

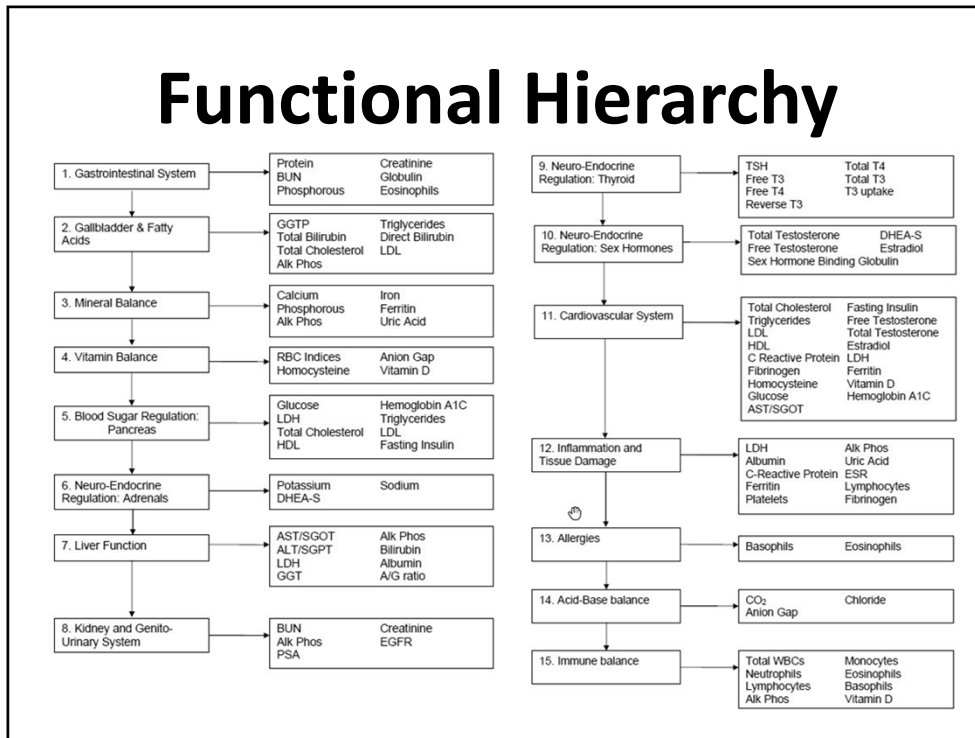
10 Essential Blood Tests

PART 1

The Blood Chemistry Webinars With
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Creator of the Blood Chemistry Software

Essential Blood Test #1:

Basic Chem Screen and CBC



Top Metabolic Patterns

- Globulin and Total Protein
- Liver Enzymes
- GGTP, Bilirubin & Alk Phos
- Albumin
- Uric Acid
- Alk phos
- Ferritin and MCV
- LDH
- Potassium
- BUN and Creatinine

Globulin and Total Protein

Hypochlorhydria and Gastric Inflammation

Digestive Dysfunction and Protein Deficits Reference Ranges

	Optimal Range
Total Protein	6.9 – 7.4
Globulin	2.4 – 2.8

Elevated Globulin: Hypochlorhydria Pattern

- An increased total globulin (>2.8)
- Normal or decreased total protein (<6.9) and/or albumin (<4.0)
- Increased BUN (>16)
- Decreased serum phosphorous (<3.0)
- Other values
 - An increased MCV (>90) and MCH (>31.9),
 - Decreased or normal calcium (<9.2) and Iron (<50)
 - Decreased CO₂ (<25)
 - Increased Anion Gap (>12)
 - Decreased alkaline phosphatase (<70)

Low Protein- GI dysfunction & inflammation Pattern

- Decreased protein (<6.9),
- Decreased total globulin (<2.4),
- Decreased serum phosphorus (<3.00),
- Increased BUN (>16),
- Decreased Creatinine (<0.9)

■ Chronic versus Acute

SGOT/AST, SGPT/ALT & GGTP

Getting the Most from the Liver Panel

Liver Panel- Reference Ranges

Test	Optimal Value
SGOT/AST	10 – 26
SGPT/ALT	10 – 26
GGTP	10 – 30

GGTP, ALK PHOS, & BILIRUBIN

**Getting to the Bottom of
Your Patients' Gallbladder
Problems**

Hepato-Biliary Function- Optimal Ranges

	Optimal Range
GGTP	10 – 30
Alk Phos	70 – 100
Bilirubin- total	0.1 – 0.9 or 1.7 – 15.4 umol/L
Bilirubin- direct	0 – 0.19 or 0.0 – 3.25 umol/L
Total Cholesterol	160-180 or 3.9-5.7 mmol/L

Biliary Dysfunction: Biliary Stasis & Insufficiency

- Suspect biliary insufficiency or biliary stasis if the GGTP is increased (>30).
- Bilirubin levels may also be elevated (>0.9 or 15.4 mmol/L) along with alkaline phosphatase (>100) and total cholesterol (>220 or 5.69 mmol/L). SGOT/AST and SGPT/ALT may be normal or increased (>30).
- Many cases of biliary insufficiency or stasis will show normal lab values.

Intrahepatic Biliary Obstruction - Pattern

- Elevated total bilirubin (>1.2 or >20.5 mmol/L)
- Elevated Indirect bilirubin (>0.7 or 12 umol/L)
- Increased GGTP (>30),
- Increased SGPT/ALT (>30),
- Increased alk phos (>100) and/or
- Increased LDH (>200).

Extrahepatic Biliary Obstruction - Pattern

- GGTP (>85)
- Alk Phos (>140)
- Normal or increased SGOT/AST (>55)
- Normal or increased SGPT/ALT (>55)
- Elevated total bilirubin (>1.2 or >20.5 umol/L)
- Elevated Direct Bilirubin (>0.2 or 3.4 umol/L)

Albumin

Liver Dysfunction and Oxidative Stress

Oxidative Stress- Reference Ranges

	Optimal Range
Albumin	4.0 – 4.5 or 40 – 50
Cholesterol	160-180 or 3.9-5.7 mmol/L

Oxidative Stress Pattern

- Total cholesterol level suddenly below its historical level and seen with:
- Decreased albumin (<4.0)
- Decreased platelet level (<150)
- Decreased lymphocyte count (<20)
- Increased total globulin (>2.8 or 28)
- Increased Uric acid level (>5.9 or >351 men and >5.5 or 327 women)
- May also see increased Ferritin, bilirubin and LDL levels

Uric Acid

Poor Detoxification

Poor Detoxification- Reference Ranges

	Optimal Value
Uric acid	Males: 3.5 – 5.9 or 208 – 351 mmol/L Females: 3.0 – 5.5 or 178 – 327 mmol/L

Decreased uric acid level (♀ <3.0 or <178 mmol/L, ♂ < 3.5 or < 208 mmol/L) and a normal MCV (82 – 89.9) and MCH (28 – 31.9)

Alk Phos

Zinc Deficiency

Zinc Deficiency- Reference Ranges

	Optimal Value
Alk Phos	70 – 100

- Decreased Alk Phos (<70) associated with zinc deficiency.
- WBC and/or RBC zinc levels may also be decreased along with a low normal or decreased total WBC (<5.0).

Nutrient Deficiencies and Anemia

Anemia- Reference Ranges

	Optimal
MCV	82.0 – 89.9
RBC Count	Male: 4.2 – 4.9 Female: 3.9 – 4.5
HCT	Male: 40 – 48 or 0.4 – 0.48 Female: 37 – 44 or 0.37 – 0.44
HGB	Male: 14 – 15 or 140 - 150 Female: 13.5 – 14.5 or 135 - 145
MCH	28 – 31.9
MCHC	32 – 35
RDW	<13

Ferritin

Iron Deficiency Anemia

Iron Deficiency Anemia- Reference Ranges

	Optimal Value
Total Iron	85 – 130 or 15.22 – 23.27 mmol/L
Ferritin	30 – 70
% Sat	25 – 30% or 0.25 – 0.30
TIBC	250 – 350 or 44.8 – 62.7

Iron Deficiency Anemia Pattern

- Decreased HCT (♀ <37 or <0.37, ♂ <40 or 0.40)
- Decreased HGB (♀ <13.5 or <135, ♂ <14.0 or <140)
- Decreased MCV (<82), MCH (<28), and MCHC (32)
- Decreased serum iron (<85 or <15.22)
- Decreased ferritin (<10 – 15 in women, <20 in men),
- Decreased % transferrin saturation (<16% or <0.16)
- An increased RDW (>13)

MCV

B12/Folate- Deficiency

B12 Deficiency- Reference Ranges

	Optimal Value
MCV	82.0 – 89.9

B12/Folate Deficiency Anemia- Pattern

- Increased MCV > 89.9
- Increased MCH >31.9
- Increased RDW >13,
- Increased MCHC >35,
- Increased LDH >200
- Decreased uric acid level (♀ <3.0 or <178, ♂<3.5 or <208)
- Hypersegmented neutrophils

Nutrient Deficiency Anemia Summary

	RBC	HCT	HGB	MCV	MCH/ MCHC	Iron
Iron def.	↓	↓	↓	↓	↓	↓
B12/ folate	↓	↓	↓	↑	↑	↑

LDH

Reactive Hypoglycemia

Reactive Hypoglycemia- Reference Ranges

	Optimal Range
LDH	140 - 200
Blood Glucose	75– 86 mg/dl or 4.16 – 4.77 mmol/L

Hypoglycemia- Reactive

- Liver and Adrenal connection
- Liver glycogen problem
- Pattern:
 - Decreased blood glucose (<75 or <4.16 mmol/L)
 - Decreased LDH (<140)
- Clinical indicators

Potassium

Adrenal dysfunction

Adrenal Dysfunction- Reference Ranges

	Optimal Range
Potassium	4.0 – 4.5
Sodium	135 – 142
Sodium:Potassium Ratio	30 - 35

Adrenal Insufficiency- Pattern

- Adrenal insufficiency is possible if:
 - Potassium levels are increased (>4.5)
 - Sodium is normal or decreased (<135)
 - Sodium:Potassium Ratio decreased (<30)
 - Chloride values will often follow sodium
- Other values that may be out of balance include:
 - Increased triglyceride and cholesterol levels
 - Decreased aldosterone and Cortisol levels

Adrenal Stress Pattern

- Adrenal stress is possible if:
 - Potassium levels are decreased (<4.0)
 - Sodium is normal or increased (>142)
 - Sodium:Potassium Ratio increased (>35)
 - Chloride values will often follow sodium
- Other values that may be out of balance include:
 - Decreased triglyceride and cholesterol levels
 - Increased aldosterone and cortisol levels.

BUN and Creatinine

Renal Insufficiency

Renal Insufficiency Reference Ranges

	Optimal Range
BUN	10 - 16 or 3.57 – 5.71 mmol/L
Creatinine	0.8 – 1.1 or 70.7 – 97.2 mmol/L

Renal Insufficiency

- **Background**
- **Contributing Factors**
- **Kidney/Liver Connection**

Renal Insufficiency - Pattern

- **Increased BUN:** >16 or > 5.71 mmol/L,
- **Increased or Normal Creatinine:** >1.1 or > 97.2 mmol/L
- **Increased or Normal Uric Acid:** ♀ >5.5, ♂ >5.9 or ♀ >327, ♂ >351
- **Increased Phosphorous:** >4.0 or >1.29
- **LDH and AST usually Normal**

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