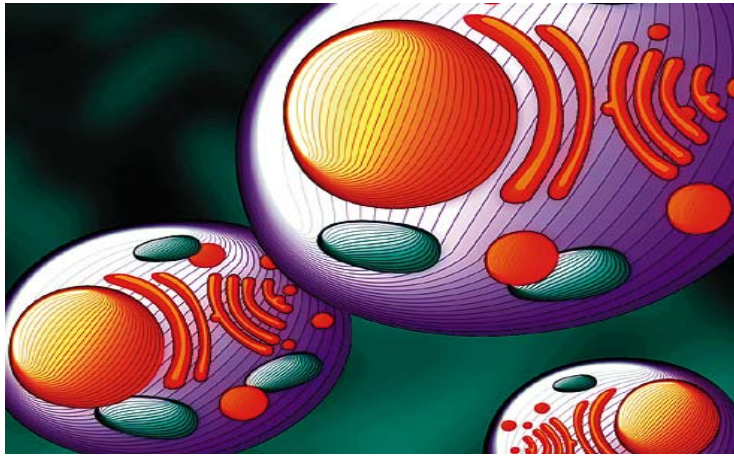


CellMate Wellness Systems™



A drawing of a cell with mitochondria and cell nucleus

A Foundational Model for Laboratory Testing and Optimal Wellness

A Fundamental Model

It is only after careful consideration of the architect's plan and review of numerous factors that construction on a new home begins with the work on the foundation. Later it proceeds to the walls, the roof and then the finish details. Each step in the process is carefully scheduled because to construct out of sequence creates confusion, inefficiency and even unnecessary damage. (Imagine putting in the wallboard before installing the electrical wiring!)

Each component of your home is necessary for the final product, but there is an order in which the parts must be constructed for all the parts to work well. Constantly throughout the endeavor, the plans are consulted to make the steps in order and to make adjustments in the work. The application of this conceptual model to health disorders should be obvious.

Keys to a Health Foundation

Electrolytes are an important primary consideration. The body's processes work within a relatively narrow range of pH. That balance must be appropriate to assimilate and utilize nutrients whether they are taken from the diet or dietary supplementation.

Amino Acids are fundamental building blocks for hormones, neurotransmitters, digestive enzymes, muscle and brain tissue. Numerous physiological processes depend on amino acids. Restricted food intake, poorly chosen diets and unique nutrient demands all explain the commonality of imbalances or insufficiencies of amino acids. Amino acids serve us best when their intricate balances are maintained.

Cofactors include a variety of substances that activate amino acids (and fatty acids) in metabolic processes. Either too much or too little of certain cofactors can disrupt metabolic efficiency. The hazards of insufficient cofactors are obvious. Too much may demand its detoxification, consuming other reserves at a higher rate. Balance geared to need is the ideal goal of cofactor supplementation.

Probiotics are beneficial bacteria that can be used to restore balance in the digestive tract. Imbalanced flora in the gastrointestinal tract results in inadequate production of cofactors for metabolic processes and increased toxic waste that adversely affects metabolic efficiency. Prebiotics are nutritional elements used to support the GI environment for best growth of probiotic organisms.

Diet is of prime importance for all of us, but even more critical for those who struggle with health compromises. Food quality, availability and personal choices all factor into our need for additional nutrient supplementation.

Enzymes may be distinguished in two categories. One category includes cofactors (or catalysts) in metabolic reactions, such as those that take place in the mitochondria of the cell. However, here we refer to the other category - that of digestive enzymes used in the breakdown, assimilation and utilization of nutrients in the gastrointestinal tract.

Fatty Acids are essential components of cellular function, however, since both proteins (amino acids) and cofactors are necessary for the conversion processes of fatty acids at an early stage, fatty acid considerations and evaluations are at the end of this list of essentials.

Where to Start?

The best starting point is laboratory analysis of fundamental metabolic functions. The common practice of sweeping profiles, thousands of dollars of testing and seemingly endless arbitrary recommendations dilutes precious funds and energy.

Our suggestion for a beginning point in metabolic analysis includes a comprehensive blood chemistry, a plasma amino acid assay and an organic acid profile. The combination of these tests with an integrative, computerized interpretive analysis of the data provides the most economical, but comprehensive evaluation of metabolic processes currently available.

We call this the "Foundational Wellness Profile." On the following pages you will read about a logical approach to evaluating and intervening in inefficient metabolic functions that are likely to make positive health changes. It begins with the Foundational Wellness Profile.

The "Foundational Wellness Profile"

The Foundational Wellness Profile includes key laboratory analytical tests (Comprehensive Blood Chemistry, Plasma Amino Acids - 40 analytes, Organic Acids Profile) to evaluate the metabolic function of an individual integrated into a single interpretive report.

The Foundational Wellness Profile transforms a few pages of numbers representing the test results into 30-50 pages of comprehensive analysis of that individual's metabolic function. Recommendations for appropriate diet and supplementation (along with suggestions of contraindicated foods and supplements), priority listings of both metabolic imbalances and the supplement schedule with intake recommendations, and additional suggested tests indicated by the results are all included.

The Foundational Wellness Profile enables specific and individual determination of the appropriate supplemental levels of electrolytes, amino acids, vitamins, minerals, probiotics, anti-pathogenic agents and other interventions. It also permits sensitive tracking of the success of interventions.

Why order this test?

- Establish a baseline
- Aid in determining progress through comparison reporting
- Determine which system is most out of balance
- Select a specific electrolyte formula
- Acquire foundational information on metabolic capability
- Allow for highly specific recommendations
- Provide information on the primary nutritional emphasis in a complex case
- Manifest intermediate conversion competence
- Identify:
 - gross pathology
 - immediate or urgent concerns
 - contraindicated supplements
 - some dietary contraindications and guidelines
 - clinical correlations that may be used as a guide for diagnostic coding
 - information that will enable customization of intervention protocol
- Amino acids are foundational elements to the proper functioning of many metabolic processes of the human body.
- If the amino acids are inadequate and/or imbalanced, higher orders of chemistry are likely to not respond as favorably to nutritional balancing.
- Helpful in determining co-factors and metabolic impairments as well as functional ability to deal with bacteria, yeast, fungus and clostridial pathogens.
- Identifies functional management of dysbiosis, rather than simply the presence of potential pathogens.

The Foundational Wellness Profile Components

- Comprehensive Wellness Profile
- Plasma Amino Acid 40
- Organic Acid Profile
- Interpretive Report
- Dietary and Supplement Recommendations
- Suggested additional testing
- Priority list, price list, where to purchase

Nutrient Supplementation and Synergy

In every living organism, there exists a specific interplay between each of the myriad vital elements that make up its biochemical nature. This delicate interplay must be carefully considered whenever nutritional supplementation is used as part of a program to address illness or chronic symptoms.

Most supplements are formulated without taking into account the synergistic effect achieved with specific combinations of nutrients or considering the impact that too much of any nutrient can have on metabolic pathways.

For instance:

- Vitamin C can regenerate oxidized vitamin E. This effect allows for lower intakes of vitamin E due to the potentiating action of vitamin C.
- Magnesium is required to turn the B-complex vitamin, thiamin, into its active bioavailable form and is also involved in over 300 other enzymatic reactions.
- Folic acid is reactivated by vitamin B12 and B12 influences melatonin production.
- Lipoic acid has shown a sparing effect on other antioxidants, again allowing antioxidant effects to be achieved at lower amounts.
- Controlled free radical generation is a necessary part of our metabolism. Damping down this system by excessive, unbalanced antioxidant intake can cause as many problems as not getting enough.

These are only a few of the thousands of interlocking relationships that nutrients can have with each other. Without testing, a particular individual's needs and metabolic peculiarities cannot be determined with any accuracy.

There is no specific "cookbook" approach that fits every individual. There are rational approaches that can be used as guidelines to address the symptoms of health disorder in an efficient and effective manner. Notice I did not say "faster." Faster is not necessarily better, and as you proceed in your understanding of the approach we suggest you will come to understand that more clearly.

Human biochemistry is incredibly intricate. What may seem to be a simple question often cannot be answered simply. You may need to grow in understanding to get closer to the truth of your "simple" answer.

The Complexity of Metabolic Disorder

One example more common than you may realize can be drawn from a better understanding of the intricacies of hypothyroid disorder. Within the last few years, thyroid disorder has been acknowledged by researchers to be as large a problem as diabetes. In a study conducted in 1997, it was determined that the numbers of thyroid disorder in the U.S. nearly equaled that of diabetic disorders. Thyroid disorder, similar to diabetes, is a condition that can predispose individuals to a variety of life-threatening health problems.

The common approach to hypothyroidism is supplementation with thyroid hormone. This does not take into consideration the level of peripheral conversion of thyroid hormone which may be dependant on adequate levels of iodine or selenium, or the thyroid hormone precursors, phenylalanine and tyrosine, not to mention the limitations of enzyme conversion activity which may be dependant on sufficient levels of niacin, niacinamide, biopterin, folic acid, NADH or other nutrients/enzymes.

Get the picture? Without analysis and intervention at the level of precursors and cofactors, approaches to addressing dysfunctional thyroid conditions are an overly casual and scientifically inadequate course of action.

This complexity of biochemical mechanisms can be much more simply addressed through the right laboratory assessment and nutrient intervention protocols.

Searching Through The Maze

A phenomenal amount of scientific knowledge is daily being overlooked. Hundreds of scientific journals are published monthly creating a wellspring of thousands of scientific papers. Each one is a proposal to an understanding of a piece of the puzzle of optimal human functioning. It has become impossible for any one doctor, or any professor, to keep abreast of all the advances in the understanding of human functioning.

Technology Advances

In computer technology, we have access to the only tool that could possibly compile and correlate the mass of available scientific data. Combine that with the ability of the computer to discern the myriad relationships of one individual's physiologic functions to that information "Fort Knox" of scientific study. No human could be expected to draw all those correlations from a laboratory test in the standard office visit without such a tool.

We can help to assess and address the fundamental mechanisms of physiological function. The following pages discuss fundamental keys in metabolic function in more detail. All are either assessed and/or affected by interventions directed from the Foundational Wellness Profile.

What is an electrolyte?

The classical definition is a fluid containing dissolved ions (minerals) that conduct electricity. By that definition a typical cola drink is an electrolyte, although a very poor one for good health. A good electrolyte supplement should be highly conductive and help to maintain acid-base balance.

A healthy electrolyte solution used to create and maintain balance should also be isotonic. Using a hypotonic solution may displace fluid improperly in cells (causing cells to expand), interfering with good function. Conversely if the solution is hypertonic, too much fluid may leave the cell (causing them to shrink) and move into the blood stream, also compromising optimal function of the cells.

In fluids (especially blood), salts (minerals or ions) are divided into two categories:

Anions : negatively charged ions

Chloride

Phosphorus

Bicarbonates

Cations: positively charged ions

Sodium

Potassium

Calcium

Magnesium

Determining Ionic Balance

A way to determine ion balance is to calculate the anion gap: (Sodium + Potassium) – (Chloride + CO₂). A common finding among ASD children is an Anion Gap over 18 mEq/l, serum CO₂ under 21 mEq/L and some below 18 mEq/L. A good electrolyte solution used as a dietary supplement can be used to bring this ratio back to balance. It has been reported that the use of Alka Seltzer Gold® (bicarbonates) to help balance pH, has been effective with individuals experiencing allergy sensitivity responses. However, excessive bicarbonates can cause imbalances in total electrolyte concentration, so overuse is not recommended. A carefully designed (or in some cases, individualized) electrolyte solution, with a proper balance of electrolyte salts specifically for a given individual's metabolism resolves this potential problem.

Electrolytes concentrate predominantly either in extracellular (outside the cell) or intracellular (inside the cell) fluids of the cell. The breakdown is as follows:

Intracellular

Sodium

Chloride

Calcium

Bicarbonate

Extracellular

Potassium

Phosphorus

Magnesium

Although all of these salts also appear on opposite sides of the cell membrane, they do so in relatively low concentrations. Keeping these ions balanced in their appropriate narrow range is crucial for optimal health.

Why worry about electrolyte balance?

Electrolyte balance is vital in digestion, cellular reactions, cell function and the transit of nutrients across numerous cellular membranes.

In order for nutrients and waste material to be properly transported into and out of cells, the proper concentration and balance of the electrolyte salts must be maintained.

Dehydration causes imbalances in electrolyte concentration that in turn can cause impairment in gastrointestinal, renal and cerebral motor function. Researchers found that until imbalances in concentration are addressed, problems will worsen.

Any of numerous drugs can cause electrolyte imbalances and deficiencies resulting in water loss or excessive retention. Here are examples of commonly used drugs that can affect electrolyte imbalance:

<u>Drug</u>	<u>Electrolyte and effect (in serum)</u>
Phenytoin	Phosphorus decrease
Ammonium Chloride	Potassium decrease, and Sodium increase
Carbamazepine	Phosphorus decrease
Antibiotics	Potassium decrease
Fluoxetine (Prozac)	Sodium decrease
Sodium and bicarbonate	Increase in urine volume

CellMate Wellness Systems™ analysts have noted decreased CO₂ levels (bicarbonates) commonly accompanying broad-spectrum amino acid deficiencies. Dramatic improvements have been observed when electrolytes were used in conjunction with amino acid therapy. Studies have shown that electrolytes are important in the absorption and transport of amino acids. Proper pH increases the absorption and transport of nutrients into and out of cells and enhances detoxification of waste metabolites. Utilizing the balancing effects of a properly formulated supplemental electrolyte solution helps regulate pH balance.

Taurine, a beta-amino acid, has also been used with seizure disorders with varying success due to problems with transport across the blood brain barrier. Electrolyte balance may be the answer to accessing the brain with taurine's neuroregulatory capabilities.

Taurine, considered by some to be a powerful neuroinhibitory amino acid, has been reported to be helpful with seizure disorders. The two main ways to synthesize taurine in the body (decarboxylation of cysteine sulphinic acid, and synthesis of taurine from inorganic sulphate) are not adequate to explain taurine concentration in the brain. It has been proposed that taurine is dependent on Na⁺ and Cl⁻ for transport across the blood brain barrier.

Of course, just increasing NaCl levels (table salt) could cause an increase in blood pressure, water retention and other negative side effects. Therefore, a balance of the salts is the desired avenue of supplementation. This is why a formula specific to each individual represents such an important initial intervention.

Choosing an Electrolyte Formula

The best method for determining the appropriate combination of electrolytes is a blood test. That test is available with an interpretation through CellMate Wellness.

If a blood test is impractical or unavailable, a reasonable (though not precise) method of choosing an acceptable formula is available upon request.

Amino Acids

Amino acids are critical for life and health. Proper balances provide for optimal functioning. Aminos make up proteins found in every tissue of the body and play a major role in nearly every chemical process that affects physical and mental function.

As a result, amino acids have more diverse functions than other nutrient groups. They contribute to the formation of proteins, muscles, neurotransmitters, enzymes, antibodies and receptors and are involved in basic cellular energy production. Amino acid imbalances can manifest as a variety of metabolic abnormalities and clinical symptoms.

Every disease is associated with a number of amino acid deficiencies. Replacing those depleted amino acids can have a profound healing effect on illness. The implications for health, wellness, and peak performance are vast.

Amino acid analysis is a primary tool for the determination of amino acid imbalances, evaluation of functional vitamin and mineral deficiencies, and can be used by doctors for diagnosis of metabolic disorders. Symptoms such as fatigue, headache, anxiety and shakiness between meals can be traced back to deficient amounts of specific amino acids.

Amino acid analysis provides, in one low-cost procedure, a wide spectrum of valuable nutritional information, giving you a useful and powerful tool for monitoring many areas of your health and providing healthier dietary and supplement guidelines.

Vitamin & Mineral Assessment

Amino Acid Analysis of plasma and/or urine goes a long way toward achieving this goal. Not only can it measure levels of up to 40 amino acids in the body that affect many important processes, it also gives insights into functional needs for a wide variety of vitamins and minerals.

Many of the enzymes which catalyze the interconversion of amino acids require vitamin and mineral co-factors to function optimally. In many cases, incomplete conversion of one amino to another is due to sluggish enzymes. This indicates a functional need for increased intake of a vitamin or mineral co-factor.

In addition to helping define nutrient status, Amino Acid Analysis can be useful in the detection of deficiencies and targeted nutritional support for a wide variety of disorders. This is because amino acids are involved in so many basic chemical reactions in tissues.

Here are a few examples:

Allergies:

This field is receiving more attention presently because of the increased awareness of the broad effects of food and chemical allergy and/or hypersensitivity on health. The mechanisms include disordered methionine metabolism, taurine depletion and free radical pathology. Many people with food allergies report improved tolerance of foods with amino acid supplementation, particularly when plasma taurine and histidine levels are low. Taurine is a potent antioxidant and helps to control chemical sensitivity reactions.

Seizures:

The amino acid taurine has been used clinically to control seizures. Because of its ability to regulate intracellular potassium concentration, it is also useful in cases of congestive heart failure. It has also been used in vision disorders with encouraging results.

Dysbiosis:

Intestinal overgrowth of Candida (a naturally existing fungus) and foreign bacteria produce the amino acids Beta-alanine and Beta-aminoisobutyric acid. These beta amino acids increase your requirements of B6 and increase loss of other amino acids (especially taurine). This situation often results in imbalanced levels of amino acids, protein intolerances and excessive free radical activity characteristic of many Candida overgrowth conditions.

Normalization of urinary amino acid levels parallels demonstrated improvement and monitoring these levels can indicate specific supplements useful at different times.

Digestive Disorders:

Improper digestion and assimilation are often reflected as low levels of essential amino acids in plasma or urine. Food proteins are prepared for absorption in the stomach and small intestine. Low hydrochloric acid in the stomach (extremely common beginning at age 40) inhibits the activity of enzymes that are necessary for the absorption of the amino acids phenylalanine, tyrosine and tryptophan. Low levels of these in plasma would be indicative of inadequate stomach acid production.

The enzymes of the intestinal lining are activated by zinc and manganese. Functional deficiencies of these minerals can lead to low levels of the branched chain amino acids leucine, isoleucine, and valine. High acidity of the small intestine will also inhibit pancreatic enzyme activity. This can also be seen as low levels of essential amino acids.

Behavior Disorders:

The effects of amino acids on neurotransmitters in the brain have been known for some time. Tryptophan, tyrosine, and phenylalanine along with B6 have been shown to be useful in countering depression. Amino Acid Analysis can help evaluate need and effectiveness of supplementation. Learning and behavioral disorders are often ameliorated by correcting cellular energy deficits revealed in their analyses.

Other useful areas of Amino Acid Analysis include blood sugar disorders, immune dysfunction, trauma, eating disorders, connective tissue disorders and subacute ammonia toxicities. The broad applications for this test make it particularly attractive because of the wide spectrum of vital nutritional information provided.

What are Cofactors?

We take a bit of latitude in our description of numerous concepts in biochemistry, and here we will ask for your indulgence. Concepts in nutritional biochemistry are far more complex than what we outline in these pages. Our objective is to offer more condensed and understandable principles regarding interventions for health disorders without unduly compromising accuracy.

We take some literary license and use the term "cofactors" broadly to encompass both the precursors to cofactors (compounds used in metabolic conversion processes) and metalloenzymes, without which these reactions would not occur. (Technically, minerals used as "cofactors" in metabolic reactions fall into the category of enzymes.) Thus, both vitamins and minerals are included in our concept of "cofactors." By their nature, some amino acids, fatty acids and lipoate are all considered cofactors as well.

The Genesis of an Enzyme

The ribosome inside the cell initiates the journey of an enzyme when it creates an apoenzyme. The apoenzyme must be bound to a helper (called a coenzyme) to become active. When this occurs, the active enzyme is called a holoenzyme. The coenzyme that binds to the apoenzyme (to create the active holoenzyme) is almost always derived from an essential nutrient. This essential nutrient will be either vitamin-derived or it may be one of the trace elements. Enzymes must be bound to their appropriate coenzyme and at an adequate concentration or level to function efficiently.

Note: "Functional nutrient insufficiency" is a phrase that describes inadequacy of nutrients to construct sufficient levels of enzymes for efficient metabolic reaction capability. Conventional medical thought recognizes "deficiency" as a level of nutrients at which select, identifiable disease symptoms become apparent. In reality, "functional insufficiency" and "deficiency" are indistinguishable as a biochemical state of being, however, you may experience communication difficulties with some healthcare professionals in that regard. A "functional insufficiency" may exist in the absence of symptoms that can be clearly attributed to the inadequacy.

Additionally, the genetic uniqueness of each individual determines the level of nutrient inadequacy that will affect the level of binding of an apoenzyme to its coenzyme. The level of binding is further modified in tissue-specific conditions.

This means that a deficiency (or functional insufficiency) of the same nutrient may manifest in one individual as a skin rash and another individual as constipation. The level at which this nutrient deficiency induces a symptom will likely also differ from one individual to another or from one time to another in the same individual. This complex nutrient demand interplay is one of the reasons why functional testing is so important to identifying individual nutrient needs. "One size" does not "fit all" in vitamin and mineral supplementation. This is what has been called "biochemical individuality."

Vitamins

Vitamins are compounds required for biochemical reactions, which cannot be synthesized in higher animals but must be obtained in the diet. Vitamins are precursors of cofactors in numerous reactions such as:

- those of the vitamin B group used in enzymatic reactions;
- vitamin A involvement in the visual processes and regulation of transcription;
- vitamin C and E use in redox reactions;
- vitamin D importance in bone formation; and,
- vitamin K necessity in the coagulation of blood;

to mention but a few of the dependent mechanisms.

Vitamins are generally classified in two categories. Those that are water-soluble (the Bs, folate, biotin, pantothenate) are poorly stored and require frequent replenishment. Because they are not stored, overdoses do not pose a risk for toxicity, however as we will discuss in regard to detoxification, that does not mean that improper intake of water-soluble nutrients are innocuous.

The fat-soluble vitamins can be stored in tissue and thus pose a risk for toxicity when taken to excess. This risk is commonly overstated. Toxic responses from relatively high intakes of fat-soluble vitamins are rare and easily reversible in most situations when overdose symptoms are not ignored.

Minerals

The minerals used in cofactor composition or construction also have a dual nature in that they can be stored in tissue and thus can pose potential toxicity. The minerals are central to the composition of metalloenzymes used in innumerable cellular reactions.

For example, magnesium is used in over 300 enzyme reactions and zinc is used as a component of over 5,000 reactions in every cell every second of our lives. Copper, iron, cobalt and others similarly have important roles in healthy metabolic operations.

Cofactors as Raw Material

The cofactors function by action on the amino acids, fatty acids and metabolic products of the energy production cycle of the cell (known variably as the Citric Acid Cycle - the CAC - or the Tricarboxylic Acid Cycle - the TCA cycle). It should be obvious that to some extent a "pecking order" exists in fundamental nutrient needs. The vital components of our dietary intake include proteins (amino acids), carbohydrates and fats. (This is discussed in more detail in the segment on diet.)

All three components are necessary, but it could be argued that amino acids, when deficient or imbalanced, constitute the most significant rate-limiting component. Based on our clinical observations, we believe this to be true. Secondly, the adequate availability (without excess) of the cofactors is required to catalyze the conversion reactions of the amino acids to produce cellular energy from carbohydrates and catalyze the conversion and elongation reactions of fatty acids that result in energy production and cellular function integrity.

Following this principle we have demonstrated dramatic changes in symptoms and laboratory tests with relatively minimal intervention (little or no fatty acid supplementation or drug therapy).

Thus, we propose that cofactors comprise a necessary "raw material" source that should be added to the other fundamental considerations.

Laboratory Analysis of Nutrient Sufficiency

A more reliable, responsible and supportable approach to accurately assess unique, individual physiologic cofactor demand uses a combined evaluation of physical and mental functions as well as *functional* laboratory assessment. Recommendations for supplementation of nutrients, especially in ASD children should not be "shoot from the hip" but tailored to the individual, based at least partially on laboratory analysis of metabolic pathway function of the specific nutrient.

This can be attained through the use of interpretive reports and quality tests.

Probiotics

An incredible number of microorganisms coexist with us, on and inside us. We are composed of 100 trillion bacteria cells and only 10 trillion animal cells. Each of us contains more microorganisms in our gastrointestinal tract than there are stars in the known universe.

Some of the microorganisms inside us may be harmful, but the majority of organisms (a minority of the species) are not - most being necessary for good health. For the most part, we have developed a symbiotic relationship with the microbial organisms in our gut. Beneficial bacteria in the intestines help digest foods, create nutrient cofactors and inhibit the growth of pathogenic (disease-promoting) bacteria. Without these probiotic microorganisms, we could not survive.

The intestinal microflora consists of an estimated 400-700 species of bacteria. Among these may also be hundreds of different genetic variants. This colony of bacteria may weigh from three to five pounds. There are dramatic variations in bacterial populations all along the gastrointestinal tract with the colon being the most heavily populated segment. (Microflora also inhabit the mouth, esophagus and vagina performing both a local and systemic role in health.) During fasting, the stomach and duodenum contain very few microorganisms. Those that are present are mainly derived from the mouth and throat. After a meal, the bacterial counts in the gastric juice increase 100 to 1000 fold. This dramatic increase in transient bacterial counts returns to baseline levels within an hour or two as gastric juice volume and pH decrease and as a result of GI motility. The intestinal microflora can vary considerably in the stomach and duodenum depending on the level of gastric acid secretion, bile salts, and mucosal integrity of the intestinal wall.

The bacteria in the gut are continually responding to changes in diet, environment, stress, pathogen exposure and other factors. If we are on a diet that we cannot digest well, the composition of the microflora will alter in time, so it can produce the enzymes needed to extract nutrients from our diet. If you eat a consistent high meat diet, or alternately if you eat a high plant fiber diet, your intestinal microflora will adapt accordingly.

Benefits of Probiotic Organisms

- Immune System Enhancement
- Inhibition of Pathogenic Organisms
- Prevention of Diarrhea
- Protection against Inflammatory Bowel Disorders
- Improved Digestion
- Vitamin Synthesis
- Detoxification
- Protection from Toxins
- Microflora Formation in Infants

The formation of the gut ecology begins at birth. The infant is inoculated with microflora from the birth canal. Later, breast-feeding provides bacterial and immunogenic substances that create a simple complex of Bifidobacteria species and a few other beneficial anaerobic bacteria. This early growth influences the development and composition of the adult microbial population. A manufactured infant formula diet can allow potentially pathogenic bacteria, such as clostridia and anaerobic streptococci, to proliferate in an infant's digestive tract.

Addition of cow's milk to an infant's diet can decrease the population of Bifidobacteria, increase the gut pH and increase numbers of Bacteroides (some species are pathogenic) - which is considered to be less desirable.

A high percentage of children nourished on mother's breast milk enjoy better health and a stronger immune system when compared to bottle-fed infants. These children acquire a larger number of friendly strains of Bifidobacteria when compared to bottle-fed children who develop few species or none at all. Cesarean-section babies frequently have lesser amounts of friendly bacteria than do normal birth babies, and in some instances, these C-section babies lack certain strains of the beneficial bacteria entirely. This suggests that beneficial bacteria are introduced to the infant as it passes through the birth canal.

Lactic acid producing bacteria maintain the colon pH of healthy breast-fed babies within a constant range of pH 5.5 to 6.5. Organic acids produced by the lactic acid bacteria present in the colon prevent the proliferation of harmful bacteria in the baby's gastrointestinal tract. This condition forms the first line of defense for the infant against illness. Providing a gut environment that is conducive for the proliferation of friendly bacteria involves addressing pH status in the gut. Unless the harmful bacteria are controlled optimal function will not be achieved and maintained.

Lactic Acid Producing Bacteria

Lactic acid bacteria are found throughout the gastrointestinal tract. The predominant population of lactic acid bacteria in the upper gastrointestinal tract is the lactobacillus species. Lactobacilli may colonize the mucosal surface of the duodenum as well as the stomach. For this to occur, lactobacilli must possess certain properties including adhesion, competitive exclusion ability and production of bacterial inhibitors.

Lactic acid bacteria play an important physiological role in the human gastrointestinal (GI) tract. Microbial interactions represent the main force in the homeostasis of the bacteria flora in the GI tract. Combined with the host this microflora forms a unique ecosystem in which the complex interactions can either be synergistic or antagonistic depending on their strain, population levels and metabolic activity. The healthy survival of the host is determined by these interactions. This ecosystem is destabilized as a result of gastrointestinal disorders. Other endogenous components such as enzymes, hormones and immunoglobulins will also influence it.

Medications, diet, infections, age, stress and climate can also alter the microflora. The content of microflora may also be influenced by bacterial interactions (antagonism or symbiosis). Intestinal microflora may either adapt or modify within days to most substances that enter the intestines from the oral tract or the biliary system. Gastric acid inhibits the growth of pathogens, and those with reduced gastric acid production exhibit an increased number of detrimental bacteria.

GI problems such as leaky bowel syndrome, ulcerative colitis, spastic colon and irritable bowel syndrome are induced and/or aggravated by diminishing probiotic populations and the proliferation of pathogenic bacteria. Specific strains of detrimental bacteria are known to cause severe health problems.

- E. coli can lead to insulin dysregulation and blood sugar regulation abnormalities.
- Yersinia enterocolitica metabolites can induce overproduction of thyroid hormone and may also contribute to autoimmune disorder.
- The excessive use of antibiotics has led to the creation of new strains of "super" bacteria that have become resistant to antibiotics.

Restoring the Balance

Simply providing large numbers of beneficial bacteria by supplements to unhealthy individuals does not always result in dramatic improvement in their unhealthy condition. Consumption and short-term presence of good bacteria alone does not lead to improved health unless harmful bacteria in the digestive tract are adequately controllable. This condition can only persist in the presence of an appropriate colon pH. Simply introducing friendly bacteria in large numbers will not resolve the situation if an unfavorable condition for survival of beneficial flora persists. Such a condition is conducive to the proliferation of harmful bacteria.

Monitoring metabolic byproducts of pathogenic organisms through organic acids analysis offers an accurate and relatively inexpensive method for assessing the need of anti-pathogenic agents and the success of their use in intervention.

The Difference Between Diet and Nutrition

Nutrition experts generally agree that ideally food would be the best source of vitamins, minerals, and other nutrients, however reality presents us with a few challenges.

1. Nutrient density of food:

Quoting US Senate Document #264:

"The alarming fact is that foods (fruits, vegetables and grains) now being raised on millions of acres of land that no longer contain enough of certain minerals are starving us -- no matter how much of them we eat. No man today can eat enough fruits and vegetables to supply his system with the minerals he requires for perfect health because his stomach isn't big enough to hold them... The truth is that our foods vary enormously in value, and some of them aren't worth eating as food..."

Now the frightening part – **THAT WAS IN 1936!**

The 1992 Earth Summit Report documents the declining mineral values in farm and range soils over the past 100 years: *"...The mineral depletion level in North America is 85%." !!* Rutgers University conducted a study of the nutrient content of fruits and vegetables found on grocery store shelves. They found a variation of as much as 1900% in the content of key nutrients like iron, magnesium and calcium. Our food is often grown far from our homes, adding early harvesting and preservation methods to the list of things depleting nutrients from our foods.

According to the Kellogg Report:

"By the time the processed foods reach you, it may have been shipped and stored, trimmed, blanched, frozen, canned, condensed, dehydrated, pasteurized, sterilized, smoked, cured, milled, roasted, cooked, toasted or puffed. What's left of their composition after any combination of those tortures is then liable to be further stolen by heat, light, oxygen, oxalates, antivitamins, acidity, alkalinity, metal catalysts, enzymes, and irradiation."

Live foods contain enzymes that allow nutrients to be released into the bloodstream and into the cells. Prepared food (processed in any way besides eaten "from the vine") has no enzymes. None.

The two exceptions are freeze-dried foods, which release a retained portion of their enzymatic activity when ingested, and juiced foods, which are not heated, but pulverized so the cell walls are opened, allowing the nutrients to be released.

2. Chemical contamination:

Since the 1936 report cited above, we have added over 7000 chemicals to our food which scientific evidence suggests may be further compromising our health.

Our food is commonly exposed to water in the growing and harvesting processes that may be contaminated with heavy metals or chemicals. We must ask whether our milk is contaminated, coming from a cow fed on antibiotics and pesticide-laden grain; many yeasts, some excellent sources of B vitamins, phosphorus and iron, are high in lead.

And this:

"According to the United States General Accounting Office, almost 80% of the additives in foods are cosmetic. Instead of the bright yellow color and tangy-sour taste of lemonade, we get sodium caseinate and artificial flavoring; instead of the deep ebony color and rich dark flavor of real chocolate pudding, we get cotton-based synthetics; instead of creamy milk and smooth ice cream in our shakes, we get fat

solids. An ever increasing proportion of the food we eat is no longer even food but is now a conglomerate of high priced chemistry experiments designed to simulate food."

The agriculture and food processing industries are simply responding to consumer demand for low prices and investor demand for higher profits. Ultimately each of us is responsible if our diet is not what it should be, however, if food sources are really this bad, what can be done?

It starts with awareness, resulting from your openness to education about your health. How much time and effort do you take to educate yourself about your health?

3. Dietary choices:

The food-guide pyramid is on your refrigerator as a "write on/wipe off" board that you mark to be sure you've gotten your daily quotas, right? Two-thirds of the U.S. population will die from heart related illnesses or cancer – both conditions that science has shown are affected by diet.

The Conclusions and Findings of the Select Committee on Nutrition and Human Needs of the US Senate reads:

"The American public is eating blind. Medical schools have underemphasized nutrition with the result that the typical examination does not involve thorough nutritional evaluation or counseling. The starkest evidence of medical neglect of nutrition is the finding of malnutrition in hospitals."

Nutritional surveys consistently report that most people do not consume adequate amounts of most vitamins and minerals.

The "balanced" diet has long been recommended as the way to meet nutritional needs. Unfortunately, the typical American chooses an "unbalanced" diet of extremes – too much total fat, saturated fat, cholesterol, protein, sugar, and salt and not enough complex carbohydrates, fiber, fruits, vegetables, vitamins, and minerals. Americans, with the greatest amount and variety of nutritious foods of any country, consistently fall short in self-selection of nutritious foods. The "unbalanced" American diet (sometimes called the "SAD" – Standard American Diet) has been shown by an overwhelming number of studies to be a contributing factor in the development of chronic, degenerative diseases such as cardiovascular disease, cancer, diabetes, and obesity.

The second National Health and Nutrition Examination Survey (NHANESII) found that on any given day, 46 percent of Americans have not eaten any fruit, 24 percent have not consumed any dairy products, and 18 percent have avoided vegetables.⁴ Other studies report that nine out of ten Americans do not eat even the minimum daily recommendation of five fruit and vegetable servings.

The Total Diet Study reported that intakes of calcium, magnesium, iron, zinc, copper, and manganese are less than 80 percent of the RDA or below the low end of the Estimated Safe and Adequate Daily Dietary Intake range in most males and females of all ages.

Additional research confirms the inadequacy of American diets:

- Nine out of every ten diets are marginal in chromium;
- Many American diets provide only half the recommended amounts of folic acid;
- Four out of five people do not consume adequate amounts of vitamin B6;
- 20 percent of women in general and up to 80 percent of exercising women are iron deficient; and
- Young women commonly consume only half of the recommended intake for copper and zinc.

Reservations about recommending supplements are often based on the belief that food is the appropriate source for nutrients and that recommendations to supplement could lead people to think that supplements can substitute for a healthy diet. Supplements are not able to compensate for poor nutritional habits. Most Americans are not eating a healthy, well-balanced diet that provides even adequate amounts of all nutrients, let alone optimal levels.

4. Nutrient demands are altered by a number of factors:

- Aging
- Injury
- Weight
- Pregnancy
- Dental work
- Recent surgery
- Emotional stress
- Illness or disease
- Metabolic disorders
- Environmental pollution
- Pharmaceutical medications
- Unique genetic requirements
- Heavy work or physical exercise
- Very warm or very cold climates
- The consumption of drugs or alcohol

5. Digestion and Assimilation:

The usual perspective of “nutritionists” is to measure fat, protein, carbohydrate, and project the vitamin and mineral content of food to determine its nutritional value. Failure to acknowledge the difference between diet and nutrition can result in ignorance of the contribution of nutritional deficiencies to chronic degenerative disease.

Diet is what you eat (including supplements) while nutrition is what happens to the food after you eat it. The distinction between food quality and food utilization represents the difference between diet and nutrition.

Assimilation efficiency is even more important than the nutritional quality of the food itself. It is possible to eat a “well-balanced” diet and still not obtain adequate nutrition from the food consumed.

Some people have poor nutrition as a result of “relative malabsorption.” Compared to healthy digestive functioning, there is a reduction in efficiency and performance in these individuals. Metabolic imbalance may predispose a person to malabsorption regardless of the quality of the food consumed. Given conditions of extreme stress, an environment rife with toxins and our resulting metabolic imbalance, the human system often does not digest as it should.

Complete digestion takes time and sufficient absence of stress for metabolic processes to “disassemble” food into more basic components. Failing these simple requirements, food may be only partially digested, leading to symptoms of indigestion, increased fat storage, and increased food sensitivity responses. Optimal uptake and utilization will not occur when stress and metabolic imbalance predominate. Do you and your family make a practice of eating peaceful, unhurried meals?

All of these factors make laboratory nutrient assessment a valuable component of a comprehensive intervention protocol.

Fatty Acids

Fatty acids are the components of dietary fat. In the body, they serve as sources of energy, structural components for nerves and cell membranes, and as precursors to a special class of hormones. Because fatty acids function relative to each other, ***a balanced intake is crucial for good health.***

For example, high levels of arachidonic acid relative to GLA or EPA will lead to a predominance of inflammatory chemicals in the body which can promote a greater tendency for heart and other inflammatory diseases. Dietary intake of EPA and DHA helps balance these fatty acids and prevents this cascade of adverse chemical reactions. This is why fish oils have been shown to be beneficial for your health.

Because of the importance of fatty acids in inflammatory processes, the major contributor to pathological damage, correcting your balance of essential and non-essential fatty acids can improve health and extend active years.

Red Cell fatty acid analysis is preferred for screening because it reveals long-term balance in the tissues. The red cell stearic/oleic index is useful as an early warning for cancer.

Plasma fatty acid levels reveal the quality of fatty acids available for rapid mobilization and are useful for monitoring your response to supplementation and dietary modifications.

We have repeatedly demonstrated satisfactory changes in fatty acid metabolism when electrolytes, amino acids and nutrient cofactor enzymes are adequately addressed, without fatty acid supplementation. Fatty acid analysis and targeted interventions may be necessary in a minority percentage of individuals.

Interpretive Reports from a Metabolic Perspective

Metabolism is an extremely complex subject in human biochemistry. There are dozens of metabolic pathways containing thousands of components and reactions. All of them are important to optimal physical and mental function.

There is no way to assess the intricacies of your metabolism completely, however, through a variety of tests we can gain considerable insight into the efficiency of various aspects of your metabolic processes.

No laboratory test or even combination of tests is totally reliable in assessing your needs, deficiencies, imbalances or creating an infallible picture of your biochemical functions.

Even the most sophisticated combination of tests still requires some individualized interpretation and/or monitoring and adjustment with interventions (diet, lifestyle, nutritional supplements, or medications) with the objective of achieving better physical and mental health.

However, science has found some indicators, or biomarkers, that can help you find your way on the path to better health. A CellMate™ Report will help you understand the significance of some of these biomarkers and suggest ways you might be able to improve your biochemical balance while providing a way to monitor changes.

A CellMate™ Report is limited to reporting on the analysis of body fluids. Although there is a tremendous reservoir of knowledge contained within these technologies, they are not designed or intended to diagnose disease or suggest any treatment for disease. Only a qualified physician can do that. The report is to be regarded only as an aid to monitoring wellness or supporting endeavors to find a healthy balance of nutrients.

A CellMate™ Report is based on the most currently published scientific literature. Test results are compared against the most extensive available database of published scientific information anywhere. We use a patented process to detect irregularities that are not easily identified and correlate them with the freshest available knowledge in human function. What results is a highly sensitive, complex photograph of biochemical mechanisms. We are then able to make some simple recommendations for nutritional balancing that will enhance efforts to achieve good health.

The CellMate™ Report is a highly sophisticated analysis based solely on the reported medical and scientific study information drawn from academia of the highest caliber.

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