INE | INSTITUTE OF NUTRITIONAL ENDOCRINOLOGY

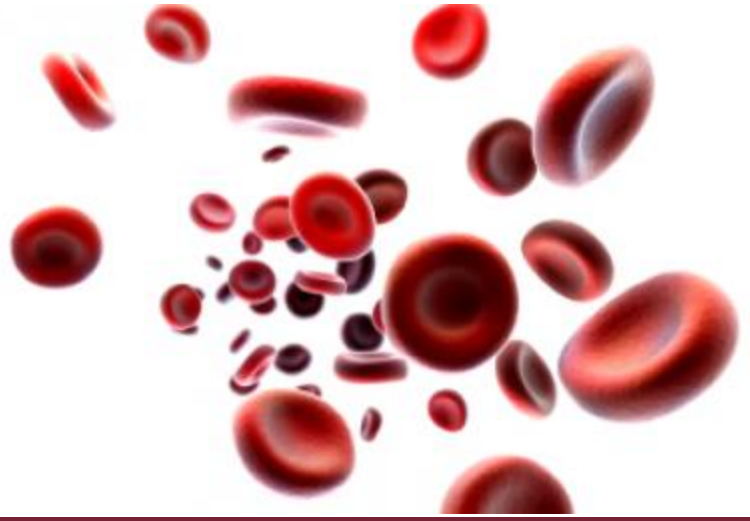
Blood Chemistry: Introduction

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.

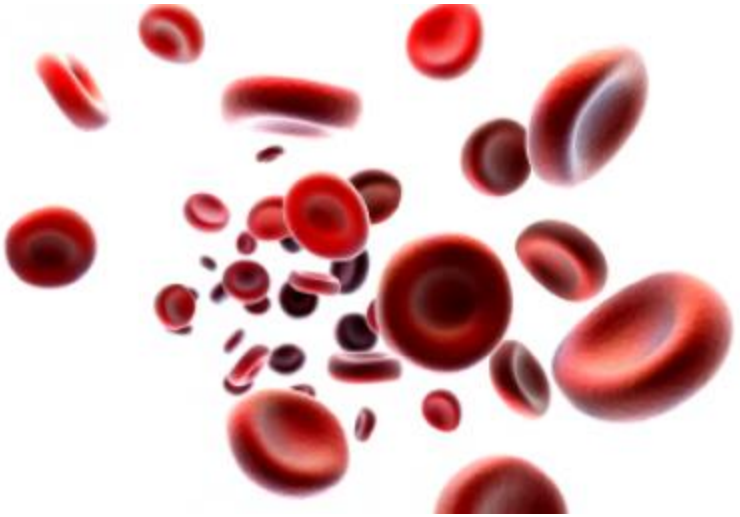
Blood Chemistry
What We'll Cover #1

- ✓ 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



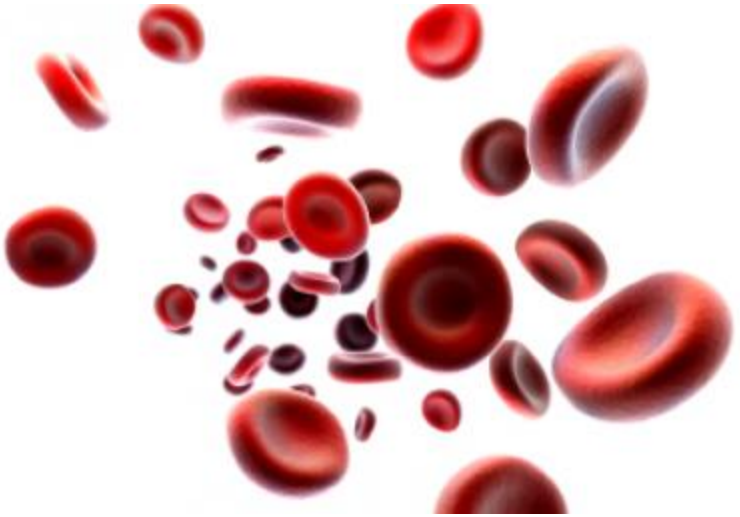
Blood Chemistry
What We'll Cover #2

- ✓ 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

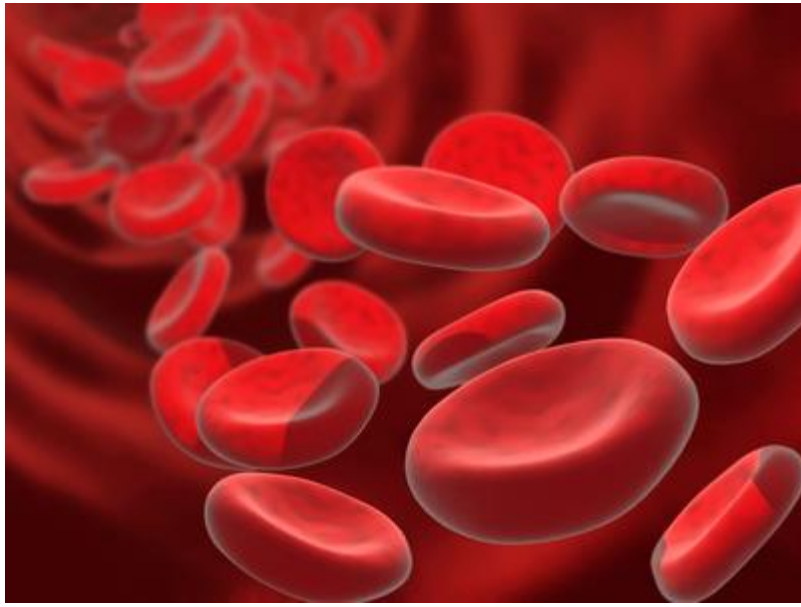


Introduction to Blood Analysis

- ✓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



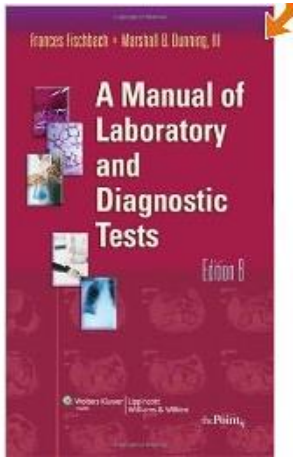
Blood Chemistry Testing Resources

- ✓ **Direct Labs:**
  www.directlabs.com
- ✓ **Personal Labs:**
  www.personalabs.com
- ✓ **Life Extensions:**

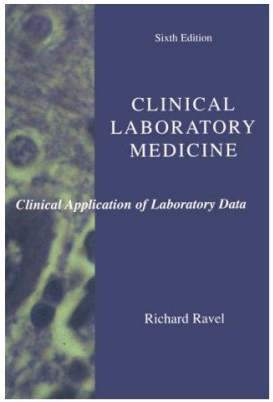
www.lef.org/Vitamins-Supplements/Blood-Tests/index.htm

Conventional Medical Interpretation Books

- ✓ **A Manual of Laboratory and Diagnostic Tests**
  Frances Fischbach and Marshall B. Dunning
  http://www.drritamarie.com/go/ManualOfLabDiagnosticTests



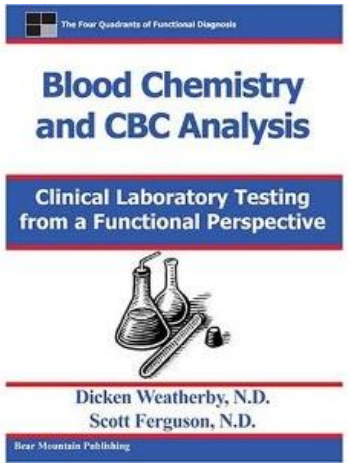
- ✓ **Clinical Laboratory Medicine: Clinical Applications of Laboratory Data**
  Richard Ravel MD
  http://www.drritamarie.com/go/CLMLabData



- ✓ **Lab Tests Online**
- ✓ http://www.labtestsonline.org/

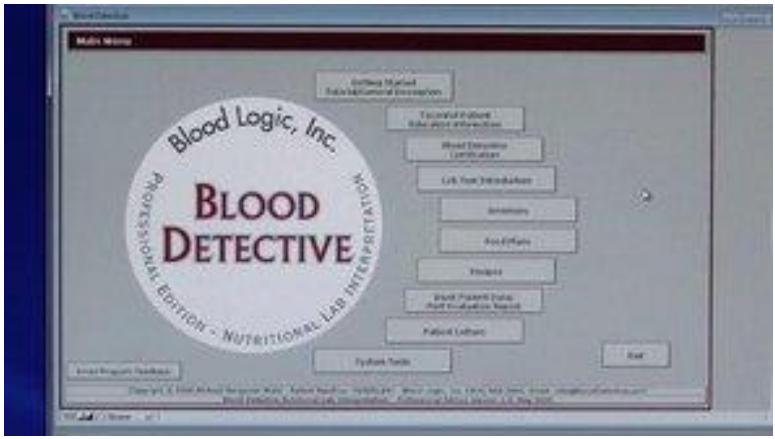
Functional Interpretation Books

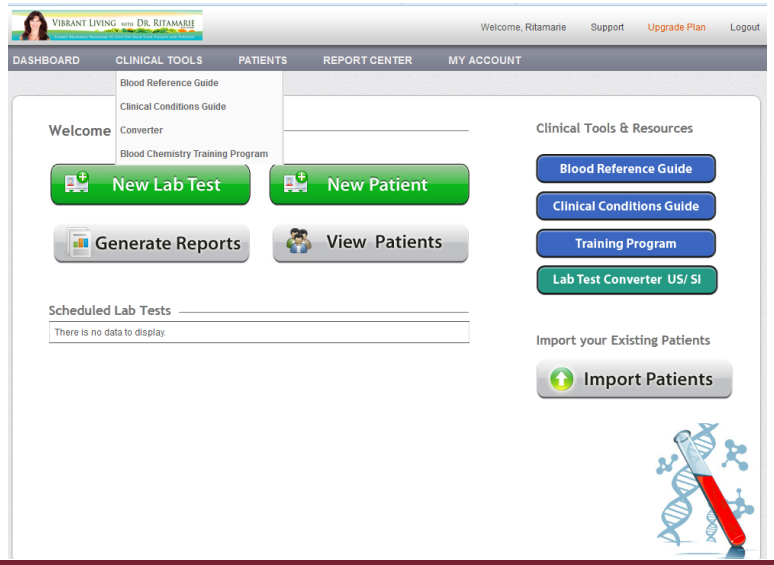
- ✓ **Blood Chemistry and CBC Analysis**
  Dicken Weatherby, ND, Scott Ferguson
  http://www.drritamarie.com/go/BloodChemCBCWeatherby



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

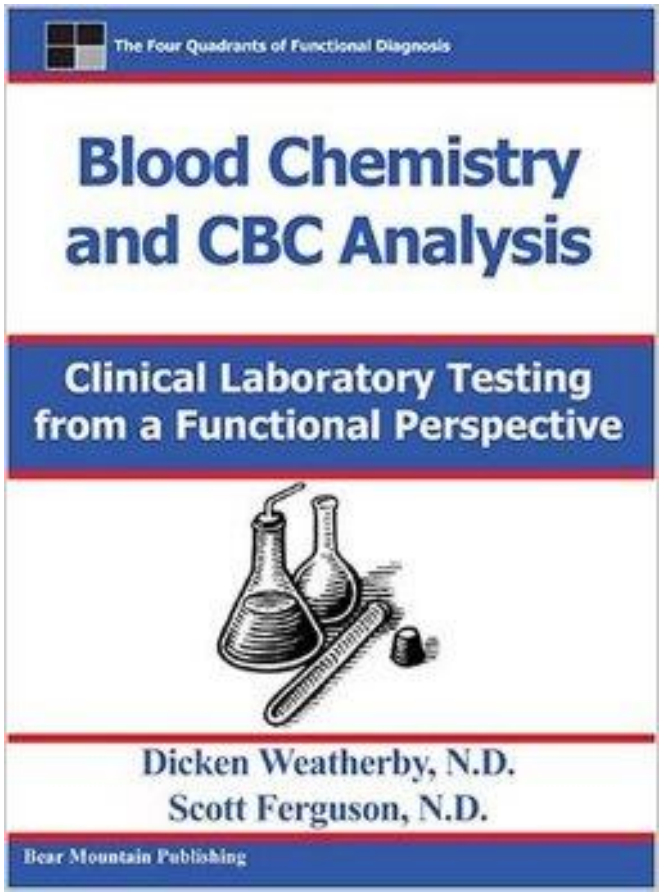
Specialty Blood Tests

- ✓ 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		RANGE		DATE	DATE	DATE			
6	CATEGORIES		Min	Max	Min	Max				Possible Interpretation		
7	Lab Markers						Results	Results	Results	High	Low	Follow-up
8	Glucose, serum	mg/dl	65.0	110.0	75.0	89.0				Diabetes; insulin resistance; thiamin deficiency; stress; liver	Hypoglycemia; low adrenal	Test fasting insulin, hemoglobin A1C
9	Uric Acid, serum (Female)	mg/dL	1.8	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)
10	Uric Acid, serum (Male)	mg/dL	1.8	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)
11	BUN	mg/dL	8.0	28.0	13.0	18.0				Malabsorption; kidney issues; dehydration; excessive protein intake; hyperadrenal	Malabsorption; liver dysfunction; low protein diet	HCl challenge, enzymes, optimize digestion
12	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
13	eGFR	mL/min/1.73	59.0	-	59.0	-						referral to kidney specialist
14	eGFR (African American)	mL/min/1.73	59.0	-	59.0	-						referral to kidney specialist
15	BUN/Creatinine Ratio	-	8.0	27.0	8.0	27.0				See BUN & Creatinine	See BUN & Creatinine	HCl challenge, enzymes, optimize digestion
16	Sodium, serum	mmol/L	135.0	148.0	135.0	140.0				Hyperadrenal; dehydration	Hypoadrenal; edema; laxative use	check for signs of edema or dehydration, Adrenal Stress Index Test, Heart Math and other stress management skills
17	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
18	Chloride, serum	mmol/L	99.0	111.0	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

LabCorp
Laboratory Corporation of America

Page 1

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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Page 2

Tests	Result	Flag	Units	Reference Interval	Lab
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
Baso (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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TESTS	RESULT	FLAG	UNITS	REFERENCE INTERVAL	LAB
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.

Coach Name	Dr. Ritamarie									
	Units	LAB RANGE		IDEAL RANGE		02/18/15	DATE			
CATEGORIES		Min	Max	Min	Max			Possible Interpretation		
Lab Markers						Results	Results	High	Low	Follow-up
Glucose, serum	mg/dL	65.0	110.0	75.0	89.0	75		Diabetes; insulin resistance; thiamin deficiency; stress; liver	Hypoglycemia; low adrenal	Test fasting insulin, hemoglobin A1C
Uric acid, serum (female)	mg/dL	1.8	7.0	3.2	5.5	2.9		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	1.8	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)
Blood urea nitrogen (BUN), serum	mg/dL	8.0	28.0	13.0	18.0	10		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	0.65		Urinary tract congestion/obstruction; kidneys; prostate	Muscle wasting; malabsorption	HCl challenge, enzymes, optimize digestion
Estimated glomerular filtration rate (eGFR), serum	mL/min/1.73 m^2	59.0	-	59.0	-	105				referral to kidney specialist
Estimated glomerular filtration rate (eGFR) (African American),	mL/min/1.73 m^2	59.0	-	59.0	-					referral to kidney specialist
BUN/Creatinine Ratio	-	8.0	27.0	8.0	27.0	16		See BUN & Creatinine	See BUN & Creatinine	HCl challenge, enzymes, optimize digestion
Sodium, serum	mEq/L	135.0	148.0	135.0	140.0	140		Hyperadrenal; dehydration	Hypoadrenal; edema; laxative use	check for signs of edema or dehydration, Adrenal Stress Index Test, HeartMath and other stress management skills
Potassium, serum	mEq/L	3.5	5.5	4.0	4.5	3.8		Hypoadrenal; dehydration; acidosis	Hyperadrenal; hypertension; diuretics	Check for signs of edema or dehydration, Adrenal Stress Index Test, HeartMath and other stress management skills
Chloride, serum, plasma	mEq/L	99.0	111.0	100.0	106.0	101		Acidosis; hyperadrenal	Hypochlorhydria; alkalosis; hypoadrenal	HCl challenge, ph monitoring and appropriate diet changes, Adrenal Stress Index Test, HeartMath and other stress management skills
Carbon dioxide, total, serum	mEq/L	19.0	31.0	25.0	30.0	24		Alkalosis; hyperadrenal; hypochlorhydria; respiratory distress	Acidosis; thiamin (B-1) deficiency; hyperventilation	pH monitoring and appropriate diet changes, HCl challenge

Lab Results - U.S.								Lab Results - U.S.		
Calcium, serum	mg/dL	8.7	10.5	9.2	10.1	9.1		Hypothyroid; vitamin D excess; hypoadrenal; hyper-parathyroid	Hypochlorhydria; hypoparathyroid;deficiency of vitamin D, essential fatty acids, or calcium	Check serum vitamin D, HCl challenge, optimize omega 6 to 3 fat ratio per the chart and consider blood spot fatty acid test
Phosphorus, serum	mg/dL	2.3	4.8	3.5	4.0	3.3		Hypoparathyroid; fracture; excess vitamin D intake; excess dietary phosphate (soda); kidney	Hyper parathyroid; hypochlorhydria; hyperinsulin; high carb diet; vitamin D deficiency	Test and adjust vitamin D supplementation, HCl challenge, enzymes, optimize digestion
Protein, total, serum	g/dL	6.2	8.3	6.9	7.4	5.9		Dehydration	Hypochlorhydria; poor digestion; GI inflammation; liver; low protein diet	Protein intake, HCl challenge, enzymes, optimize digestion, supplement with raw protein powder (Sunwarrior, Warrior Food, Vitamin Code raw protein) until digestive status is optimized
Albumin, serum	g/dL	3.8	5.0	4.0	5.0	4.1		Dehydration	Hypochlorhydria; liver; oxidative stress; vitamin C deficiency	Rule out liver problems, check protein intake, HCl challenge, enzymes, optimize digestion, supplement with raw protein powder (Sunwarrior, Warrior Food, Vitamin Code raw protein) until digestive status is optimized, anti-inflammatory diet
Globulin, total, serum	g/dL	2.0	3.8	2.4	2.8	1.8		Hypochlorhydria; liver; oxidative stress; metals/chemicals; autoimmune/allergy	Poor digestion; GI inflammation; low immunity	Rule out liver problems, check protein intake, HCl challenge, enzymes, optimize digestion, supplement with raw protein powder (Sunwarrior, Warrior Food, Vitamin Code raw protein) until digestive status is optimized, anti-inflammatory diet
A/G Ratio	calc	1.1	2.3	1.5	2.0	2.3		See Globulin & Albumin	See Globulin & Albumin	
Bilirubin, serum, total	mg/dL	0.1	1.5	0.2	1.2	0.4		Liver/gallbladder; thymus; oxidative stress; RBC hemolysis; Gilbert's syndrome	Spleen	Check liver
Alkaline phosphatase, serum	U/L	27.0	142.0	70.0	90.0	47		Liver/gall bladder; bone loss/disease; leaky gut syndrome; shingles; vitamin C deficiency	Estrogen dominance; zinc and/or B-6 deficiency; malabsorption; hypothyroid/adrenal	If >120, do isoenzymes
Lactate dehydrogenase (LDH), serum	U/L	89.0	215.0	140.0	180.0	144		Liver/gall bladder; heart; B12/folate deficiency; inflammation; tissue destruction; viral infection	Hypoglycemia	Isoenzymes if high
Aspartate aminotransferase (AST) (SGOT), serum	U/L	1.0	45.0	10.0	26.0	19		Liver; heart; muscle breakdown; mono/EBV/CMV	Vitamin B-6 deficiency; alcoholism	If the SGOT is elevated above SGPT, look outside of liver

Alanine aminotransferase (ALT) (SGPT), serum	U/L	1.0	55.0	10.0	26.0	13		Liver/gall bladder; muscle breakdown; alcoholism	Vitamin B-6 deficiency; early fatty liver; alcoholism	If the SGOT is elevated above SGPT, look outside of liver
Gamma-glutamyltransferase (GGT), serum	U/L	5.0	52.0	10.0	26.0	9		Liver/gall bladder; pancreas (including insufficiency); excess alcohol;	Vitamin B-6 and/or magnesium deficiency; malabsorption; hypothyroid; oral contraceptives	If GGT is elevated above SGOT & SGPT, problem is more likely in gall bladder, bile ducts & pancreas
Iron, serum	µg/dL	40.0	180.0	85.0	130.0	86		Liver; hemochromotosis; excess consumption of iron; iron conversion problem (B-12, folic acid, B-6, molybdenum); chronic viral infection	Anemia; hypochlorhydria; internal bleeding	Serum ferritin, look at hemoglobin, hematocrit and MCV, HCL challenge if low
Cholesterol, total, serum	mg/dL	0.1	200.0	150.0	200.0	126		Hypothyroid; adrenal stress; fat malabsorption; insulin resistance/diabetes; fatty liver; multiple sclerosis;	Oxidative stress; heavy metal/chemical overload; gallbladder; low fat diet; hyperthyroid; autoimmune; hyperadrenals	VAP; VLDL; C-reactive protein; homocysteine, imaging of heart
Triglycerides, serum	mg/dL	35.0	160.0	50.0	100.0	61		Insulin resistance/diabetes; high sugar intake; liver; fat malabsorption;	Fat malabsorption; low fat diet; hyperthyroid; autoimmune; hyper adrenals	low sugar diet, avoid refined foods, optimize fat digestion (enzymes)
Cholesterol, high-density lipoprotein (HDL) (low level), serum	mg/dL	40.0	110.0	55.0	110.0	64		Autoimmune processes; estrogen dominance	Refined carbs; insulin resistance/diabetes; oxidative stress; heavy metal/chemical; fatty liver; hyperthyroid; sedentary	Rule out estrogen dominance, if high. If low, increase exercise
Cholesterol, low-density lipoprotein (LDL) (high-level), serum	mg/dL	1.0	130.0	10.0	99.0	50		Insulin resistance/diabetes; high sugar intake; liver; fat malabsorption;		VAP; VLDL; C-reactive protein; homocysteine, imaging of heart
Triglycerides/HDL ratio, calc	-	0.3	4.0	0.8	1.3	0.953125				Increase exercise if low: burst training, weights

		Lab Results - U.S.				Lab Results - U.S.		
THYROID MARKERS								
Thyroid-stimulating hormone (TSH), serum	µIU/mL	0.3	5.7	1.5	3.0	2.26	Hypothyroidism	Hyperthyroid; hypopituitary; heavy metals	Additional testing: Total T4, Free T3 and antibodies: thyroid peroxidase (TPO) and Antithyroglobulin if high, thyroid stimulating antibodies, if low
Thyroxine, total, (T4 or TT4), serum	µg/mL	4.5	12.5	6.0	12.0	5.9	Hyperthyroidism, thyroid replacement medication	Hypothyroid, anterior pituitary dysfunction, iodine or selenium deficiency, deficiency of cofactors: B1	Replenish nutrients, test for antibodies as per TSH follow-up
Triiodothyronine (T3) uptake, serum	%	27.0	37.0	28.0	38.0	30	Hyperthyroidism, thyroid replacement medication	Hypothyroid; deficiency of selenium or iodine	Further testing as per TSH
Free Thyroxine Index (FTI), serum		1.2	4.9	1.2	4.9	1.8			
Total T3 or TT3 (total	ng/dL	100.0	180.0	100.0	180.0				
Thyroxine, free (FT4), serum	ng/dL	0.7	2.0	1.0	1.5	1.05	Hyperthyroid; estrogen dominance; adrenal	Hypothyroid; iodine deficiency	
Free T3 or FT3 (triiodothyronine, free), serum	pg/dL	2.0	4.4	3.0	4.5	2.1	Hyperthyroid; iodine deficiency, T4 over conversion, excess testosterone	Hypothyroid; selenium deficiency, T4 under conversion, estrogen dominance	Test estrogen, testosterone, look for exogenous sources, i.e., birth control pills, hormone replacement therapy
Reverse T3 (RT3 or Reverse Triiodothyronine), serum	ng/dL	90.0	350.0	90.0	350.0		Low Free T3 , insufficient T4 to T3 conversion	No specific significance	Full thyroid panel and nutritional replacement.
Thyroxine-binding globulin (TBG), serum	µg/m	18.0	27.0	18.0	27.0		Poor unbinding of thyroid hormones and insufficient levels of free hormones - excess		Full thyroid and hormone evaluation - birth control pills
Thyroglobulin antibody screen (or antithyroglobulin), serum	IU/mL	0.0	1.0	0.0	1.0	0.999	Autoimmune thyroid, probably Hashimoto's	Normal is negative	Immune system balancing protocol, gluten and allergen free diet
Thyroid peroxidase (TPO) antibodies, serum	IU/mL	0.0	34.0	0.0	2.0	7	Autoimmune thyroid, probably Hashimoto's	Normal is negative	Immune system balancing protocol, gluten and allergen free diet

CBC MARKERS									
White blood cell count (WBC), whole blood	/µL	4.0	10.5	5.0	8.0	6	Acute viral or bacterial infection; stress; highly refined diets; parasites	Chronic viral or bacterial infection; enzyme deficiency; lupus; raw food diet; deficiencies of B-6, B-12 and/or folic acid; food allergies; parasites	Further testing to determine source of infection, nutritional deficiency
Red blood cell count (RBC) (female), whole blood	x10^6/µL	3.9	5.1	3.9	4.5	4.17	Dehydration; respiratory distress; vitamin C deficiency; polycythemia vera	Anemia (iron, B-6, B-12 and/or folic acid); internal bleeding	Retest in 3 months, hydrate properly if high. If low, look at other markers and possibly test ferritin, iron, B12 - methylmalonic acid
Red blood cell count (RBC) (male), whole blood	x10^6/µL	3.9	5.1	4.2	4.9		Dehydration; respiratory distress; vitamin C deficiency; polycythemia vera	Anemia (iron, B-6, B-12 and/or folic acid); internal bleeding	Retest in 3 months, hydrate properly, if high. If low, look at other markers and possibly test ferritin, iron, B12 - methlymalonic acid
Hemoglobin (Hb) (female), whole blood	g/dL	12.0	16.0	13.5	14.5	12.3	Asthma/emphysema; polycythemia vera; dehydration	Anemia; vitamin C deficiency; digestive inflammation; internal bleeding; copper deficiency	Look at other markers - hct, rbc, mcv and test ferritin, iron
Hemoglobin (Hb) (male), whole blood	g/dL	12.0	16.0	14.0	15.0		Asthma/emphysema; polycythemia vera; dehydration	Anemia; vitamin C deficiency; digestive inflammation; internal bleeding; copper deficiency	Look at other markers - hct, rbc, mcv and test ferritin, iron
Hematocrit (female), whole blood	%	36.0	48.2	37.0	44.0	37	Asthma/emphysema; polycythemia vera; dehydration; spleen; deficiency of B-6; adrenal	Anemia; internal bleeding; digestion inflammation; thymus hypofunction; deficiencies of vitamin C or thiamin (B-1); parasites	Look at other markers - hct, rbc, mcv and test ferritin, iron, rule out internal bleeding
Hematocrit (male), whole blood	%	36.0	48.2	40.0	48.0		Asthma/emphysema; polycythemia vera; dehydration; spleen; deficiency of B-6; adrenal	Anemia; internal bleeding; digestion inflammation; thymus hypofunction; deficiencies of vitamin C or thiamin (B-1); parasites	look at other markers - hct, rbc, mcv and test ferritin, iron, rule out internal bleeding
Mean corpuscular volume (MCV), whole blood	µm^3	82.0	103.0	85.0	92.0	89	Anemia (B-12/folic acid); hypochlohydria; vitamin C deficiency; heavy metals; parasites	Anemia (iron/B-6); internal bleeding	Urinary methylmalonic acid to test B-12, or supplement (sublingual, patch, or shot)
Mean corpuscular hemoglobin (MCH), whole blood	pg/cell	27.0	34.0	27.0	32.0	29.5	Anemia (B-12/folic acid); hypochlohydria	Anemia(iron/B-6); vitamin C deficiency; internal bleeding; heavy metals body burden	Urinary methylmalonic acid to test B-12, or supplement (sublingual, patch, or shot)
Mean corpuscular hemoglobin concentration (MCHC), whole blood	g/dL	30.9	35.4	32.0	35.0	33.2	Anemia (B-12/folic acid); hypochlohydria	Anemia(iron/B-6); vitamin C deficiency; internal bleeding; heavy metals body burden	Urinary methylmalonic acid to test B-12, or supplement (sublingual, patch, or shot)
Red blood cell distribution width (RDW or RCDW)	%	10.8	14.8	0.0	13.0	13	Deficiencies of iron, B-12 and/or folate; thalassemia	Blood loss anemia	Urinary methylmalonic acid to test B-12, or supplement (sublingual, patch or shot)

Lab Results - U.S.							Lab Results - U.S.		
Platelet count (thrombocytes), whole blood	×10^3/µL	150.0	400.0	150.0	450.0	274	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	78.0	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	13.0	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	1.8	7.8	1.8	7.8	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	0.3	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	211.0	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	

