Fertility Lab Reference Guide

Test	Functional Optimal Range	Fertility Implications If Out of Range
General and Metabolic Health		
CBC with differential	WNL, no anemia/ infection	Anemia reduces oxygen delivery; infection impairs implantation
Fasting glucose	70–85 mg/dL	Elevated glucose drives insulin resistance, PCOS, inflammation
Fasting insulin	2–6 µIU/mL	High insulin (≥10–12) disrupts ovulation and egg maturation and increases miscarriage rates; slightly elevated (~8–10) is early insulin resistance, even if glucose is still normal.[1]
HA1C	4.8%–5.3%	High A1C reflects chronic glucose dysregulation; levels above ~5.3%–5.4% can indicate subtle glucose dysregulation or early insulin resistance, even if they do not meet the threshold for prediabetes.
Fasting leptin	~4–10 ng/mL	High leptin (above 12 ng/mL) signals leptin resistance, ovulatory dysfunction, and poor egg quality; low leptin signals reduced hormones and anovulation/ irregular and light cycles.
Lipid panel: total cholesterol	160–200 mg/dL	Very low impairs hormone production; high increases inflammation; high indicates inflammation

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Test	Functional Optimal Range	Fertility Implications If Out of Range
Lipid panel: LDL	<110 mg/dL (large, buoyant)	High LDL = inflammation, oxidative stress
Lipid panel: HDL	>60 mg/dL	Low HDL = insulin resistance
Lipid panel: Triglycerides	<90 mg/dL	High TG = metabolic dysfunction, PCOS, insulin resistance
Lipid panel: TG/HDL ratio	<2:1	High ratio = insulin resistance
Vitamin D	50–80 ng/mL	Low linked to miscarriage, implantation failure, and poor fertility outcomes; in reproductive medicine, maintaining vitamin D in the upper half of the normal range (~50–80 ng/mL) is often recommended to support ovulation, lower AMH when it is pathologically elevated, and improve metabolic profiles.
Vitamin B_6	Upper normal (~30–100 mcg/L)	Deficiency disrupts luteal phase, methylation/detoxification
DHEA-S	~100–250 mcg/dL	High = androgen excess; low = low ovarian reserve; low DHEA-S (<100 mcg/dL) may sometimes be associated with adrenal insufficiency or chronic stress.
SHBG	50–80 nmol/L	Low SHBG raises free androgens; often suppressed in PCOS due to insulin resistance and hyperinsulinemia.
IGF-1	~150–200 ng/mL (age-adjusted)	Low = undernutrition; high may disrupt ovulation
Cortisol (a.m.)	10–16 mcg/dL	Low = adrenal fatigue; high = stress-induced anovulation
Fibrinogen	<400 mg/dL	Elevated = inflammation, clotting risk
Ferritin	50–90 ng/mL	Low = anemia; high = inflammation

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Test	Functional Optimal Range	Fertility Implications If Out of Range
Thyroid and Autoimmunity		
TSH	0.8–2.5 mIU/L	High linked to miscarriage, luteal defects
Free T_4	1.1–1.5 ng/dL	Low reduces metabolism, ovulation
Free T_3	3.2–3.8 pg/mL	Low impairs progesterone, implantation
TPO antibodies	Undetectable/ <9 IU/mL	Elevated = autoimmunity, miscarriage risk
Thyroglobulin antibodies	Undetectable	Same as TPO
Reverse T_3	<15 ng/dL	High indicates chronic stress, impaired metabolism
Reproductive Hormones and Androgens		
Estradiol (day 2–3)	30–50 pg/mL	High can mask FSH, indicate dysfunction
FSH (day 2–3)	Contextual with E2; I don't pay much attention to this number with my clients, and I always look at it in relation to day 2 or 3 estradiol.	High suggests diminished reserve: Please remember—FSH levels are NOT static, nor do they determine pregnancy outcomes
AMH	Age-dependent (~1–4 ng/mL); I don't pay much attention to this number with my clients, and I always look at it in relation to FSH and AFC.	Low = low reserve; high = PCOS. Please remember—AMH levels are NOT static, nor do they determine pregnancy outcomes.
Free testosterone	0.3–1.0 ng/dL	High or low levels disrupt folliculogenesis and impair egg quality.
Androstenedione	<2.0 ng/mL	High = adrenal androgen excess
17-OHP	<200 ng/dL	Elevated in nonclassic CAH

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Test	Functional Optimal Range	Fertility Implications If Out of Range
Progesterone (6–7 days postovulation); please keep in mind testing progesterone only once in your luteal phase is not enough—I recommend testing it several times to get an overall picture of the health of your luteal phase.	≥10 ng/mL (ideally >15)	Low luteal progesterone impairs implantation.
Prolactin	5–15 ng/mL	High suppresses ovulation and blunts progesterone; even mild elevations can disrupt ovulation.
Clotting and Methylation		
Homocysteine	6–9 µmol/L	High increases clotting, miscarriage risk
MTHFR	No homozygous mutations	Mutations impair methylation.
SAMe/SAH ratio	>5:1	Low ratio = methylation dysfunction
Methylmalonic acid	<150 nmol/L	High = B_{12} deficiency
Clotting factors (factor V Leiden, PAI-1, APA; I have a complete list for you later in this table); all clotting factors should be tested on anyone who has had more than one miscarriage without a live birth in between.	Negative	Positive increases miscarriage risk; see full list in the RPL/RIF section. Please get ALL clotting factors tested with history of miscarriage.

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Test	Functional Optimal Range	Fertility Implications If Out of Range
Inflammation and Immune Function		
hsCRP	<1 mg/L	High = inflammation disrupting implantation
ANA	Negative	Positive = autoimmunity, pregnancy loss risk
TNF-α	<2.5 pg/mL	High = chronic inflammation
IL-6	<2.0 pg/mL	High linked to implantation failure
NK cells (peripheral)	<12%	High = implantation failure, miscarriage
CD57+ NK cells	<12%	High = endometrial immune activation
Th1/Th2 ratio	Balanced (<30:1)	High Th1 = miscarriage risk
Beta-2 glycoprotein antibodies	Negative	Positive = antiphospholipid syndrome
Specialized and Advanced Fertility Testing		
DUTCH test	Balanced hormones and cortisol rhythm	Imbalances impair ovulation, luteal phase
OAT	Optimal nutrient/ mitochondrial markers	Deficiencies affect egg quality
Carnitine profile	Normal spectrum	Abnormal = mitochondrial dysfunction
CoQ10 (plasma/ RBC)	~1.0–1.8 mcg/mL	Low reduces egg mitochondrial energy
RBC magnesium	~6–6.5 mg/dL	Low = insulin resistance, luteal defects
RBC zinc	~8–12 mg/L	Low affects DNA, egg maturation
Copper/zinc ratio	~0.7–1.0	High ratio = inflammation, oxidative stress
Ceruloplasmin	20–35 mg/dL	High = chronic inflammation
Endometrial BCL6 (ReceptivaDx)	<1.4 H-score	High = silent endometriosis

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Test	Functional Optimal Range	Fertility Implications If Out of Range
Endometrial microbiome (EMMA + ALICE)	>90% *Lactobacillus*	Pathogens impair implantation
Chlamydia IgG/IgM	Negative	Positive = tubal damage risk
Mycoplasma/ *Ureaplasma* PCR	Negative	Positive = chronic endometritis

17-OHP, 17-hydroxyprogesterone; AFC, antral follicle count; ALICE, analysis of infectious chronic endometritis; AMH, anti-Müllerian hormone; ANA, antinuclear antibodies; APA, antiphospholipid antibodies; CAH, congenital adrenal hyperplasia; CBC, complete blood count; DHEA-S, dehydroepiandrosterone sulphate; E2, estradiol; EMMA, endometrial microbiome metagenomic analysis; FSH, follicle-stimulating hormone; HDL, high-density lipoproteins; hsCRP, high-sensitivity C-reactive protein; IGF-1, insulin-like growth factor 1; IgG, immunoglobulin G; IgM, immunoglobulin M; IL, interleukin; LDL, low-density lipoproteins; MTHFR, methylenetetrahydrofolate reductase; NK, natural killer; OAT, organic acids test; PAI-1, plasminogen activator inhibitor-1; PCOS, polycystic ovarian syndrome; PCR, polymerase chain reaction; RBC, red blood cell; RIF, repeat implantation failure; RPL, recurrent pregnancy loss; SAH, adenosylhomocysteine; SAMe, S-adenosylmethionine; SHBG, sex hormone–binding globulin; T_3, triiodothyronine; T_4, thyroxine; TG, triglycerides; TNF-α, tumor necrosis factor-alpha; TPO; thyroid peroxidase; WNL, within normal limits.

Celiac/Non-Celiac Gluten Sensitivity Testing

Category	Celiac Disease	Non-Celiac Gluten Sensitivity
Nature of condition	Autoimmune reaction to gluten damaging small intestine (villous atrophy)	Nonautoimmune, nonallergic reaction to gluten with symptoms but no intestinal damage
Genetic marker	HLA-DQ2 and/or HLA-DQ8 positive (necessary but not sufficient)	May or may not have HLA-DQ2/DQ8; not diagnostic
Serologic testing	tTG-IgA (primary); total IgA; DGP-IgG (especially if IgA deficient)	Negative for celiac serologies
Gold-standard diagnostic test	Duodenal biopsy showing villous atrophy (must be on gluten diet)	Elimination and blinded gluten challenge (research) or symptom-based elimination-reintroduction

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Wheat allergy testing	Not applicable	Negative wheat-specific IgE to rule out allergy
Functional/ supportive testing	Optional: micronutrients, gut barrier markers (e.g., zonulin)	Optional: AGA IgG/IgA, zonulin, calprotectin, microbiome analysis (nondiagnostic but helpful)
Gluten consumption needed for testing	Yes: 2–4 weeks minimum for accurate serology and biopsy	Yes: for symptom observation and gluten challenge
Role in fertility	Associated with RPL, implantation failure, DOR/ POI, unexplained infertility	Linked to inflammation, immune reactivity, nutrient depletion, possible gut–uterus axis impact

AGA, antigliadin antibody; DOR, diminished ovarian reserve; IgA, immunoglobulin A; IgE, immunoglobulin E; IgG, immunoglobulin G; POI, premature ovarian insufficiency; RPL, recurrent pregnancy loss; tTG, tissue transglutaminase.

Recurrent Pregnancy Loss/Repeat Implantation Failure Testing

Test Name	Optimal/ Functional Range	What It Means If Out of Range
Clotting factors: Imperative to test for any history of miscarriage		
Lupus anticoagulant	Negative	If positive, suggests APS, increasing risk for clotting, miscarriage, and implantation failure
Antiphospholipid antibodies	Negative	If positive, indicates APS and immune-mediated clotting risk, associated with RPL and RIF
Cardiolipin IgM	<12 MPL	Elevated levels increase risk of thrombosis and miscarriage.
Cardiolipin IgG	<15 GPL	High levels suggest APS, increasing miscarriage and implantation failure risk.
Beta-2 glycoprotein 1 IgM	<20 SMU	Elevated levels suggest APS, associated with thrombosis and pregnancy loss.
Beta-2 glycoprotein 1 IgG	<20 SGU	Elevated levels can indicate APS and increased clotting tendency.

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Test Name	Optimal/ Functional Range	What It Means If Out of Range
Antiprothrombin IgM	Negative	Elevated levels linked to APS and RPL
Antiprothrombin IgG	Negative	Positive results associated with thrombophilia
Antithrombin III	80%–120%	Low levels indicate higher clotting risk, affecting implantation and pregnancy maintenance.
Plasminogen	70%–130%	Low levels impair fibrinolysis, contributing to clot formation and pregnancy complications.
Protein S	60%–130%	Deficiency increases clotting risk, contributing to RPL
Protein C	70%–140%	Low protein C levels increase thrombosis risk, impairing placental function.
Activated protein C resistance	Ratio >2.0	Resistance (often due to factor V Leiden) increases clotting risk.
Factor V Leiden gene R506Q	Negative	Positive mutation increases thrombosis risk, linked to RPL.
Prothrombin gene G20210A	Negative	Mutation raises clot risk, linked to miscarriage and placental issues.
APTT	25–35 seconds	Shortened APTT may indicate clotting disorder; prolonged may suggest bleeding risk.
Factor II	70%–130%	Low: bleeding risk; High: thrombosis risk and potential RPL
PAI-1	<15 ng/mL	Elevated PAI-1 inhibits fibrinolysis, promoting clotting and placental insufficiency.
Fibrinogen	200–400 mg/dL	High levels increase clotting risk; low levels impair implantation and early pregnancy support.

APS, antiphospholipid syndrome; APTT, activated partial thromboplastin time; GPL, IgG phospholipid units; IgG, immunoglobulin G; IgM, immunoglobulin M; MPL, IgM phospholipid units; PAI-1, plasminogen activator inhibitor-1; RIF, repeat implantation failure; RPL, recurrent pregnancy loss.

Test Name	Functional Reference Range	What It Indicates If Positive or Out of Range
Immunological tests: To be done with any history of RPL or RIF		
Anti-DNA (dsDNA) antibodies	Negative (<30 IU/mL)	Suggests systemic autoimmunity (e.g., lupus); may contribute to miscarriage via immune-mediated damage
ANA	Negative (≤1:40 titer)	Indicates generalized autoimmunity; associated with RPL, autoimmune thyroiditis, and connective tissue disorders
Anti-ENA antibodies	Negative	May indicate Sjögren syndrome, lupus, or other systemic autoimmune diseases that impair implantation or placentation
Antiovarian antibodies	Negative	Suggests autoimmune oophoritis; may impair ovarian function and contribute to infertility and RPL.
Anti-tTG (IgA) or EMMA	Negative (<20 U/mL)	Suggests celiac disease, which is linked to nutrient malabsorption and recurrent pregnancy loss
HLA tissue typing	No shared HLA alleles between partners	Shared alleles may impair immune tolerance of the embryo, increasing RPL risk.
Peripheral blood lymphocyte surface markers	Balanced immune cell subsets	Imbalance in immune cell populations (T, B, NK) may reflect immune dysfunction contributing to RPL or RIF.

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Test Name	Functional Reference Range	What It Indicates If Positive or Out of Range
NK cell ratios	$CD56^{bright}$ <10%, $CD56^{dim}$ ~90%	Elevated $CD56^{bright}$ NK cells are associated with implantation failure or pregnancy loss.
NK cell assay (cytotoxicity)	<15% cytotoxicity at 50:1 ratio	High NK-cell cytotoxicity may target embryo or placental tissue, increasing RIF/ RPL risk.
Th1/Th2 ratio	<10	Elevated ratio indicates Th1 dominance (proinflammatory), unfavorable for implantation and pregnancy
Th17 assay	Th17 cells <2% of CD4+ T cells	Elevated Th17 linked to inflammation, autoimmunity, and impaired implantation
T regulatory cells (Tregs)	>5% of CD4+ T cells	Low Treg levels impair immune tolerance of the embryo, contributing to miscarriage or implantation failure.
LAD test	Negative	Detects maternal alloimmune reaction to paternal antigens; positivity may suggest alloimmune RPL
Thyroid antibodies (TPO, TgAb)	TPO <35 IU/mL; TgAb <20 IU/mL	Associated with increased risk of miscarriage and implantation failure, even with normal thyroid hormone levels

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Test Name	Functional Reference Range	What It Indicates If Positive or Out of Range
Homocysteine	5–9 µmol/L	Elevated levels increase risk of thrombosis and endothelial dysfunction, affecting placental development and fetal support.
CRP	<1.0 mg/L (functional); <3.0 mg/L (conventional)	Elevated CRP indicates systemic inflammation, which can impair implantation and placental health.
LAD test	Negative	Indicates maternal immune sensitization to paternal antigens; may suggest alloimmune-related RPL or implantation failure
Anti-ovarian antibodies	Negative	Suggests autoimmune oophoritis; associated with DOR, impaired ovarian function, and increased miscarriage risk
HLA typing (Class I & II)	No significant HLA allele sharing between partners	High HLA sharing between partners may impair immune tolerance of the embryo, increasing risk of implantation failure or miscarriage.
KIR genotyping and HLA-C typing	KIR B haplotype and HLA-C1/C2 mismatch preferred	KIR AA and fetal HLA-C2 is linked to increased NK activation and risk of miscarriage or RIF.

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Test Name	Functional Reference Range	What It Indicates If Positive or Out of Range
Endometrial biopsy with CD138 staining	CD138-negative (no plasma cells)	CD138+ plasma cells confirm chronic endometritis, which is associated with RIF, miscarriage, and persistent implantation failure.
EndomeTRIO panel (ERA, ALICE, EMMA)	ERA: receptive; ALICE: negative; EMMA: *Lactobacillus* >90%	Abnormal ERA, CE detection (ALICE), or dysbiosis (EMMA) can impair implantation and reduce ART success.
ReceptivaDx (CicloDx)	BCL6 <1.4 H-score	Elevated BCL6 suggests silent endometriosis and inflammation, often present in unexplained RIF or RPL.
Fertilysis uterine microbiome test	*Lactobacillus*-dominant (>90%)	Identifies dysbiosis or pathogenic bacteria; a non-*Lactobacillus*-dominant microbiome can impair endometrial receptivity
MicroGenDX Women's Health Key Test	Low pathogen load; absence of biofilms	Highly sensitive test that detects chronic endometritis, resistant infections, or biofilms that affect implantation and fertility outcomes

ALICE, analysis of infectious chronic endometritis; ANA, antinuclear antibodies; ART, assisted reproductive technology; CRP, C-reactive protein; DOR, diminished ovarian reserve; EMMA, endometrial microbiome metagenomic analysis; ENA, extractable nuclear antigen; ERA, endometrial receptivity analysis; HLA, human leukocyte antigen; KIR, killer-cell immunoglobulin-like receptor; LAD, leukocyte antibody detection; RIF, repeat implantation failure; RPL, recurrent pregnancy loss; TgAb, thyroglobulin antibodies; TPO, thyroid peroxidase.

REFERENCE

1. Selvin E, Zhu H, Brancati FL. Elevated A1C in adults without a history of diabetes in the U.S. *Diabetes Care*. 2009;32(5):828-833. doi:10.2337/dc08-1699