How to Assess Environmental Toxicity Loads in Your Clientele

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The Research

- My topic relates to the way environmental toxins affect the health of your patients and how to test for them.
- The research is based upon the review of over 42,000 laboratory tests from around the world through Crayhon Research.
- It also relies on over 5,000 scientific papers.

Toxins – How Prevalent?

- According to the United States Environmental Protection Agency in 2002 through their “Toxic Release Inventory” tracking system, over 7.1 billion pounds of 650 different industrial chemicals were released in the air and water, 266 of which are linked to birth defects.
- Worldwide, the estimates approach 80 billion pounds of toxins released annually.
- Some of these toxins affect human health in microgram doses.

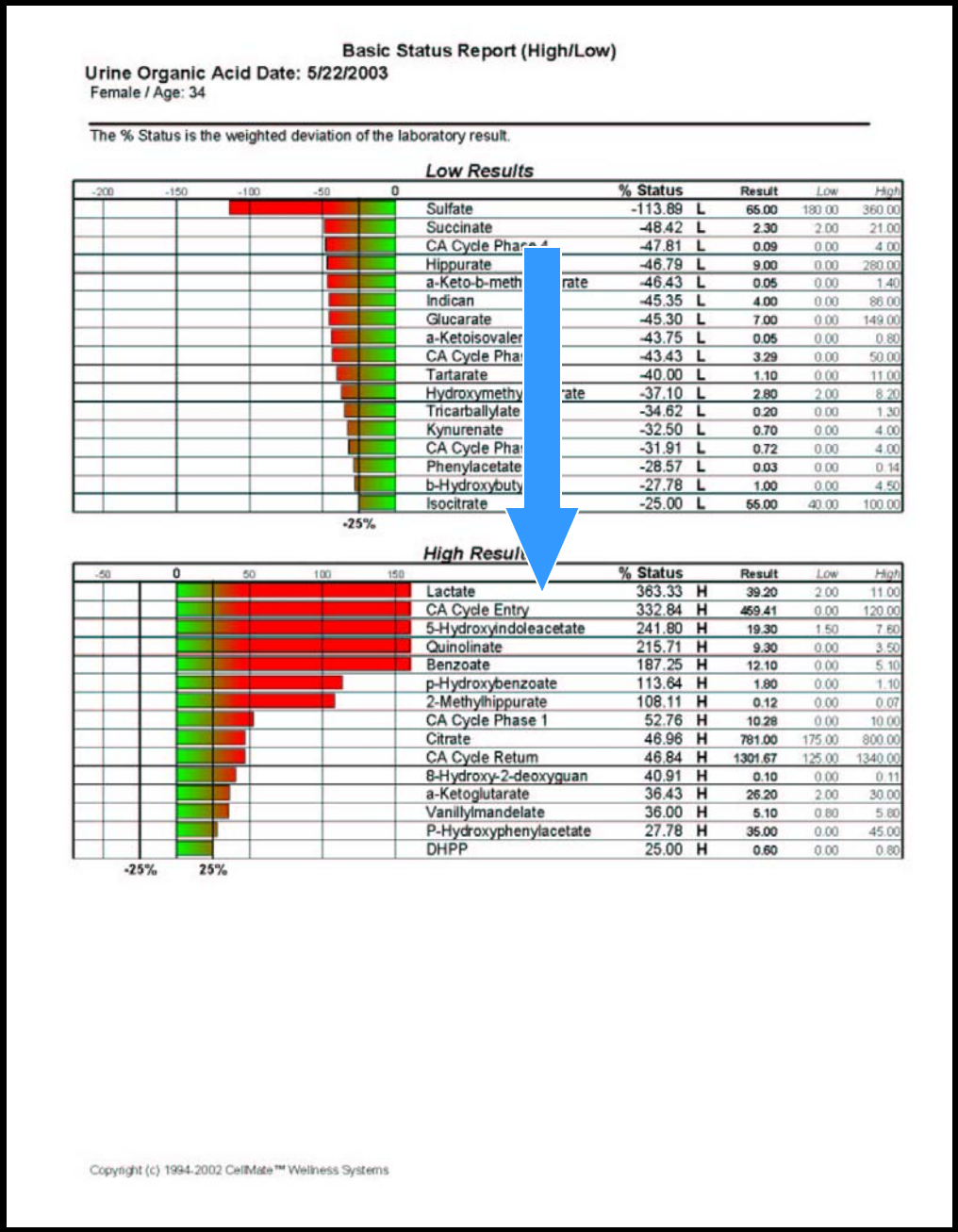
Toxins – How Prevalent?

- 9 individuals not in the chemical industry were tested for 210 chemicals and 167 of them were found in at least one of the people with an average number of chemicals found per person was an astounding 91. Most of these chemicals did not exist 20 years ago.
- In a recent study published by the Environmental Working Group (www.ewg.org) the cord blood of ten newborn babies was tested and 287 chemicals were detected, all of whom are linked to cancer, developmental problems and/or nervous system damage.

How Toxins Affect the Citric Acid Cycle

- Arsenic can disrupt the pyruvate and succinate oxidation pathways.
- This inhibition effectively blocks the Krebs cycle, which results in marked depletion of ATP stores.
- Alcohol affects the same cycle as arsenic, so arsenic toxicity is accentuated by alcohol ingestion by up to 100 fold.

Sample of a patient with a citric acid cycle disruption.
The test to determine a CAC cycle problem is a urine organic acid test. Crayhon Research is the first and only one (not even the labs do this) to be able to pinpoint the location of the disturbance and help find the potential toxin.



Basic Status Report (High/Low)

Urine Organic Acid Date: 5/22/2003
Female / Age: 34

The % Status is the weighted deviation of the laboratory result.

Low Results

	% Status		Result	Low	High
Sulfate	-113.89	L	65.00	180.00	360.00
Succinate	-48.42	L	2.30	2.00	21.00
CA Cycle Phase 4	-47.81	L	0.09	0.00	4.00
Hippurate	-46.79	L	9.00	0.00	280.00
a-Keto-b-methylvalerate	-46.43	L	0.05	0.00	1.40
Indican	-45.35	L	4.00	0.00	86.00
Glucarate	-45.30	L	7.00	0.00	149.00
a-Ketoisovalerate	-43.75	L	0.05	0.00	0.80
CA Cycle Phase 3	-43.43	L	3.29	0.00	50.00
Tartarate	-40.00	L	1.10	0.00	11.00
Hydroxymethylglutarate	-37.10	L	2.80	2.00	8.20
Tricarballylate	-34.62	L	0.20	0.00	1.30
Kynurenate	-32.50	L	0.70	0.00	4.00
CA Cycle Phase 2	-31.91	L	0.72	0.00	4.00
Phenylacetate	-28.57	L	0.03	0.00	0.14
b-Hydroxybutyrate	-27.78	L	1.00	0.00	4.50
Isocitrate	-25.00	L	55.00	40.00	100.00

-25%

High Results

	% Status		Result	Low	High
Lactate	363.33	H	39.20	2.00	11.00
CA Cycle Entry	332.84	H	459.41	0.00	120.00
5-Hydroxyindoleacetate	241.80	H	19.30	1.50	7.60
Quinolinate	215.71	H	9.30	0.00	3.50
Benzoate	187.25	H	12.10	0.00	5.10
p-Hydroxybenzoate	113.64	H	1.80	0.00	1.10
2-Methylhippurate	108.11	H	0.12	0.00	0.07
CA Cycle Phase 1	52.76	H	10.28	0.00	10.00
Citrate	46.96	H	781.00	175.00	800.00
CA Cycle Return	46.84	H	1301.67	125.00	1340.00
8-Hydroxy-2-deoxyguanosine	40.91	H	0.10	0.00	0.11
a-Ketoglutarate	36.43	H	26.20	2.00	30.00
Vanillylmandelate	36.00	H	5.10	0.80	5.80
P-Hydroxyphenylacetate	27.78	H	35.00	0.00	45.00
DHPP	25.00	H	0.60	0.00	0.80

-25% 25%

Implications of Toxicity

- My proposition, which I made over 5 years ago, was that environmental toxins, ranging from heavy metals, to petrochemicals, to mycotoxins can slow down the ability of our cells to create energy from food, especially carbohydrates.

Implications of Toxicity

- Aside from hormonal, neurological and endocrine disruption, environmental toxins can slow down the resting metabolic rate which may be one of the most important reasons for the increase of obesity worldwide.

Toxicity – Implications in Weight Management

- 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

Toxicity – Implications in Weight Management

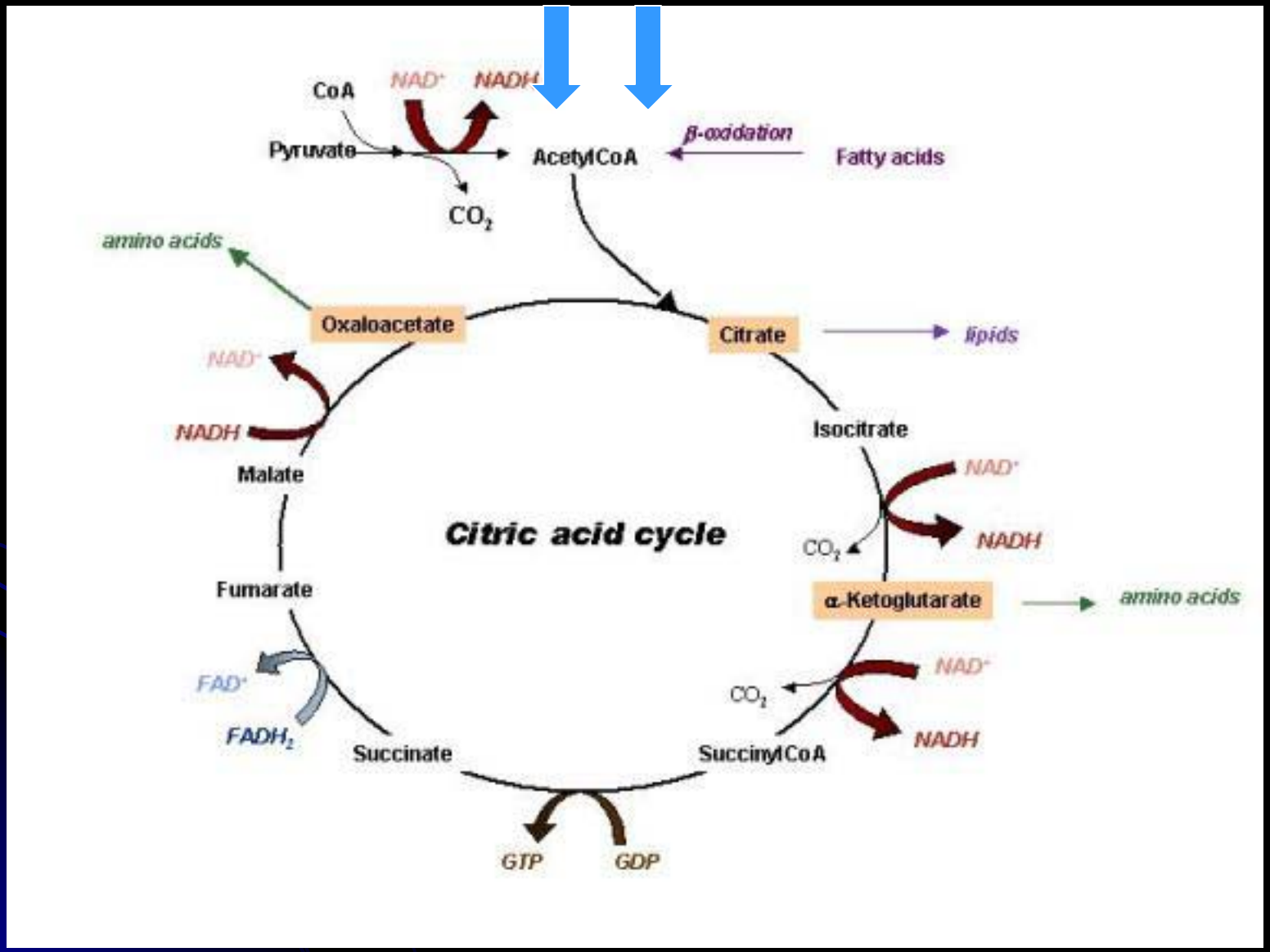
- *In the July 2004* International Journal of Obesity, *Dr. Angelo Tremblay of Laval University in Quebec, Canada said the following:*

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

Toxicity – Implications in Weight Management

- 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.
- Calculations originally done by me at my old company, Carbon Based Corporation on Citric Acid Cycle metabolites Pyruvate, Lactate and Citrate pinpointed the abnormality.

Citric Acid Cycle Entry Blockade Point



Toxicity – Implications in Weight Management

- 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.

Toxicity – Implications in Weight Management

- 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.

Toxicity – Implications in Weight Management

- 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.

Toxicity – Implications in Weight Management

- In America, it is estimated that over 55% of the population is either obese or overweight.
- In Europe according to the **Kraft Foods Questionnaire, GFK-NOP, 2006**, 50% were overweight or obese (32% ow. / 18% ob.)
- 50-80% knew that exercise is essential for health but only 20% exercised regularly
- Obesity and overweight was not regarded as a serious health risk (4^{th}-5^{th} place)!

Toxicity – Citric Acid Cycle - Treatment

- Three different protocols are universal:
  - The use of the amino acid Glycine (1-3 grams daily) is critical.
  - The buildup of stores and production of the tri-peptide Glutathione.
  - The use of a Citric Acid Cycle stimulant. My preference is one that is homeopathic.
- Reduction of exposure to the many sources of these toxins is also important.

Implications of Toxicity

- 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.

Implications of Toxicity

- "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.
- "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."

Implications of Toxicity

- 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.
- This is the same women who said that we don’t need nutritional supplements and that our food contains all the nutrients we will ever need. She also supported NutraSweet and food dyes for children.

Transgenerational Epigenetics

- I also believe that there is a deeper threat and that is we may be passing on this legacy of environmental toxicity to future generations because of the newly discovered effect of transgenerational epigenetics
- In a study published in the journal Science, researchers led by Anway, found that fetal exposure to certain endocrine disrupting toxins not only affected the individuals exposed in the womb but in subsequent generations.
  - Anway MD, Cupp AS, Uzumcu M, and Skinner MD, Epigenetic Transgenerational Actions of Endocrine Disruptors and Male Fertility, Science, 308:1466-1469, June 2005.

Transgenerational Epigenetics

- The fourth generation of rats tested had the same damage as the exposed rat in generation one.
- The inheritance of the damage was not to the DNA but by altering patterns of DNA methylation.
- This transgenerational epigenetic effect makes detoxification of individuals, especially those of child bearing age more important than ever.

Therapeutic Treatment Modalities

- In reviewing potential treatment modalities it has become increasingly apparent that broad, population based protocols are bound to fail for the great majority of individuals.
- The relatively new field of *Metabonomics* holds the key to treating each person in a biochemically individualized manner.

Metabonomics: Biochemical Individuality in the Treatment of Toxicity

- A paper in the April 20th, 2006 issue of *Nature* confirmed my long standing belief in biochemical individuality as noted biochemist Dr. Jeremy K. Nicholson of Imperial College London believed that a multitude of factors aside from genetics have a huge influence of how our bodies process medications.

- While his study was on the processing of drugs, the ramifications of his paper shows that in the laboratory, genetically identical mice had a wide range of reactions to acetaminophen (Tylenol) and these reactions were highly correlated to urinary marker patterns.

Metabonomics: Biochemical Individuality in the Treatment of Toxicity

- The patterns include a number of markers looked at by urinary organic acid tests that Carbon Based Corporation and now Crayhon Research has been interpreting for years.
- In the LabAssist Reports™, we developed a method of looking at both blood and urinary markers and how they relate to toxin interactions. Our other breakthroughs came in the personalizing of nutritional interventions based on cross-correlated markers of blood and urine metabolites. By measuring the results from these tests we are able to help medical professionals construct biochemically individualized nutritional protocols which will maximize the dollar spent by the patient towards achieving optimal health.

Metabonomics: Biochemical Individuality in the Treatment of Toxicity

- Using this theory is critical in developing proper and *safe* detoxification protocols for toxic patients.
- We must also be of the opinion that presently all humans are carrying a significant amount of toxins in their blood.
- It then becomes paramount that we determine excretion capacity of these toxins.

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 mutualsim 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.

Urinary Environmental Solvent Testing in Conjunction with Organic Acids

- 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 using the theory of metabonomics over genetics.

Urinary Environmental Solvent Testing

- 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.

Urinary Environmental Solvent Testing

- A study has implicated phthalate exposure to DNA damage to male sperm
  - Susan, M., N. Singh, et al. (2003). "The Relationship between Environmental Exposures to Phthalates and DNA Damage in Human Sperm Using the Neutral Comet Assay." Environmental Health Perspectives **111**(9): 1164-9.
- They will also change the anogenital distance in developing male fetuses. The higher the level of phthalates the greater the damage.
  - McIntyre, B., N. Barlow, et al. (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." Toxicological Sciences **65**: 62-70.
  - Swan, S., K. Main, et al. (2005). "Decrease in Anogenital Distance among Male Infants with Prenatal Phthalate Exposure." Environmental Health Persepectives **113**(8): 1056-1061.

Urinary Environmental Solvent Testing

- Phthalate exposure has been correlated to the shortening duration of pregnancy
  - Latini, G., C. De Felice, et al. (2003). "In Utero Exposure to Di-(2-ethylhexyl)phthalate and Duration of Human Pregnancy." Environmental Health Perspectives **111**(14): 1783-5.
- It has been further 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.

Urinary Environmental Solvent Testing

- 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 monoethyphthalates 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.

Urinary Environmental Solvent Testing

- 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.

Urinary Environmental Solvent Testing in Conjunction with Organic Acids

- Crayhon Research, provides a detailed report for US Biotek that provides the correct treatment protocol.
- The urine sample does not need freezing or overnight shipping as it uses a novel dry strip technology.

Urinary Environmental Solvent Testing

- When developing detoxification protocols it is important to make sure you deal with each toxin differently.
- Much like the difference between EDTA and DMSA in the metals chelated, different protocols are necessary for each of the solvents.
- Benzene, if detoxed incorrectly, can be made to be carcinogenic.

Urinary Environmental Solvent Testing

- If the gut is highly dysbiotic, using a broad spectrum amino acid blend containing phenylalanine and/or tyrosine, you can create phenol compounds which can turn benzene carcinogenic.
  - McDonald, T., N. Holland, et al. (2001). "Hypothesis: Phenol and hydroquinone derived mainly from diet and gastrointestinal flora activity are causal factors in leukemia." Leukemia **15**: 10-20.

Heavy Metal Testing

- Two best tests for heavy metals are Hair Elements and Whole Blood Elements from Doctor's Data.
- Hair Elements should be a first line screening technique.
- A good book on how to interpret the results is "Hair Test Interpretation: Finding Hidden Toxicities" by Andrew Hall Cutler, PhD.

Heavy Metal Testing

- The newly developed Whole Blood Elements test, available through Crayhon Research is a great way of assessing both heavy metal toxicity and trace mineral competency.
- While no method is totally reflective of body burden of metals, the combination of the two is the best there is.

Heavy Metal Testing

- Urine challenges, while revealing a presence of heavy metals, is not a good indicator of total body burden.
- Some with little total heavy metal burden may excrete high quantities of mercury, arsenic, cadmium or aluminum.
- Others with high levels in tissue and bone may show little or no excretion but may have a strong side-effect from the challenge chelator.

Heavy Metal Testing

- Chelate with amalgams or not?
- According to Dr. David Quig of Doctor's Data, there is little evidence that chelating with DMSA or DMPS causes an increase in mercury release from amalgam fillings.
- If that were the case, then adding the chelating agents would be an effective means of removing mercury amalgams.
- He believed it was safe to chelate with amalgams.

Coming Soon…..

- I have spent the last 3 years working on a book detailing my search for answers for my daughter and my findings on environmental toxicity and its implications for our world, ourselves and our children.
- Its title is “Achieving Victory Over A Toxic World”.
- It will be available later this year.

For More Information

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