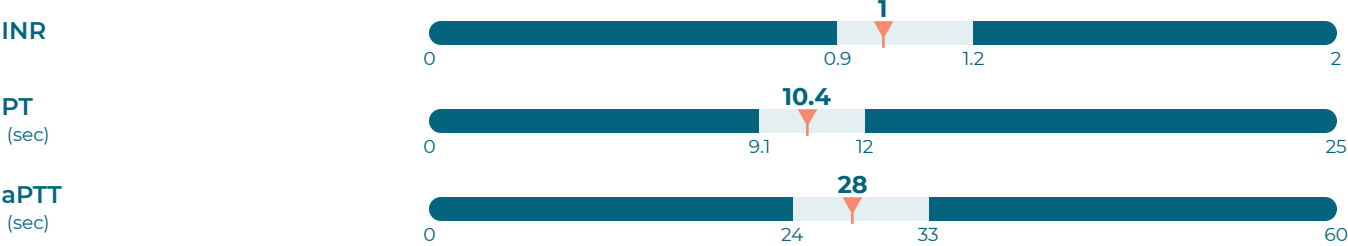
The patient's homocysteine levels are normal and do not pose a risk.

Blood Clotting Measurements

STATUS

Normal

normal abnormal



WHY WE TEST THIS

PT (prothrombin time), aPTT (activated partial thromboplastin time), and INR (international normalized ratio) are all different measures of a person's blood clotting reaction. PT measures how quickly a patient's blood clots when exposed to an injury like a cut and INR is simply the ratio of the patient's PT to an average population's PT. aPTT measures how quickly a patient's blood clots when exposed to internal vascular damage. If a patient's blood clots too quickly, it could indicate an increased risk of thrombosis. [Learn more →](#)

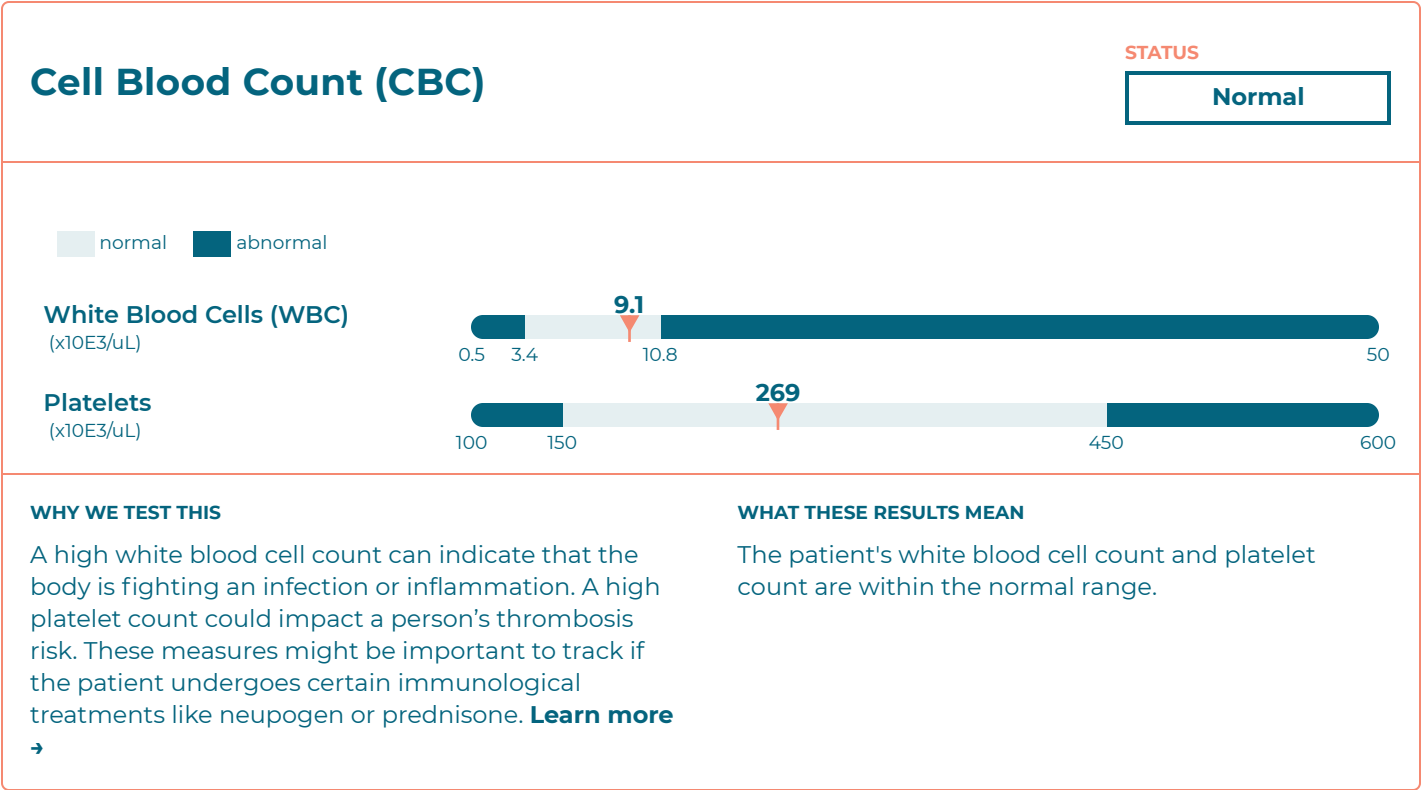
WHAT THESE RESULTS MEAN

The patient's clotting results appear normal.

Blood Count

The cells that travel through a person's bloodstream include red blood cells that carry oxygen, white blood cells that belong to the immune system, and platelets that initiate blood clots. Because of the diversity of

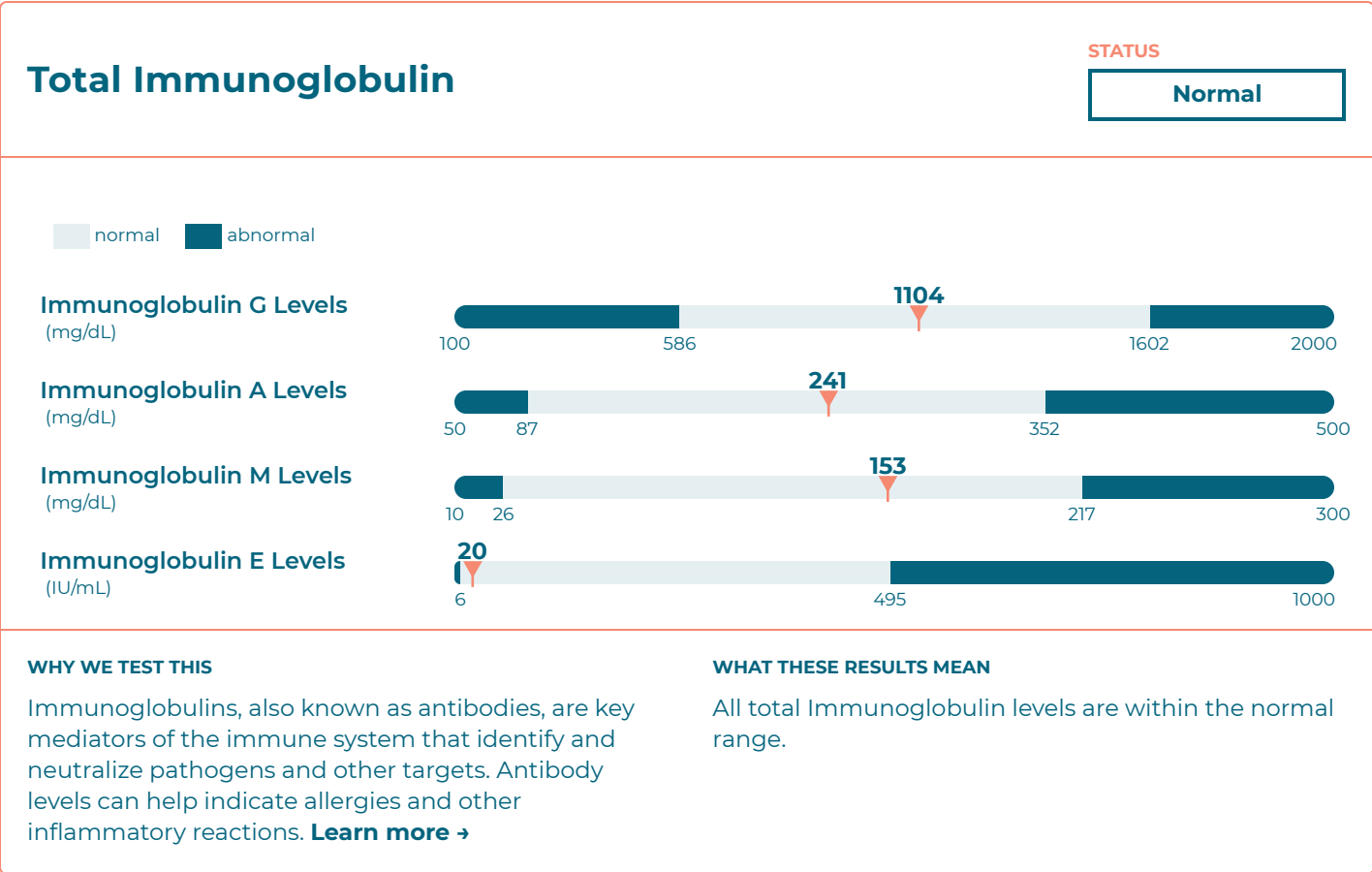
blood cell functions, these test results contribute to both a patient's thrombophilia assessment and inflammation assessment.



Inflammation

Whether caused by an autoimmune condition, infection, allergies, or another source, different inflammatory markers have been associated with reproductive challenges. During a healthy pregnancy, the body must be able to shift to a relatively anti-inflammatory state to maintain the pregnancy. The

following tests are some of the most established markers of inflammation in reproductive immunology. These results can be used to determine if treatments to reduce inflammation could help improve a patient's chances of reproductive success.



Complement Activity

STATUS

Normal

normal abnormal

Complement C4 Activity
(mg/dL)



Complement C3 Activity
(mg/dL)



WHY WE TEST THIS

The complement system is part of the innate immune system and, when activated, is a strong inducer of inflammation. C3 and C4 are two key proteins in the complement system. Complement activation has been linked to pregnancy complications like pre-eclampsia. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient's C3 and C4 complement levels are within the optimal range reflecting a complement activity within the normal range.

Th1/Th2 Helper T Cell Ratio*

STATUS

Normal

normal borderline elevated abnormal

Th1/Th2



WHY WE TEST THIS

Some immune cells, like T helper cells, produce molecules that tell the immune system to either kick into high gear (pro-inflammatory) or calm down (anti-inflammatory). Th1 cells are T helper cells that produce pro-inflammatory molecules, while Th2 cells produce anti-inflammatory molecules. The ratio of Th1 to Th2 can help determine the patient's inflammation levels. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient has a normal Th1/Th2 ratio.

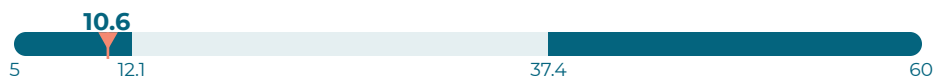
Natural Killer Cell Cytotoxic Activity (NKa)*

STATUS

Abnormal

normal abnormal

NK Cytotoxic Activity Assay
(%)



WHY WE TEST THIS

Natural killer (NK) cells are immune cells that have a bad reputation as “killers.” However, in addition to killing cells (through cytotoxic activity), NK cells can do many other things like encouraging healthy placental development in the uterus. This test measures how much the patient’s NK cells are primed towards killing. High NK cytotoxic activity has been associated with recurrent pregnancy loss. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient's NK cytotoxic activity levels are low. The patient and their healthcare provider may discuss the implications of these results.

Regulatory T Cells*

STATUS

Normal

normal abnormal

Regulatory T Cell Levels
(% of Helper T Cells)



WHY WE TEST THIS

Regulatory T cells (Treg cells) are specialized immune cells that suppress inflammation and are essential for preventing the uterus from rejecting the embryo. Low Treg levels in the uterus are linked to infertility, recurrent miscarriage, and pregnancy complications. This test measures the patient’s circulating Treg cell levels, which can be used to help estimate recruitment of Treg cells to the uterus during pregnancy. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient's Treg cell levels are within the normal range.

*DISCLAIMER

In the field of reproductive immunology, some functional assays are described which reflect the immune capacity of peripheral blood derived natural killer cells (NK cells) or regulatory T cells. Recent data clearly show that the composition of the immune cells locally in the placenta, where the relevant immune regulation of an ongoing pregnancy takes place, is significantly different from that in the peripheral blood. Nevertheless, data are available showing that increased NK levels in the peripheral blood are associated with pregnancy failure. However, there is no evidence that these peripheral NK cells are directly responsible for the failure. The phenotypic characteristics and function of uterine Natural Killer cells are completely different from those of the peripheral blood derived NK cells. Similarly, scientific literature shows a difference in immune regulation by regulatory T cells in the peripheral blood versus the placenta, in which partner specific regulatory T cells are induced. Thus we don't think there is enough evidence to consider the NK cytotoxic activity or peripheral regulatory T cell function as independent factors to predict failure. Nevertheless, these provide valuable information and are part of the predictive pregnancy success algorithm.

Autoimmunity

Many autoimmune diseases can raise a patient's chances for adverse pregnancy outcomes, which is why expectant mothers with antiphospholipid syndrome, lupus, rheumatoid arthritis, and other autoimmune disorders are considered high-risk pregnancies.

However, many people remain undiagnosed for autoimmune conditions. These tests help determine a patient's risk for various autoimmune conditions, which are each treated accordingly.

Antinuclear Antibodies (ANAs)

STATUS

Normal

negative / normal borderline positive / abnormal

Sjogrens Ab SS-A igG
(AI)



Sjogrens Ab SS-B igG
(AI)



ANA-DS.DNA
(IU/mL)



Anti-Jo1 Ab
(AI)



ANA RNP
(AI)



ANA SM
(AI)



ANA SCL
(AI)



Antichromatin
(AI)



ANA CENT
(AI)



WHY WE TEST THIS

The nucleus of a cell contains DNA and diverse proteins required to keep the cell functioning. Sometimes, a person's immune system will begin to attack proteins in the nucleus by developing antinuclear antibodies (ANAs). When present in high concentrations, ANAs could indicate an autoimmune disease such as lupus. These tests assess the presence of different ANAs. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient is negative for all ANAs tested.

Antiphospholipid Antibodies (APAs)

STATUS

Normal

negative / normal borderline moderately positive positive / abnormal

Anticardiolipin IgG
(GPL U/mL)



Anticardiolipin IgM
(MPL U/mL)



Anticardiolipin IgA
(APL U/mL)



Anti Beta-2 Glycoprotein I IgG
(GPI IgG units)



Anti Beta-2 Glycoprotein I IgM
(GPI IgM units)



Anti Beta-2 Glycoprotein I IgA
(GPI IgA units)



Antiphosphatidylserine IgG
(Units)



Antiphosphatidylserine IgM
(Units)



Antiphosphatidylserine IgA
(APS Units)



Lupus Anti Coagulant dPT
(sec)



Lupus Anti Coagulant dPT Confirm Ratio
(Ratio)



Lupus Anti Coagulant Thrombin Time
(sec)



Lupus Anti Coagulant PTT-LA
(sec)



Lupus Anti Coagulant DRVVT
(sec)



WHY WE TEST THIS

Phospholipids are integral components of human cell membranes. Sometimes, a person's immune system will begin to attack its own phospholipids by developing antiphospholipid antibodies (APAs). Because blood cells contain phospholipids, APAs can lead to blood clots, miscarriages, or pregnancy complications. These tests assess the presence of different APAs. [Learn more →](#)

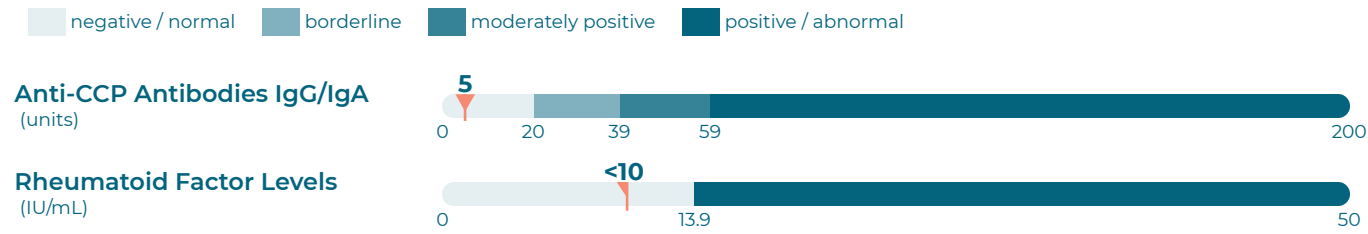
WHAT THESE RESULTS MEAN

The patient is negative for all APAs tested.

CCP Antibodies and Rheumatoid Factor

STATUS

Normal



WHY WE TEST THIS

Cyclic citrullinated protein (CCP) antibodies and rheumatoid factor are antibodies that can indicate rheumatoid arthritis and some other autoimmune diseases. These tests assess the presence of these antibodies. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient is negative for both Rheumatoid Factor and Anti-CCP antibodies.

Autoimmunity Predisposition*

Autoimmune diseases are thought to arise from a combination of a person's genetics and environment. Although being genetically predisposed to

autoimmunity might raise a person's chances for developing an autoimmune disease, it is not a guarantee.

HLA Autoimmune Disease Predisposition

RISK LEVEL

N/A

HLA Alleles Associated with Autoimmune Disease

DRB1*09:01

Associated Autoimmune Diseases

Rheumatoid arthritis, Systemic lupus erythematosus

WHY WE TEST THIS

Human Leukocyte Antigen (HLA) genes play an integral role in activating the immune response. Some HLA alleles change the features of a person's HLAs to make them more likely to inappropriately trigger the immune response and develop an autoimmune condition. This genetic test looks at different alleles of the patient's HLA genes which might predispose the patient to autoimmune issues than can interfere with a healthy pregnancy. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient harbors several HLA alleles that confer genetic predispositions to many conditions that may affect one's fertility.

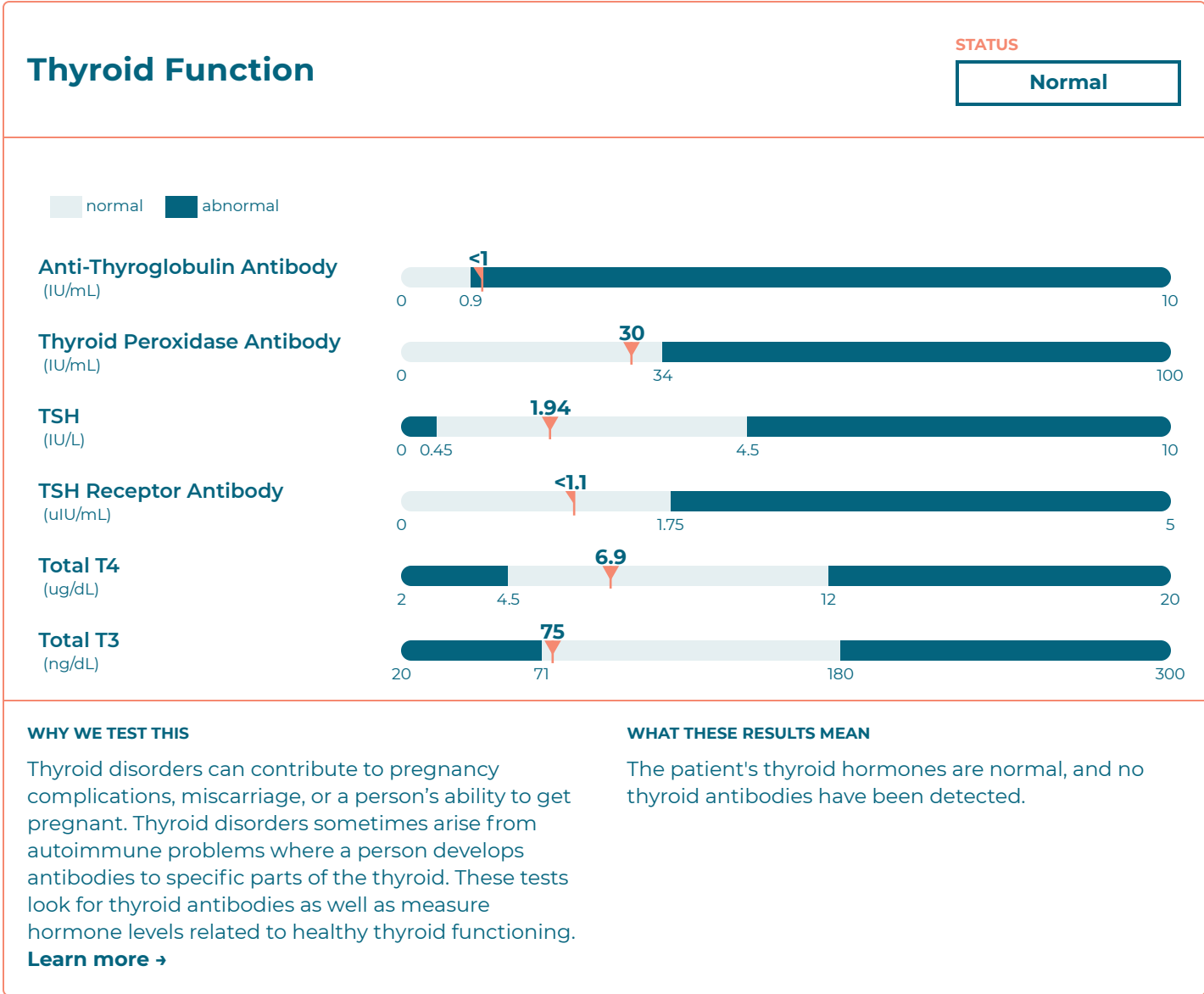
*DISCLAIMER

Please note that being predisposed to certain diseases does not mean a patient will actually develop the disease. Besides genetics, the risk for developing a particular condition is linked to a person's family history (indicating an increased risk) and other factors including environmental factors and lifestyle that may trigger the development of an autoimmune condition.

Thyroid Function

The thyroid is a butterfly-shaped gland located in the neck. It secretes hormones that regulate metabolism, body temperature, the cardiovascular system, and the

digestive system. The thyroid's proper function is crucial when pregnant because the mother's thyroid hormones affect fetal growth and brain development.



Metabolism

Metabolic disorders, like diabetes and PCOS, can increase a person's chance for infertility and miscarriage. When these disorders are properly diagnosed, studies indicate that taking metformin

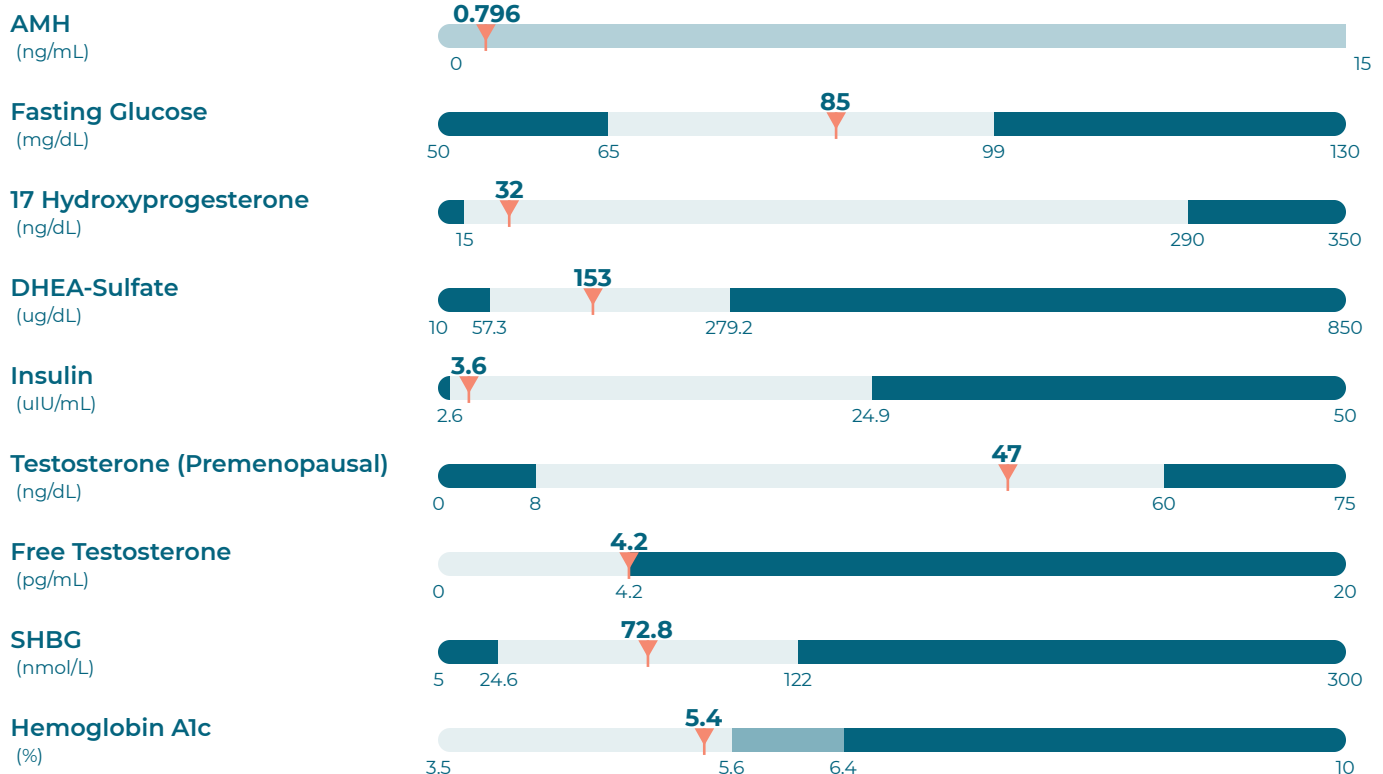
and/or getting blood sugar levels under control could help reduce chances of miscarriage or pregnancy complications. These tests look for signs of metabolic problems.

Insulin Resistance and Polycystic Ovarian Syndrome (PCOS) Assessment

RISK LEVEL

Lower Risk

normal age-based borderline abnormal



WHY WE TEST THIS

Polycystic ovarian syndrome (PCOS) is a common endocrine condition, characterized by high levels of androgens and resistance to insulin. People with PCOS are at an increased risk for infertility and pregnancy complications such as gestational diabetes and hypertension. These tests look for signs of insulin resistance and hormonal dysregulation. [Learn more →](#)

WHAT THESE RESULTS MEAN

Results are normal. There is no indication of insulin resistance or type 2 diabetes. Based on the Rotterdam criteria, the patient is not likely to have PCOS.

Nutrition

Diet can impact a person's ability to get pregnant and deliver a healthy baby. Certain dietary deficiencies can increase the risk of pregnancy complications or birth defects, while other dietary imbalances can lead to

increased levels of inflammation. These tests examine a few of the most important nutritional markers for pregnancy to help determine if a dietary supplement or other dietary action could help.

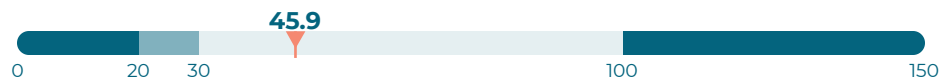
Vitamin D

STATUS

Normal

normal borderline low abnormal

25 Hydroxy Vitamin D levels
(ng/mL)



WHY WE TEST THIS

Vitamin D has an essential role in immune health and calcium absorption. Low levels of vitamin D are linked to recurrent pregnancy loss and numerous pregnancy complications. [Learn more →](#)

WHAT THESE RESULTS MEAN

The patient has healthy vitamin D levels and does not require supplementation.

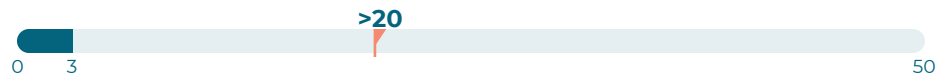
Folic Acid

STATUS

Normal

normal abnormal

Folic Acid levels
(ng/mL)



WHY WE TEST THIS

Folic acid, also known as vitamin B-9, is naturally found in many foods. It is added to prenatal vitamins and many fortified foods such as cereal. Folic acid is a crucial nutrient during early pregnancy and can help reduce the risk of birth defects. [Learn more →](#)

WHAT THESE RESULTS MEAN

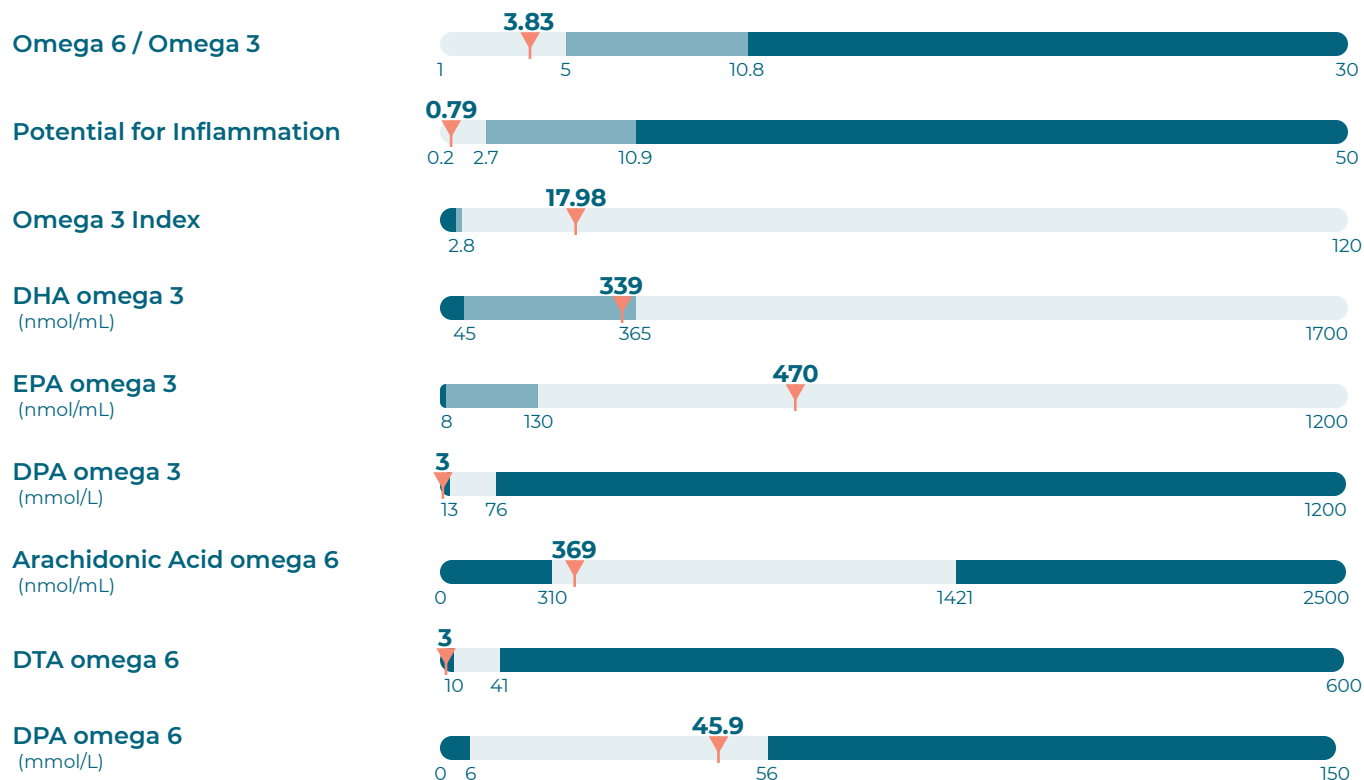
The patient has healthy folic acid levels.

Fatty Acid Profile

RISK LEVEL

Lower Risk

normal borderline abnormal



WHY WE TEST THIS

Omega 3 and omega 6 fatty acids are important classes of dietary fats. Omega 3 fatty acids, like EPA and DHA, are well known for their anti-inflammatory properties and have been found to help lower the risk of pregnancy complications. Omega 6 fatty acids aren't inherently bad, but without a healthy intake of omega 3 fatty acids, could promote inflammation. These tests look at omega 3 levels and determine if they're sufficient to counterbalance omega 6 levels.

[Learn more →](#)

WHAT THESE RESULTS MEAN

The patient's omega 3 intake appears sufficient, and they may benefit from taking a 3g EPA/DHA daily supplement to help maintain a good omega 6 / omega 3 balance.

Leptin Levels

STATUS

Normal

normal abnormal

Leptin Levels
(ng/mL)



WHY WE TEST THIS

Leptin is a hormone released by fat cells that regulates hunger and many aspects of pregnancy. High leptin levels are linked to multiple reproductive issues including impaired egg production, pregnancy failures and complications. Low leptin levels might be linked to miscarriage. [Learn more →](#)

WHAT THESE RESULTS MEAN

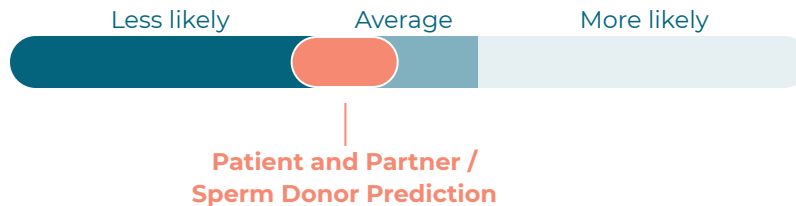
The patient's leptin levels are within the normal range.

IRMA Prediction

IRMA is a holistic examination of different blood markers and genetic traits that have been found in scientific studies to contribute to implantation failure, miscarriage, or pregnancy complications. Some tests (histocompatibility and chromosome analysis) involve both parents when a partner or sperm donor is

available for testing. The remaining tests check the patient for signs of an autoimmune condition or high inflammation levels, as well as assess the patient's thyroid, metabolism, thrombophilia risk, nutrition status, and hormones.

LIKELIHOOD OF A SUCCESSFUL BIRTH



ABOUT THIS VALUE

This is an AI-generated risk stratification model of the likelihood that the patient and their partner/sperm donor will have a successful pregnancy and birth using their own eggs and sperm while following our recommendations. E.g., when likelihood is 0.7, that means we expect 7 successful pregnancies out of 10 embryo transfers for patients with the same conditions. It is calculated based on a comparison against data from over 700 fertility clinic patients with an average success rate of 55%. The fertility clinic patients were aged 45 or younger and typically had a history of recurrent pregnancy loss, implantation failure, or infertility. This prediction is based on patient history, genetics, and immunological factors. Because this prediction was created from a database of patients aged 45 or younger, this calculation will be less accurate for patients over the age of 45, and in some cases will not be calculated.

WHAT IMPACTS THIS PREDICTION

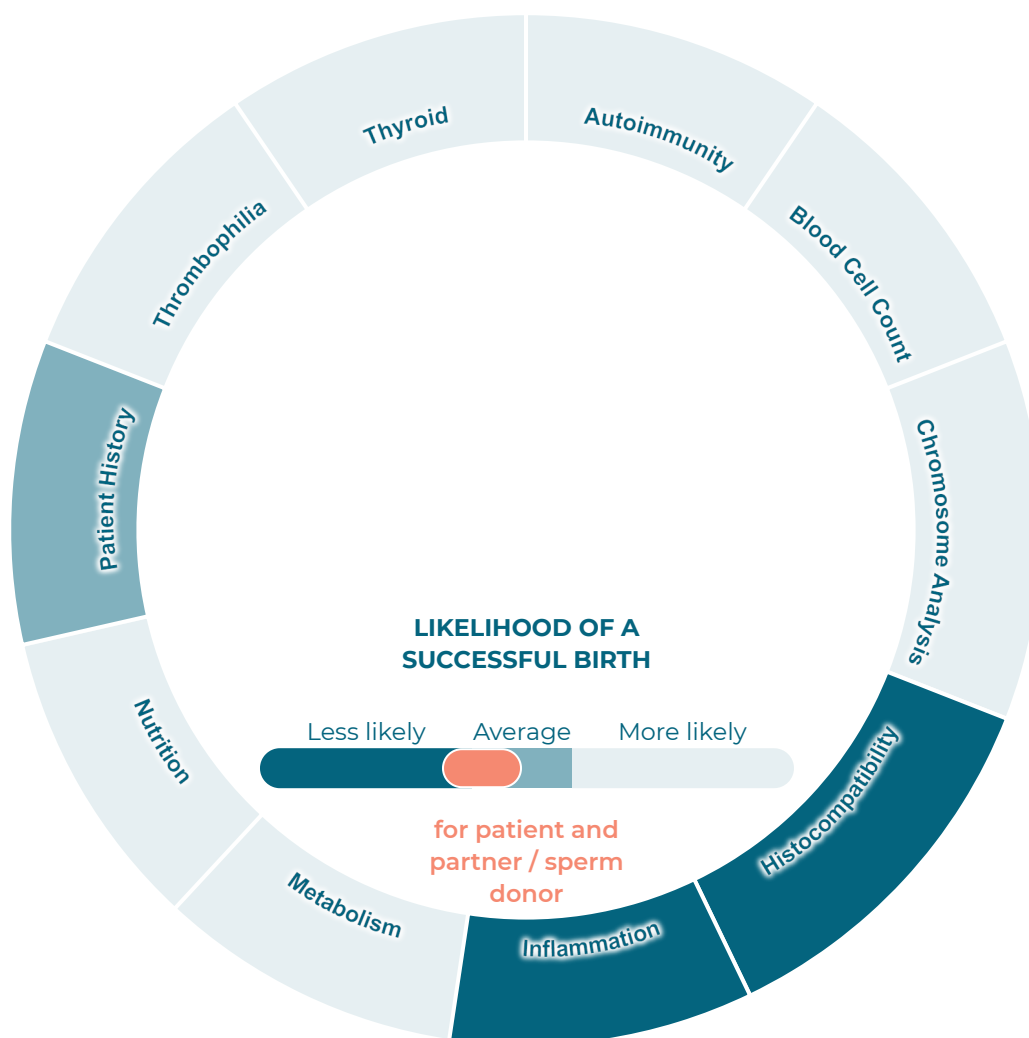
The patient history and test results that most impact this prediction are presented on the following page. Not all individual IRMA test results that are high risk or abnormal will impact this prediction as they may not present a significant risk for pregnancy failure. Similarly, some IRMA test results that are normal may impact this prediction but should not be factored into treatment decisions. The IRMA prediction algorithm considers all factors as they relate to one another, which means a factor that is important for one person may not be important for someone else who is, for example, a different age. Because it is an AI-generated model, factor importance may change over time. Treatment decisions should be based on the provider's clinical judgment and unique patient circumstances and should not be solely based on factor importance in the IRMA prediction.

*DISCLAIMER

The IRMA Prediction and other predictions contained in this Report ("Predictions") are for informational purposes only and should not be viewed or relied upon as any form of assurance or guarantee. The Predictions are estimates generated by statistical models and related technology used to analyze the limited data provided to Pregmune. Various factors may impact this analysis including information about the patient that is not included within the data provided to Pregmune and changes to the patient's health status that may cause the Predictions to be incomplete or incorrect. Pregmune does not assume any liability for these Predictions and makes no warranties, nor express or implied representations whatsoever regarding the accuracy, completeness, or timeliness of any of these Predictions.

Color: Risk Level

Overall risk assessment for each section included in IRMA



Report Review

Patient Name

MELODY WU

DOB

1985-11-09

Partner/Sperm Donor Name

GEOFFREY BOWER

DOB

1983-08-10

Physician

Dr. Atena Asiaii

NPI

1720421282

Report ID

WUM110985F-IRMA



Physician's Signature

6-10-2024

Date

DISCLAIMER

Please note that this Assessment is to be considered of high complexity and will be billed accordingly. This Assessment is to be considered complete with the creation of this IRMA report and of the forwarding of this report to the ordering physician.