

# Infection and Immune Dysregulation - Part Two

This patient is a 51-year-old male ER physician with chief complaint of low libido, fatigue, cold hands and feet, and poor exercise tolerance and recovery. Obviously, based on his profession as an ER physician, you're immediately thinking HPA axis dysregulation, and these signs and symptoms fit that perfectly. You'd probably be thinking about thyroid too, but remember in the HPA axis dysregulation unit, I said that cold hands and feet, which is almost always attributed to thyroid, is also a sign of autonomic nervous system dysregulation. It happens very often in HPA axis dysregulation. It turned out that his thyroid was fine, and for him, it was HPA-D.

Marker	Value	Functional Range	Lab Range
Glucose	88	75 - 85	65 - 99
Hemoglobin A1c	5.3	4.4 - 5.4	4.8 - 5.6
Uric Acid	6.9	M: 3.7 - 6.0	3.7 - 8.6
BUN	22	13 - 18	6 - 24
Creatinine	0.96	0.85 - 1.1	0.76 - 1.27
Sodium	140	135 - 140	134 - 144
Potassium	4.2	4.0 - 4.5	3.5 - 5.2
Chloride	101	100 - 106	97 - 108
CO2	24	25 - 30	19 - 28
Calcium	9.5	9.2 - 10.1	8.7 - 10.2
Phosphorus	2.9	3.5 - 4.0	2.5 - 4.5
Magnesium	2.0	2.0 - 2.5	1.6 - 2.6
Protein, total	7.0	6.9 - 7.4	6.0 - 8.5
Albumin	4.8	4.0 - 5.0	3.5 - 5.5
Globulin	2.2	2.4 - 2.8	1.5 - 4.5
A/G ratio	2.2	1.5 - 2.0	1.1 - 2.5
Bilirubin, total	0.5	0.1 - 1.2	0.0 - 1.2
Alkaline Phosphatase	69	42 - 107	39 - 117
LDH	156	140 - 180	0 - 225
AST	19	10 - 26	0 - 40
ALT	18	10 - 26	0 - 44
GGT	16	10 - 26	0 - 65
TIBC	318	250 - 350	250 - 450
UIBC	203	150 - 375	150 - 375
Iron	115	85 - 135	40 - 155
Iron saturation	36	15 - 40	15 - 55
Ferritin	157	M: 33-100	30 - 400
Cholesterol, total	294	150 - 250	100 - 199
Triglycerides	173	50 - 100	0 - 149
HDL	56	55 - 85	> 39
LDL	203	0 - 175	0 - 99
Triglycerides / HDL Ratio	3.089	< 2	< 3.8
TSH	2.080	0.5 - 2.5	0.450 - 4.500
T4, Total	7.6	6.0 - 12	4.5 - 12.0
T3 Uptake	33	M: 30-38	24 - 39
T3, Total	97	100 - 180	71 - 180
Vitamin D, 25-hydroxy	40.7	35 - 60	30.0 - 100.0
WBC	8.3	5.0 - 8.0	3.4 - 10.8
RBC	5.22	4.4 - 4.9	4.14 - 5.80
Hemoglobin	14.7	M: 14-15	12.6 - 17.7

Marker	Value	Functional Range	Lab Range
Hematocrit	44.8	M: 40-48	37.5 - 51.0
MCV	86	85 - 92	79 - 97
MCH	28.2	27.7 - 32.0	26.6 - 33.0
MCHC	32.8	32 - 35	31.5 - 35.7
RDW	13.7	11.5 - 15.0	12.3 - 15.4
Platelets	197	150 - 415	155 - 379
Neutrophils	40	40 - 60	40 - 74
Lymphocytes	49	25 - 40	14 - 46
Monocytes	8	4.0 - 7.0	4 - 12
Eosinophils	3	0.0 - 3.0	0 - 5
Basophils	0	0.0 - 3.0	0 - 3
B-12	924	450 - 2000	211 - 946
Additional Tests:			

White blood cell count and monocytes were high in the functional range. Lymphocytes were high in the lab range, so one of the questions here is whether there is a viral infection present.

TEST	RESULTS		REFERENCE RANGE	UNITS
	NORMAL	ABNORMAL		
*** VIRAL PANEL PREMIER ***				
IgG EPSTEIN-BARR VCA		3.95	<0.9	ISR
IgM EPSTEIN-BARR VCA	0.07		<0.9	ISR
IgG EARLY ANTIGEN		1.21	<0.9	ISR
IgG EB NUCLEAR ANTIGEN		1.14	<0.9	ISR
IgM EB NUCLEAR ANTIGEN		1.60	<0.9	ISR
IgG AND IgM REPORTED AS 0.91-1.09 ARE CONSIDERED EQUIVOCAL.				
IgG CYTOMEGALOVIRUS		3.18	<0.9	ISR
IgM CYTOMEGALOVIRUS	0.40		<0.9	ISR
IgG AND IgM RESULTS REPORTED AS 0.9-1.09 ARE CONSIDERED EQUIVOCAL.				
IgG HSV 1+2 (HERPES 1+2)		136.10	<16.0	EU/mL
RESULTS REPORTED AS <16 ARE CONSIDERED NEGATIVE; 16-19.9 ARE CONSIDERED EQUIVOCAL; EQUAL TO OR GREATER THAN 20 INDICATE PREVIOUS IMMUNOLOGIC EXPOSURE AND IMMUNOLOGICAL EXPERIENCE TO HSV 1 AND/OR HSV 2.				
IgM HSV 1+2 (HERPES 1+2)	0.70		<0.9	INDEX
RESULTS REPORTED AS < 0.9 ARE CONSIDERED NEGATIVE; 0.9-1.09 ARE CONSIDERED EQUIVOCAL; EQUAL TO OR GREATER THAN 1.1 ARE CONSIDERED POSITIVE.				
IgG HHV-6 (HERPES TYPE-6)	19.14		<37.00	EU
RESULTS REPORTED AS <8 EU ARE CONSIDERED WITHIN THE LOWER				
CONTINUED ON NEXT PAGE				

In this case, the follow-up testing for viral infection did reveal a reactivated Epstein-Barr infection. We treated this and his white blood cell markers normalized. I think there was a kind of two-way street here. The HPA axis dysregulation wore down his system and allowed the Epstein-Barr to reactivate. We've all been exposed to it. It's dormant in our bodies, but when we're under a lot of stress and our ability to fight it and keep it at bay breaks down, it can reactivate. Likewise, the reactivated viral infection was further wearing down his HPA axis, his metabolic reserve, and his resilience, as we talked about. There is very often a two-way street, and you have to address both at the same time in order to resolve the situation.

The next patient is a 43-year-old male, also a physician, this time a general practitioner. I have to say that my physician patients or any clinicians whether they are naturopaths, chiropractors, or acupuncturists, all of us caregivers, we often have the most messed-up lab work. As health care providers, unfortunately, we seem least likely to take care of ourselves. I think that, to some extent, it fits with the giver personality that many health care providers have, and it's something, of course, I've emphasized a lot throughout the course the importance that we can walk our talk and be models for our patients, but it's something that seems to be a work in progress for many of us.

Marker	Value	Functional Range	Lab Range
Glucose	77	75 - 85	65 - 99
Hemoglobin A1c	5.5	4.4 - 5.4	4.8 - 5.6
Uric Acid	9.4	M: 3.7 - 6.0	3.7 - 8.6
BUN	19	13 - 18	6 - 24
Creatinine	1.31	0.85 - 1.1	0.76 - 1.27
Sodium	140	135 - 140	134 - 144
Potassium	4.4	4.0 - 4.5	3.5 - 5.2
Chloride	99	100 - 106	97 - 108
CO2	25	25 - 30	18 - 29
Calcium	10.0	9.2 - 10.1	8.7 - 10.2
Phosphorus	2.0	3.5 - 4.0	2.5 - 4.5
Magnesium	2.0	2.0 - 2.5	1.6 - 2.6
Protein, total	6.4	6.9 - 7.4	6.0 - 8.5
Albumin	4.7	4.0 - 5.0	3.5 - 5.5
Globulin	1.7	2.4 - 2.8	1.5 - 4.5
A/G ratio	2.8	1.5 - 2.0	1.1 - 2.5
Bilirubin, total	0.6	0.1 - 1.2	0.0 - 1.2
Alkaline Phosphatase	71	42 - 107	39 - 117
LDH	215	140 - 180	0 - 225
AST	37	M: 10-30	0 - 40
ALT	42	M: 10-29	0 - 44
GGT	37	10 - 26	0 - 65
TIBC	330	250 - 350	250 - 450
UIBC	195	150 - 375	150 - 375
Iron	135	85 - 135	40 - 155
Iron saturation	41	15 - 40	15 - 55
Ferritin	534	M: 33-100	30 - 400
Cholesterol, total	255	150 - 250	100 - 199
Triglycerides	148	50 - 100	0 - 149
HDL	52	55 - 85	> 39
LDL	173	0 - 175	0 - 99
Triglycerides / HDL Ratio	2.846	< 2	< 3.8
TSH	1.960	0.5 - 2.5	0.450 - 4.50
T4, total	6.3	6.0 - 12	4.5 - 12.0
T3 Uptake	31	M: 30-38	24 - 39
T3, Total	91	100 - 180	71 - 180
Vitamin D, 25-hydroxy	18.7	35 - 60	30.0 - 100.0
WBC	7.7	5.0 - 8.0	3.4 - 10.8
RBC	4.83	4.4 - 4.9	4.14 - 5.80
Hemoglobin	14.5	M: 14-15	12.6 - 17.7

	Value	Functional Range	Lab Range
Hematocrit	42.9	M: 40-48	37.5 - 51.0
MCV	89	85 - 92	79 - 97
MCH	30.0	27.7 - 32.0	26.6 - 33.0
MCHC	33.8	32 - 35	31.5 - 35.7
RDW	13.6	11.5 - 15.0	12.3 - 15.4
Platelets	239	150 - 415	150 - 379
Neutrophils	77	40 - 60	40 - 74
Lymphocytes	14	25 - 40	14 - 46
Monocytes	8	4.0 - 7.0	4 - 12
Eosinophils	1	0.0 - 3.0	0 - 5
Basophils	0	0.0 - 3.0	0 - 3
B-12	450	450 - 2000	211 - 946
<b>Additional Tests:</b>			
CRP-hs	0.53		0.00 - 3.00
Homocysteine	9.7		0.00 - 15.0
Sed Rate (Westergren)	2		0 - 15
T3, Free			2.0 - 4.4
T4, Free			0.82 - 1.77
NMR - LDL-P	2902		< 1000
NMR - LDL-C	169		< 100
HDL-C	49		> 40
Triglycerides	157		< 150
Cholesterol, Total	249		< 200
HDL-P (Total)	35.7		> 30.5
Small LDL-P	1124		< 527
LDL Size	20.5		> 20.5
LP-IR Score	70		< 45
LP(a)	277		< 75
Lp-PLA2	196		131 - 199

White blood cell count here is normal, but neutrophils are high. Lymphocytes are functionally low, and monocytes are functionally high. Ferritin is super high here at 534, but other iron markers are normal, and CRP is normal. AST, ALT, and GGT are high. A1c is borderline high. Uric acid is high. Low vitamin D and high creatinine, so there is a whole lot going on here.

TEST	RESULT			
	IN RANGE (Normal)	EQUIVOCAL*	OUT OF RANGE	REFERENCE (ELISA Index)
<b>Array 5 – Multiple Autoimmune Reactivity Screen **</b>				
Parietal Cell + ATPase		1.22		0.1-1.4
Intrinsic Factor	0.65			0.1-1.2
ASCA + ANCA			1.52	0.2-1.4
Tropomyosin	1.10			0.1-1.5
Thyroglobulin		1.01		0.1-1.3
Thyroid Peroxidase		1.24		0.1-1.3
21-Hydroxylase (Adrenal Cortex)			1.54	0.2-1.2
Myocardial Peptide		1.46		0.1-1.5
Alpha-Myosin			1.53	0.3-1.5
Phospholipid	0.69			0.2-1.3
Platelet Glycoprotein		1.17		0.1-1.3
Ovary/Testis ***			1.45	0.1-1.2
Fibulin		1.48		0.4-1.6
Collagen Complex	1.18			0.2-1.6
Arthritic Peptide			1.32	0.2-1.3
Osteocyte		1.34		0.1-1.4
Cytochrome P450 (Hepatocyte)			1.62	0.3-1.6
Insulin + Islet Cell		1.58		0.4-1.7
Glutamic Acid Decarboxylase 65			1.76	0.2-1.6
Myelin Basic Protein		1.34		0.1-1.4
Asialoganglioside	0.93			0.1-1.4
Alpha-Tubulin + Beta-Tubulin			3.01	0.4-1.4
Cerebellar		1.13		0.2-1.4
Synapsin			1.28	0.1-1.2

Further testing for autoimmunity revealed antibody production to multiple tissues here. You can see that, in fact, there were only five tissues that he wasn't producing antibodies to, and numerous tissues were in the equivocal range, and I think about nine tissues that were completely out of range. He ended up being diagnosed with Crohn's disease and Hashimoto's. That's the ASCA and ANCA antibodies that are out of range, and then you can see that his thyroglobulin and thyroperoxidase were equivocal.

This really highlights what I said earlier, which is that autoimmunity is a pathological process. Autoimmune disease refers to particular tissues that are being affected by that autoimmune process. What we can see here is that, in this case, he's already been diagnosed with Crohn's disease and Hashimoto's, so he has two autoimmune diseases, but there are several other tissues that are being affected. Even if they haven't manifested in full-on clinical disease, there is a risk for that with these elevated antibodies. This is why it is so important not to just give drugs that suppress the symptoms, as is often the case in conventional medicine, because that does not do anything to address the underlying pathological process of autoimmunity. It doesn't protect the patient from developing a future autoimmune disease that then would require more drugs to suppress more symptoms. This is our job as functional medicine clinicians—to go deeper and look

at these pathologies, and address them. The amazing thing is that if you address the pathology of autoimmunity, you can take care of all of this antibody production, or at least step it back in one fell swoop without addressing each specific tissue or body system individually.

The next patient is a 51-year-old male with adult-onset type 1 diabetes; also significant GI problems such as gas, bloating, and constipation; thyroid symptoms such as hair loss, cold hands and feet, itchy skin; sinusitis; swelling; and stiffness in toes. These are, of course, all symptoms that could be caused by autoimmunity.

Marker	Value	Functional Range	Lab Range
Glucose	108	75 - 85	65 - 99
Hemoglobin A1c	5.9	4.4 - 5.4	4.8 - 5.6
Uric Acid	4.1	W: 3.2 - 5.5	2.5 - 7.1
BUN	21	13 - 18	6 - 24
Creatinine	0.78	0.85 - 1.1	0.57 - 1.00
Sodium	137	135 - 140	134 - 144
Potassium	4.7	4.0 - 4.5	3.5 - 5.2
Chloride	99	100 - 106	97 - 108
CO2	24	25 - 30	18 - 29
Calcium	9.2	9.2 - 10.1	8.7 - 10.2
Phosphorus	3.5	3.5 - 4.0	2.5 - 4.5
Magnesium	1.9	2.0 - 2.5	1.6 - 2.6
Protein, total	6.6	6.9 - 7.4	6.0 - 8.5
Albumin	4.1	4.0 - 5.0	3.5 - 5.5
Globulin	2.5	2.4 - 2.8	1.5 - 4.5
A/G ratio	1.6	1.5 - 2.0	1.1 - 2.5
Bilirubin, total	0.3	0.1 - 1.2	0.0 - 1.2
Alkaline Phosphatase	40	42 - 107	39 - 117
LDH	132	140 - 180	0 - 214
AST	13	10 - 26	0 - 40
ALT	14	10 - 26	0 - 32
GGT	10	10 - 26	0 - 60
TIBC	193	250 - 350	250 - 450
UIBC	104	150 - 375	150 - 375
Iron	89	85 - 135	35 - 155
Iron saturation	46	15 - 40	15 - 55
Ferritin	160	W: 10-122	15 - 150
Cholesterol, total	287	150 - 250	100 - 199
Triglycerides	63	50 - 100	0 - 149
HDL	99	55 - 85	> 39
LDL	175	0 - 175	0 - 99
Triglycerides / HDL Ratio	0.636	< 2	< 3.8
TSH	1.850	0.5 - 2.5	0.450 - 4.50
T4, total	7.3	6.0 - 12	4.5 - 12.0
T3 Uptake	34	W: 28-35	24 - 39
T3, Total	102	100 - 180	71 - 180
Vitamin D, 25-hydroxy	61.8	35 - 60	30.0- 100.0
WBC	5.5	5.0 - 8.0	3.4 - 10.8
RBC	4.70	4.4 - 4.9	3.77 - 5.28
Hemoglobin	14.3	W: 13.5-14.5	11.1 - 15.9

	Value	Functional Range	Lab Range
Hematocrit	42.1	W: 37-44	34.0 - 46.6
MCV	90	85 - 92	79 -97
MCH	30.4	27.7 - 32.0	26.6 - 33.0
MCHC	34.0	32 - 35	31.5 -35.7
RDW	12.8	11.5 - 15.0	12.3 - 15.4
Platelets	233	150 - 415	150 - 379
Neutrophils	39	40 - 60	40 -74
Lymphocytes	44	25 - 40	14 - 46
Monocytes	9	4.0 - 7.0	4 - 12
Eosinophils	7	0.0 - 3.0	0 - 5
Basophils	1	0.0 - 3.0	0 - 3
B-12	564	450 - 2000	211 - 946
<b>Additional Tests:</b>			
C- Reactive Protein	1.43		0.00 - 3.00
Homocysteine	8.4		0.00 - 15.0
Sed Rate (Westergren)	2		0 - 32

White blood cell count was normal. Neutrophils were lab-low. Lymphocytes and monocytes were functionally high. Eosinophils were lab-high.

**Comprehensive Stool Analysis / Parasitology x3**

PARASITOLOGY/MICROSCOPY *	PARASITOLOGY INFORMATION
<p><b>Sample 1</b></p> <p>Mod Blastocystis hominis            Rare Dientamoeba fragilis trophs            Rare Endolimax nana cysts            Few Endolimax nana trophs            Rare WBC</p> <p><b>Sample 2</b></p> <p>Mod Blastocystis hominis            Rare Dientamoeba fragilis trophs            Few Endolimax nana cysts            Few Endolimax nana trophs            Few Yeast</p> <p><b>Sample 3</b></p> <p>Mod Blastocystis hominis            Rare Dientamoeba fragilis trophs            Rare Endolimax nana cysts            Rare Endolimax nana trophs</p> <p><small>*A trichrome stain and concentrated iodine wet mount slide is read for each sample submitted.</small></p>	<p>Intestinal parasites are abnormal inhabitants of the gastrointestinal tract that have the potential to cause damage to their host. The presence of any parasite within the intestine generally confirms that the patient has acquired the organism through fecal-oral contamination. Damage to the host includes parasitic burden, migration, blockage and pressure. Immunologic inflammation, hypersensitivity reactions and cytotoxicity also play a large role in the morbidity of these diseases. The infective dose often relates to severity of the disease and repeat encounters can be additive.</p> <p>There are two main classes of intestinal parasites, they include protozoa and helminths. The protozoa typically have two stages; the trophozoite stage that is the metabolically active, invasive stage and the cyst stage, which is the vegetative inactive form resistant to unfavorable environmental conditions outside the human host. Helminths are large, multicellular organisms. Like protozoa, helminths can be either free-living or parasitic in nature. In their adult form, helminths cannot multiply in humans.</p> <p>In general, acute manifestations of parasitic infection may involve diarrhea with or without mucus and or blood, fever, nausea, or abdominal pain. However these symptoms do not always occur. Consequently, parasitic infections may not be diagnosed or eradicated. If left untreated, chronic parasitic infections can cause damage to the intestinal lining and can be an unsuspected cause of illness and fatigue. Chronic parasitic infections can also be associated with increased intestinal permeability, irritable bowel syndrome, irregular bowel movements, malabsorption, gastritis or indigestion, skin disorders, joint pain, allergic reactions, and decreased immune function.</p> <p>In some instances, parasites may enter the circulation and travel to various organs causing severe organ diseases such as liver abscesses and cysticercosis. In addition, some larval migration can cause pneumonia and in rare cases hyper infection syndrome with large numbers of larvae being produced and found in every tissue of the body.</p> <p>One negative parasitology x1 specimen does not rule out the possibility of parasitic disease, parasitology x3 is recommended. This exam is not designed to detect <i>Cryptosporidium</i> spp, <i>Cyclospora cayetanensis</i> or <i>Microsporidia</i> spp.</p>

GIARDIA/CRYPTOSPORIDIUM IMMUNOASSAY				
	Within	Outside	Reference Range	
Giardia intestinalis	Neg		Neg	<p><b>Giardia intestinalis</b> (lamblia) is a protozoan that infects the small intestine and is passed in stool and spread by the fecal-oral route. Waterborne transmission is the major source of giardiasis.</p> <p><b>Cryptosporidium</b> is a coccidian protozoa that can be spread from direct person-to-person contact or waterborne transmission.</p>
Cryptosporidium	Neg		Neg	

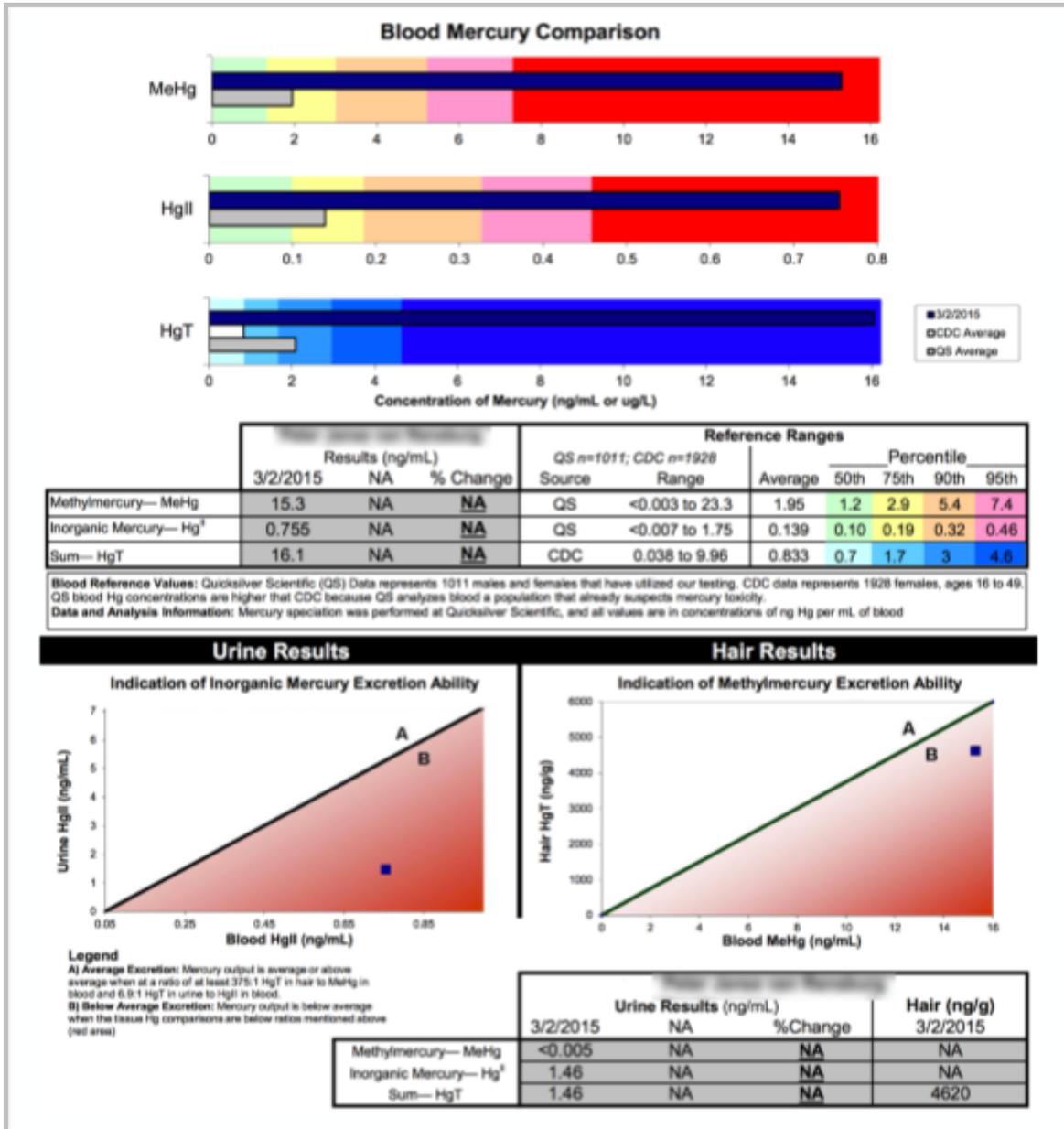
Stool tests revealed both *Dientamoeba fragilis* and *Blastocystis* on all three samples and *Endolimax nana*, which is, as you may recall, considered to be nonpathogenic but often an indicator of fecal oral transmission. In his case, type 1 diabetes was causing part of the pattern of immune dysregulation that we saw on the CBC, but parasites were likely causing the elevation of the eosinophils.

The next patient is a 40-year-old male with chief complaint of facial acne, GERD, fatigue, lethargy, and food intolerances. He had been working overseas, in Beijing, for the past several years.

Marker	Value	Functional Range	Lab Range
Glucose	91	75 - 85	65 - 99
Hemoglobin A1c	5.4	4.4 - 5.4	4.8 - 5.6
Uric Acid	6.0	M: 3.7 - 6.0	3.7 - 8.6
BUN	13	13 - 18	6 - 20
Creatinine	0.85	0.85 - 1.1	0.76 - 1.27
Sodium	141	135 - 140	134 - 144
Potassium	4.0	4.0 - 4.5	3.5 - 5.2
Chloride	99	100 - 106	97 - 108
CO2	27	25 - 30	18 - 29
Calcium	9.6	9.2 - 10.1	8.7 - 10.2
Phosphorus	3.6	3.5 - 4.0	2.5 - 4.5
Magnesium	2.0	2.0 - 2.5	1.6 - 2.6
Protein, total	6.5	6.9 - 7.4	6.0 - 8.5
Albumin	4.5	4.0 - 5.0	3.5 - 5.5
Globulin	2.0	2.4 - 2.8	1.5 - 4.5
A/G ratio	2.3	1.5 - 2.0	1.1 - 2.5
Bilirubin, total	0.6	0.1 - 1.2	0.0 - 1.2
Alkaline Phosphatase	72	42 - 107	39 - 117
LDH	135	140 - 180	0 - 225
AST	15	M: 10-30	0 - 40
ALT	12	M: 10-29	0 - 44
GGT	10	10 - 26	0 - 65
TIBC	307	250 - 350	250 - 450
UIBC	219	150 - 375	150 - 375
Iron	88	85 - 135	40 - 155
Iron saturation	29	15 - 40	15 - 55
Ferritin	129	M: 33-100	30 - 400
Cholesterol, total	205	150 - 250	100 - 199
Triglycerides	39	50 - 100	0 - 149
HDL	52	55 - 85	> 39
LDL	145	0 - 175	0 - 99
Triglycerides / HDL Ratio	0.75	< 2	< 3.8
TSH	3.610	0.5 - 2.5	0.450 - 4.50
T4, total	8.7	6.0 - 12	4.50 - 12.0
T3 Uptake	28	M: 30-38	24 - 39
T3, Total	129	100 - 180	71 - 180
Vitamin D, 25-hydroxy	87.6	35 - 60	30 - 100.0
WBC	6.4	5.0 - 8.0	3.4 - 10.8
RBC	4.82	4.4 - 4.9	4.14 - 5.80
Hemoglobin	14.7	M: 14-15	12.6 - 17.7

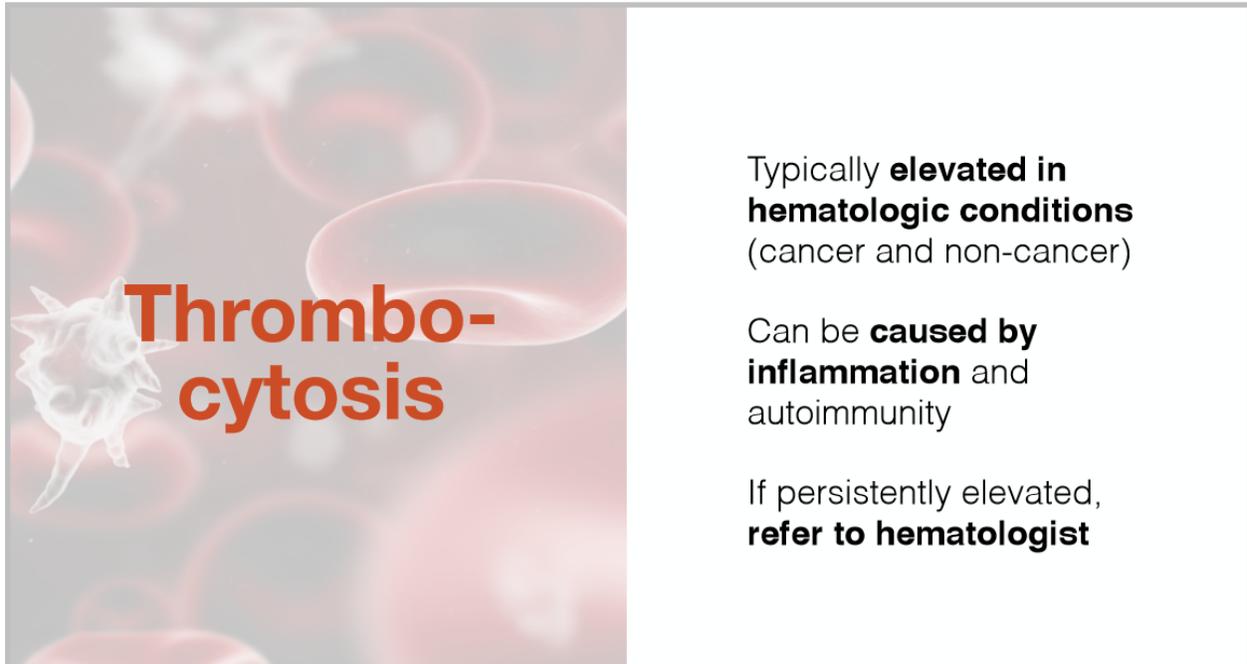
	Value	Functional Range	Lab Range
Hematocrit	43.6	M: 40-48	37.5 - 51.0
MCV	91	85 - 92	79 - 97
MCH	30.5	27.7 - 32.0	26.6 - 33.0
MCHC	33.7	32 - 35	31.5 - 35.7
RDW	12.8	11.5 - 15.0	12.3 - 15.4
Platelets	254	150 - 415	150 - 379
Neutrophils	37	40 - 60	40 - 74
Lymphocytes	50	25 - 40	14 - 46
Monocytes	10	4.0 - 7.0	4 - 12
Eosinophils	3	0.0 - 3.0	0 - 5
Basophils	0	0.0 - 3.0	0 - 3
B-12	1320	450 - 2000	211 - 946
<b>Additional Tests:</b>			
CRP-hs	6.01		0.00 - 3.00
Homocysteine	7.6		0.00 - 15.0
Sed Rate (Westergren)	4		0 - 15
T3, Free	3.4		2.0 - 4.4
T4, Free	1.43		0.82 - 1.77
Thyroid Antibodies - TPO	< 6		0 - 34
Thyroglobulin	< 1.0		0.0 - 0.9
Heparin Cofactor II	112		65 - 145
Tryptase	4.3		2.2 - 13.2
Histamine	0.33		< 1.00

White blood cell count was normal. Neutrophils were low. Lymphocytes were high. Monocytes were functionally high, and C-reactive protein was high. One question you might ask when you see this kind of pattern is, is there a viral infection? It's pretty consistent with the viral pattern than I showed you earlier.



In this case, it was not, in fact, a viral infection. It was mercury toxicity, and I've seen this in several patients who have lived in China for a significant period of time. Industrial mercury pollution is a much bigger issue there, and there is also a lot of mercury in seafood. His methylmercury, which you would tend to get from seafood consumption, was high at 15.3, above the 95th percentile, probably in the 99th percentile. Inorganic mercury was 0.755. That is the kind of mercury you get exposed to from industrial exposure or dental amalgams. That was also 99th percentile. Sum total mercury was 16.1, again 99th percentile.

Also, his ability to detoxify, particularly inorganic mercury and also methylmercury or organic mercury, was compromised, so we had a lot going on. Mercury was really wreaking havoc on this particular patient, and that was the cause of the inflammation and immune dysregulation.



The infographic features a background of red blood cells and a white platelet. The word "Thrombocytosis" is written in large, bold, orange letters. To the right, there are three lines of text in black, with key terms in bold.

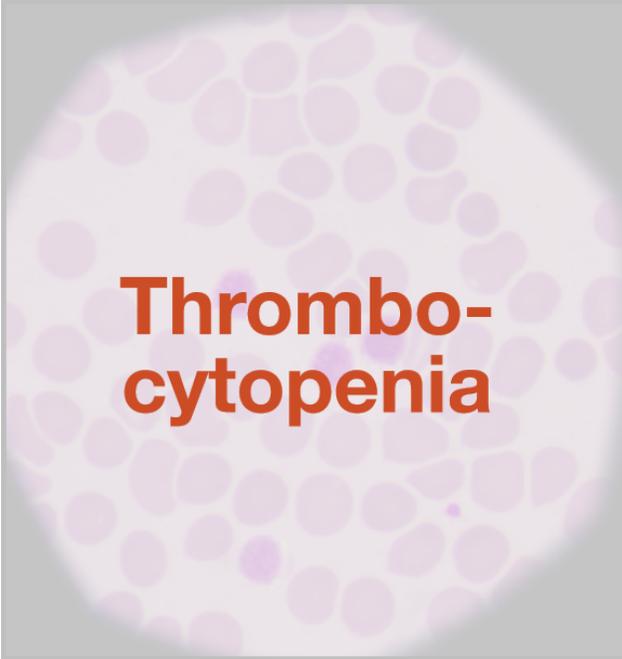
Typically **elevated in hematologic conditions** (cancer and non-cancer)

Can be **caused by inflammation** and autoimmunity

If persistently elevated, **refer to hematologist**

Although we haven't typically covered individual biomarkers in these blood chemistry presentations, I want to do that in a few cases here because there are some potentially serious and even life-threatening indications in the case of high and low platelets. Elevated platelet counts or thrombocytosis is most commonly seen in hematologic conditions, both cancer such as lymphoma, and non-cancer disorders such as iron-deficiency anemia. If a patient doesn't have iron-deficiency anemia but has high platelets, retest them. If they are still high, and especially if they are very high, refer out to a hematologist immediately.

Note that inflammatory diseases such as rheumatoid arthritis can also lead to thrombocytosis, so when you see high platelets, it doesn't necessarily mean cancer. There are a lot of potential conditions that can cause that, but it is something you want to be proactive with because of the potential for cancer.



## Thrombocytopenia

**Bone marrow** not making enough

**Destruction**

**Liver or spleen** removing from circulation

**Genetic** (non-pathological)

Thrombocytopenia, or low platelet count, occurs in three broad circumstances: one, when the bone marrow is not making enough platelets; two, when platelets are being destroyed in the bloodstream; and three, when the liver or spleen is removing platelets from the circulation. All of those are potentially life threatening, so if you see persistently low platelets, especially very low platelets on a CBC, then refer to a hematologist immediately.

Note, however, that some people do have genetically low platelet levels. These will tend to be maybe 10 percent, 5 to 10 percent below the laboratory reference range. If you ask the patient if they have had slightly low platelets every time they have been tested from the first time that they've had the blood tests, then it's pretty likely that is the case. However, you still may want to be cautious and refer out for further workup just to be sure. You also, of course, have to look at the rest of the case. If the patient is fundamentally healthy with no other major stuff going on and has just had a platelet count that is slightly low, and they've seen a hematologist already, then there is likely not any need to be really concerned in that situation. With platelet count, because of the potential for cancer and other life-threatening conditions, I generally prefer to be cautious and, if the levels are persistently low or high, refer to a hematologist just to be safe.

This patient is an 85-year-old female who had severe fatigue, headache, tremors, neuropathy, and a long list of other symptoms. She was hardly able to get out of bed, and these symptoms all started with a Lyme disease infection in Woodstock, New York, in 1989.

Marker	Value	Functional Range	Lab Range
Calcitriol (1,25 di-OH Vitamin D)	53	19.9 - 79.3	19.9 - 79.3
<b>WBC</b>	<b>3.4</b>	<b>5.0 - 8.0</b>	3.4 - 10.8
RBC	4.56	4.4 - 4.9	4.14 - 5.8
Hemoglobin	13.8	13.5 - 14.5	12.6 - 17.7
Hematocrit	41.1	37 - 44	37.5 - 51.0
MCV	90	85 - 92	79 - 97
MCH	30.3	27.7 - 32.0	26.6 - 33.0
MCHC	33.6	32 - 35	31.5 - 35.7
<b>RDW</b>	<b>15.2</b>	<b>11.5 - 15.0</b>	12.3 - 15.4
<b>Platelets</b>	<b>147</b>	<b>150 - 415</b>	<b>150 - 379</b>
Neutrophils	58	40 - 60	
Lymphocytes	25	25 - 40	
<b>Monocytes</b>	<b>11</b>	<b>4.0 - 7.0</b>	
<b>Eosinophils</b>	<b>5</b>	<b>0.0 - 3.0</b>	
Basophils	1	0.0 - 3.0	
HNK1 (CD57) % Lymphs	12.2		2 17
HNK1 (CK57) AbsLymphs	110		60 360

White blood cell count was functionally low, almost lab-low. Monocytes and eosinophils were functionally high. Neutrophils and lymphocytes were normal.

In 2012, she was diagnosed with maltoma on routine EGD/colonoscopy, which is a tumor in the stomach. She took Rituxan and did well and was in remission for two years, but then the lymphoma returned shortly before this appointment, and she has not taken Rituxan again.

This patient is a 29-year-old female with chief complaint of eye floaters, chronic anal itching, shingles, anxiety, and poor stress management.

Component	Your Value	Standard Range	Flag
White Blood Cell Count	6.5	4.0-11.0 K/uL	
Red Blood Cell Count	4.81	3.90-5.40 M/uL	
Hemoglobin	14.4	12.0-15.5 g/dL	
Hematocrit	43.0	35.0-47.0 %	
MCV	89	80-100 fL	
MCH	29.9	27.0-33.0 pg	
MCHC	33.5	31.0-36.0 g/dL	
RDW	13.6	%	
<b>Platelet Count</b>	<b>110</b>	<b>150-400 K/uL</b>	<b>L</b>
Differential Type	Automated		
<b>Neutrophil %</b>	<b>63</b>	<b>49.0-74.0 %</b>	

https://myhealthonline.sutterhealth.org/mho/inside.asp?mode=results&printmode=true

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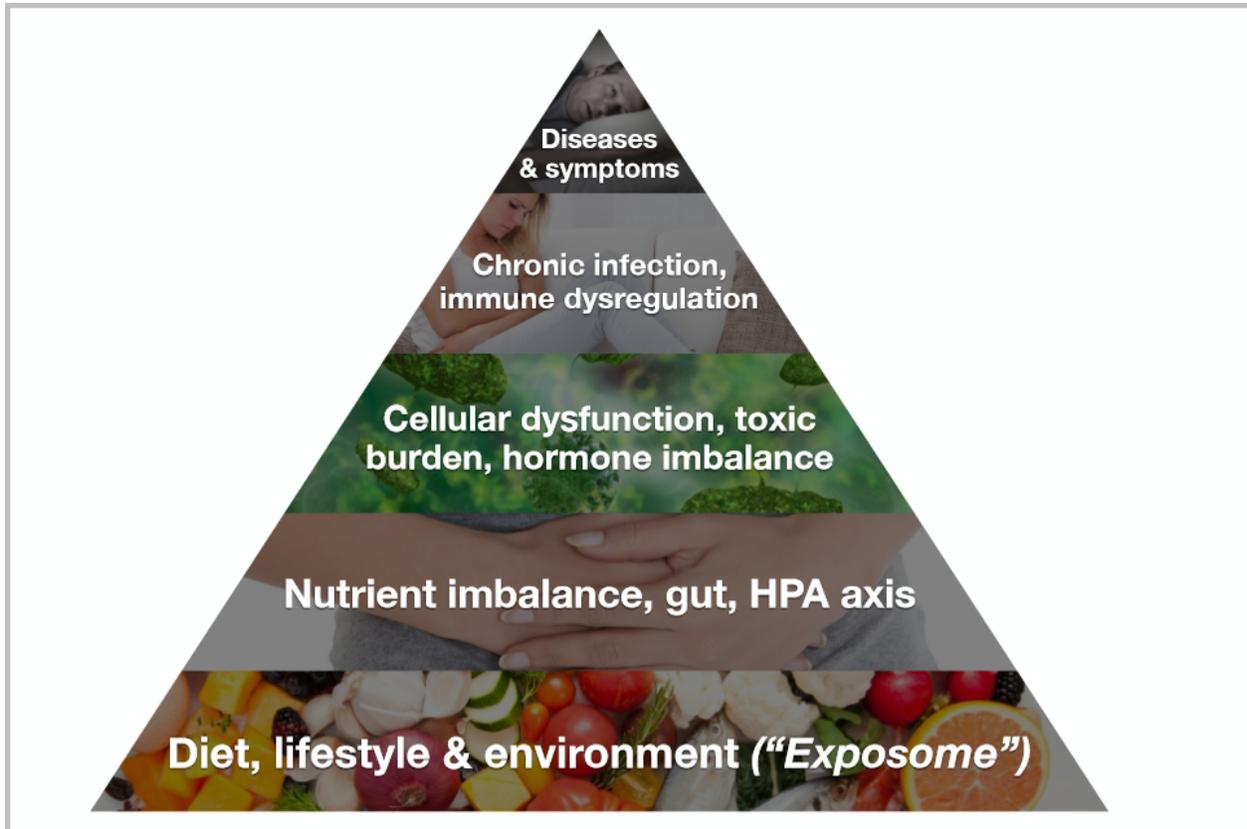
Health Online - Test Results Summary

1/9/15, 9:51

<b>Lymphocyte %</b>	<b>24</b>	<b>26.0-46.0 %</b>	<b>L</b>
<b>Monocyte %</b>	<b>9</b>	<b>2.0-12.0 %</b>	
Eosinophil %	3	0.0-5.0 %	
Basophil %	1	0.0-2.0 %	
Abs. Neutrophil	4.1	2.0-8.0 K/uL	
Abs. Lymphocyte	1.6	1.0-5.1 K/uL	
Abs. Monocyte	0.6	0.0-0.8 K/uL	
Abs. Eosinophil	0.2	0.0-0.5 K/uL	
Abs. Basophil	0.0	0.0-0.2 K/uL	

White blood cell count was normal. Neutrophils and monocytes were out of the functional range. Lymphocytes were out of the lab range, and platelets are lab-low. She did have a history of low platelets ever since the first blood test that she had as a child, and she already had a workup with a hematologist, who had told her that he suspected it was genetic and nonpathological.

We did a full case review of tests, addressed her GI issues, HPA axis dysregulation, and then retested, and her platelets were still mildly decreased, so in this case, it probably was genetic.



The treatment of infection and immune dysregulation and autoimmunity obviously depends on the cause. It’s beyond the scope of this presentation. If you remember this triangle here of pathologies in ADAPT Level One, we’re focusing on diet, lifestyle, environment, nutrient imbalance, gut, and HPA axis. In later courses, we’ll talk about things such as cellular dysfunction, toxic burden, hormone imbalance—male and female hormone imbalance—chronic infection, and immune dysregulation and then treatment of specific diseases and symptoms.

Okay, that’s it for now. See you next time.