**Introduction**

Most of us are using the conventional laboratory reference ranges for our blood chemistry and CBC interpretation. For many practitioners blood chemistry and CBC analysis is a matter of comparing a test result with the conventional laboratory reference range, seeing whether or not the patient’s results are normal or abnormal and attempting to fit them into a particular disease pattern or pathology. Unfortunately these conventional laboratory ranges are designed to identify and diagnose disease states and pathology. People who fall within the reference range are assumed to have no clinical signs and symptoms of any disease, and are considered “normal”.

In the field of alternative and preventative medicine we know that most of our patients are by no means “normal”, so why do we use an interpretive method that is based on that assumption? It is our hope that this book will present another method of analysis, one that looks at blood chemistries from a functional or prognostic perspective and can therefore give us data on how the physiology of body is functioning. By looking for optimum function we increase our ability to detect the dysfunctions that plague our patients long before disease manifests. Our conventional lab testing becomes more comprehensive by being prognostic and preventative, as well as pathology oriented.

**Functional versus pathological**

Medicine and healthcare are undergoing a paradigm shift. We are seeing more and more demand from our patients to look at their complex cases from a holistic rather than a mechanistic or reductionistic perspective. In order to do this we need to have diagnostic methods that focus on physiological function as a marker of health, rather than merely the presence of pathology or tissue change as a marker of disease. The following lists the differences between a reductionistic, pathological view of the body, and the view of the body as functioning physiology.

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<tr>
<th>PATHOLOGICAL VIEW</th>
<th>FUNCTIONAL VIEW</th>
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<td>1. The body is viewed as a “machine” composed of separate systems reduced into its constituent parts.</td>
<td>1. The body is viewed as a dynamic and complex interconnected system of mind, body, and emotions.</td>
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<td>2. Emphasis is placed on the identification of disease or pathological tissue change.</td>
<td>2. Emphasis is placed on identification of areas of imbalance or dysfunction in normal physiology.</td>
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<td>3. Diagnosis is extremely specialized.</td>
<td>3. Diagnosis integrates data from many different systems and methods.</td>
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<td>4. Treatment is based on reducing symptoms.</td>
<td>4. Treatment addresses the underlying causes of dysfunction.</td>
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<td>5. Major focus is spent on how the patient is doing based on charts, statistics, and test results etc. that are measured against a statistical “normal population”.</td>
<td>5. Major focus is spent on both subjective and objective information gathering based on a concept of optimal physiological function.</td>
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The main focus of this book is to look at blood chemistry and CBC testing from this functional perspective. We will present different ranges, which we call optimal ranges, for each test on a regular blood chemistry and CBC or hematology screen. In addition to the US units of measurement we have included the Standard International units used by physicians in the rest of the world.

Alternative blood chemistry and CBC analysis has been around for many years with many researchers and clinicians contributing their particular talents to this growing field. We have been using this particular method of analysis for the last 6 years, and over that time we have refined our diagnostic criteria into the system that it is today.

Conventional Laboratory Reference Ranges vs., Optimal Ranges

Conventional laboratory reference ranges are designed to identify and diagnose disease states and pathology. People who fall within the reference range are assumed to have no clinical signs and symptoms of any disease, and are considered “normal”. The reference range used by conventional laboratories is based on a Gaussian or bell curve distribution of test results with an established mean value. The standard in laboratory medicine is to use 2 standard deviations above and below the mean to represent normal. This places 95% of people within the “clinically” normal reference range.

Unfortunately, this method of assessment does not allow for the large numbers of people who are told that they are “clinically” normal yet suffer from a wide range of signs and symptoms more suggestive of a subclinical or functional problem. The conventional reference ranges, because they are based on the Gaussian distribution, get wider and wider as the population gets sicker and sicker. Remember 95% of the population falls within the normal reference range. As the population becomes sicker the number of people who are declared “clinically normal” gets larger, making the definition of abnormal or disease states relative.

It is our experience that most people who seek medical care do not have a clinically identifiable disease. As a result they are told by their doctor that they have an “unremarkable” or “normal” laboratory test, i.e. they are “clinically” normal. They may be normal compared to the rest of the sick population, but they are a long way from being in a state of optimal health.

Many of the optimal ranges in this book used to be the “normal” ranges 10 or 15 years ago. Also, many of these optimal ranges and patterns were inadvertently discovered by
doctors seeking serum cancer markers. The optimal ranges are tighter than the conventional laboratory reference ranges, thereby increasing the sensitivity while reducing specificity. We increase our ability to detect patients with changes in physiological function and thus use laboratory testing in a more preventative way. We can identify the factors that obstruct the patient from achieving optimal physiological, biochemical, and metabolic functioning in their body. For example, if a patient’s blood glucose is 105 mg/dL or 5.82 mmol/L, this falls within the normal laboratory reference range. In the conventional system the patient would be told that the lab test is normal and that he/she does not have diabetes. This is true, the patient may not have diabetes now, but as functionally-oriented practitioners we are more concerned with preventing disease from occurring. By using an optimal range for blood glucose, a serum glucose of 105 mg/dL or 5.82 mmol/L alerts us to the possibility that this patient’s ability to regulate blood glucose is becoming compromised. Combining this with a thorough history, a diet and symptom analysis, functional physical exam, and looking at other values on their chemistry screen we can more accurately determine whether or not the patient is having problems with blood sugar dysregulation. We have the opportunity to deal with the dysfunction long before it manifests in diabetes.

Patterns/trends

We have added sections throughout the book on the key patterns and trends that exist between different laboratory tests. The body’s blood chemistry is a profound network of checks and balances, biochemical regulation of function, and important compensatory mechanisms at work. To analyze only an isolated value or limited set of values is therefore incomplete. Often what we see in our patients is the result of something else that’s out of balance, rather than the apparent problem itself. The detective work is simplified by understanding the root cause of many chemistry shifts and observing key trends and patterns suggestive of metabolic dysfunction long before there is overt pathology.

We must therefore learn to recognize and treat the underlying cause of these imbalances and not just the compensatory reactions occurring in response. Treatment of a metabolic or nutritional dysfunction at the root level will produce a more efficient and longer lasting result than just treating one symptom or effect of the imbalance.

In addition, independent values can be used to track particular trends (i.e. lipid levels); however, we propose looking at all values in the context of many other related values or clusters (i.e. lipid levels and serum glucose for Syndrome X) in order to establish causative patterns which can direct the clinician to key diagnostic and therapeutic resources.

Where blood chemistries fit in the scope of practice

Many practitioners base their treatment decisions and follow-up care primarily on symptoms and patient history alone, because many lab tests, when analyzed using the conventional laboratory reference range, are “normal” and are often too expensive to repeat frequently. This is unfortunate, because many symptoms emerge later into a process of dysfunction or pathology and often disappear long before a dysfunction is
fully addressed. This leaves a large prognostic “gray zone” both before and after a symptom is present.

It is essential in a practice of patient-centered preventative medicine to have the tools to assess where a patient lies upon this spectrum. Blood chemistry and CBC analysis from an optimal and functional perspective is one of the tools that allows the practitioner to assess that prognostic “gray zone”. We also recommend using symptom questionnaires, a thorough functional physical examination, and appropriate in-office lab tests along with regular blood chemistry analysis to get a thorough picture of what is going on.

Incorporating symptom questionnaires into the analysis can be very useful. We cannot over-emphasize the importance of a good, thorough history when interpreting baseline or serial laboratory values. Diet, lifestyle, and medication history is critical for the proper interpretation of a routine blood analysis, as many of these factors play an important role in establishing the etiology of a dysfunction.

We recommend running a comprehensive blood chemistry and CBC every 6 months for active patients and every year for those patients on a maintenance program. They should be run more frequently when dealing with an acute case. In between these visits we encourage the use of simple and inexpensive in-office laboratory tests that can be run economically to help track a patient’s progress. Recommendations for these tests are made throughout the book. Please see our book entitled “In-Office Lab Testing-Functional Terrain Analysis” for a more comprehensive and detailed explanation of these in-office tests.

Most tests do not give immediate feedback and therefore take valuable time between data gathering and action or treatment. In our office we use a biofeedback technique called Neuro-Lingual Testing in conjunction with hands-on reflex testing to quickly and accurately gather data from the patient using. We find that this system of analysis, when combined with blood chemistry and CBC analysis and appropriate in-office testing, allows us to accurately assess the individual needs of the patient.

For more information on health questionnaires, in-office lab testing, Neuro-Lingual Testing, and the hands-on reflex testing please see the resources pages on page 290 or call us at 1-888-DrTeach (378-3224).

**Procedure and Integration into Practice**

This method of blood chemistry analysis will help you elucidate multiple nutritional and metabolic deficiencies as well as identify potential organ dysfunction. We therefore advocate doing a full comprehensive metabolic panel in addition to a complete blood count and differential on all patients for a proper analysis. Please note that many laboratories are variable in their nomenclature, methodologies, and order of reporting values. Standard international units are included throughout our material for your conversion if needed.

We recommend a full chemistry panel and CBC on every patient to:

1. Establish working baseline if they have not had recent testing.
2. To assess their current health status and identify patterns or trends from previous testing.

3. To use as a prognostic indicator for potential nutritional and/or metabolic imbalances and to establish a preventative health plan.

We recommend that you run a full chemistry panel and CBC every six months for active patients and every year for patients on a maintenance program.