Blood Chemistry Analysis From a Functional Perspective

With DR. DICKEN WEATHERBY
Naturopathic Physician
A Little About Me...
Why Blood Testing?
Here’s Why!

• Most commonly ordered lab test worldwide
• Most people have had a blood test
• Blood testing is the norm for health testing assessment
• Conditioned that blood contains the answers
• However, most health care practitioners are unaware that blood chemistry is Functional testing
Benefits of Functional Analysis of Blood

• Detect early stages of dysfunction and hidden health trends
• Improves decision making and reduces uncertainty
• You get an objective proof of results
• It confirms thoughts made in the initial intake and history
• It guides therapy decisions and modification
• It helps assess the efficacy of treatment protocols
• It helps both you and the patient assess their progress
S/Sxs of a Functionally Disturbed Patient

- Fatigue or low energy
- Digestive disorders
- Allergies
- Reduced immunity
- Infertility
- Pain & Inflammation
- Thyroid issues

- Sex hormone dysfunction
- Sleep disturbances
- Skin issues
- Anxiety/depression
- Weight fluctuations
- Hypertension
- Cognitive impairment
GOOD NEWS! YOUR TEST INDICATES THAT YOU'RE IN THE NORMAL RANGE!
CASE STUDY:
Pertinent Health Information

• 39 year old male

• PTC with complaints of low libido, gaining weight, especially around the abdomen, not sleeping well, catches colds every winter, muscle aches and generally has low energy

• Ordered a comprehensive blood panel to try and evaluate what is going on
Analysis of The Lab Test Report

**LIPID PANEL**
- **CHOLESTEROL, TOTAL**: 195 mg/dL (In Range)
- **HEM CHOLESTEROL**: 71 mg/dL (In Range)
- **TRIGLYCERIDES**: 66 mg/dL (In Range)
- **LDL-CHOLESTEROL**: 111 mg/dL (In Range)

Desirable range: 150 mg/dL for patients with CVD or diabetes and <70 mg/dL for diabetic patients with known heart disease.

**GLUCOSE**
- **In Range**: 7.3 mmol/L
- **Out of Range**: 65-99 mmol/L

Fasting reference interval: <11.4 umol/L

**NITROGEN METABOLITE**
- **UREA NITROGEN (BUN)**: 11 mg/dL
- **CREATININE**: 0.83 mg/dL
- **eGFR NON-AFR. AMERICAN**: >60 ml/min/1.73m2
- **eGFR AFRICAN AMERICAN**: >90 ml/min/1.73m2

**BUN/CREATININE RATIO**
- 91 (In Range)
- Lab: 65-99 mg/dL

**BLOOD CHEMISTRY**
- **BILIRUBIN, TOTAL**: 1.9 mg/dL
- **ALKALINE PHOSPHATASE**: 63 U/L
- **AST**: 16 U/L
- **ALT**: 32 U/L

**HEMOGLOBIN**: 5.5 g/dL

**VITAMIN D**
- **VITAMIN D, 25 OH (ML)/L**: 40 ng/mL
- **VITAMIN D, 1,25 D (OH)2, TOTAL**: 40 ng/mL

**NEEDS additional context or interpretation**
## Analysis of The Lab Test Report

### Test Name: Tissue Transglutaminase (1100, IgA)

<table>
<thead>
<tr>
<th>In Range</th>
<th>Out of Range</th>
<th>Reference Range</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2.5-4.5 mg/dL</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.0-6.0 mg/dL</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; OR = 0.2 mg/dL</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150-350 D/L</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3-30 D/L</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.40-1.50 mU/L</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.5-12.5 mcg/dL</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.8-1.8 mg/dL</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0-0.40 mg/dL</td>
<td>IU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.0-0.18 mg/dL</td>
<td>IU</td>
</tr>
</tbody>
</table>

### Test Name: Total IgG, IgA, IgM

<table>
<thead>
<tr>
<th>In Range</th>
<th>Out of Range</th>
<th>Reference Range</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td></td>
<td>0.1-1.6 mg/dL</td>
<td>IU</td>
</tr>
</tbody>
</table>

### Test Name: Free Testosterone

<table>
<thead>
<tr>
<th>In Range</th>
<th>Out of Range</th>
<th>Reference Range</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.0</td>
<td></td>
<td>30.0-150.0 ng/dl</td>
<td>IU</td>
</tr>
</tbody>
</table>

Total Testosterone was measured by LC/MSMS. The LC/MSMS method correlates well with our saturation/RIA method.

---

**Page 3 - Continued on Page 4**

---

**Page 4 - Continued on Page 5**
Analysis of The Lab Test Report

<table>
<thead>
<tr>
<th>Test Name</th>
<th>In Range</th>
<th>Out of Range</th>
<th>Reference Range</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron and total iron</td>
<td>134</td>
<td></td>
<td>45-170 mcg/dL</td>
<td>NW</td>
</tr>
<tr>
<td>Iron, total</td>
<td>394</td>
<td></td>
<td>250-425 mcg/dL</td>
<td>NW</td>
</tr>
<tr>
<td>Iron binding capacity</td>
<td>182</td>
<td></td>
<td>20-50 % (mean)</td>
<td>NW</td>
</tr>
<tr>
<td>Ferritin</td>
<td>100</td>
<td></td>
<td>20-545 ng/mL</td>
<td>NW</td>
</tr>
<tr>
<td>C-Reactive protein</td>
<td>&lt;0.10</td>
<td></td>
<td>&lt;0.80 ng/mL</td>
<td>NW</td>
</tr>
<tr>
<td>DHEA sulfate</td>
<td>66 L</td>
<td></td>
<td>110-370 mcg/dL</td>
<td>NW</td>
</tr>
<tr>
<td>Insulin</td>
<td>&lt;2</td>
<td></td>
<td>&lt;17 ug/mL</td>
<td>NW</td>
</tr>
<tr>
<td>Estradiol</td>
<td>53</td>
<td></td>
<td>13-54 pg/mL</td>
<td>NW</td>
</tr>
<tr>
<td>PSA, total</td>
<td>0.6</td>
<td></td>
<td>&lt; UR = 4.0 ng/mL</td>
<td>NW</td>
</tr>
</tbody>
</table>

This test was performed using the Siemens chemiluminescent method. Values obtained from different assay methods cannot be used interchangeably. PSA levels, regardless of value, should not be interpreted as absolute evidence of the presence or absence of disease.
Values Out of Range

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>BILIRUBIN, TOTAL</td>
<td>1.9</td>
<td>&lt; 0.2-1.2 mg/dL</td>
</tr>
<tr>
<td>BILIRUBIN, DIRECT</td>
<td>0.3</td>
<td>&lt; OR = 0.2 mg/d</td>
</tr>
<tr>
<td>DHEA SULFATE</td>
<td>66</td>
<td>110-370 mcg/dL</td>
</tr>
</tbody>
</table>

• What does this tell us about this patient’s condition?
Traditional Lab Reports Lack Meaning

<table>
<thead>
<tr>
<th>Test Name</th>
<th>In Range</th>
<th>Out of Range</th>
<th>Reference Range</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIPID PANEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHOLESTEROL TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>100-200 mg/dL</td>
<td>x OR = 65 mg/dL</td>
<td>HM</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>150 mg/dL</td>
<td>x OR = 130 mg/dL</td>
<td>HM</td>
<td></td>
</tr>
<tr>
<td>DESIREABLE RANGE &lt;150 mg/dL for patients with CHD or diabetes and &lt;10 mg/dL for diabetics with known heart disease.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDL CREATINOL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>150 mg/dL</td>
<td>x OR = 130 mg/dL</td>
<td>HM</td>
<td></td>
</tr>
<tr>
<td>LDL-CREASOLIN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDL/CRC RATIO</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>x OR = 1.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2</td>
<td>mg/dL</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Lower Relative Cardiovascular Risk According to AHA/CDC Guidelines**

For ages ≥17 Years:
- cCAD mg/dL: Risk According to AHA/CDC Guidelines
  - 1.0: Lower relative cardiovascular risk
  - 1.0-3.0: Average relative cardiovascular risk
  - 3.0-10.0: Higher relative cardiovascular risk
  - >10.0: Consider repeating in 4 to 6 months to exclude a benign transient elevation. Persistent elevation, even with normal values, may be associated with infection or inflammation.

**BILIRUBIN, TOTAL**

<table>
<thead>
<tr>
<th>Test Name</th>
<th>In Range</th>
<th>Out of Range</th>
<th>Reference Range</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALKALINE PHOSPHATASE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Blood Chemistry Software**
The Problem With “Normal”

- The “normal” range is based on statistics and not on whether a certain value represents good health or function.
- “Normal” reference ranges represent “average” populations, rather than the optimal level required to maintain good health.
- Normal is not the same as optimal.
The Functional “Optimal” Range

- A result in this “gray area” tells me something’s not right in the physiological system associated with this element.

Where you are in the “normal” range tells us much more.

- A result in this “gray area” tells me something’s not right in the physiological system associated with this element.
Where do these optimal ranges come from?

- “Normal” ranges 20 to 30 years ago.
- Biochemical Biopsy
- Research
- “Old Time Docs”
- Clinical observations
- Where to Start?
Organizing Your FBCA Analysis
Part 1
Drilling Down:
How to Think About Individual Biomarkers
1. Where does this biomarker come from?
2. What are some of the reasons why it might be elevated?
3. What are some of the reasons why it might be decreased?
Example: BUN

1. Where does it come from?
Example: BUN

2. What are some of the reasons why it might be elevated?
Example: Increased BUN

• Too much exogenously
• Too much endogenously
• Not being excreted
Example: BUN

3. What are some of the reasons why it might be decreased?
Example: Decreased BUN

• Not enough exogenously
• Not enough endogenously
• Too much being excreted
Organizing Your FBCA Analysis
Part 2
Body Systems, Functional Indicators and Patterns
Functional Hierarchy

1. Gastrointestinal System
   - Protein
   - BUN
   - Phosphorous
   - Creatinine
   - Globulin
   - Eosinophils

2. Gallbladder & Fatty Acids
   - GGTP
   - Total Bilirubin
   - Total Cholesterol
   - Aik Phos
   - Triglycerides
   - Direct Bilirubin
   - LDL

3. Mineral Balance
   - Calcium
   - Phosphorous
   - Aik Phos
   - Iron
   - Ferritin
   - Uric Acid

4. Vitamin Balance
   - RBC Indices
   - Homocysteine
   - Anion Gap
   - Vitamin D

5. Blood Sugar Regulation: Pancreas
   - Glucose
   - LDH
   - Total Cholesterol
   - HDL
   - Fasting Insulin
   - Hemoglobin A1C
   - Triglycerides
   - LDL

6. Neuro-Endocrine Regulation: Adrenals
   - Potassium
   - DHEA-S
   - Sodium

7. Liver Function
   - AST/Sgot
   - ALT/Sgot
   - LDH
   - GGT
   - A/G ratio
   - Alk Phos
   - Bilirubin
   - Albumin

8. Kidney and Genito-Urinary System
   - BUN
   - Aik Phos
   - PSA
   - Creatinine
   - EGFR

9. Neuro-Endocrine Regulation: Thyroid
   - TSH
   - Free T3
   - Free T4
   - Reverse T3
   - Total T3
   - T3 uptake

10. Neuro-Endocrine Regulation: Sex Hormones
    - Total Testosterone
    - DHEA-S
    - Free Testosterone
    - Estradiol
    - Sex Hormone Binding Globulin

11. Cardiovascular System
    - Total Cholesterol
    - Triglycerides
    - LDL
    - HDL
    - C Reactive Protein
    - Fibrinogen
    - Homocysteine
    - Vitamin D
    - Hyperemoglobin A1C
    - AST/SGOT

12. Inflammation and Tissue Damage
    - LDH
    - Albumin
    - Uric Acid
    - C Reactive Protein
    - Ferritin
    - ESR
    - Fibrinogen

13. Allergies
    - Basophils
    - Eosinophils

14. Acid-Base Balance
    - Basophils
    - Eosinophils
    - Chloride
    - Anion Gap

15. Immune Balance
    - Total WBCs
    - Neutrophils
    - Lymphocytes
    - Monocytes
    - Eosinophils
    - Basophils
    - Vitamin D
Approaching the Analysis

- Look for values outside “normal” range
- Look for values outside the optimal/physiological range
- Begin the analysis by starting to look for patterns among the elements
- Report of Findings Presentation
# FBCA Tracking Form

## FUNCTIONAL CHEMSCREEN and CBC RESULTS TRACKING FORM STANDARD U.S. UNITS

<table>
<thead>
<tr>
<th>TEST</th>
<th>OPTIMAL</th>
<th>RESULT</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>75 – 96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hgb A1C</td>
<td>&lt;4.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fasting Insulin</td>
<td>&lt;5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUN</td>
<td>10 – 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.8 – 1.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sodium</td>
<td>136 – 142</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>4.0 – 4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloride</td>
<td>100 – 106</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂</td>
<td>25 – 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anion Gap</td>
<td>7 – 12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uric Acid</td>
<td>3.5 – 5.9 male</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.0 – 5.5 female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Protein</td>
<td>6.9 – 7.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin</td>
<td>4.0 – 5.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium</td>
<td>9.5 – 10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phosphorous</td>
<td>3.0 – 4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alk Phos</td>
<td>70 – 100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGOT (AST)</td>
<td>10 – 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SGPT (ALT)</td>
<td>10 – 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDH</td>
<td>140 – 260</td>
<td></td>
<td></td>
</tr>
<tr>
<td>total Bilirubin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>direct</td>
<td>0.1 – 1.2 (&lt;2.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>indirect</td>
<td>0.1 – 1.0 (&lt;1.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GGT</td>
<td>10 – 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Globulin</td>
<td>2.4 – 2.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/G ratio</td>
<td>1.4 – 2.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUN/Creat</td>
<td>10 – 16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total iron</td>
<td>85 – 130</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferritin</td>
<td>30 – 70</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIBC</td>
<td>250 – 350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Sat</td>
<td>25 – 35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cholesterol</td>
<td>180 – 189</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Triglycerides</td>
<td>75 – 80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LDL</td>
<td>&lt;100</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HDL</td>
<td>&gt;55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSH</td>
<td>1.3 – 2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free T-3</td>
<td>3.0 – 3.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total T-3</td>
<td>90 – 156</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free T-4</td>
<td>1.0 – 1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4 thyroxine</td>
<td>6.0 – 11.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hs-CRP</td>
<td>&lt;0.55 male</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>&lt;1.5 female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homocysteine</td>
<td>&lt;7.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>200 – 300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin D</td>
<td>50 – 85</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHEA Sulfate</td>
<td>500 – 640 male</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>250 – 360 female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Free T</td>
<td>15 – 26.5 male</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testosterone</td>
<td>1.4 – 2.2 female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estradiol</td>
<td>10 – 30 male</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Pertinent Health Information

• 39 year old male
• PTC with complaints of low libido, gaining weight, especially around the abdomen, not sleeping well, catches colds every winter, muscle aches and generally has low energy

Values Out of Range

<table>
<thead>
<tr>
<th>Test</th>
<th>Value</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilirubin, Total</td>
<td>1.9 H</td>
<td>0.2-1.2 mg/dL</td>
</tr>
<tr>
<td>Bilirubin, Direct</td>
<td>0.3 H</td>
<td>&lt; OR = 0.2 mg/dL</td>
</tr>
<tr>
<td>Dhea Sulfate</td>
<td>66 L</td>
<td>110-370 mcg/dL</td>
</tr>
</tbody>
</table>
### Blood Test Results Comparative Report

The Blood Test Results Comparative Report lists the results of the patient’s latest and previous Chemistry Screen and CBC and allows you whether or not an individual biomarker is outside the optimal range and/or outside of the clinical lab range. The biomarkers appear in the order in which they appear on the lab test form.

#### Biomarker List

<table>
<thead>
<tr>
<th>Biomarker</th>
<th>Current Jan 27 2013</th>
<th>Optimal Range</th>
<th>Standard Range</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glucose</td>
<td>91.00</td>
<td>75.00-96.00</td>
<td>85.00-99.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Hemoglobin A1C</td>
<td>5.50</td>
<td>4.50-5.50</td>
<td>4.00-5.70</td>
<td>%</td>
</tr>
<tr>
<td>Insulin - Fasting</td>
<td>2.00</td>
<td>2.00-5.50</td>
<td>2.00-19.00</td>
<td>µU/ml</td>
</tr>
<tr>
<td>BUN</td>
<td>11.00</td>
<td>10.0-11.00</td>
<td>7.00-25.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Creatinine</td>
<td>0.83</td>
<td>0.60-1.10</td>
<td>0.40-1.50</td>
<td>mg/dL</td>
</tr>
<tr>
<td>BUN/Creatinine Ratio</td>
<td>13.25</td>
<td>10.0-16.00</td>
<td>8.0-22.00</td>
<td>Ratio</td>
</tr>
<tr>
<td>PSA</td>
<td>0.80</td>
<td>0.00-4.00</td>
<td>0.00-4.00</td>
<td>ng/ml</td>
</tr>
<tr>
<td>eGFR Non-African American</td>
<td>92.20</td>
<td>50.00-120.00</td>
<td>60.00-120.00</td>
<td>mL/min/1.73m²</td>
</tr>
<tr>
<td>Sodium</td>
<td>140.00</td>
<td>135.00-142.00</td>
<td>135.00-148.00</td>
<td>mEq/L</td>
</tr>
<tr>
<td>Potassium</td>
<td>4.01</td>
<td>3.50-4.50</td>
<td>3.50-5.50</td>
<td>mEq/L</td>
</tr>
<tr>
<td>Potassium/Sodium Ratio</td>
<td>34.15</td>
<td>30.00-35.00</td>
<td>30.00-35.00</td>
<td>Ratio</td>
</tr>
<tr>
<td>Chloride</td>
<td>100.00</td>
<td>90.00-106.00</td>
<td>90.00-110.00</td>
<td>mEq/L</td>
</tr>
<tr>
<td>CO2</td>
<td>25.00</td>
<td>25.00-35.00</td>
<td>19.00-30.00</td>
<td>mEq/L</td>
</tr>
<tr>
<td>Anion gap</td>
<td>8.10</td>
<td>8.10-12.00</td>
<td>6.00-12.00</td>
<td>mEq/L</td>
</tr>
<tr>
<td>Urea and Male</td>
<td>4.10</td>
<td>3.50-5.90</td>
<td>3.45-8.10</td>
<td>g/dL</td>
</tr>
<tr>
<td>Protein total</td>
<td>7.70</td>
<td>6.00-7.40</td>
<td>6.10-8.10</td>
<td>g/dL</td>
</tr>
<tr>
<td>Albumin</td>
<td>5.00</td>
<td>4.00-6.00</td>
<td>3.60-5.10</td>
<td>g/dL</td>
</tr>
<tr>
<td>Albumin/Globulin Ratio</td>
<td>1.90</td>
<td>1.40-2.10</td>
<td>1.70-3.00</td>
<td>Ratio</td>
</tr>
<tr>
<td>Calcium</td>
<td>9.50</td>
<td>9.20-10.40</td>
<td>8.0-10.40</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Calcium/Albumin Ratio</td>
<td>1.90</td>
<td>1.80-2.40</td>
<td>1.60-2.00</td>
<td>Ratio</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>3.20</td>
<td>2.30-3.20</td>
<td>2.50-4.50</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Phosphorus/Magnesium Ratio</td>
<td>2.92</td>
<td>2.70-3.20</td>
<td>2.70-3.20</td>
<td>Ratio</td>
</tr>
<tr>
<td>Magnesium</td>
<td>1.95</td>
<td>1.20-2.50</td>
<td>1.50-2.50</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Alk. Phe</td>
<td>43.00</td>
<td>20.00-100.00</td>
<td>35.00-115.00</td>
<td>µg/dL</td>
</tr>
<tr>
<td>AST (SGOT)</td>
<td>16.00</td>
<td>10.00-26.00</td>
<td>10.00-35.00</td>
<td>IU/L</td>
</tr>
<tr>
<td>ALT (SGPT)</td>
<td>32.00</td>
<td>140.00-200.00</td>
<td>120.00-250.00</td>
<td>IU/L</td>
</tr>
<tr>
<td>Direct Bilirubin</td>
<td>0.00</td>
<td>0.0-0.90</td>
<td>0.20-1.20</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Indirect Bilirubin</td>
<td>1.00</td>
<td>0.10-0.70</td>
<td>0.20-0.70</td>
<td>mg/dL</td>
</tr>
<tr>
<td>GGT</td>
<td>18.00</td>
<td>10.0-50.00</td>
<td>3.00-70.00</td>
<td>IU/L</td>
</tr>
<tr>
<td>Ferritin</td>
<td>30.00</td>
<td>30.00-70.00</td>
<td>10.00-232.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>TIBC</td>
<td>344.00</td>
<td>250.00-350.00</td>
<td>250.00-425.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>% Transferrin Saturation</td>
<td>39.00</td>
<td>20.00-30.00</td>
<td>15.00-50.00</td>
<td>%</td>
</tr>
<tr>
<td>Cholesterol - Total</td>
<td>156.00</td>
<td>160.00-180.00</td>
<td>125.00-200.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Triglycerides</td>
<td>88.00</td>
<td>70.00-80.00</td>
<td>40.00-150.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>HDL Cholesterol</td>
<td>111.00</td>
<td>100.00-120.00</td>
<td>80.00-130.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>LDL Cholesterol</td>
<td>71.00</td>
<td>55.00-70.00</td>
<td>40.00-100.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Cholesterol/HDL Ratio</td>
<td>2.70</td>
<td>2.00-4.00</td>
<td>2.00-2.00</td>
<td>Ratio</td>
</tr>
<tr>
<td>Triglyceride/HDL Ratio</td>
<td>0.63</td>
<td>0.00-2.00</td>
<td>0.00-2.00</td>
<td>Ratio</td>
</tr>
<tr>
<td>TSH</td>
<td>0.85</td>
<td>1.30-3.00</td>
<td>4.00-4.50</td>
<td>µU/ml</td>
</tr>
<tr>
<td>T3</td>
<td>3.22</td>
<td>3.00-3.50</td>
<td>2.30-4.20</td>
<td>µg/dL</td>
</tr>
<tr>
<td>T4</td>
<td>9.70</td>
<td>0.00-11.00</td>
<td>4.50-12.00</td>
<td>IU/L</td>
</tr>
<tr>
<td>PTH Uptake</td>
<td>26.00</td>
<td>27.00-35.00</td>
<td>22.00-37.00</td>
<td>%</td>
</tr>
<tr>
<td>Reverse T3</td>
<td>17.60</td>
<td>10.00-25.00</td>
<td>8.00-25.00</td>
<td>ng/dL</td>
</tr>
<tr>
<td>Hct, CRP, Male</td>
<td>0.20</td>
<td>0.00-0.85</td>
<td>0.00-2.00</td>
<td>%</td>
</tr>
<tr>
<td>ESR, Male</td>
<td>4.20</td>
<td>0.00-5.00</td>
<td>0.00-15.00</td>
<td>mm/hr</td>
</tr>
<tr>
<td>Hemoglobin</td>
<td>7.50</td>
<td>6.80-8.00</td>
<td>7.00-10.00</td>
<td>%</td>
</tr>
<tr>
<td>Erythrocyte</td>
<td>263.00</td>
<td>200.00-300.00</td>
<td>150.00-300.00</td>
<td>mg/dL</td>
</tr>
<tr>
<td>Hemoglobin, Male</td>
<td>14.80</td>
<td>14.00-15.00</td>
<td>13.20-17.10</td>
<td>g/dL</td>
</tr>
<tr>
<td>Hematophils, Male</td>
<td>44.00</td>
<td>40.00-49.00</td>
<td>38.50-50.00</td>
<td>%</td>
</tr>
<tr>
<td>MCV</td>
<td>82.80</td>
<td>82.00-88.90</td>
<td>60.00-100.00</td>
<td>fl</td>
</tr>
<tr>
<td>MCH</td>
<td>31.10</td>
<td>28.00-31.00</td>
<td>27.00-33.00</td>
<td>pg</td>
</tr>
<tr>
<td>MCHC</td>
<td>33.50</td>
<td>32.00-35.00</td>
<td>32.00-36.00</td>
<td>g/dL</td>
</tr>
<tr>
<td>Platelets</td>
<td>214.00</td>
<td>155.00-385.00</td>
<td>140.00-400.00</td>
<td>k/µL</td>
</tr>
<tr>
<td>RDW</td>
<td>11.00</td>
<td>11.00-15.00</td>
<td>11.00-15.00</td>
<td>%</td>
</tr>
<tr>
<td>Neutrophils</td>
<td>4.20</td>
<td>4.00-6.00</td>
<td>3.80-7.00</td>
<td>%</td>
</tr>
<tr>
<td>Lymphocytes</td>
<td>4.10</td>
<td>4.00-6.00</td>
<td>4.00-13.00</td>
<td>%</td>
</tr>
<tr>
<td>Monocytes</td>
<td>7.00</td>
<td>0.00-7.00</td>
<td>0.00-5.00</td>
<td>%</td>
</tr>
<tr>
<td>Eosinophils</td>
<td>0.00</td>
<td>0.00-3.00</td>
<td>0.00-3.00</td>
<td>%</td>
</tr>
<tr>
<td>Basophils</td>
<td>1.10</td>
<td>0.00-1.00</td>
<td>0.00-1.00</td>
<td>%</td>
</tr>
</tbody>
</table>
Functional Systems Analysis

A Macro view of 13 Functional Body Systems and 7 Functional Accessory Systems
Macronutrient Systems Analysis

A Macro view of 7 Macronutrient Systems and 14 individual Nutrients

<table>
<thead>
<tr>
<th>Nutrient Index Status</th>
<th>Optimum &lt; 50%</th>
<th>Moderate 50% - 70%</th>
<th>Low 70% - 90%</th>
<th>Poor &gt; 90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin Index</td>
<td>10%</td>
<td>38%</td>
<td>36%</td>
<td>100%</td>
</tr>
<tr>
<td>Fat Index</td>
<td>17%</td>
<td>38%</td>
<td>36%</td>
<td>100%</td>
</tr>
<tr>
<td>Mineral Index</td>
<td>12%</td>
<td>11%</td>
<td>10%</td>
<td>100%</td>
</tr>
<tr>
<td>Electrolyte Balance</td>
<td>9%</td>
<td>12%</td>
<td>11%</td>
<td>10%</td>
</tr>
<tr>
<td>Carbohydrate Index</td>
<td>12%</td>
<td>11%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Protein Index</td>
<td>11%</td>
<td>10%</td>
<td>9%</td>
<td>10%</td>
</tr>
<tr>
<td>Hydration Index</td>
<td>10%</td>
<td>9%</td>
<td>8%</td>
<td>10%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deficiency</th>
<th>Less Likely &lt; 50%</th>
<th>Possible 50% - 70%</th>
<th>Likely 70% - 90%</th>
<th>Highly Likely &gt; 90%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>DHEA Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin D Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Magnesium Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin B12/Folate Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Thiamine Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Calcium Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin B6 Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Vitamin C Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Iron Deficiency</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Iodine Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Molybdenum Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Selenium Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
<tr>
<td>Glutathione Need</td>
<td>100%</td>
<td>75%</td>
<td>65%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Clinical Dysfunction Analysis

A view of likely health concerns and dysfunctions based on the blood test results
# Health Improvement Plan

A summary report of the top areas to treat with a protocol already created

<table>
<thead>
<tr>
<th>Protocols</th>
<th>Primary Product</th>
<th>Dosage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Testosterone Deficiency</td>
<td>Premier Testosterone</td>
<td>Take 2 capsules daily.</td>
</tr>
<tr>
<td>Biliary Stasis/Insufficiency</td>
<td>Gallbladder-ND</td>
<td>Take 1/2 teaspoon mixed in water or juice, 2 times daily or as directed by your healthcare practitioner. Shake gently before use.</td>
</tr>
<tr>
<td></td>
<td>BiliVen</td>
<td>Take 1 capsule, 3 times daily or as directed by your healthcare practitioner.</td>
</tr>
<tr>
<td>Liver Dysfunction</td>
<td>HepatoVen</td>
<td>Take 3 capsules, in divided doses, daily with meals or as directed by your healthcare practitioner.</td>
</tr>
<tr>
<td>Increased Cardiovascular Disease Risk</td>
<td>CardioVen</td>
<td>Take 1 capsule, 3 times daily or as directed by your healthcare practitioner.</td>
</tr>
<tr>
<td></td>
<td>Deltanol</td>
<td>Take 1 softgel daily or as directed by your healthcare practitioner.</td>
</tr>
<tr>
<td>Viral Infection</td>
<td>Olive Leaf Immune</td>
<td>Take 1 capsule, 3 times daily or as directed by your healthcare practitioner.</td>
</tr>
<tr>
<td>DHEA Need</td>
<td>Premier DHEA</td>
<td>For men: Take 1 capsule, 4 times daily. For women: Take 1 capsule, 2 times daily. As with all hormone products, consult your practitioner prior to use.</td>
</tr>
<tr>
<td>Vitamin D Need</td>
<td>D3 Serum</td>
<td>Take 1 drop daily with a meal or as directed.</td>
</tr>
<tr>
<td>Zinc Need</td>
<td>Liquid Zinc Assay</td>
<td>Take 1 teaspoon in water or juice daily or as directed by a healthcare practitioner.</td>
</tr>
</tbody>
</table>
Identifying and Assessing for Dysfunctions in the GI

Blood Testing, Signs and Symptoms Analysis and Other Assessment Techniques
Functional Assessment G.I.

- Hypochlorhydria
- H. pylori
- Gastric Inflammation
- Pancreatic insufficiency
- Biliary Insufficiency
- Biliary Stasis
- Biliary obstruction
Hypochlorhydria - Causes

- Aging
- Stress
- Carbohydrates
- Zinc and Thiamine Deficiency
- Drugs
- Lack of protein in diet
Hypochlorhydria Signs and Symptoms

• Belching or gas within one hour after eating
• Bloating within one hour after eating
• Bad breath (halitosis)
• Stomach upset by taking vitamins
• Fingernails chip, peel or break easily
• Anemia unresponsive to iron
• Sense of fullness after meal
The Functional and Nutritional Physical Exam
Hypochlorhydria - Nutritional Physical Findings

- Adult acne
- Dilated capillaries on nose and face
- Dandruff
- Soft, poor growth of fingernails
- Brittle and splitting nails
- White spots on the nails
Functional Physical Findings G.I. & Hepato-Biliary

- Upper G.I. Reflexes
  - HCL & Enzyme Points
  - Chapman’s reflex for upper GI

- Hepato-Biliary (Liver Gallbladder) Reflexes
  - Chapman’s Reflex for Liver
  - Murphy’s Sign
  - Chronic Gallbladder Marker
The HCL Point

1" below xiphoid and over to the left edge of the rib cage
Anatomical Inch

Thumb

Distal Phalanx of Thumb = 1 anatomical inch
The Enzyme Point

1" below xiphoid and over to the right edge of the rib cage

First Rib
Clavicle
Xiphoid Process
Upper GI Chapman’s Reflex

- First Rib
- Clavicle
- 6th Rib
- Xiphoid Process
- Stomach

Chapman's Upper GI Reflex
6th Intercostal Space
Mid-Mamillary line on patient's left side
In-Office Testing

In-Office Test
• Zinc Taste test

In-Office Lab Testing
• Check urine indican levels
• Check urine sediment levels
Blood Test Findings

• Suspect a hypochlorhydria when globulins start to climb above 2.8 or 28 g/L
• May also see a decreased total protein <6.9 or 69 g/L and/or a decreased albumin <4 or 40 g/L
• Likelihood increases with these findings:
  – Increased BUN (>16 or 5.71 mmol/L)
  – Decreased serum phosphorous (<3.0 or <0.97 mmol/L)
  – Decreased serum calcium (<9.2 or 2.3 mmol/L)
  – Increased MCV >90
Helicobacter pylori
H. Pylori - Symptoms

• Discomfort in the upper GI especially upper left quadrant discomfort
• Bloating
• Nausea
• Maybe even vomiting
• May have symptoms suggestive of an ulcer
H. Pylori Blood Test Pattern

- An increased or decreased total globulin (>2.8 or < 2.4)
- Increased or decreased total protein (<6.9 or > 7.4)
- Increased or Decreased BUN (< 10 or >16)
- decreased serum phosphorous (<3.0)
- Increased WBC count (>7.5)
- Increased Neutrophils (>60)
- Decreased Lymphocytes (<24)
- Normal or Increased Monocytes (N or >7)
H. Pylori - Advanced FDM Testing

• Blood test to measure H. pylori antibodies
• Breath test
• The H. pylori stool antigen test
• CDSA

• Allopathic Testing
  – Endoscopy with tissue biopsy
Gastric Inflammation
Gastritis – S/Sxs

- (Very) frequent stools or normal stool frequency
- Weak appetite
- Epigastric pain
- Unexplained nausea
- Unexplained vomiting
- Fever: High/moderate/or slight
- Blood in the stool (end stage)
- Vomiting blood (end stage)
Gastritis – Blood Testing

- Decreased total globulin (<2.4 or 24 g/L)
- Decreased serum phosphorus (<3.0 or <0.97 mmol/L)
- Increased BUN (>16 or 5.71 mmol/L)
- Increased basophils (> 1)
- Increased ESR
Pancreatic Insufficiency – S/SX

- Loose watery stool
- Maldigestion
- Post prandial abdominal pain
- Stools with undigested food
- Acne
- Food allergies

- Hypoglycemic symptoms
- Abnormal weight gain, or more commonly, weight loss
- Gastroesophageal reflux
- Bloating
- Food intolerance
Pancreatic Insufficiency

• Functional Physical Exam Findings
  – Positive Ridler Pancreatic Enzyme
  – Positive Ridler HCL reflex

• In-Office Lab Testing
  – Elevated urine indican
  – Elevated urine sediment
Pancreatic Insufficiency – Blood Test Findings

- Decreased Amylase <28
- Decreased Lipase <22
- Decreased WBC count <5.5
- Decreased Albumin <4.0
- Increased Globulin >2.8
- Increased GGT >30
Pancreatic Insufficiency – Lab Findings

• Advanced Lab Findings – Stool Analysis
  – Decreased Pancreatic elastase
  – High fat in stool (steatorrhea)
  – Decreased Chymotrypsin
Hepato-Biliary Dysfunction

Biliary Insufficiency and Stasis
Biliary Insufficiency - Causes

- Changes in metabolism
- Diseases that affect gallbladder function
- Diseases that reduce the number of hepatocytes
Biliary Stasis - Causes

- Supersaturation of bile
- Decrease in bile acid formation
- Decrease in phosphatidylcholine secretion
Biliary Stasis - Problems

- Accumulation of toxins
- Digestive disorders
- Poor fat soluble vitamin absorption
- EFA deficiency
- Increased risk of gallstones
Biliary Dysfunction: S/Sxs

- Pain between shoulder blades
- Stomach upset by greasy foods
- Loose, bulky and offensive stools
- Greasy or shiny stools
- Nausea
- Sea, car, airplane or motion sickness
- History of morning sickness

- Light or clay colored stools
- Dry skin, itchy feet or skin peels on feet
- Headache over eyes
- History of gallbladder attacks
- Bitter taste in mouth, especially after meals
- Dark orange urine
Biliary Dysfunction: Nutritional PE

- Dry, scaly and hyperemic ear canal
- Dry skin and dry hair
- Red bumps on the elbow
- Follicular hyperkeratosis
- Clubbing of the fingers
- Steatthorea
Biliary Dysfunction: Functional PE

- Check for a positive Murphy’s sign
- Check chronic gallbladder sign
- Check for tenderness in the Chapman reflex for the liver-gallbladder
- **Functional Urinalysis**
  - Increased urinary sediment levels
Gallbladder Palpation
(Murphy's Sign)
Palpate the gallbladder under the right rib cage

Gallbladder (Chronic)
Palpate for tenderness and nodulation on the web of the right hand

Liver

Gallbladder Markers
Liver/GB Chapman’s Reflex

Chapman's Liver/G.B. Reflex
6th Intercostal Space
Mid-Mamillary line on patient's right side

First Rib
Clavicle
6th Rib
Liver
Xiphoid Process
Biliary Dysfunction: Blood Test

- **Biliary insufficiency**
  - Elevated total bilirubin (>1.2)
  - Increased GGTP (>30),
  - Increased SGPT/ALT (>30),
  - Increased alkaline phosphatase (>100)
  - Increased LDH (>200).
Biliary Dysfunction: Blood Test

• Biliary stasis
  – GGTP levels will frequently be increased (>30) but not necessarily.
  – Bilirubin levels will also be elevated (>1.2 or 20.5 μmol/dL)
  – Increased alkaline phosphatase (>100)
  – Increased total cholesterol (>220 or 5.69 mmol/L).
  – SGOT/AST and SGPT/ALT may be normal or increased (>30).
Biliary Obstruction

• Leads to cholestasis
• Intrahepatic obstruction
• Extrahepatic obstruction
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)
SUMMARY
Free FBCA Crash Course Training

BloodChemSoftware.com
Functional Diagnosis
Books

Blood Chemistry Book
Signs and Symptoms Book

Amazon.com

Do a search for Dicken Weatherby