hello FERTILITY

Infertility: The Top 3 Functional Lab Tests you Should be Using

Reminder: Definition of Infertility

- Absence of pregnancy or delivery of a live-born child after one year of unprotected intercourse

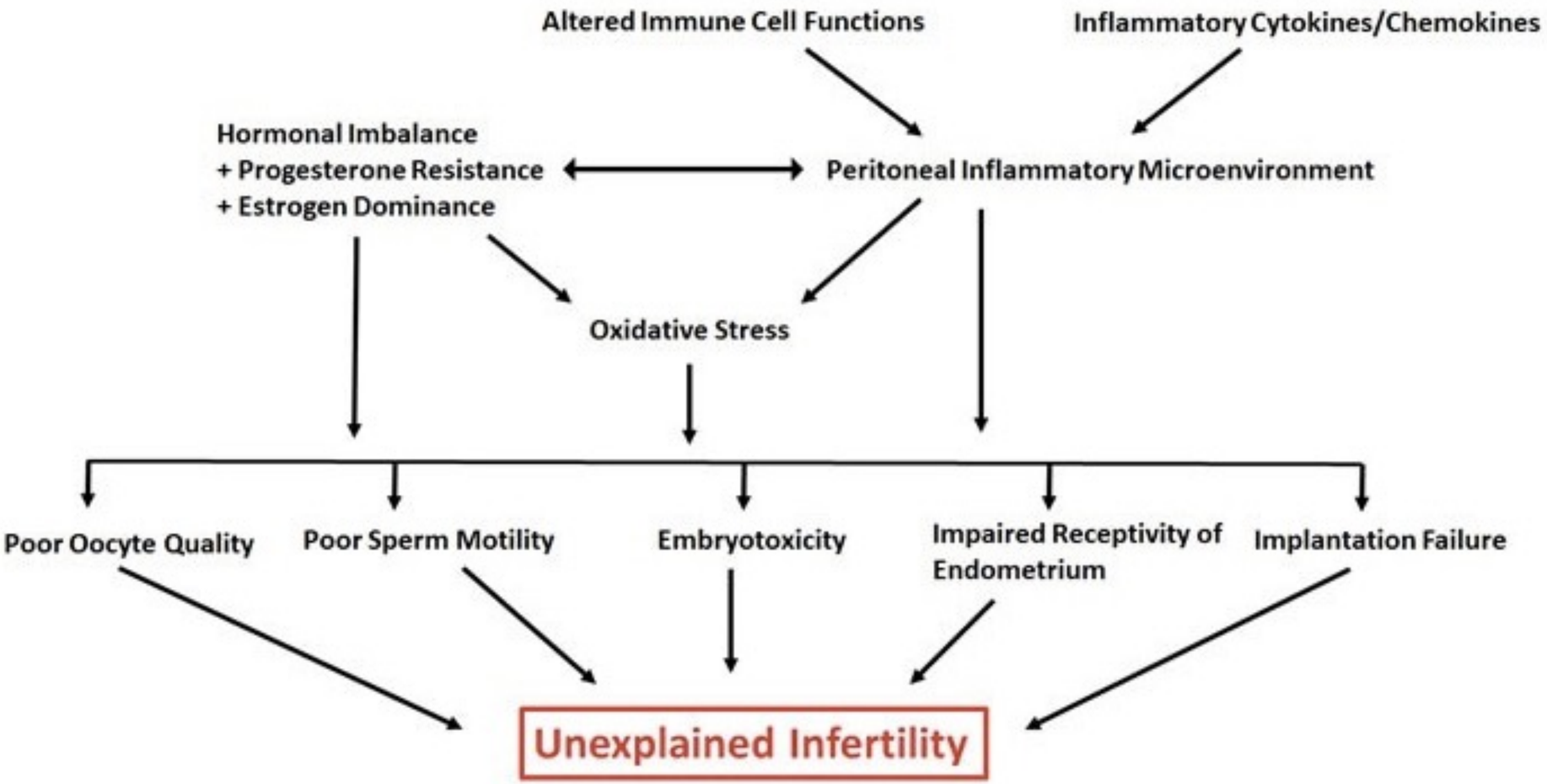
Evaluation is warranted:

- Any age with known or suspected barriers to pregnancy (family history, history of relevant medical concerns, etc)
- After 1 year of timed intercourse for <35 years
- After 6 months of timed intercourse for >=35 years

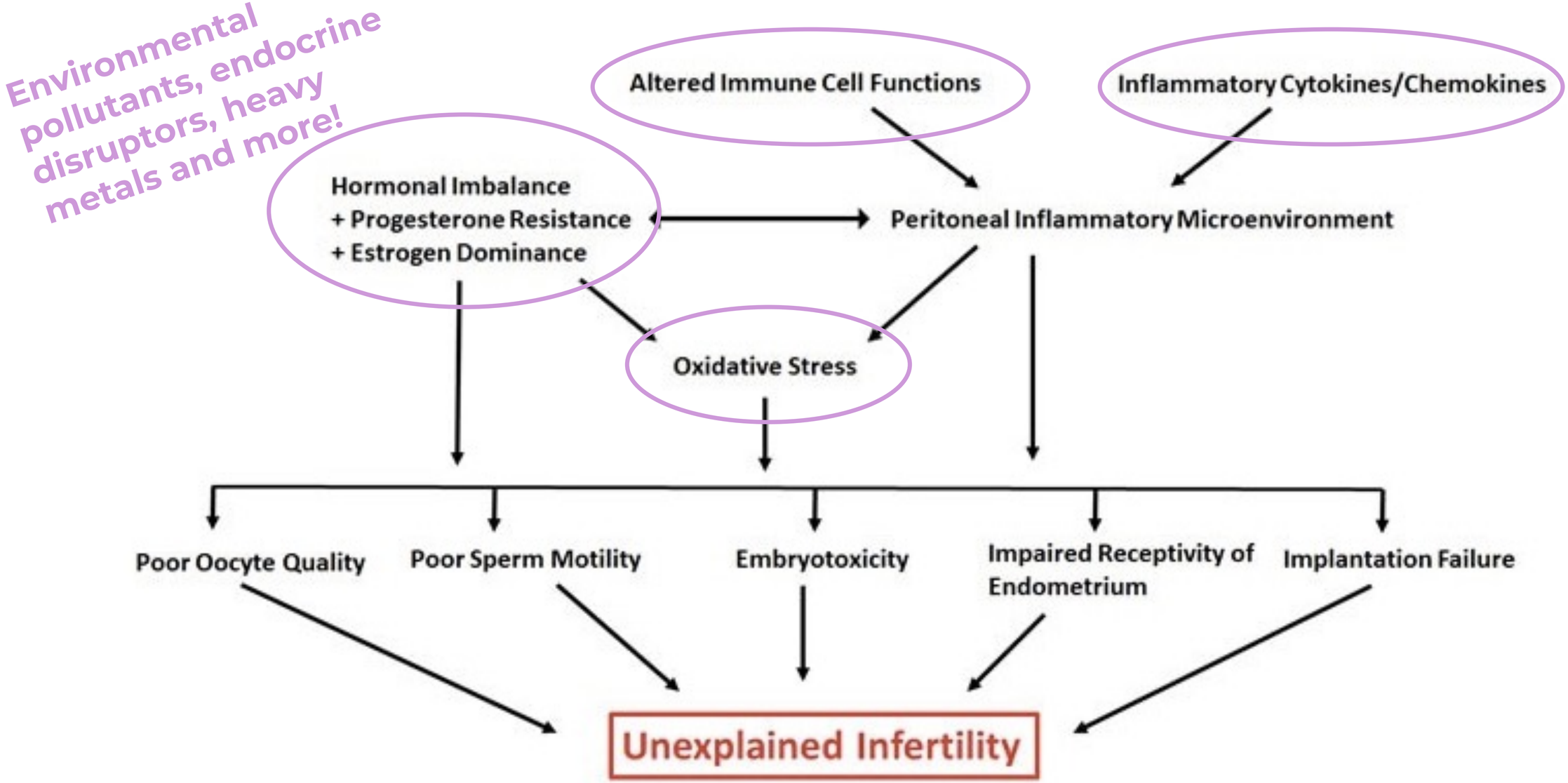
Standard Evaluation

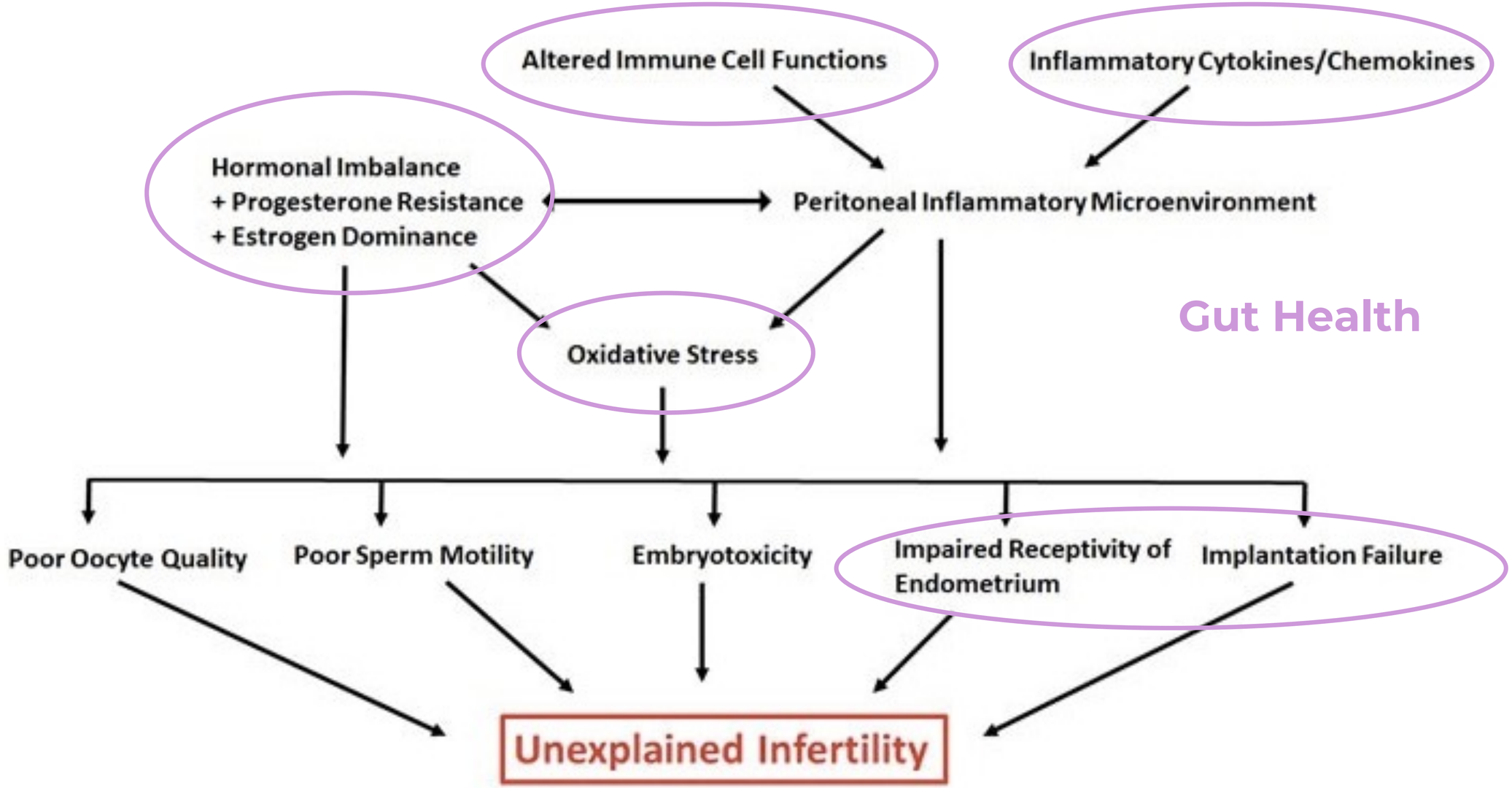
- Documentation of ovulation
  - Patient history
  - Mid-luteal progesterone level >5 ng/mL
- Standard semen analysis
- HSG (Hysterosalpingogram), to test for tubal patency
- Assessment of ovarian reserve
  - Many options here (CD3 FSH, E2, AMH, Inhibin B)
- Diagnostic laparoscopy
  - When indicated by patient history, abnormal pelvic exam or abnormal HSG

the world underneath infertility



Oncotarget 2017 Jan 24;8(4):7138-47


Environmental pollutants, endocrine disruptors, heavy metals and more!
Altered Immune Cell Functions
Inflammatory Cytokines/Chemokines
Hormonal Imbalance
+ Progesterone Resistance
+ Estrogen Dominance
Peritoneal Inflammatory Microenvironment
Oxidative Stress
Poor Oocyte Quality
Poor Sperm Motility
Embryotoxicity
Impaired Receptivity of Endometrium
Implantation Failure
Unexplained Infertility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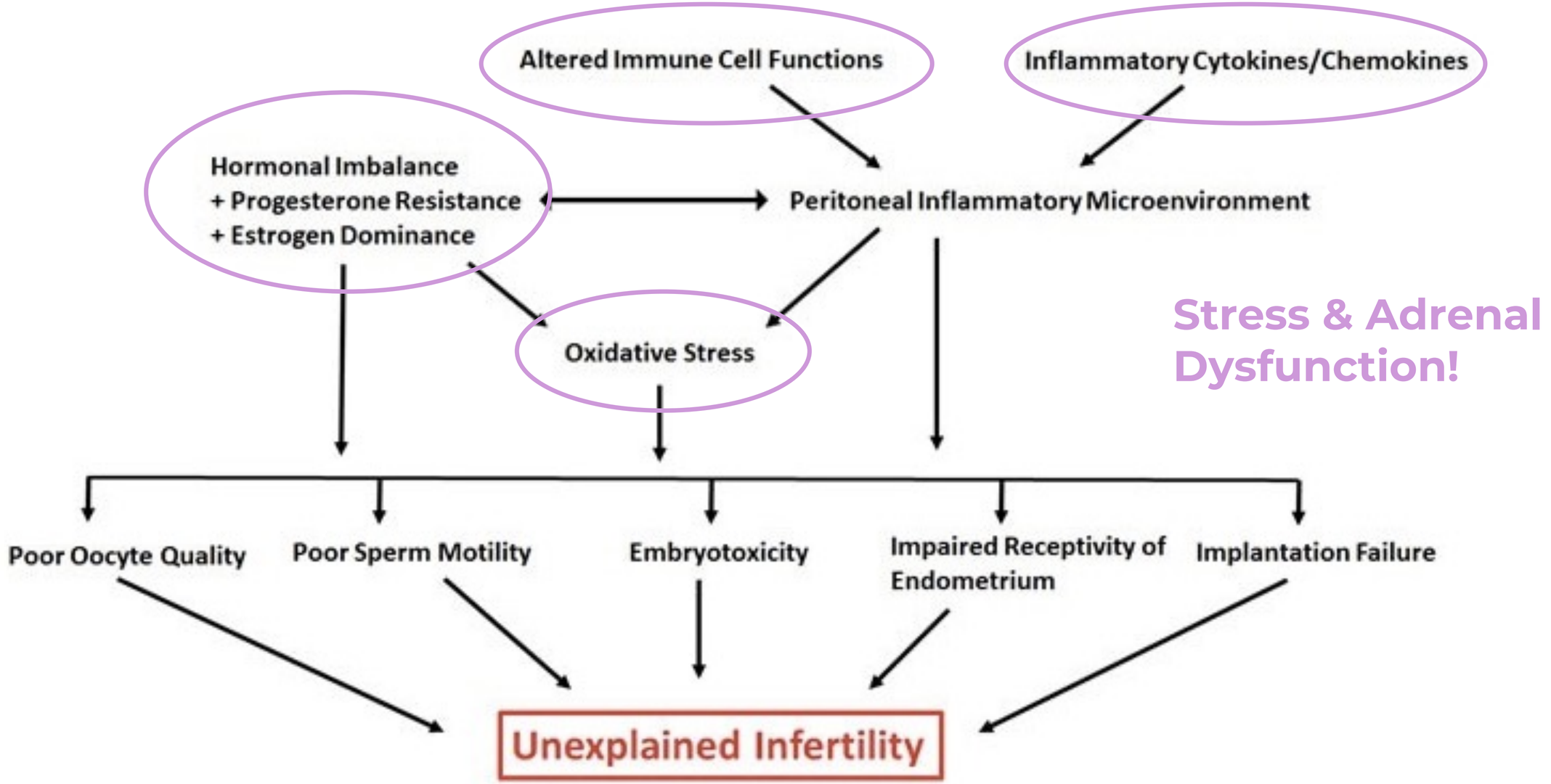
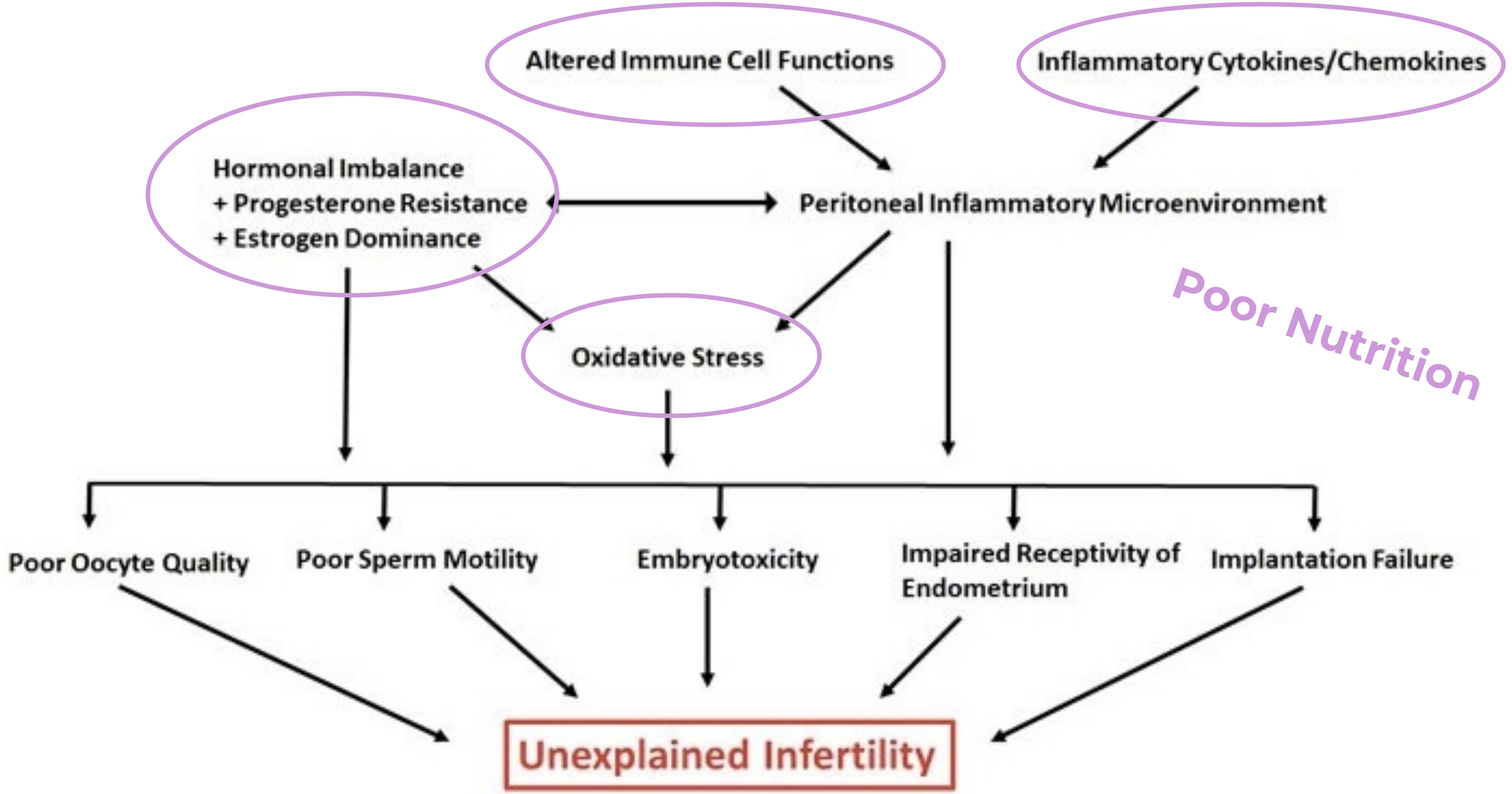


Stress & Adrenal Dysfunction!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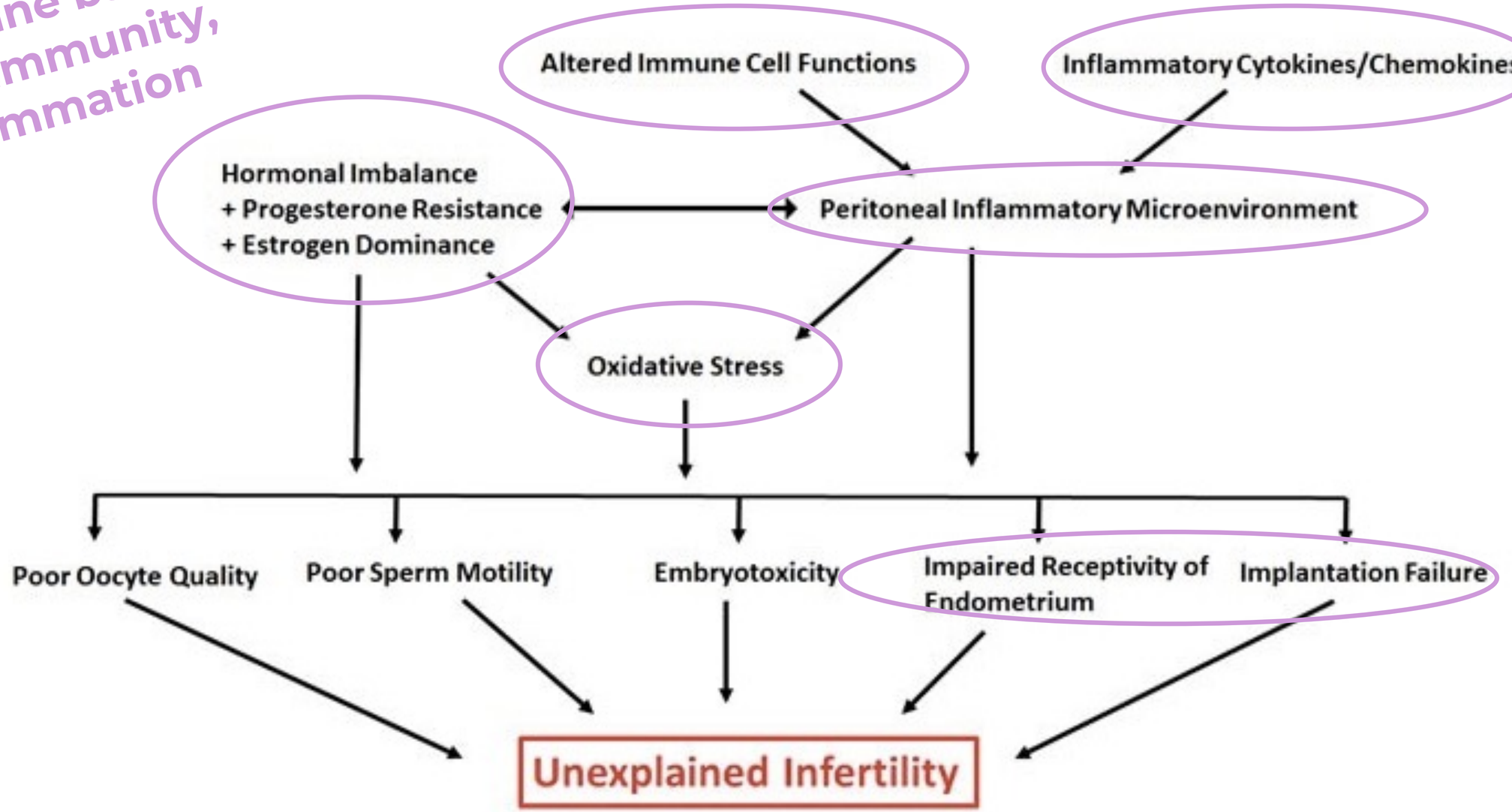
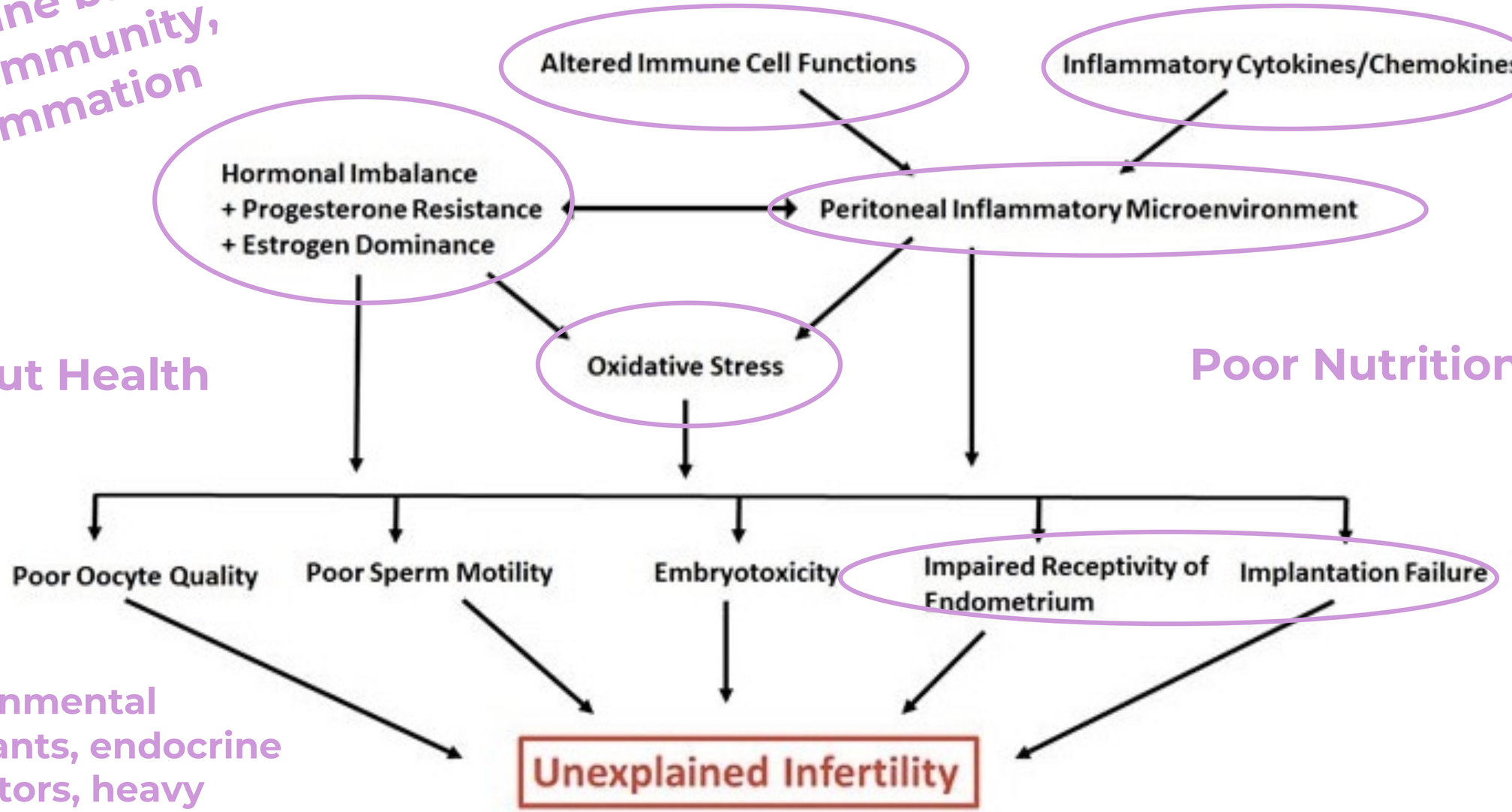
Immune balance,
autoimmunity,
inflammation



Immune balance, autoimmunity, inflammation

Stress & Adrenal Dysfunction!



Gut Health

Poor Nutrition

Environmental pollutants, endocrine disruptors, heavy metals and more!

Evaluation for Patients with Infertility

- Thorough intake
  - Review of systems, health histories
  - Signs of underlying physiological patterns/problems?
    - Gut health (maldigestion, pain, gas/bloating, dysbiosis, abx use)
    - Infection (gut, chronic viral, etc)
    - Detoxification (liver, hormone detoxification & elimination)
    - Energy production (adrenal, thyroid, pancreas)
    - Oxidative imbalance (allergies, skin inflammation, itching, histamine issues, etc)
    - Immune balance/Inflammation: (frequent illness, AI in past/family hx, etc)
    - Hormonal imbalance (luteal phase defect, endometriosis)
    - Structural (endometriosis, fibroids, blocked tubes, etc)

Functional Medicine Model

Table 1. Assessments, Laboratory Findings and Treatments
Organized According to the Functional Medicine Matrix

Clinical Assessment	Initial Laboratory Results	Initial Recommended Treatment
Fundamental Lifestyle Factors: Nutrient Imbalances		
Hypertension Maldigestion/malabsorption (MSQ: GI)	Low B12 (elevated urinary methylmalonic acid) Low serum COQ10 Low serum vitamin D Low fecal elastase (poor digestion)	Methylcobalamin 5000ug SL QD CoQ10 300mg PO QD D3 5000IU PO QD HCL 500mg titrate to tolerance Digestive enzymes: 2 with main meals
Defense and Repair (e.g. Immune, Inflammation, Infection/microbiota)		
Food allergies/sensitivities Dysbiosis History of antibiotics Intestinal hyperpermeability (MSQ: GI, Joint, Energy) Environmental allergies (MSQ: Nose) Hypovitaminosis D	Celiac gene: HLADQ2 Low serum vitamin D IgG4 testing +3 to dairy, mild positives 5 additional foods Stool testing: microbiota imbalance, low fecal elastase (hs-CRP normal),	Vitamin D3, Digestive enzymes, HCL – as noted in "Nutrient Imbalances" Glutamine-based GI repair powder Probiotic combination:100 billion CFU per day **Dietary changes:** Lower carbohydrate, gluten and dairy-free, minimal sugar, protein at all meals. Whole foods, minimally processed, organic diet. Rotate mild reactants.
Assimilation (e.g. Digestion, Absorption, microbiota/GI, Respiration)		
Dysbiosis History of antibiotics Intestinal hyperpermeability Maldigestion/malabsorption (MSQ: GI)	Celiac gene: HLADQ2 (Celiac serology negative) IgG4 testing +3 to dairy, mild positives 5 additional foods Stool testing: microbiota imbalance	As noted in "Defense and Repair"
Communication (e.g. Endocrine, Neurotransmitters, immune messengers)		
Hypertension Hyperlipidemia Family history of heart disease and diabetes	Low HDL Low-normal free testosterone High-normal fasting blood glucose (thyroid panel, LDL, homocysteine, Lp(a), essential elements and amino acids all normal)	Dietary changes as noted in "Defense and Repair" Cardiovascular exercise prescription DHEA 50mg PO QD
Energy (e.g. Energy Regulation, Mitochondrial Function)		
MSQ: fatigue Statin rx	Low serum vitamin D Low serum CoQ10 B12 deficiency (cardiovascular, inflammatory and oxidative markers all within normal limits)	Alpha lipoic acid 200mg: 1 tab TID As noted in "Nutrient Imbalances"
Mental, Emotional, Spiritual		
High-stress work life	N/A	Pending retirement Exercise prescription

Dr. Kara Fitzgerald

Physiological Area	Symptoms/Signs	Potential Testing
Gut health	Abd pain, maldigestion, gas, bloating, irregular BMs, diarrhea, constipation, abx use, H pylori	Comprehensive stool panel GI Map SIBO testing H. pylori testing
Infection	Fatigue, pain, cognitive, brain fog, history of exposure (travel, outdoor time, etc)	Lyme screening Viral panel (EBV, CMV, heptatits) O&Px3
Detoxification	Irregular BMs, fatigue, pain, brain fog	NutrEval, EnviroTox panel
Energy Production	Fatigue, muscle aches, anxiety, mood disorders, blood sugar imbalance	NutrEval, Organic Acids, fasting BG, fasting Insulin, A1c
Oxidative imbalance	Weight fluctuations, allergies, skin rashes, fatigue	NutrEval
Immune imbalance/inflammation	Frequent infection, pain, gut trouble, etc	hsCRP, sed rate, ANA, total IgA
Hormonal Imbalance	Menstrual irregularity, PMS, short luteal phase, scanty menses, heavy menses, endometriosis, OCP use, etc	DUTCH test (plus, cycle map), adrenal testing, complete thyroid
Structural	Suspected endometriosis, fibroids, blocked tubes, vaginal/reproductive dysbiosis	Ultrasound, laparoscopy, HSG, Mayan abdominal massage practitioner, Vaginosis profile

Some Favorite Labs

Genova NutrEval

3001 NutrEval Plasma - Plasma and Blood

Results Overview

Functional Imbalance Scores

Key 0-4 : Minimal Need for Support | 5-7 : Moderate Need for Support | 8-10 : High Need for Support

Need for Antioxidant Support		Need for Mitochondrial Support		Need for Inflammation Support		Need for Reduced Exposure		Need for Methylation Support	
Oxidative Stress		**Mitochondrial Dysfunction**		**Omega Imbalance**		**Toxic Exposure**		**Methylation Imbalance**	
5		0		6		0		0	
Cyst(e)ine	●	Glutathione	●	Omega-3 Index	▽	Lead	●	Methylmalonic Acid	●
Lipid Peroxides	△	CoQ10	▲	Omega 6/3 Ratio	▽	Mercury	●	Methionine	●
8-OHdG	●	Magnesium	▽	α-Linolenic Acid	▼	α-Hydroxyisobutyric Acid	●	Glutathione	●
Glutathione	●	FIGLU	●	Arachidonic Acid	●	α-Ketophenylacetic Acid	●	FIGLU	●
Taurine	●	Methylmalonic Acid	●	Linoleic Acid	●	Arsenic	●	Sarcosine	●
Citric Acid	●	Glutaric Acid	●	γ-Linolenic Acid	▼	Cadmium	●	Vanillmandelic Acid	▽
cis-Aconitic Acid	●	Lactic Acid	▽	Dihomo-γ-linolenic Acid	▼	Pyroglutamic Acid	●	Arginine	●
		Pyruvic Acid	▽			Orotic Acid	▽	Glycine	●
		Citric Acid	●			Citric Acid	●	Serine	●
		cis-Aconitic Acid	●			cis-Aconitic Acid	●	Creatinine	●
		Isocitric Acid	●			Isocitric Acid	●		
		α-Ketoglutaric Acid	●			Glutaric Acid	●		
		Succinic Acid	●						
		Malic Acid	●						
		Adipic Acid	●						
		Suberic Acid	●						
		Manganese	▽						

Nutrient Need Overview

	DRI	Suggested Recommendations	Provider Recommendations
Antioxidants			
Vitamin A	2,333 IU	3,000 IU	
Vitamin C	75 mg	250 mg	
Vitamin E / Tocopherols	22 IU	100 IU	
α-Lipoic Acid		50 mg	
CoQ10		30 mg	
Glutathione			
Plant-based Antioxidants			
B-Vitamins			
Thiamin - B1	1.1 mg	25 mg	
Riboflavin - B2	1.1 mg	10 mg	
Niacin - B3	14 mg	30 mg	
Pyridoxine - B6	1.3 mg	10 mg	
Biotin - B7	30 mcg	100 mcg	
Folate - B9	400 mcg	400 mcg	
Cobalamin - B12	2.4 mcg	100 mcg	
Minerals			
Magnesium	320 mg	600 mg	
Manganese	1.8 mg	7.0 mg	
Molybdenum	45 mcg	75 mcg	
Zinc	8 mg	10 mg	
Essential Fatty Acids			
Omega-3 Fatty Acids	500 mg	1,000 mg	
GI Support			
Digestive Support/Enzymes		0 IU	
Microbiome Support/Probiotics		10 billion CFU	

Organic Acids

Malabsorption & Dysbiosis Markers

Malabsorption Markers

		Reference Range
Indoleacetic Acid	1.1	<= 4.2
Phenylacetic Acid	0.08	<= 0.12

Dysbiosis Markers

		Reference Range
Dihydroxyphenylpropionic Acid (DHPPA)	0.7	<= 5.3
3-Hydroxyphenylacetic Acid	5.4	<= 8.1
4-Hydroxyphenylacetic Acid	19	<= 29
Benzoic Acid	0.02	<= 0.05
Hippuric Acid	214	<= 603

Yeast / Fungal Dysbiosis Markers

		Reference Range
D-Arabinitol	32	<= 36
Citramalic Acid	2.2	<= 5.8
Tartaric Acid	<dl	<= 15

Vitamin Markers

Branched-Chain Catabolites (B1, B2, B3, ALA)

		Reference Range
α-Ketoadipic Acid	0.3	<= 1.7
α-Ketoisovaleric Acid	0.30	<= 0.97
α-Ketoisocaproic Acid	0.36	<= 0.89
α-Keto-β-Methylvaleric Acid	1.3	<= 2.1
Glutaric Acid	0.19	<= 0.51
Isovalerylglycine	1.8	<= 3.7

Methylation Markers (Folate, B12)

		Reference Range
Formiminoglutamic Acid (FIGlu)	1.1	<= 1.5
Methylmalonic Acid	0.4	<= 1.9

Biotin Markers

		Reference Range
3-Hydroxypropionic Acid	7	5-22
3-Hydroxyisovaleric Acid	11	<= 29

Cellular Energy & Mitochondrial Markers

Fatty Acid Metabolism

		Reference Range
Adipic Acid	1.5	<= 2.8
Suberic Acid	0.5	<= 2.1

Carbohydrate Metabolism

		Reference Range
Pyruvic Acid	9	7-32
Lactic Acid	2.6	1.9-19.8
α-Hydroxybutyric Acid	0.83	<= 0.83
β-OH-Butyric Acid	>20.3	<= 2.8
β-OH-β-Methylglutaric Acid	7	<= 15

Energy Metabolism

		Reference Range
Citric Acid	127	40-520
cis-Aconitic Acid	16	10-36
Isocitric Acid	46	22-65
α-Ketoglutaric Acid	10	4-52
Succinic Acid	2.7	0.4-4.6
Malic Acid	1.3	<= 3.0

Neurotransmitter Metabolites

Kynurenine Markers (Vitamin B6)

		Reference Range
Kynurenic Acid	3.7	<= 7.1
Quinolinic Acid	3.8	<= 9.1
Kynurenic / Quinolinic Ratio	0.97	>= 0.44
Xanthurenic Acid	0.67	<= 0.96

Catecholamine Markers

		Reference Range
Homovanillic Acid	1.4	1.2-5.3
Vanilmandelic Acid	0.8	0.4-3.6
3-Methyl-4-OH-phenylglycol	0.03	0.02-0.22

Serotonin Markers

		Reference Range
5-OH-indoleacetic Acid	9.2	3.8-12.1

Toxin & Detoxification Markers

		Reference Range
Pyroglutamic Acid	26	16-34
α-Ketophenylacetic Acid (from Styrene)	0.25	<= 0.46
α-Hydroxyisobutyric Acid (from MTBE)	4.4	<= 6.7
Orotic Acid	0.40	0.33-1.01

Methodology: GCMS, LC/MS/MS, Alkaline Picrate, Colorimetric

Organic Acid Reference Ranges are Age Specific

Organic Acids

Oxalate Markers

		Reference Range
Glyceric Acid	5.2	3.5-16.4
Glycolic Acid	22	<= 67
Oxalic Acid	17	<= 78

All biomarkers reported in mmol/mol creatinine.

Creatinine Concentration

		Reference Range
Creatinine •	18.9	3.1-19.5 mmol/L

Oxidative Stress Markers

Antioxidants

		Reference Range
Glutathione (whole blood)	1,337	>= 669 micromol/L
Coenzyme Q10, Ubiquinone (serum)	4.85	0.43-1.49 mcg/mL

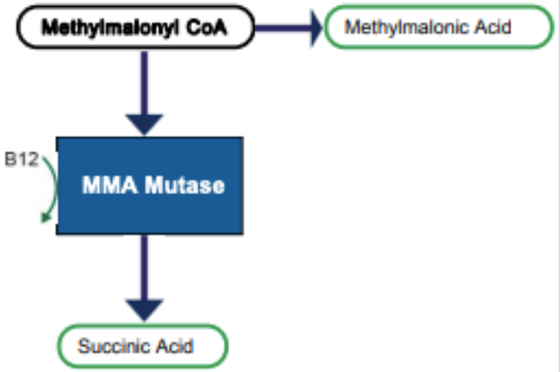
Oxidative Damage

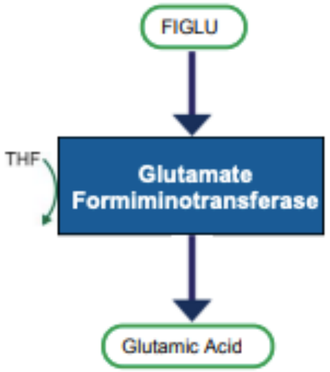
		Reference Range
Lipid Peroxides (urine)	7.7	<= 10.0 micromol/g Creat.
8-OHdG (urine)	5	<= 15 mcg/g Creat.

The Oxidative Stress reference ranges are based on an adult population.

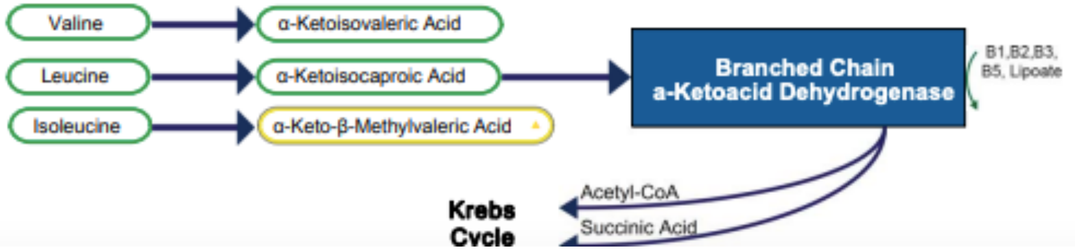
Pathways

Methylation Markers





Branch-Chain Amino Acid Metabolism



Amino Acids (Plasma)

Nutritionally Essential Amino Acids

Amino Acid		Reference Range
Arginine	8.1	6.0-17.5
Histidine	8.0	6.5-13.3
Isoleucine	6.95	5.79-18.69
Leucine	12.7	12.1-36.1
Lysine	20.8	13.7-34.7
Methionine	3.6	2.3-6.5
Phenylalanine	8.80	6.07-17.46
Taurine	6.58	4.41-10.99
Threonine	9.80	6.42-16.32
Tryptophan	3.38	2.65-6.67
Valine	28.8	18.3-42.6

Nonessential Protein Amino Acids

Amino Acid		Reference Range
Alanine	31	23-62
Asparagine	6.0	3.5-11.6
Aspartic Acid	<dl	<= 0.67
Cyst(e)ine	8.1	5.9-19.9
γ-Aminobutyric Acid	<dl	<= 0.06
Glutamic Acid	3.3	2.0-14.5
Glutamine	48	44-111
Proline	18	15-57
Tyrosine	6.6	6.2-18.5

Intermediary Metabolites

B-Vitamin Markers		Reference Range
α-Aminoadipic Acid	0.07	<= 0.28
α-Amino-N-butyric Acid	6.50	1.76-9.99
β-Aminoisobutyric Acid	0.37	<= 0.72
Cystathionine	<dl	<= 0.09

Urea Cycle Markers		
Citrulline	2.6	1.6-5.7
Ornithine	7.18	4.38-15.42
Urea •	429	216-1,156

Glycine/Serine Metabolites		
Glycine	14	5-23
Serine	5.6	2.1-7.0
Ethanolamine	0.63	0.19-0.78
Phosphoethanolamine	0.25	0.15-0.64
Phosphoserine	<dl	<= 0.39
Sarcosine	0.09	<= 0.15

Dietary Peptide Related Markers		Reference Range
1-Methylhistidine	0.39	<= 1.64
3-Methylhistidine	0.39	<= 0.78
β-Alanine	0.5	<= 0.7

Amino Acid reference ranges are age specific.

Methodology: LC/MS/MS

Essential & Metabolic Fatty Acids (RBCs)

Omega-3 Fatty Acids

Analyte		Reference Range
	(cold water fish, flax, walnut)	
α-Linolenic (ALA) 18:3 n3	<dl	>= 0.09 wt %
Eicosapentaenoic (EPA) 20:5 n3	0.96	>= 0.16 wt %
Docosapentaenoic (DPA) 22:5 n3	2.10	>= 1.14 wt %
Docosahexaenoic (DHA) 22:6 n3	6.2	>= 2.1 wt %
% Omega-3s	8.3	>= 3.8

Omega-9 Fatty Acids

Analyte		Reference Range
	(olive oil)	
Oleic 18:1 n9	12	10-13 wt %
Nervonic 24:1 n9	2.9	2.1-3.5 wt %
% Omega-9s	15.5	13.3-16.6

Saturated Fatty Acids

Analyte		Reference Range
	(meat, dairy, coconuts, palm oils)	
Palmitic C16:0	20	18-23 wt %
Stearic C18:0	17	14-17 wt %
Arachidic C20:0	0.24	0.22-0.35 wt %
Behenic C22:0	0.89	0.92-1.68 wt %
Tricosanoic C23:0	0.16	0.12-0.18 wt %
Lignoceric C24:0	2.5	2.1-3.8 wt %
Pentadecanoic C15:0	0.06	0.07-0.15 wt %
Margaric C17:0	0.28	0.22-0.37 wt %
% Saturated Fats	41.4	39.8-43.6

Omega-6 Fatty Acids

Analyte		Reference Range
	(vegetable oil, grains, most meats, dairy)	
Linoleic (LA) 18:2 n6	12.5	10.5-16.9 wt %
γ-Linolenic (GLA) 18:3 n6	<dl	0.03-0.13 wt %
Dihomo-γ-linolenic (DGLA) 20:3 n6	1.14	>= 1.19 wt %
Arachidonic (AA) 20:4 n6	17	15-21 wt %
Docosatetraenoic (DTA) 22:4 n6	1.82	1.50-4.20 wt %
Eicosadienoic 20:2 n6	0.24	<= 0.26 wt %
% Omega-6s	33.0	30.5-39.7

Monounsaturated Fatty Acids

Omega-7 Fatty Acids

		Reference Range
Palmitoleic 16:1 n7	0.26	<= 0.64 wt %
Vaccenic 18:1 n7	1.30	<= 1.13 wt %

Trans Fats

Elaidic 18:1 n9t	0.28	<= 0.59 wt %

Delta-6-Desaturase Activity

	Upregulated Functional Impaired	Reference Range
Linoleic / DGLA 18:2 n6 / 20:3 n6	11.0	6.0-12.3

Cardiovascular Risk

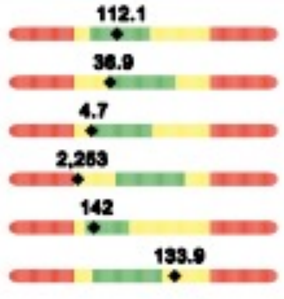
Analyte		Reference Range
Omega-6s / Omega-3s	4.0	3.4-10.7
AA / EPA 20:4 n6 / 20:5 n3	18	12-125
Omega-3 Index	6.2	>= 4.0

The Essential Fatty Acid reference ranges are based on an adult population.

Elemental Markers

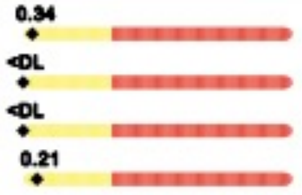
Nutrient Elements

Element	Reference Range
Copper *(plasma)*	75.3-192.0 mcg/dL
Magnesium *(RBC)*	30.1-56.5 mcg/g
Manganese *(whole blood)*	3.0-16.5 mcg/L
Potassium *(RBC)*	2,220-3,626 mcg/g
Selenium *(whole blood)*	109-330 mcg/L
Zinc *(plasma)*	64.3-159.4 mcg/dL



Toxic Elements*

Element	Reference Range
Lead	<= 2.81 mcg/dL
Mercury	<= 4.35 mcg/L
Arsenic	<= 13.7 mcg/L
Cadmium	<= 1.22 mcg/L



* All toxic Elements are measured in whole blood. The reference ranges for Lead, Mercury, and Cadmium are derived from the 95th percentile from NHANES

The Elemental reference ranges are based on an adult population.

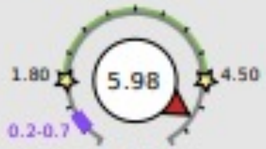
Elemental testing performed by Genova Diagnostics, Inc. 3425 Corporate Way, Duluth, GA 30096 - Robert M. David, PhD, Lab Director - CLIA Lic. #11D0255349 - Medicare Lic. #34-8475

DUTCH Plus & Cycle Map

Hormone Testing Summary

Key (how to read the results):

Sex Hormones
See Pages 2 and 3 for a thorough breakdown of sex hormone metabolites



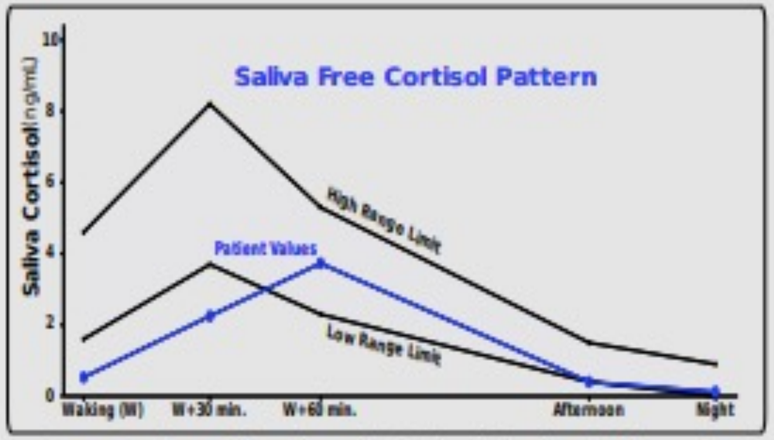
Estradiol(E2)

Progesterone
(Serum Equivalent, ng/mL)

Progesterone Serum Equivalent is a calculated value based on urine pregnanediol.

Testosterone

Adrenal Hormones
See pages 4 and 5 for a more complete breakdown of adrenal hormones



Total DHEA Production

Age	Range
20-39	1300-3000
40-59	750-2000
>60	500-1200

Total DHEA Production
(DHEAS + Etiocholanolone + Androsterone)

Saliva Cortisol Total
(Sum of 5 values)

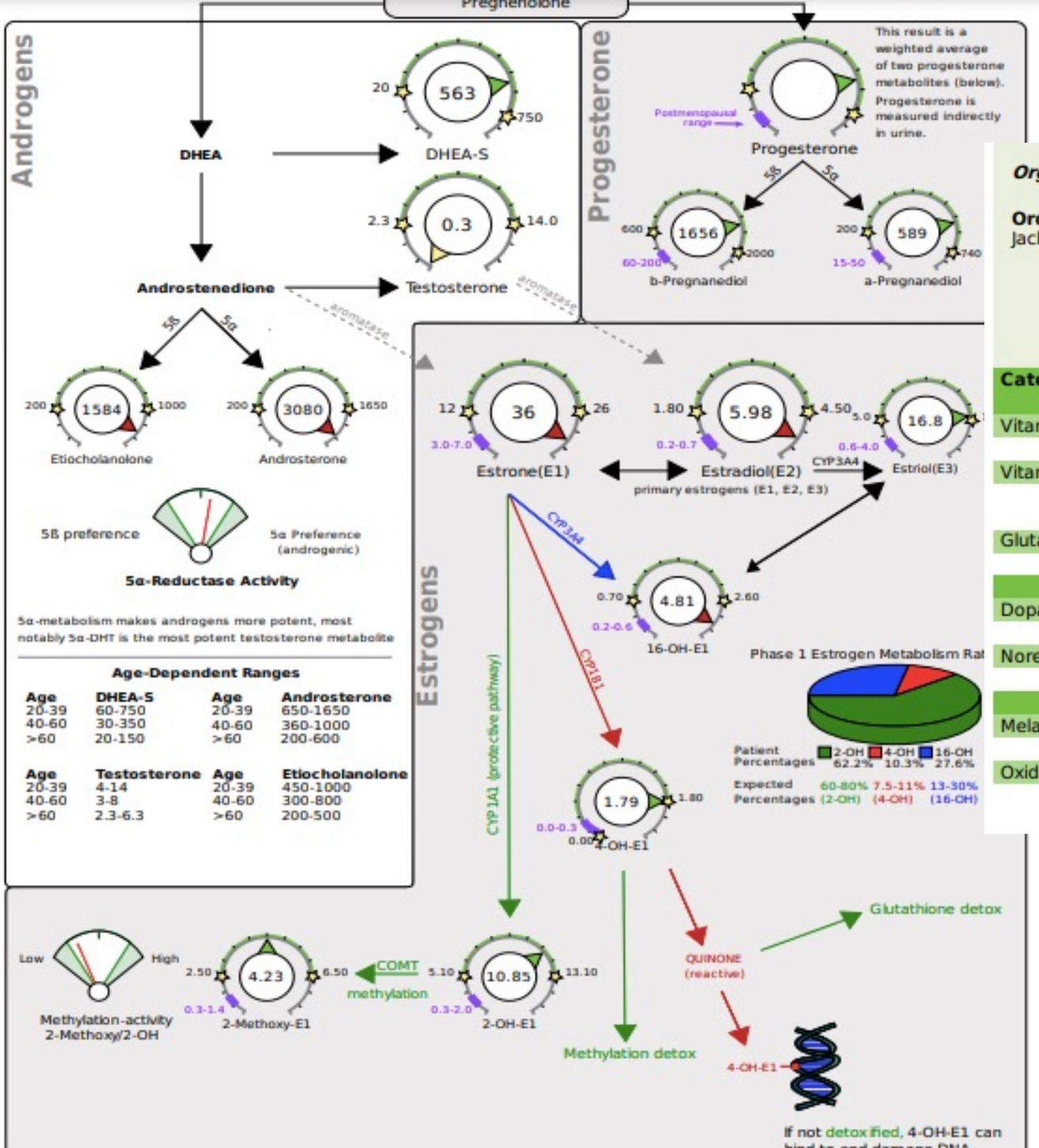
cortisol metabolism

Metabolized Cortisol (THF+THE)
(Total Cortisol Production)

Free cortisol best reflects tissue levels. Metabolized cortisol best reflects total cortisol production.

The following videos (which can also be found on the website under the listed names along with others) may aid your understanding:
DUTCH Plus Overview **(quick overview)** Estrogen Tutorial Female Androgen Tutorial Cortisol/CAR Tutorial

PLEASE BE SURE TO READ BELOW FOR ANY SPECIFIC LAB COMMENTS. More detailed comments can be found on page 7.



Organic Acid Tests (OATs)

Ordering Provider:
Jaclyn Smeaton ND

DOB: 1985-03-12
Age: 36
Gender: Female

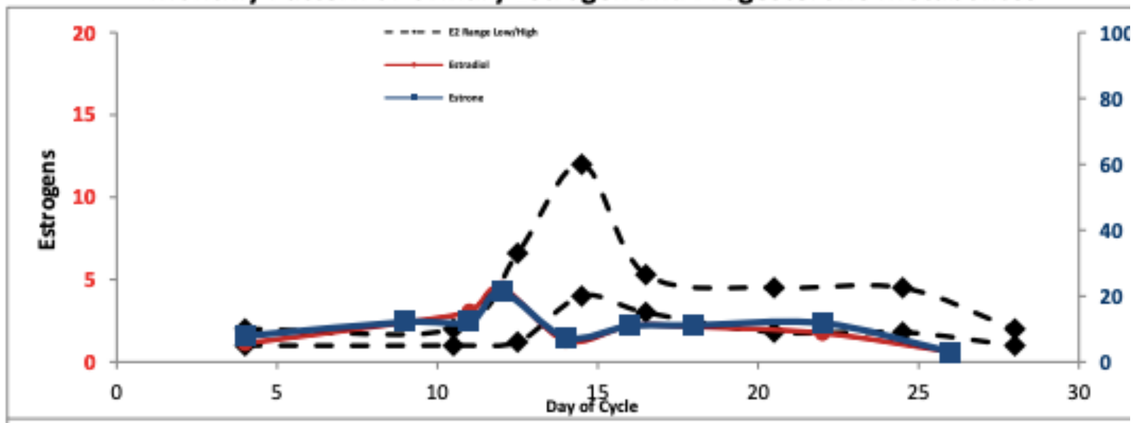
Last Menstrual Period:
2021-06-11

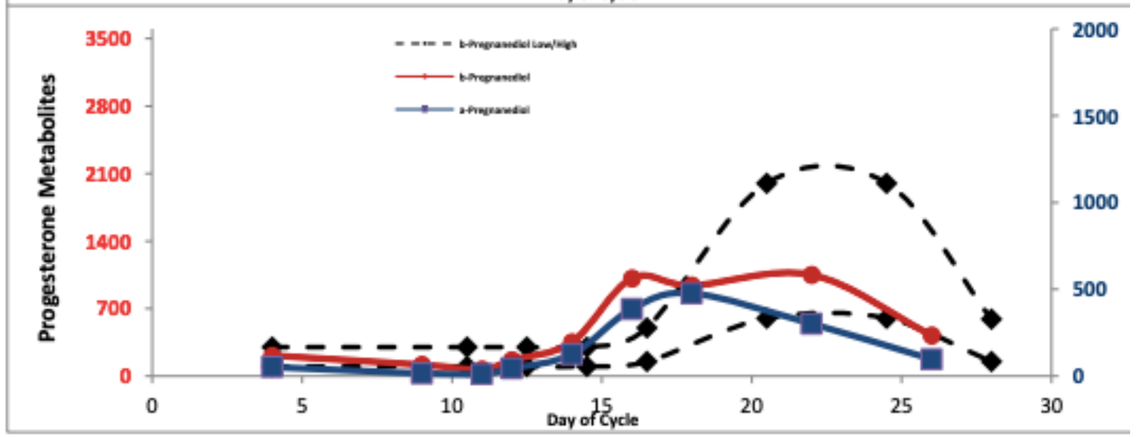
Collection Times:
2021-07-01 04:45AM (S)
2021-07-01 05:18AM (S)
2021-07-01 05:50AM (S)
2021-07-01 05:00PM (S)
2021-07-01 09:30PM (S)
2021-07-01 04:50AM (U)
2021-07-01 07:00AM (U)
2021-07-01 04:50PM (U)
2021-07-01 09:30PM (U)

Category	Test		Result	Units	Normal Range
Nutritional Organic Acids					
Vitamin B12 Marker (may be deficient if high) - (Urine)					
	Methylmalonate (MMA)	Within range	1.0	ug/mg	0 - 2.5
Vitamin B6 Markers (may be deficient if high) - (Urine)					
	Xanthurenate	Within range	0.20	ug/mg	0.12 - 1.2
	Kynurenate	Within range	1.4	ug/mg	0.8 - 4.5
Glutathione Marker (may be deficient if low or high) - (Urine)					
	Pyroglutamate	Within range	47.5	ug/mg	28 - 58
Neurotransmitter Metabolites					
Dopamine Metabolite - (Urine)					
	Homovanillate (HVA)	Low end of range	4.1	ug/mg	3 - 11
Norepinephrine/Epinephrine Metabolite - (Urine)					
	Vanilmandelate (VMA)	Within range	2.9	ug/mg	2.2 - 5.5
Melatonin (*measured as 6-OH-Melatonin-Sulfate) - (Urine)					
	Melatonin* (Waking)	Above range	822.2	ng/mg	10 - 85
Oxidative Stress / DNA Damage, measured as 8-Hydroxy-2-deoxyguanosine (8-OHdG) - (Urine)					
	8-OHdG (Waking)	Within range	2.2	ng/mg	0 - 5.2

DUTCH - Cycle Mapping

Monthly Pattern of Urinary Estrogen and Progesterone Metabolites



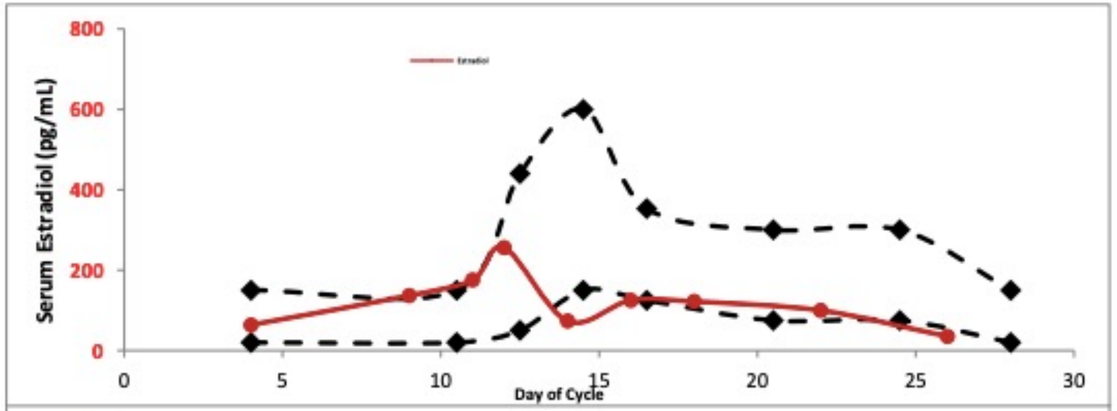


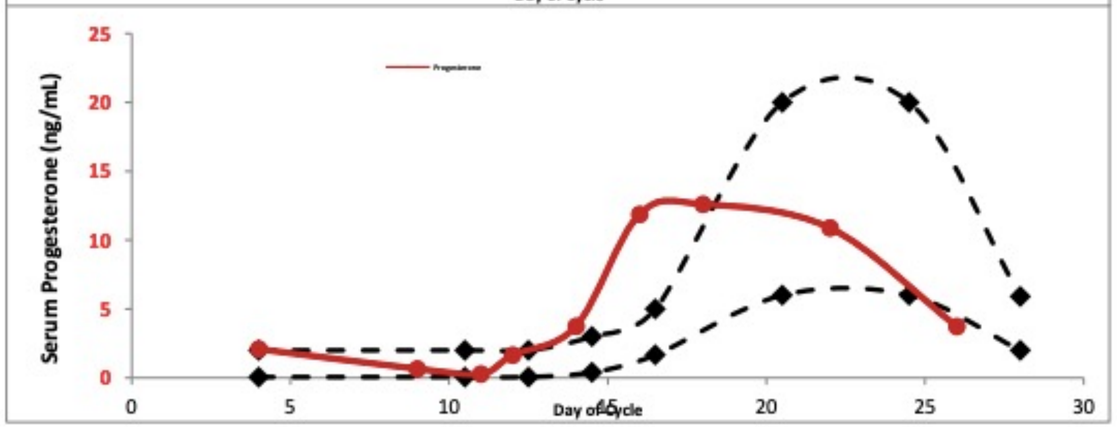
All values given in ng/mg creatinine

Measurement	1	2	3	4	5	6	7	8	
Day of Cycle	4	9	11	12	14	16	18	22	
Estradiol (E2)	1.1	2.4	3.1	4.5	1.3	2.2	2.1	1.7	
Estrone (E1)	7.9	12.1	12.1	21.2	7.5	10.9	11.1	11.8	
a-Pregnanediol	52	15	12	44	125	386	476	301	
b-Pregnanediol	213	117	68	165	351	1014	939	1049	
b-Pg / E2 Ratio	190	49	22	37	274	463	440	601	684

DUTCH - Cycle Mapping

Monthly Pattern of Estradiol and Progesterone - Serum Equivalent Estimates*





Measurement	1	2	3	4	5	6	7	8	9
Day of Cycle	4	9	11	12	14	16	18	22	26
Estradiol(pg/mL)	63.8	136.6	175.3	256.3	73.2	125.0	121.9	99.6	35.2
Progesterone(ng/mL)	2.1	0.7	0.3	1.7	3.8	11.9	12.6	10.9	3.7

Doctor's Data- Vaginosis Profile

Vaginosis Profile

GRAM STAIN MICROSCOPY

	Normal	Abnormal	Expected
Lactobacilli	Many		Mod - Many
Curved Gram Negative Rods	None		None
Small Gram Negative Rods	None		None
Yeast	None		None
RBC's	None		None
WBC's	0		0 - 6
Clue Cells	None		None
Eosinophils	N/A		None

Eosinophils reported and Wrights Stain performed when WBC's >6

BACTERIAL VAGINOSIS SCORE

0

score interpretation:
0 - 3 BV not likely
4 - 6 BV indeterminate
7-10 BV highly suggestive

The BV score[1] is calculated based upon the gram stain results and is independent of the yeast, and bacterial cultures.
[1]Nugent Scoring System. (Nugent et al. J. Clin. Micro. (1991)29:297-301)

YEAST CULTURE

No yeast isolated

Additional Gram Stain Findings:

Few Gram positive cocci in clusters

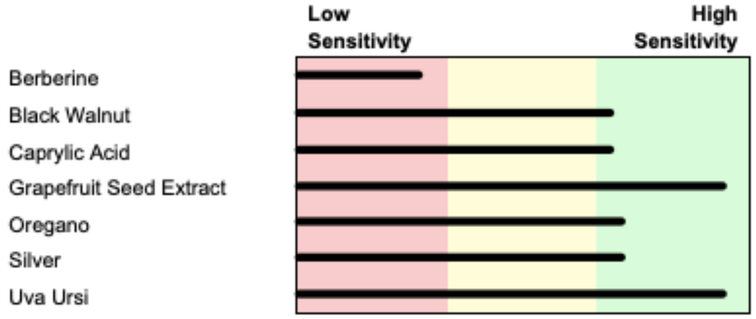
BACTERIOLOGY CULTURE

Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
4+ Lactobacillus spp.	1+ Bifidobacterium	3+ Staphylococcus aureus
	1+ Staphylococcus epidermidis	

NG = No Growth

Bacterial Susceptibilities: **Staphylococcus aureus**

NATURAL ANTIBACTERIALS



Natural antibacterial agents may be useful for treatment of patients when organisms display in-vitro sensitivity to these agents. The test is performed by using standardized techniques and filter paper disks impregnated with the listed agent. Relative sensitivity is reported for each natural agent based upon the diameter of the zone of inhibition surrounding the disk. Data based on over 5000 individual observations were used to relate the zone size to the activity level of the agent. A scale of relative sensitivity is defined for the natural agents tested.

Other Useful Labs

Diagnostic Solutions laboratory

5895 Shiloh Rd, Ste 101
Alpharetta GA 30005
877-485-5336

GI Map

Pathogens		
Bacterial Pathogens	Result	Normal
Campylobacter	**<dl**	<1.00e3
C. difficile, Toxin A	**<dl**	<1.00e3
C. difficile, Toxin B	**<dl**	<1.00e3
Enterohemorrhagic E. coli	**1.76e1**	<1.00e3
E. coli O157	**<dl**	<1.00e3
Enteroinvasive E. coli/Shigella	**<dl**	<1.00e2
Enterotoxigenic E. coli LT/ST	**<dl**	<1.00e3
Shiga-like Toxin *E. coli* stx1	**<dl**	<1.00e3
Shiga-like Toxin *E. coli* stx2	**<dl**	<1.00e3
Salmonella	**<dl**	<1.00e4
Vibrio cholerae	**<dl**	<1.00e5
Yersinia enterocolitica	**<dl**	<1.00e5
Parasitic Pathogens	Result	Normal
Cryptosporidium	**<dl**	<1.00e6
Entamoeba histolytica	**<dl**	<1.00e4
Giardia	**<dl**	<5.00e3
Viral Pathogens	Result	Normal
Adenovirus 40/41	**<dl**	<1.00e10
Norovirus GI/II	**<dl**	<1.00e7

H. pylori

	Result		Normal
Helicobacter pylori	**2.4e3**	**High**	<1.0e3
Virulence Factor, babA	**Negative**		Negative
Virulence Factor, cagA	**Negative**		Negative
Virulence Factor, dupA	**Negative**		Negative
Virulence Factor, iceA	**Negative**		Negative
Virulence Factor, oipA	**Negative**		Negative
Virulence Factor, vacA	**Negative**		Negative
Virulence Factor, virB	**Negative**		Negative
Virulence Factor, virD	**Negative**		Negative

Normal Bacterial Flora

	Result		Normal
Bacteroides fragilis	**3.32e10**		1.60e9 - 2.50e11
Bifidobacterium spp.	**9.64e10**		>6.70e7
Enterococcus spp.	**8.28e5**		1.9e5 - 2.00e8
Escherichia spp.	**3.16e7**		3.70e6 - 3.80e9
Lactobacillus spp.	**2.42e6**		8.6e5 - 6.20e8
Clostridia (class)	**5.78e7**	**High**	5.00e6 - 5.00e7
Enterobacter spp.	**4.38e6**		1.00e6 - 5.00e7
Akkermansia muciniphila	**<dl**		1.00e1 - 5.00e4
Faecalibacterium prausnitzii	**4.25e4**		1.00e3 - 5.00e8

Phyla Microbiota	Result		Normal
Bacteroidetes	**2.09e11**	**Low**	8.61e11 - 3.31e12
Firmicutes	**1.59e11**		5.70e10 - 3.04e11
Firmicutes:Bacteroidetes Ratio	**0.76**		<1.00

Opportunistic Bacteria

Additional Dysbiotic/Overgrowth Bacteria	Result		Normal
Bacillus spp.	**9.46e5**	**High**	<1.50e5
Enterococcus faecalis	**<dl**		<1.00e4
Enterococcus faecium	**2.03e2**		<1.00e4
Morganella spp.	**4.90e4**	**High**	<1.00e3
Pseudomonas spp.	**4.81e4**	**High**	<1.00e4
Pseudomonas aeruginosa	**<dl**		<5.00e2
Staphylococcus spp.	**<dl**		<1.00e4
Staphylococcus aureus	**1.51e2**		<5.00e2
Streptococcus spp.	**6.70e3**	**High**	<1.00e3
Methanobacteriaceae (family)	**5.73e8**		<5.00e9

Potential Autoimmune Triggers	Result		Normal
Citrobacter spp.	**<dl**		<5.00e6
Citrobacter freundii	**<dl**		<5.00e5
Klebsiella spp.	**2.28e4**	**High**	<5.00e3
Klebsiella pneumoniae	**<dl**		<5.00e4
M. avium subsp. paratuberculosis	**<dl**		<5.00e3
Prevotella spp.	**5.29e6**		<1.00e8
Proteus spp.	**<dl**		<5.00e4
Proteus mirabilis	**<dl**		<1.00e3
Fusobacterium spp.	**6.62e6**		<1.00e8

Fungi/Yeast

	Result	Normal
Candida spp.	**1.28e2**	<5.00e3
Candida albicans	**<dl**	<5.00e2
Geotrichum spp.	**<dl**	<3.00e2
Microsporidium spp.	**<dl**	<5.00e3
Rodotorula spp.	**<dl**	<1.00e3

Viruses

	Result	Normal
Cytomegalovirus	**<dl**	<1.00e5
Epstein Barr Virus	**<dl**	<1.00e7

Parasites

Protozoa	Result	Normal
Blastocystis hominis	**<dl**	<2.00e3
Chilomastix mesnili	**<dl**	<1.00e5
Cyclospora spp.	**<dl**	<5.00e4
Dientamoeba fragilis	**<dl**	<1.00e5
Endolimax nana	**<dl**	<1.00e4
Entamoeba coli	**<dl**	<5.00e6
Pentatrichomonas hominis	**<dl**	<1.00e2

Worms	Result	Normal
Ancylostoma duodenale	**Not Detected**	Not Detecte
Ascaris lumbricoides	**Not Detected**	Not Detecte
Necator americanus	**Not Detected**	Not Detecte
Trichuris trichiura	**Not Detected**	Not Detecte
Taenia spp.	**Not Detected**	Not Detecte

Intestinal Health

Digestion	Result	Normal
Steatocrit	**<dl**	<15 %
Elastase-1	**347**	>200 ug/g

GI Markers	Result	Normal
b-Glucuronidase	**398**	<2486 U/mL
Occult Blood - FIT	**0**	<10 ug/g

Immune Response	Result		Normal
Secretory IgA	**767**		510 - 2010 ug/g
Anti-gliadin IgA	**163**	High	0 - 157 U/L

Inflammation	Result	Normal
Calprotectin	**57**	<173 ug/g

Antibiotic Resistance Genes, phenotypes

Helicobacter		Result			Expected Result
Amoxicillin		**Negative**			Negative
A926G	Absent	AGA926-928TTC	Absent		
Clarithromycin		**Negative**			Negative
A2142C	Absent	A2142G	Absent	A2143G	Absent
Fluoroquinolones		**Negative**			Negative
gyrA N87K	Absent	gyrA D91N	Absent	gyrA D91G	Absent
gyrB S479N	Absent	gyrB R484K	Absent		
Tetracycline		**Negative**			Negative
PBP1A S414R	Absent	PBP1A T556S	Absent	PBP1A N562Y	Absent

Intestinal Health

Digestion	Result		Normal
Steatocrit	**<dl**		<15 %
Elastase-1	**301**		>200 ug/g

GI Markers	Result		Normal
b-Glucuronidase	**4419**	High	<2486 U/mL
Occult Blood - FIT	**0**		<10 ug/g

Immune Response	Result		Normal
Secretory IgA	**274**	Low	510 - 2010 ug/g
Anti-gliadin IgA	**50**		0 - 157 U/L

Inflammation	Result	Normal
Calprotectin	**14**	<173 ug/g

Add-on Test	Result	Normal
Zonulin	**82.8**	<107 ng/g

Great Plains Lab GPL Tox

Toxic Compounds

Metabolite	Result µg/g creatinine	Percentile
Industrial Toxicants		
1) 2-Hydroxyisobutyric Acid (2HIB)	6,482	LLOQ 200 / 75th 7,493 / 95th 11,908

Parent: MTBE/ETBE

MTBE and ETBE are gasoline additives used to improve octane ratings. Exposure to these compounds is most likely due to groundwater contamination, inhalation or skin exposure to gasoline or its vapors, and exhaust fumes. MTBE has been demonstrated to cause hepatic, kidney, and central nervous system toxicity, peripheral neurotoxicity, and cancer in animals. Very high values have been reported in genetic disorders. Because the metabolites of these compounds are the same, ETBE may be similarly toxic.

2) Monoethylphthalate (MEP)	25	LLOQ 5.0 / 75th 73 / 95th 374

Parent: Diethylphthalates

Phthalates may be the most widespread group of toxins in our environment, commonly found in many bath and beauty products, cosmetics, perfumes, oral pharmaceuticals, insect repellants, adhesives, inks, and varnishes. Phthalates have been implicated in reproductive damage, depressed leukocyte function, and cancer. Phthalates have also been found to impede blood coagulation, lower testosterone, and alter sexual development in children. Low levels of phthalates can feminize the male brain of the fetus, while high levels can hyper-masculinize the developing male brain.

3) 2-3-4 Methylhippuric Acid (2,-3-,4-MHA)	154	LLOQ 10 / 75th 603 / 95th 1,623

Parent: Xylene

Xylenes (dimethylbenzenes) are found not only in common products such as paints, lacquers, pesticides, cleaning fluids, fuel and exhaust fumes, but also in perfumes and insect repellents. Xylenes are oxidized in the liver and bound to glycine before eliminated in urine. High exposures to xylene create an increase in oxidative stress, causing symptoms such as nausea, vomiting, dizziness, central nervous system depression, and death. Occupational exposure is often found in pathology laboratories where xylene is used for tissue processing.

Toxic Compounds

Metabolite	Result µg/g creatinine	Percentile
4) Phenylglyoxylic Acid (PGO)	291	LLOQ 5.0 / 75th 279 / 95th 562

Parent: Styrene/Ethylbenzene

Styrene is used in the manufacturing of plastics, in building materials, and is found in car exhaust fumes. Polystyrene and its copolymers are widely used as food-packaging materials. The ability of styrene monomer to leach from polystyrene packaging to food has been reported. Occupational exposure due to inhalation of large amounts of styrene adversely impacts the central nervous system, causes concentration problems, muscle weakness, fatigue, and nausea, and irritates the mucous membranes of the eyes, nose, and throat.

5) N-acetyl phenyl cysteine (NAP)	N.D.	LLOQ 0.20 / 75th 1.2 / 95th 3.0

Parent: Benzene

Benzene is an organic solvent that is widespread in the environment. Benzene is a by-product of all types of industrial processes and combustion, including motor vehicle exhaust and cigarette smoke, and is released by outgassing from synthetic materials. Benzene is an extremely toxic chemical that is mutagenic and carcinogenic. High exposures to benzene cause symptoms of nausea, vomiting, dizziness, lack of coordination, central nervous system depression, and death. It can also cause hematological abnormalities.

6) N-acetyl(2-cyanoethyl)cysteine (NACE)	0.34	75th 5.8 / 95th 227

Parent: Acrylonitrile

Acrylonitrile is a colorless liquid with a pungent odor. It is used in the production of acrylic fibers, resins, and rubber. Use of any of these products could lead to exposure to acrylonitrile. Smoking tobacco and cigarettes is another potential exposure. Exposure to acrylonitrile can lead to headaches, nausea, dizziness, fatigue, and chest pains. The European Union has classified acrylonitrile as a carcinogen.

7) Perchlorate (PERC)	1.2	LLOQ 2.0 / 75th 4.9 / 95th 11

Parent: Perchlorate

This chemical is used in the production of rocket fuel, missiles, fireworks, flares, explosives, fertilizers, and bleach. Studies show that perchlorate is often found in water supplies. Many food sources are also contaminated with percholate. Percholate can disrupt the thyroid's ability to produce hormones. The EPA has also labeled perchlorate a likely human carcinogen. Patients that are high in perchlorate can use a reverse osmosis water treatment system.

Toxic Compounds

Metabolite	Result µg/g creatinine	Percentile
8) Diphenyl phosphate (DPP)	0.58	LLOQ 1.0, 75th 1.6, 95th 5.5

Parent: Diphenyl Phosphate

This is a metabolite of the organophosphate flame retardant triphenyl phosphate (TPHP), which is used in plastics, electronic equipment, nail polish, and resins. TPHP can cause endocrine disruption. Studies have also linked TPHP to reproductive and developmental problems.

Metabolite	Result µg/g creatinine	Percentile
9) 2-hydroxyethyl mercapturic (HEMA)	1.5	LLOQ 0.80, 75th 1.9, 95th 5.1

Parent: Ethylene oxide, Vinyl chloride, Halopropane

High HEMA may be due to exposure to ethylene oxide, which is used in many different industries including agrochemicals detergents, pharmaceuticals, and personal care products. Ethylene oxide is also used as a sterilant on rubber, plastics, and electronics. Chronic exposure to ethylene oxide has been determined to be mutagenic to humans. Multiple agencies have reported it as a carcinogen. Studies of people exposed to ethylene oxide show an increased incidence of breast cancer and leukemia. Ethylene oxide may be difficult to detect since it is odorless at toxic levels.

High HEMA may also due to exposure to vinyl chloride, an intermediate in the synthesis of several major commercial chemicals, including polyvinyl chloride, and used in the past as an aerosol propellant. Exposure to vinyl chloride has been associated with increased incidence of autism. High concentrations of vinyl chloride may cause central nervous system depression, nausea, headache, dizziness, liver damage and liver cancer, degenerative bone changes, thrombocytopenia, enlargement of the spleen and even death. To reduce exposure to vinyl chloride, eliminate use of plastic containers for cooking, reheating, eating or drinking (especially warm or hot) food or beverages. Replace these containers with glass, paper, or stainless steel whenever possible. Elimination of vinyl chloride can also be accelerated by sauna treatment, the Hubbard detoxification protocol employing niacin supplementation, vitamin B-12 therapy, by glutathione (reduced) supplementation (oral, intravenous, transdermal, or precursors such as N-acetyl cysteine [NAC]).

Metabolite	Result µg/g creatinine	Percentile
10) N-acetyl(propyl)cysteine (NAPR)	43	LLOQ 4.0, 75th 8.7, 95th 35

Parent: 1-bromopropane

1-bromopropane is an organic solvent used for metal cleaning, foam gluing, and dry cleaning. Studies have shown that 1-BP is a neurotoxin as well as a reproductive toxin. Research indicates that exposure to 1-BP can cause sensory and motor deficits. Chronic exposure can lead to decreased cognitive function and impairment of the central nervous system. Acute exposure can lead to headaches.

Toxic Compounds

Metabolite	Result µg/g creatinine	Percentile
11) N-acetyl(2-hydroxypropyl)cysteine (NAHP)	20	LLOQ 4.0, 75th 48, 95th 180

Parent: Propylene oxide

This chemical is used in the production of plastics and is used as a fumigant. Propylene oxide is used to make polyester resins for textile and construction industries. It is also used in the preparation of lubricants, surfactants, and oil demulsifiers. It has also been used as a food additive, an herbicide, a microbicide, an insecticide, a fungicide, and a miticide. Propylene oxide is a probable human carcinogen.

Metabolite	Result µg/g creatinine	Percentile
12) N-acetyl-S-(2-carbamoylethyl)cysteine (NAE)	108	LLOQ 4.0, 75th 87, 95th 233

Parent: Acrylamide

Acrylamide can polymerize to form polyacrylamide. These chemicals are used in many industrial processes such as plastics, food packaging, cosmetics, dyes, and treatment of drinking water. Food and cigarette smoke are also two major sources of exposure. Acrylamide has been found in foods like potato chips and French fries. This is because asparagine, an important amino acid for central nervous system function, can produce acrylamide when cooked at high temperature in the presence of sugars. Foods rich in asparagine include asparagus, potatoes, legumes, nuts, seeds, beef, eggs, and fish, and are potential sources of exposure to acrylamide. High levels of acrylamide can elevate a patient's risk of cancer. In addition, acrylamide is known to cause neurological damage.

Metabolite	Result µg/g creatinine	Percentile
13) N-acetyl(3,4-dihydroxybutyl)cysteine (NADB)	85	LLOQ 4.0, 75th 390, 95th 624

Parent: 1,3 butadiene

This is a chemical made from the processing of petroleum. It is often a colorless gas with a mild gasoline-like odor. Most of this chemical is used in the production of synthetic rubber. 1,3 butadiene is a known carcinogen and has been linked to increased risk of cardiovascular disease. Individuals that come into contact with rubber, such as car tires, could absorb 1,3 butadiene through the skin. The increased use of old tires in the production of crumb rubber playgrounds and athletic fields is quite concerning since soccer players on such fields have increased cancer rates.

Toxic Compounds

Metabolite	Result µg/g creatinine	Percentile

Organophosphate Insecticide Metabolites

		LLOQ	75th	95th
14) Dimethylphosphate (DMP)	N.D.	4.0	9.1	34

Parent: Organophosphates

Organophosphates are one of the most toxic groups of substances in the world, primarily found in pesticide formulations. They are inhibitors of cholinesterase enzymes, leading to overstimulation of nerve cells, causing sweating, salivation, diarrhea, abnormal behavior, including aggression and depression. Children exposed to organophosphates have more than twice the risk of developing pervasive developmental disorder (PDD), an autism spectrum disorder. Maternal organophosphate exposure has been associated with various adverse outcomes including having shorter pregnancies and children with impaired reflexes.

		LLOQ	75th	95th
15) Diethylphosphate (DEP)	18	0.60	3.2	16

Parent: Organophosphates

Organophosphates are one of the most toxic groups of substances in the world, primarily found in pesticide formulations. They are inhibitors of cholinesterase enzymes, leading to overstimulation of nerve cells, causing sweating, salivation, diarrhea, abnormal behavior, including aggression and depression. Children exposed to organophosphates have more than twice the risk of developing pervasive developmental disorder (PDD), an autism spectrum disorder. Maternal organophosphate exposure has been associated with various adverse outcomes including having shorter pregnancies and children with impaired reflexes.

Herbicide

		LLOQ	75th	95th
16) 2,4-Dichlorophenoxyacetic Acid (2-,4-D)	0.46	0.20	0.50	1.6

2,4-Dichlorophenoxyacetic Acid (2,4-D) is a very common herbicide that was a part of Agent Orange, which was used by the U.S. in the Vietnam War. It is most commonly used in agriculture on genetically modified foods, and as a weed killer for lawns. Exposure to 2, 4-D via skin or oral ingestion is associated with neuritis, weakness, nausea, abdominal pain, headache, dizziness, peripheral neuropathy, stupor, seizures, brain damage, and impaired reflexes. 2, 4-D is a known endocrine disruptor, and can block hormone distribution and cause glandular breakdown.

Toxic Compounds

Metabolite	Result µg/g creatinine	Percentile

		LLOQ	75th	95th
17) 3-hydroxypropylmercapturic acid (3-HPMA)	487	8.0	416	1,460

Parent: Acrolein

3-HPMA is the main urinary metabolite of acrolein. Acrolein is an environmental pollutant, commonly used as an herbicide and in many different chemical industries. Acrolein is also present in the burning of cigarettes, gasoline, and oil. Certain bacteria produce acrolein, such as Clostridium. Acrolein metabolites are associated with diabetes and insulin resistance.

Pyrethroid Insecticide

		LLOQ	75th	95th
18) 3-Phenoxybenzoic Acid (3PBA)	N.D.	0.30	1.0	5.4

Parent: Pyrethroids - Including Permethrin, Cypermethrin, Cyhalothrins, Fenpropathrin, Deltamethrin, Trihalomethrin

Pyrethrins are widely used as insecticides. Exposure during pregnancy doubles the likelihood of autism. Pyrethrins may affect neurological development, disrupt hormones, induce cancer, and suppress the immune system.

Metabolite	Result Creat mmol/mol	Percentile

Marker for Mitochondria Function

		LLOQ	75th	95th
19) Tiglylglycine (TG)	0.75	0.04	4.7	11

Tiglylglycine (TG) is a marker for mitochondrial disorders resulting from mutations of mitochondrial DNA, which can manifest from exposure to toxic chemicals, infections, inflammation, and nutritional deficiencies. TG indicates mitochondrial dysfunction by monitoring a metabolite that is elevated in mitochondrial deficiency of cofactors such as NAD+, flavin-containing coenzymes, and Coenzyme Q10. Disorders associated with mitochondrial dysfunction include autism, Parkinson's disease, and cancer.

Toxic Compounds

Metabolite	Result µg/g creatinine	Percentile
17) 3-hydroxypropylmercapturic acid (3-HPMA)	487	LLOQ 8.0 · 75th 416 · 95th 1,460

Parent: Acrolein

3-HPMA is the main urinary metabolite of acrolein. Acrolein is an environmental pollutant, commonly used as an herbicide and in many different chemical industries. Acrolein is also present in the burning of cigarettes, gasoline, and oil. Certain bacteria produce acrolein, such as Clostridium. Acrolein metabolites are associated with diabetes and insulin resistance.

Pyrethroid Insecticide

18) 3-Phenoxybenzoic Acid (3PBA)	N.D.	LLOQ 0.30 · 75th 1.0 · 95th 5.4

Parent: Pyrethroids - Including Permethrin, Cypermethrin, Cyhalothrins, Fenpropathrin, Deltamethrin, Trihalomethrin

Pyrethrins are widely used as insecticides. Exposure during pregnancy doubles the likelihood of autism. Pyrethrins may affect neurological development, disrupt hormones, induce cancer, and suppress the immune system.

Metabolite	Result Creat mmol/mol	Percentile

Marker for Mitochondria Function

19) Tiglylglycine (TG)	0.75	LLOQ 0.04 · 75th 4.7 · 95th 11

Tiglylglycine (TG) is a marker for mitochondrial disorders resulting from mutations of mitochondrial DNA, which can manifest from exposure to toxic chemicals, infections, inflammation, and nutritional deficiencies. TG indicates mitochondrial dysfunction by monitoring a metabolite that is elevated in mitochondrial deficiency of cofactors such as NAD+, flavin-containing coenzymes, and Coenzyme Q10. Disorders associated with mitochondrial dysfunction include autism, Parkinson's disease, and cancer.

Metabolite	Result µg/g creatinine	Percentile

List of Organophosphate Insecticides that are converted to DEP

15) Diethylphosphate (DEP)	18	LLOQ 0.60 · 75th 3.2 · 95th 16

-Acethion
-Acetoxon
-Akton
-Amiton
-Amiton oxalate
-Athidathion
-Azethion
-Azinphos-ethyl
-Bromophos-ethyl
-Butathiofos
-Carbophenothion
-Chlorethoxyphos
-Chlorfenvinphos
-Chlorphoxim
-Chlorprazophos
-Chlorpyrifos
-Chlorpyrifos oxygen analog
-Chlorthiophos
-Chlorthiophos II
-Chlorthiophos III
-Coumaphos
-Coumithioate
-Cyanthoate
-Demeton
-Demeton-O
-Demeton-S
-Dialifor
-Diazinon
-Diazoxon
-Dichlofenthion
-5-Dichloro-alpha-(chloro-methylene) benzyl diethyl phosphate
-Diethyldithio phosphate
-Diethylthio phosphate
-Dioxathion
-Disulfoton
-Disulfoton sulfone
-Disulfoton sulfoxide
-Ethion
-Ethion O-analog
-Fensulfothion
-Isazophos
-Isoxathion
-Mecarbam
-Miral
-Naphthalophos
-OO-diethyl O-naphthaloximido phosphorothioate
-OO-diethyl phosphoro chloridothionate
-OO-Diethyl S-(46-dimethyl-2-pyrimidinyl) phosphorodithioate
-OO-diethyl-O-phenyl phosphoro thioate
-Paraoxon
-Parathion
-Phenkapton
-Phorate
-Phosalone
-Phoxim
-Pirimiphos ethyl
-Primidophos
-Propoxon
-Prothidathion
-Prothion
-Prothoate
-Pyrazophos
-Pyridiphenthion
-Quinalphos
-Quinothion
-Sulfotep
-TEPP
-Terbufos
-Terbufos sulfone
-Terbufos sulfoxide
-Thionazin
-Thionazin O-analog
-Triazophos

Thank you!

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