INE INSTITUTE OF NUTRITIONAL ENDOCRINOLOGY

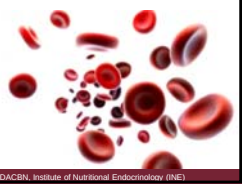
Blood Chemistry: Introduction

Dr. Ritamarie Loscalzo

Medical Disclaimer: The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, drritamarie.com, and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.

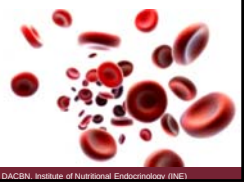
Blood Chemistry What We'll Cover #1

- ✓ Introduction: Blood testing -- what it is and what it isn't
- ✓ Secrets to finding nutritional pearls most doctors miss
- ✓ Lab normal ranges vs. functional (ideal) ranges
- ✓ What's included in a "routine" blood chemistry screen
- ✓ Introducing a cutting-edge analysis tool: *Lab Results Tracking Spreadsheet*
- ✓ Complete Blood Count (CBC) and "Going Under the Cover" to truly correct anemia



Blood Chemistry
What We'll Cover #2

- ✓ Complete Blood Count (CBC) and immune function
- ✓ Electrolytes
- ✓ Minerals and bone metabolism
- ✓ Vitamins
- ✓ Blood sugar
- ✓ Thyroid
- ✓ Digestion
- ✓ Kidney
- ✓ Liver
- ✓ Lipids and cardiovascular



Blood Chemistry
What We'll Cover #3

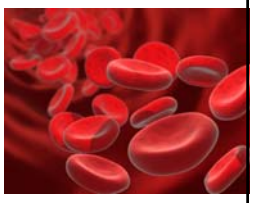
- ✓ Lab analysis summary tool – in Master Health Tracker spreadsheet
- ✓ Computerized blood chemistry analysis – software features and demo
- ✓ Case studies
- ✓ Summary

Introduction to Blood Analysis

- ✓Why do blood testing
- ✓What it is…
- ✓What it isn't…
- ✓Lab normal ranges vs. functional (ideal) ranges
- ✓Secrets to finding nutritional pearls most doctors miss

"Routine" Blood Chemistry Screen

- ✓How often to run
- ✓How can non-licensed practitioners run them
- ✓How much does it cost
- ✓Interpretation
- ✓What's usually included

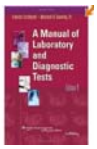


Blood Chemistry Testing Resources

- ✓**Direct Labs:** www.directlabs.com
- ✓**Personal Labs:** www.personalabs.com
- ✓**Direct Access Labs:** www.directaccesslab.com
- ✓**Life Extensions:** www.lef.org/Vitamins-Supplements/Blood-Tests/index.htm

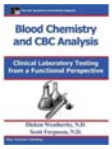
Conventional Medical Interpretation Books

- ✓**A Manual of Laboratory and Diagnostic Tests**
  Frances Fischbach and Marshall B. Dunning
  http://www.drritamarie.com/go/ManualOfLabDiagnosticTests
- ✓**Clinical Laboratory Medicine: Clinical Applications of Laboratory Data**
  Richard Ravel MD
  http://www.drritamarie.com/go/CLMLabData
- ✓**Lab Tests Online**
  http://www.labtestsonline.org/

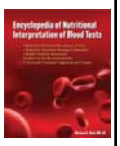


Functional Interpretation Books

✓**Blood Chemistry and CBC Analysis**
Dicken Weatherby, ND, Scott Ferguson
http://www.drritamarie.com/go/BloodChemCBCWeatherby



✓**Encyclopedia of Nutritional Interpretation of Blood Tests**
Michael Wald, MD, DC
http://www.drritamarie.com/go/EncycNutrInterpBloodTestsMichaelWald

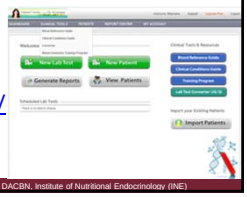


Computerized Functional Interpretation

✓Dr. Ritamarie's Spreadsheet

✓The Blood Detective - $4900
http://blooddetective.com/

✓ Blood Chemistry Software
$65 - $150 per month
http://bloodchemsoftware.com/



"Routine" Blood Chemistry Screen: What's Usually Included

✓CBC
✓Thyroid w/TSH
✓Lipid Profile
✓Liver Profile
✓Kidney Panel
✓Iron
✓Glucose
✓Fluids, Electrolytes, and Minerals

Non-Optional Extras

- ✓Vitamin D3: Vitamin D, 25-Hydroxy
- ✓Thyroid Peroxidase Antibodies (TPO) or Thyroid Antibodies (TAA) Panel which also includes Antithyroglobulin Antibodies
- ✓Iron
- ✓Ferritin
- ✓Hemoglobin A1C
- ✓Free T3

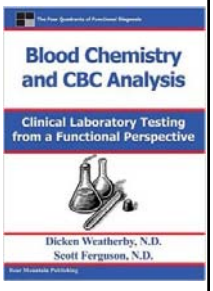
Specialty Blood Tests

- ✓C-reactive Protein
- ✓Homocysteine
- ✓Sedimentation Rate (ESR)
- ✓Fasting Insulin
- ✓DHEA
- ✓Testosterone
- ✓Estrogen
- ✓PSA

Functional Diagnosis Hierarchy

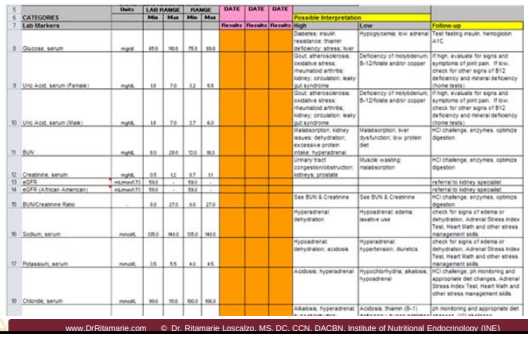
Dr. Dicken Weatherby, Blood Chemistry and CBC Analysis

- ✓ Digestion
- ✓ Gallbladder
- ✓ Detox: liver, kidney, large intestine
- ✓ Minerals, vitamins, EFAs
- ✓ Blood sugar and oxidative stress
- ✓ Kidney and bladder
- ✓ Adrenal
- ✓ Thyroid
- ✓ Sex hormones
- ✓ Cardiovascular
- ✓ Inflammation
- ✓ Immune system



Dr. Dicken Weatherby, Blood Chemistry and CBC Analysis

A Cutting-Edge Analysis Tool: Lab Results Tracking Spreadsheet



	Units	LAB RANGE Min	LAB RANGE Max	RANGE Min	RANGE Max	DATE Results	DATE Results	DATE Results	Possible Interpretation High	Low	Follow-up
CATEGORIES											
Lab Markers									High	Low	Follow-up
Glucose, serum	mg/dl	65.0	110.0	75.0	99.0				Diabetes; insulin resistance; thiamin deficiency; stress; liver	Hypoglycemia; low adrenal	Test fasting insulin, hemoglobin A1C
Uric Acid, serum (Female)	mg/dL	1.9	7.0	3.2	5.5				Gout; atherosclerosis; oxidative stress; rheumatoid arthritis; kidney; circulation; leaky gut syndrome	Deficiency of molybdenum, B-12/folate and/or copper	If high, evaluate for signs and symptoms of joint pain. If low, check for other signs of B12 deficiency and mineral deficiency (home tests)
Uric Acid, serum (Male)	mg/dL	3.8	7.0	3.7	6.0				Gout; atherosclerosis; oxidative stress; rheumatoid arthritis; kidney; circulation; leaky gut syndrome	Deficiency of molybdenum, B-12/folate and/or copper	If high, evaluate for signs and symptoms of joint pain. If low, check for other signs of B12 deficiency and mineral deficiency (home tests)
BUN	mg/dL	6.0	20.0	10.0	18.0				Malabsorption; kidney issues; dehydration; excessive protein intake; hyperadrenal	Malabsorption; liver dysfunction; low protein diet	HCl challenge, enzymes, optimize digestion
Creatinine, serum	mg/dL	0.5	1.2	0.7	1.1				Urinary tract congestion/obstruction; kidneys; prostate	Muscle wasting; malabsorption	HCl challenge, enzymes, optimize digestion
eGFR	mL/min/1.73	59.0	-	59.0	-						referral to kidney specialist
eGFR (African American)	mL/min/1.73	59.0	-	59.0	-						referral to kidney specialist
BUN/Creatinine Ratio	-	9.0	20.0	9.0	23.0				See BUN & Creatinine	See BUN & Creatinine	HCl challenge, enzymes, optimize digestion
Sodium, serum	mmol/L	135.0	146.0	135.0	144.0				Hyperadrenal; dehydration	Hypoadrenal; edema; laxative use	check for signs of edema or dehydration. Adrenal Stress Index Test. Heart Math and other stress management skills
Potassium, serum	mmol/L	3.5	5.5	4.0	4.5				Hypoadrenal; dehydration; acidosis	Hyperadrenal; hypertension; diuretics	check for signs of edema or dehydration. Adrenal Stress Index Test. Heart Math and other stress management skills
Chloride, serum	mmol/L	99.0	110.0	100.0	106.0				Acidosis; hyperadrenal	Hypochlorhydria; alkalosis; hypoadrenal	HCl challenge, ph monitoring and appropriate diet changes. Adrenal Stress Index Test. Heart Math and other stress management skills
									Alkalosis; hyperadrenal;	Acidosis; thiamin (B-1)	ph monitoring and appropriate diet

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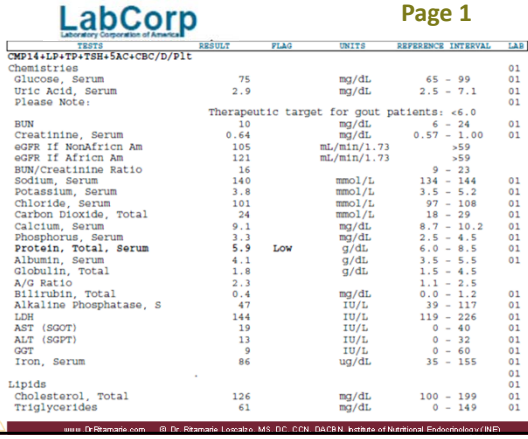

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TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
CMP14+LP+TP+TSH+5AC+CBC/D/Plt					
Chemistries					01
Glucose, Serum	75		mg/dL	65 - 99	01
Uric Acid, Serum	2.9		mg/dL	2.5 - 7.1	01
Please Note:					01
	Therapeutic target for gout patients: <6.0				
BUN	10		mg/dL	6 - 24	01
Creatinine, Serum	0.64		mg/dL	0.57 - 1.00	01
eGFR If NonAfricn Am	105		mL/min/1.73	>59	
eGFR If Africn Am	121		mL/min/1.73	>59	
BUN/Creatinine Ratio	16			9 - 23	
Sodium, Serum	140		mmol/L	134 - 144	01
Potassium, Serum	3.8		mmol/L	3.5 - 5.2	01
Chloride, Serum	101		mmol/L	97 - 108	01
Carbon Dioxide, Total	24		mmol/L	18 - 29	01
Calcium, Serum	9.1		mg/dL	8.7 - 10.2	01
Phosphorus, Serum	3.3		mg/dL	2.5 - 4.5	01
Protein, Total, Serum	**5.9**	**Low**	g/dL	6.0 - 8.5	01
Albumin, Serum	4.1		g/dL	3.5 - 5.5	01
Globulin, Total	1.8		g/dL	1.5 - 4.5	
A/G Ratio	2.3			1.1 - 2.5	
Bilirubin, Total	0.4		mg/dL	0.0 - 1.2	01
Alkaline Phosphatase, S	47		IU/L	39 - 117	01
LDH	144		IU/L	119 - 226	01
AST (SGOT)	19		IU/L	0 - 40	01
ALT (SGPT)	13		IU/L	0 - 32	01
GGT	9		IU/L	0 - 60	01
Iron, Serum	86		ug/dL	35 - 155	01
					01
Lipids					01
Cholesterol, Total	126		mg/dL	100 - 199	01
Triglycerides	61		mg/dL	0 - 149	01

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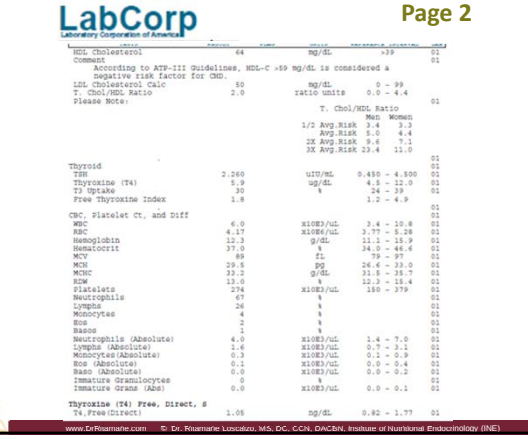

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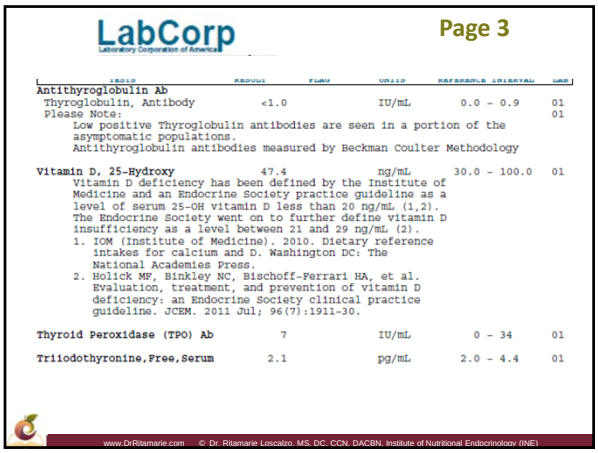
HDL Cholesterol	64		mg/dL	>39	01
Comment					01
According to ATP-III Guidelines, HDL-C >59 mg/dL is considered a negative risk factor for CHD.					
LDL Cholesterol Calc	50		mg/dL	0 - 99	
T. Chol/HDL Ratio	2.0		ratio units	0.0 - 4.4	
Please Note:					01
			T. Chol/HDL Ratio	Men Women	
			1/2 Avg.Risk	3.4 3.3	
			Avg.Risk	5.0 4.4	
			2X Avg.Risk	9.6 7.1	
			3X Avg.Risk	23.4 11.0	
					01
Thyroid					01
TSH	2.260		uIU/mL	0.450 - 4.500	01
Thyroxine (T4)	5.9		ug/dL	4.5 - 12.0	01
T3 Uptake	30		%	24 - 39	01
Free Thyroxine Index	1.8			1.2 - 4.9	
					01
CBC, Platelet Ct, and Diff					01
WBC	6.0		X10E3/uL	3.4 - 10.8	01
RBC	4.17		X10E6/uL	3.77 - 5.28	01
Hemoglobin	12.3		g/dL	11.1 - 15.9	01
Hematocrit	37.0		%	34.0 - 46.6	01
MCV	89		fL	79 - 97	01
MCH	29.5		pg	26.6 - 33.0	01
MCHC	33.2		g/dL	31.5 - 35.7	01
RDW	13.0		%	12.3 - 15.4	01
Platelets	274		X10E3/uL	150 - 379	01
Neutrophils	67		%		01
Lymphs	26		%		01
Monocytes	4		%		01
Eos	2		%		01
Basos	1		%		01
Neutrophils (Absolute)	4.0		X10E3/uL	1.4 - 7.0	01
Lymphs (Absolute)	1.6		X10E3/uL	0.7 - 3.1	01
Monocytes(Absolute)	0.3		X10E3/uL	0.1 - 0.9	01
Eos (Absolute)	0.1		X10E3/uL	0.0 - 0.4	01
Basos (Absolute)	0.0		X10E3/uL	0.0 - 0.2	01
Immature Granulocytes	0		%		01
Immature Grans (Abs)	0.0		X10E3/uL	0.0 - 0.1	01
Thyroxine (T4) Free, Direct, S					
T4,Free(Direct)	1.05		ng/dL	0.82 - 1.77	01



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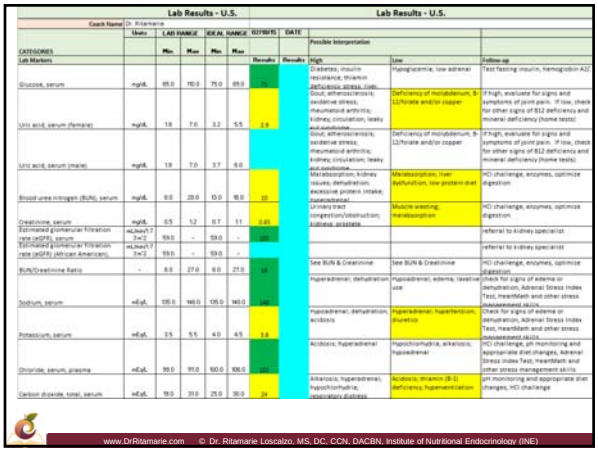
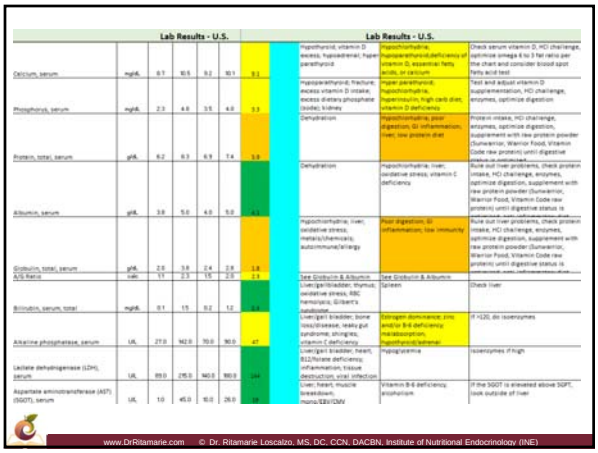
Antithyroglobulin Ab					
Thyroglobulin, Antibody	<1.0		IU/mL	0.0 - 0.9	01
Please Note:					01
Low positive Thyroglobulin antibodies are seen in a portion of the asymptomatic populations. Antithyroglobulin antibodies measured by Beckman Coulter Methodology					
Vitamin D, 25-Hydroxy	47.4		ng/mL	30.0 - 100.0	01
Vitamin D deficiency has been defined by the Institute of Medicine and an Endocrine Society practice guideline as a level of serum 25-OH vitamin D less than 20 ng/mL (1,2). The Endocrine Society went on to further define vitamin D insufficiency as a level between 21 and 29 ng/mL (2). 1. IOM (Institute of Medicine). 2010. Dietary reference intakes for calcium and D. Washington DC: The National Academies Press. 2. Holick MF, Binkley NC, Bischoff-Ferrari HA, et al. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. JCEM. 2011 Jul; 96(7):1911-30.					
Thyroid Peroxidase (TPO) Ab	7		IU/mL	0 - 34	01
Triiodothyronine,Free,Serum	2.1		pg/mL	2.0 - 4.4	01



Lab Results - U.S.

Lab Results - U.S.



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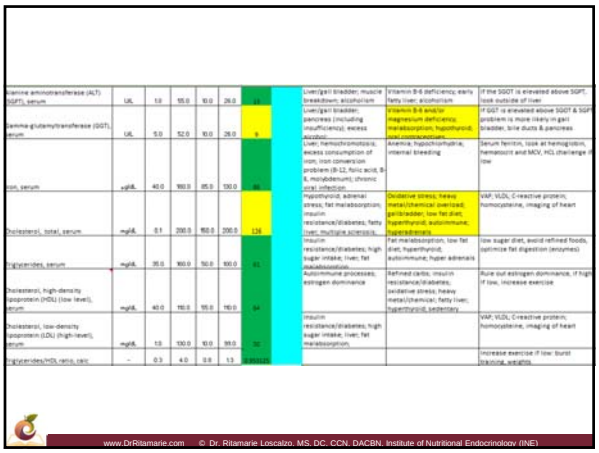
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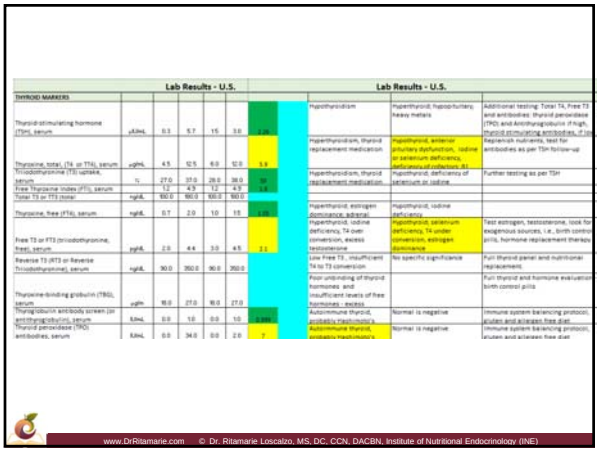
Lab Results - U.S.
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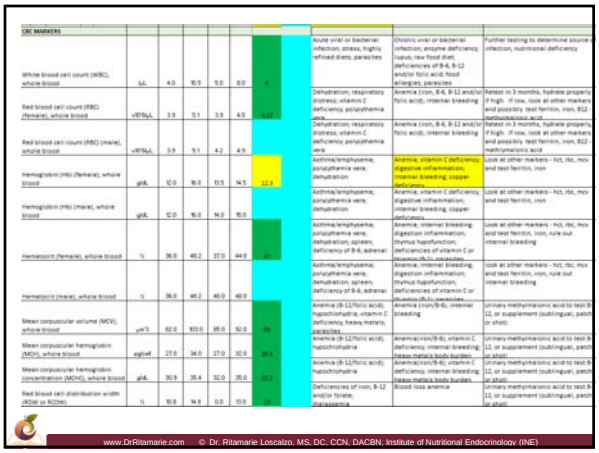
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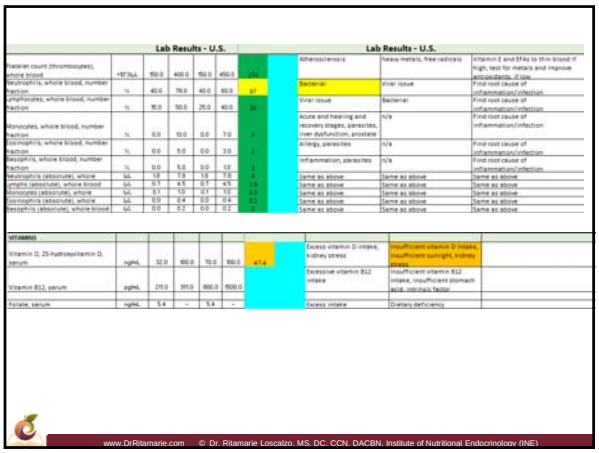

		Lab Results - U.S.					Lab Results - U.S.		
Platelet count (thrombocytes), whole blood	x10^3/µL	150.0	400.0	150.0	450.0	234	Atherosclerosis	Heavy metals, free radicals	Vitamin E and EFAs to thin blood if high, test for metals and improve antioxidants if low
Neutrophils, whole blood, number fraction	%	40.0	75.0	40.0	60.0	67	Bacterial	Viral issue	Find root cause of inflammation/infection
Lymphocytes, whole blood, number fraction	%	15.0	50.0	25.0	40.0	26	Viral issue	Bacterial	Find root cause of inflammation/infection
Monocytes, whole blood, number fraction	%	0.0	10.0	0.0	7.0	4	Acute and healing and recovery stages, parasites, liver dysfunction, prostate	n/a	Find root cause of inflammation/infection
Eosinophils, whole blood, number fraction	%	0.0	5.0	0.0	3.0	2	Allergy, parasites	n/a	Find root cause of inflammation/infection
Basophils, whole blood, number fraction	%	0.0	5.0	0.0	1.0	1	Inflammation, parasites	n/a	Find root cause of inflammation/infection
Neutrophils (absolute), whole	µL	1.9	7.8	1.5	7.5	4	Same as above	Same as above	Same as above
Lymphs (absolute), whole blood	µL	0.7	4.5	0.7	4.5	1.6	Same as above	Same as above	Same as above
Monocytes (absolute), whole	µL	0.1	1.0	0.1	1.0	0.2	Same as above	Same as above	Same as above
Eosinophils (absolute), whole	µL	0.0	0.4	0.0	0.4	0.1	Same as above	Same as above	Same as above
Basophils (absolute), whole blood	µL	0.0	0.2	0.0	0.2	0	Same as above	Same as above	Same as above
VITAMINS									
Vitamin D, 25-hydroxyvitamin D, serum	ng/mL	32.0	100.0	70.0	100.0	47.4	Excess vitamin D intake, kidney stress	Insufficient vitamin D intake, insufficient sunlight, kidney stress	
Vitamin B12, serum	pg/mL	219.0	911.0	800.0	1500.0		Excessive vitamin B12 intake	Insufficient vitamin B12 intake, insufficient stomach acid, intrinsic factor	
Folate, serum	ng/mL	5.4	-	5.4	-		Excess intake	Dietary deficiency	