

Fundamental Concepts in Developing Biochemically Individualized Protocols Using Proper Lab Test Choices

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What Lab Testing Is.

- Lab Testing is not a protocol
- It is not a package of tests
- It is not an easy way to sell nutrients
- It is not a nice feel good system to repeat over and over again.

What Lab Testing Is.

- It is a way to make your patient better
- It is a way to improve outcomes
- It is a way to treat your patient like what they are, a biochemically unique individual.

What Lab Testing Is.

- Learning how to pick the right choices will allow you to be not a good, or a fair or a darn good practitioner but a great practitioner
- You owe it to yourself but more importantly you owe it to your patient.
- Each and every one of you have that capability.
- Today you learn how to do that.

What Lab Testing Is

- Michelangelo didn't create the Pieta with a blunt instrument or accept a pre-figured package of hammers.
- He sometimes made his own precise chisels to create a beautiful masterpiece.



What Lab Testing Is

- In the next three hours you get to learn how to chisel your own Pieta with every patient who walks in the door.
- You will learn how to begin to understand how to use each test like a fine chisel in your creation of your patient's optimal health

The Laboratory Arsenal

- Comprehensive Blood Chemistry
 - Absolute must for a patient baseline and regular follow-up.
 - Most researched test with most accurate and reproducible results.
 - Given the proper interpretation, as with the LabAssist™ Report, you can uncover a veritable treasure trove of information about your patient.

The Laboratory Arsenal

- Lab results needed for a comprehensive analysis
 - Albumin, Alkaline Phosphatase, BUN, Total Bilirubin, Calcium, Chloride, Cholesterol, CO2, Creatinine, GGT, Globulin, Glucose, HDL, Iron, LDH, LDL, Phosphorus, Potassium, Total Protein, sGOT, sGPT, Sodium, Triglycerides, Uric Acid
 - Full Hematology and Differential
 - Thyroid panel including Total and Free T4, Total and Free T3 as well as TSH

The Laboratory Arsenal

- Plasma and Urine Amino Acids
 - The building blocks of life
 - Important in the building of neurotransmitters, immune response, hormones, muscle, bone formation and much, much more.
 - In today's nutrient depleted world, proper amino acid competency is harder to get out of our diet than ever before.
 - Having the right co-factors are important as well.

The Laboratory Arsenal

- Urine Organic Acids
 - This test is a great secondary test to assess nutrient co-factor competency.
 - Instead of measuring levels of nutrients in cells, it measures the functionality of them.
 - In direct measurement you have no clue as to the actual needs of the individual.
 - Urinary organic acids are a better indicator of need than direct measurement if the lab does a competent job.

The Laboratory Arsenal

- Whole Blood Elements
 - This test measures the total quantity of minerals in the inter- and extra-cellular compartments of the blood.
 - This test is approved for the testing of heavy metals and trace minerals in the state of NY while RBC minerals/heavy metals is not.
 - This gives the practitioner the best assessment of mineralization and heavy metal burden in most cases.

The Laboratory Arsenal

- LEAP MRT Food Sensitivity
 - Inflammatory responses to food and food additives is a major problem for most people today.
 - Due to the increase of environmental toxicity and the inflammatory response it causes, reducing those negative responses to food is extremely important.
 - ALCAT is an older version of LEAP.

The Laboratory Arsenal

- Cardio-Hormone Blood Spot Saliva
 - Crayhon Research is just now releasing this test to the health care community.
 - It looks at a number of male and female hormones as well as cardiovascular disease risk factors.
 - It only requires 4 saliva samples and one blood spot.
 - Early next year it will have an add on of blood spot vitamin D₃ as well.

The Laboratory Arsenal

- Environmental Pollutants Biomarker
 - In today's world, one of the most prolific problems we have is with petrochemical solvents.
 - All of us have them in our blood stream, whether we effectively excrete them is the question.
 - This easy to do urine test is something every patient (and practitioner) should do at least once.

The Laboratory Arsenal

- Other tests that may prove valuable:
 - RBC Fatty Acids
 - Comprehensive Stool Analysis
 - Hair Elements
 - Bone Resorption
 - Urine Iodine pre- and post-challenge
 - IgG Allergy tests
 - A number of single variable tests like fibrinogen, PSA, CA-125, etc.

The Laboratory Arsenal

- The important lesson is that you need a full arsenal of tests in order to give the patient the most individualized nutritional and health changing protocol possible.
- There really is no best answer for everyone.
- There is no “package” of tests that works for even the majority of patients.

The Laboratory Arsenal

- Combinations of tests.
- Crayhon Research through its LabAssist Interpretive Reports™ is the only place where you can get combinations of any of the aforementioned tests reported in a single, comprehensive and coherent manner.

The Laboratory Arsenal

- Putting together the tests gives you the practitioner a deeper understanding between the test results allowing you to create better and more biochemically individualized nutritional protocols.
- Combining the right tests together is critical as well.

The Laboratory Arsenal

- One combination that works quite well is a Comprehensive Blood Chemistry, a Plasma Amino Acid 40, Whole Blood Elements, along with a Environmental Pollutants panel.
- The results come from 4 separate labs yet the report puts the data together in a consistently looking style.

The Laboratory Arsenal

- Another important piece in the laboratory puzzle is the ability to compare two tests.
- No lab has the a report that can give you the type of graphic and numeric representation of how much the patient improved from one test to another.
- LabAssist™ does that in a manner that is easy to understand.

The Laboratory Arsenal

- Two of the most reported benefits of the comparative reports is patient compliance and patient loyalty.
- The patient knows that if they are tested again and their results will be compared, they are more likely to follow their practitioners recommended nutritional supplement regime.

The Laboratory Arsenal

- Patient's also tend to come back if they know that there will be a comparative report generated.
- They seem to be excited to see if what they are doing is making an empirical difference.
- It also helps to cure Skeptical Spouse Syndrome which brings more family support to the patient.

Diseases, Syndrome, and Health Challenges

The Best Tests Available

Pre-Pregnancy and Pregnancy

- In the term before pregnancy, the mother *and* the father should prep themselves with two laboratory tests, the Whole Blood Elements and the Environmental Pollutants Biomarker.
- Assessing and treating abnormal results from these tests will provide the child the best possible beginning.

Pre-Pregnancy and Pregnancy

- Numerous papers have been written about the issues surrounding environmental toxicity and the effects on the developing fetus.
- From phthalates, to organochloric pesticides, to heavy metals, these ubiquitous chemicals can cause a far range of neurotoxic, immunological and other disorders before the infant is born.

Pre-Pregnancy and Pregnancy

- Phthalates have been implicated in lower sperm quality in men, fetal changes in males, and shorter pregnancies.

- Hauser, R., P. Williams, et al. (2005). "Evidence of Interaction between Polychlorinated Biphenyls and Phthalates in Relation to Human Sperm Motility." [Environmental Health Perspectives](#) 113(4): 429-430.
- Frederiksen, H., N. Skakkebaek, et al. (2007). "Metabolism of phthalates in humans." [Mol.Nutr.Food.Res](#) 51: 899-911.
- Assay, S.M. et al (2003) The Relationship between Environmental Exposures to Phthalates and DNA Damage in Human Sperm Using the Neutral Comet Environmental Health Perspectives
- McIntyre BS, Barlow NJ and Foster PMD, (2002) Male Rats Exposed to Linuron in Utero Exhibit Permanent Changes in Anogenital Distance, Nipple Retention, and Epididymal Malformations That Result in Subsequent Testicular Atrophy., Reproductive and Developmental Toxicology.

Pre-Pregnancy and Pregnancy

- When dealing with infertility, three tests seem to have the greatest impact.
 - Whole Blood Elements to assess mineralization and heavy metal burden
 - Plasma Amino Acids to assess the fundamental building blocks of life
 - Comprehensive Blood Chemistry to look for any overt imbalances and electrolyte competency.

Brain Function and Laboratory Testing

- Within this category lies a wide range of different disorders including:
 - Autism Spectrum Disorder
 - Epilepsy
 - Migraine
 - ADHD
 - Schizophrenia
 - Bi-polar disorders
 - Depression
 - Anxiety
 - Obsessive Compulsive Disorders

Brain Function and Laboratory Testing

- There are four main tests that are helpful in these disorders
- LEAP MRT Food Sensitivity
- Plasma and/or Urine Amino Acids
- Comprehensive Blood Chemistry
- Comprehensive Blood Elements

Brain Function and Laboratory Testing

- Autistic Spectrum Disorder, Epilepsy, Migraine, and ADHD
- All are excellent candidates for LEAP.
- In epilepsy and migraine the connection is clear.
- Whenever you have an inflammatory reaction, the likelihood of developing a seizure or a migraine is elevated.

Brain Function and Laboratory Testing

- With both migraine and epilepsy, a food sensitivity test such as LEAP can be highly beneficial.
- With migraine Signet Diagnostics research indicates 67% of the people with migraine will receive a significant reduction in symptoms.
- In my experience with my daughter, seizure activity is held at bay by following the dietary protocols.

Brain Function and Laboratory Testing

- With migraine, epilepsy and autism, I also highly recommend either a plasma or urine amino acid test.
- Often with both disorders a number of neuroinhibitory amino acids such as glycine, taurine, and GABA are depressed.
- Conversely neuroexcitatory amino acids such as aspartic acid and glutamic acid may be elevated.

Brain Function and Laboratory Testing

- With autistics, heavy metal testing is helpful.
- Urine metal challenges are not.
- They are ineffective at ascertaining heavy metal burden and can lead to harsh reactions.
- Hair elements is a preferable test.
- Whole Blood Elements is helpful if the child can handle a blood draw.

Brain Function and Laboratory Testing

- Urine organic acids may be helpful for many people with brain function disorders but they need to look at their amino acid and co-factors first.
- There should be a 6-8 week gap between the start of the supplement protocol based on the results of minimally a blood chemistry and plasma amino acid test and if possible a whole blood elements test.

Brain Function and Laboratory Testing

- Important aspects of organic acids as they pertain to brain function include catecholamine pathway markers vanilmandelate and homovanillate
- These two markers help us more than just telling us about phenylalanine and tyrosine adequacy or the production of epinephrine, norepinephrine, and dopamine.

Brain Function and Laboratory Testing

- In the Journal of Environmental Science and Health, researchers found links between elevated homovanillate and petrochemical solvents.

– Tomei, F., M. Rosati, et al. (2003). "Work exposure to urban pollutants and urinary homovanillic acid." J Environmental Science and Health 38(12): 2909-2918.

Brain Function and Laboratory Testing

- In *Environmental Health Perspectives*, this marker was also found to be altered with heavy metal exposure, particularly arsenic, lead, cadmium and mercury.
 - de Burbure, C., J. Buchet, et al. (2006). "Renal and Neurologic Effects of Cadmium, Lead, Mercury, and Arsenic in Children: Evidence of Early Effects and Multiple Interactions at Environmental Exposure Levels." *Environmental Health Perspectives* 114(4): 584-590.

Brain Function and Laboratory Testing

- Altered catecholamine and neurotransmitter metabolism markers I have witnessed to be found concurrently with heavy metal and/or petrochemical solvent exposure.
- This warrants the use of an Environmental Pollutants Biomarker and a Whole Blood Elements test.

Brain Function and Laboratory Testing

- 5-Hydroxyindolacetate is a helpful marker of serotonin and tryptophan metabolism as are kynurenate, xanthurenate and quinolinate.
- 5-HIA can guide us as to the utilization of tryptophan.
- The latter three markers gives us clues as to the adequacy of vitamin B₆.

Brain Function and Laboratory Testing

- With schizophrenia, plasma amino acids are minimally helpful but nonetheless beneficial.
- I would suggest testing for the parasite *Toxoplasma gondii* (also with bi-polar disorder). Unless the patient is on Depakote which masks the test results.
- Dr. Paul Ewald, in his highly recommended book "Plague Time", reports how this common parasite is found in a high percentage of schizophrenics over the general population.

Brain Function and Laboratory Testing

- The effect of *Toxo* on mice and rats, their natural carriers is very similar to schizophrenia in humans.
- Cats then eat the mice making them infected.
- This is why women should not be near the litter box of cats during pregnancy.
- People who develop schizophrenia have a higher cat pet ownership ratio than non-schizophrenics.
- Ewald, P. (2002), *Plague Time: The New Germ Theory of Disease*. New York, NY, Anchor Books.
- Immunosciences Lab run by Dr. Aristo Vojdani is my favorite lab for this type of testing.

Prostate Issues

- Common test for men with a PSA (Prostate Specific Antigen) between 4-10 is a biopsy.
- Approximately 1 million are done each year with a positive cancer outcome 20% of the time.
- This means that 80% of the men have an unwarranted biopsy .

Prostate Issues

- One simple blood test is helpful in avoiding unnecessary biopsies.
- A free-PSA should be ordered. Normal PSA test measures the antigen bound to proteins.
- A free-PSA <25% would indicate the need for a biopsy. >25% and the likelihood of having prostate cancer is minimal.

Prostate Issues

- In men between the ages of 50-64 a Free-PSA over 25%, their risk of having prostate cancer is 5 percent.
- In men between the ages of 65-75, the risk is 9 percent.
- If the reading is <10% then the risk is 56% and 55% for the two age groups.
- This should be the standard of care for prostate cancer testing, unfortunately it is not.

Commonly Overused Tests

- Urine Organic Acids
 - If the individual is amino acid deficient, the test may not reflect the true nature of their metabolism.
 - If the person has had any recent trauma such as accidents, surgeries, or extreme stress, the results will likely show all high results.
 - It is very lab dependent. Some labs have wide variances in accuracy.
 - Markers of dysbiosis or infection from a urine organic acid test are only somewhat indicative of a disorder and vary widely.

Commonly Overused Tests

- Urine Organic Acids
 - Both phenylacetate and benzoate, while oft times touted as bacterial markers are better markers the presence of common food additives and/or ubiquitous petrochemical solvents. Another possible explanation is that the body is attempting to remove excess ammonia through the urea cycle.
 - Hayes, A., Ed. (2008), Principles and Methods of Toxicology. Boca Raton, CRC Press, p 714.

Commonly Over Used Tests

- Urine Organic Acids
 - Claims have been made that p-hydroxybenzoate is a marker for dysbiosis but the majority of research shows it to be a marker for paraben exposure.
 - Ye, X., A. Bishop, et al. (2006). "Parabens as Urinary Biomarkers of Exposure in Humans." Environmental Health Perspectives 114(12): 1843-1846.

Scientific Tidbits

- A warning to the wise –
- Not all markers of dysbiosis should be viewed as pathogenic. Even the lowly *H. pylori* should not be viewed as solely detrimental to our bodies. It is theorized that *H. pylori* had for many thousands of years a symbiotic relationship and only in the past hundred years has become somewhat pathogenic or has it???
- Blaser, M. and D. Kirschner (2007). "The equilibria that allows bacterial persistence in human hosts." Nature 449: 843-49.

Scientific Tidbits

- Microbes are oft times critical in the metabolism of xenobiotics, replenishing the gut epithelial cells, synthesizing nutrients, developing and protecting the immune system and affect behavior in the human host.
 - Turnbaugh, P., R. Ley, et al. (2007). "The Human Microbiome Project." *Nature* **449**: 804-10.
 - Dethlefsen, L., M. McFall-Ngai, et al. (2007). "An ecological and evolutionary perspective on human-microbe mutualism and disease." *Nature* **449**: 811-8.

Scientific Tidbits

- The Human Microbiome Project is an ongoing scientific journey into the relationships between the microbes that reside within us and our state of health, wellness and disease.
- They are finding a great many similarities in our genetics and the microbes who we share our bodies with.

Scientific Tidbits

- The reason I bring this up is to be wary of running genetic tests on your patients.
- We honestly don't know what most of the tests mean and what we do know we are not sure that the treatments we prescribe are beneficial in the long-term or not.
- DNA testing for microbes is at best exploratory and at worst dangerous.

Scientific Tidbits

- If a stool DNA test is run and it shows up positive for a specific pathogen do you treat the patient or not?
- If the species is alive yes, if not no.
- You can't tell through a stool DNA test.
- Your body could be effectively dealing with the pathogen and treatment could harm that ability.
- The pathogen may be dead and coming from the food you ate and anything you do at this point would be treating a non-issue.

Commonly Overused Tests

- Urine Organic Acids
 - This has also been a wildly over used test with autistic children.
 - This is especially true if the lab uses arabinose as a marker for yeast.
 - There is no solid evidence in any part of medical literature to indicate that arabinose is a legitimate marker.
 - D-arabinitol is a good marker for yeast.

Commonly Over Used Tests

- Plasma and RBC Fatty Acids
 - Plasma fatty acids are primarily good for discussing the patients eating habits.
 - It does not adequately reflect the metabolism of fatty acids. This can only be done with a RBC fatty acid test.
 - RBC fatty acids should only be used as a tertiary test after other tests have been run and nutritional protocols have run their course.

Commonly Over Used Tests

- RBC fatty acids may be helpful in patients with either low (<160 mg/dL) or high (>260 mg/dL) cholesterol.
- It is also useful with neurological disorders but mainly as a secondary test.
- It can also be helpful in assessing your patients dietary habits.

No More PAP Smears!

- The latest research has indicated that a test for the Human Papilloma Virus (HPV) is twice as accurate as a PAP smear.
- It has a small increase in false positives – 6 versus 3 percent.
 - Mayrand, M., E. Duarte-Franco, et al. (2007). "Human papillomavirus DNA versus papanicolaou screening tests for cervical cancer." [New England Journal of Medicine](#) 357(16): 1579-88.
- Time to put the PAP smear to rest.

Obesity

- Obesity is a multifactorial issue.
- There truly is no one cause of this epidemic.
- One important component is the presence of high levels of environmental toxicity in each and every persons blood stream.

Obesity

- As I have been lecturing for over 5 years now, toxicity is a major and overlooked factor in the inability of people the world over to halt weight gain or to lose weight.
- I further propose that the toxins we deal with create inflammatory situations that make physical exercise harder which compounds the problem.

Obesity

- Laboratory animals undergoing toxicity testing showed decreased body temperatures.
- Researchers believe that the movement towards hypothermia may be a protective device used by the body to slow down the effects of the toxins.
- A theoretical model I have proposed over the past few years is that the greater number of people being seen today with low basal temperature is our response to an increase in toxic load.
- Lower resting metabolism and low temperature = slower toxic effects = decreased ATP production = More Weight Gain = Slower Weight Loss

Obesity

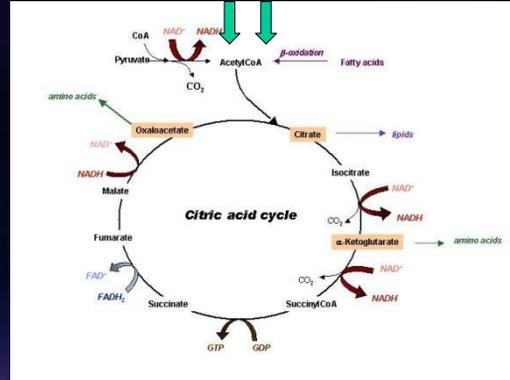
- *In the July 2004 International Journal of Obesity, Dr. Angelo Tremblay of Laval University in Quebec, Canada said the following:*

“Pollution seems to be a new factor affecting the control of thermogenesis in some obese individuals experiencing body-weight loss.”

Obesity

- Using urinary organic acid testing, we discovered that it is at the entry point to the Citric Acid Cycle where the first metabolic blockade occurs due to toxicity.
- According to my calculations on Citric Acid Cycle metabolites Pyruvate, Lactate and Citrate I was able to pinpoint the abnormality.

Citric Acid Cycle Entry Blockade Point



Obesity

- If a person were to ingest 2,500 calories daily and they were moderately physically active, their resting metabolism would be responsible for burning 1,875 calories. If toxicity caused a moderate 7% reduction in the ability to convert the calories to energy, we would be left with 131 calories unburned daily.

Obesity

- We then assume that 7,714 calories is equivalent to 1 kilogram (2.2 lbs) of weight.
- In one year at 131 calories a day, the person would have 47,815 calories unburned. (131 X 365 days)
- This would equate to 6.19 kilograms (13.6 lbs) of additional weight gain per year or 30.95 kilograms (68.09 lbs) in a 5 year period.

Obesity

- In the United States, the most toxic city is Houston, Texas. It is also the most obese town in the country.
- Since many of the toxins I believe involved in the disruption of the entry point of the Citric Acid Cycle are stored in adipose tissue, the increased levels of dietary fat intake compound the problem.

General Health – Toxicity at the Root of All Things Unhealthy

- More and more research is implicating environmental toxicity as the root of most disease in the world.
- Explosions of childhood diseases has been catastrophic.
- Asthma, autism, cancer and others are occurring at staggeringly high rates.

General Health – Toxicity at the Root of All Things Unhealthy

- The effect of these chemicals on neurodevelopment of unborn fetuses is just now coming to light.
 - Roberts, E., P. English, et al. (2007). "Maternal residence near agricultural pesticide applications and autism spectrum disorder among children in the California Central Valley." *Environmental Health Perspectives* 115(10): 1482-9.
- It is my firm belief that many of the health issues of children today, ranging from autism to asthma, ADHD to obesity, can be directly linked to environmental toxicity.
- In a study reported on by CNN this week, so many of our children are burdened by high levels of so many different toxins.

General Health – Toxicity at the Root of All Things Unhealthy

- "We are the humans in a dangerous and unnatural experiment in the United States, and I think it's unconscionable," said Dr. Leo Trasande, assistant director of the Center for Children's Health and the Environment at the Mount Sinai Medical Center in New York City.

General Health – Toxicity at the Root of All Things Unhealthy

- "We are in an epidemic of environmentally mediated disease among American children today," he said. "Rates of asthma, childhood cancers, birth defects and developmental disorders have exponentially increased, and it can't be explained by changes in the human genome. So what has changed? All the chemicals we're being exposed to."

General Health – Toxicity at the Root of All Things Unhealthy

- Elizabeth Whelan, president of the American Council on Science and Health, a "public health advocacy group", disagrees.
- "My concern about this trend about measuring chemicals in the blood is it's leading people to believe that the mere ability to detect chemicals is the same as proving a hazard, that if you have this chemical, you are at risk of a disease, and that is false," she said. Whelan contends that trace levels of industrial chemicals in our bodies do not necessarily pose health risks.

General Health – Toxicity at the Root of All Things Unhealthy

- This is the same woman who said that we don't need nutritional supplements and that our food contains all the nutrients we will ever need.
- If you go to a website called Sourcewatch.org and search for her name you can find the source of her funding which includes Dupont, Dow Chemical, Monsanto and Union Carbide to name a few.

General Health – Toxicity at the Root of All Things Unhealthy

- When looking at providing your patient the best possible outlook at a healthy future, it is critical that they be tested for environmental toxins as that is the greatest threat to health.
- Combining a US Biotek Environmental Pollutants Biomarker along with a Whole Blood Elements test from Doctor's Data with a Comprehensive Blood Chemistry from either Quest or LabCorp (all available through Crayhon Research) should be the standard.

General Health – Toxicity at the Root of All Things Unhealthy

- US Biotek in Seattle, Washington, U.S.A. has developed a urinary Environmental Pollutant Biomarker test.
- It looks for the solvent metabolites of Benzene, Styrene, Xylene, Toluene, Parabens, Trimethylbenzene, and Phthalates.
- Combining it with their urinary organic acid test allows the practitioner to pinpoint the predominant toxin and the appropriate treatment protocol.

General Health – Toxicity at the Root of All Things Unhealthy

- Phthalates, are a very common plasticizer that also is used in everything from cosmetics to shampoos, air fresheners and some time-released medications.
- The effect of this ubiquitous chemical are numerous and staggering.
- These effects are seen in developing fetuses and children as well as in adult males and females.

General Health – Toxicity at the Root of All Things Unhealthy

- It has been implicated in lowering testosterone in men, increasing insulin resistance and causing an increase in male waist circumference.
 - Stahlhut, R., E. Wijngaarden, et al. (2007). "Concentrations of Urinary Phthalate Metabolites Are Associated with Increased Waist Circumference and Insulin Resistance in Adult U.S. Males." Environmental Health Perspectives 115(6): 876-82.

General Health – Toxicity at the Root of All Things Unhealthy

- In another recent study on humans, it has been shown that phthalates can affect thyroid function as well.
 - Meeker, J., A. Calafat, et al. (2007). "Di(2-ethylhexyl) phthalate metabolites may alter thyroid hormone levels in men." Environmental Health Perspectives 115(7): 1029-34.
- High levels of estrogen mimickers and other hormone disruptors like monoethylphthalates were found in almost all prepubescent girls.
 - Wolff, M., S. Teitelbaum, et al. (2007). "Pilot Study of Urinary Biomarkers of Phytoestrogens, Phthalates, and Phenols in Girls." Environmental Health Perspectives 115(1): 116-121.

General Health – Toxicity at the Root of All Things Unhealthy

- The bottom line is that we **all** have solvents in our blood stream.
- We can no longer hide behind good eating and behavioral avoidance of toxins.
- It is everywhere.
- We need to make sure we are adequately excreting these poisons.
- The only way is through the test from US Biotek.

General Health – Toxicity at the Root of All Things Unhealthy

- With heavy metals, there is no one perfect test.
- Whole Blood Elements or a Hair Elements test are two ways of discovering the metal burden of the individual.
- Find the toxin, lower the exposure, help the body excrete the toxins and your patient will have the best chance of achieving optimal health.

Your Cases

Open discussion of what test to run for your patient's needs

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