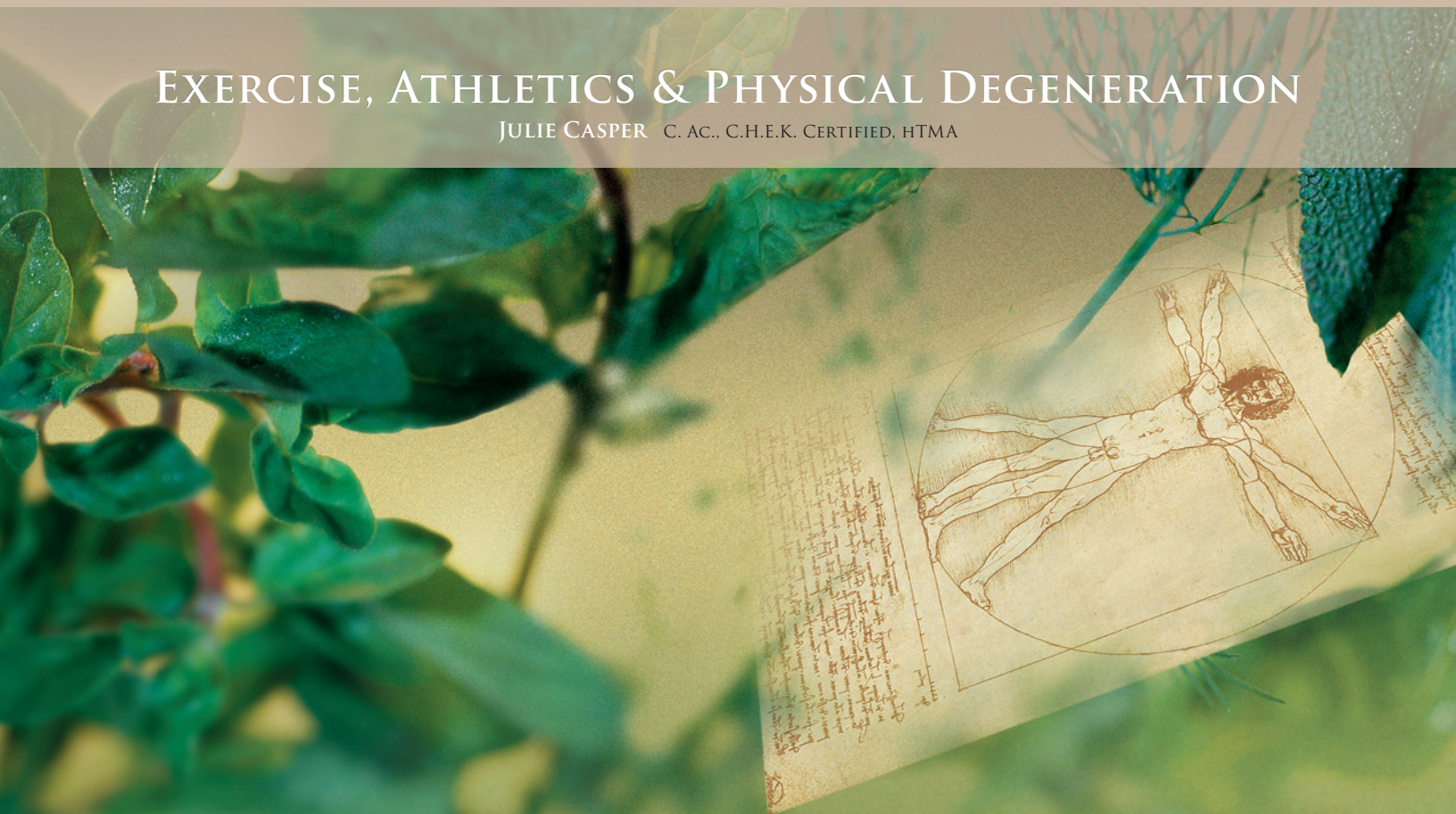


EXERCISE, ATHLETICS & PHYSICAL DEGENERATION

JULIE CASPER C. AC., C.H.E.K. CERTIFIED, HTMA



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The basic science of hTMA is the result of their pioneering research, which included evaluation of major research studies in biochemistry, physiology, pathology, nutrition and psychology. They combined this data with a number of biological, physiological and biochemical concepts of other researchers, including; Dr. Hans Selye's stages of stress, Dr. Melvin Page's sympathetic and parasympathetic balancing, Dr. George Watson's oxidation types, as well as agricultural mineral balancing (soil theory) taught by Dr. William Albrecht.

Dr. Watts and Trace Elements, Inc. continue to advance the science of hTMA diagnostics and improve therapeutic effectiveness.

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- Sally Fallon, President of the Weston Price Foundation and author of *Nourishing Traditions*
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- Lierre Kieth, activist and author of many books, including *The Vegetarian Myth*

EXERCISE, ATHLETICS AND PHYSICAL DEGENERATION

Many athletes use nutritional programs to enhance fitness and weight training programs. It is important to use nutrition correctly to help prevent fatigue, burnout and injury, and to maintain health throughout life. A nutrient-dense diet with an individualized supplementation program will prevent problems such as compulsive exercise, sympathetic dominance and adrenal exhaustion.



It is essential to first build health, and second, strength. Without a foundation of good health you risk injury and illness. Clinically, we see many athletes whose bodies are exhausted. They are under the false impression that exercise, or diet alone, will build strength and health. To improve athletic fitness requires the coordinated refinement of several inter-dependant factors, including nutrition, metabolic type, toxic metal and chemical body-burden and carbohydrate tolerance among others.

"A well nourished child, first of all, measures up to ... standards of his age in height and weight. He has good color, bright eyes, no blue or dark circles underneath them and smooth glossy hair. His carriage is good, his step elastic, his flesh firm and his muscles well developed. In disposition he is usually happy and good natured; he is brim full of life and animal spirits and is constantly active, both physically and mentally. His sleep is sound, his appetite and digestion good, his bowels regular. He is, in short, what nature meant him to be before anything else: a happy, healthy young animal."

L. J. Roberts, *What Is Malnutrition?* US. Dept of Labor Pub No. 59 1944

Physical Development

Natural physical play and athletics are vital for children to help them develop coordination, vision, hearing, musculoskeletal strength and function, and overall healthy bodies. Modern and professional-level athletic fitness is usually coerced, not naturally developed. Many athletes today are unhealthy. This is caused by stress from overtraining, improper nutrition, pharmaceutical drugs and stimulant herbs used to enhance performance (illegal or legal).

Natural stimulant herbs are typically grown and processed in China. These are usually better than *synthetic pharmaceutical* drug products (hormones anabolic-steroids, etc.). Natural herbs have an advantage for professional athletes in that they are harder to detect on blood tests. However, due to environmental pollution and profit focused production policies, many herbal stimulant products can be highly toxic. Toxicity from these herbal stimulants will inevitably damage the health and performance of an athlete.

Fitness is most positively influenced by three primary factors;

1. proper nutrition,
2. adequate rest,
3. and an appropriate level of physical activity.

Despite popular consensus, a daily running regime does not contribute to *healthy* fitness. On the contrary, the accumulative effects of running are usually harmful. Fundamentally, a person's strength should be adequate to meet daily functional demands. These demands are determined by the base physical strength level required to perform their sport, work and other activities.

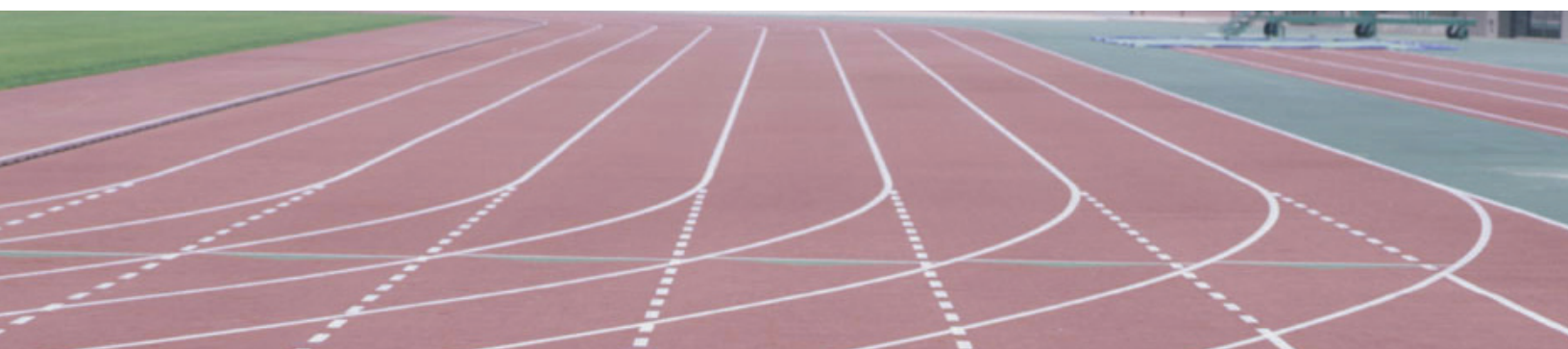


A well designed exercise program considers correcting musculoskeletal imbalances, physiological load capacity, and strength requirements. Most conventional exercise regimes are counterproductive, especially when an athlete exercises excessively (which occurs in many of the latest adrenaline-charged exercise fads). And for athletes, excessive exercising is not uncommon. This is because exercise stimulates adrenalin release (you feel better, even if temporarily). Over time, the adrenal glands become progressively fatigued. More exercise is needed in order to experience the desired physical and psychological response associated with adrenal stimulation.

Eventually this behavior leads to compulsive exercise and adrenal gland exhaustion, or *adrenal burnout*. People who experience adrenal burnout find they are tired, even after exercise. Nothing seems to relieve the feeling of fatigue, even resting for several days. In these cases, the exercise program must be reduced in order to give the adrenal glands a chance to recover. Adrenal burnout is a serious condition which requires several months, to several years, to recover from.

Strength and Stamina

Balancing the oxidation rate (cellular metabolism) enhances the efficiency of energy production at the cellular level. Both a very *slow*, or a very *fast* oxidation rate is similar to running a car or bicycle in the wrong gear, producing poor energy efficiency. The physiological load requirements in different types of sports benefit from different metabolic attributes. For example, a *fast oxidizer* may do well as a sprinter. Where a *slow oxidizer* may succeed as a long distance runner.





The nutrient minerals, including iron, copper, manganese, magnesium, chromium, zinc and other minerals are integral to cellular energy production. Additionally, the proper combination and balance of mineral *ratios* such as sodium/potassium, calcium/magnesium, zinc/copper, calcium/potassium and sodium/magnesium are crucial for achieving optimal energy production.

There is a fundamental distinction between bioavailable minerals (nutritive) and *biounavailable* minerals (toxic). Good quality food and water provide bioavailable minerals. Whereas biounavailable minerals are by-products found in our environment. For example, biounavailable copper from copper water pipes and birth control devices, cadmium from cigarette smoke, and mercury from coal fired plants and amalgam dental fillings. And there are many more sources including foods such as fish and chemically-sprayed fruits and vegetables.

Heavy metal toxicity degrades function in nerves, joints and organs and leads to failure. Identifying and eliminating toxic metals is beneficial for improving and maintaining energy, flexibility and stamina. Stabilizing carbohydrate tolerance also will contribute to increased stamina. The proper balance of nutrients including calcium, magnesium, manganese, zinc and chromium is essential for the proper metabolism of glucose needed to generate sustained energy and a balanced oxidation rate.



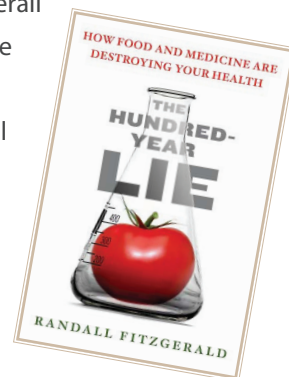


Toxic Exposure

Exposure to toxic heavy-metals and chemical environmental pollution is growing at an alarming rate. Toxic body-burden is now one of the most serious threats to *all* living organisms.

Excerpt from *The Hundred-Year Lie* by Randall Fitzgerald

(excerpt pp.218-220) Synthetic-chemical production levels overall have been doubling every decade since the 1940s. At least five new synthetic chemicals are developed for commercial use *every single day*, yet no one has any realistic idea how harmful these chemicals are to us, either alone or acting in synergy with other chemicals. Our ignorance on these matters long ago surpassed our wisdom. Even global warming, to the extent that it's caused or exacerbated by human actions, mostly stems from the release of synthetic chemical toxins.



Since the start of the Hundred-Year Lie in 1906, the year the U.S. Congress enacted the Pure Food and Drug Act, we have a century of false and misleading guarantees from which to draw lessons. Here are the ones I draw from the research contained in this book and the patterns that emerged as a consequence of one hundred years of myth making.

- We can inherit harm. Toxic synthetic chemicals can negatively alter our DNA to program us and our descendants to experience illness and disease.
- Synthetic chemicals take advantage of nutrient-poor diets to damage our immune systems, which facilitates the onset of illness and disease.
- Some synthetic chemicals interact with each other to produce toxic synergies that activate our genetic predisposition to illness and disease.
- Synthetic chemicals can create toxic synergies to trigger the development of "new" illnesses and diseases, such as chronic fatigue syndrome and Gulf War syndrome.
- Drugs being prescribed for the illnesses and diseases caused by synthetic chemicals are introducing more toxins into the body, further confusing and compromising our immune systems.
- Human bodies weren't designed to absorb synthetic chemicals, even at low doses, throughout a lifetime, without harm being inflicted.
- Our best hope for health and longevity is to embrace naturally occurring synergies found in the foods and medicines of nature.

Our rediscovery of ancient wisdom can rescue us from the follies of this failed experiment with our biochemical nature. Try and imagine what will happen if, for the rest of the twenty-first century, the synthetics belief system of the previous hundred years remains supported by our bodies and our bank accounts. We can already see the signs of an accelerated degeneration of our species. It has spread across multiple layers of life and throughout nature. It's characterized by infertility, reproductive abnormalities, birth defects, weakened immune systems, and a contagion of illness and disease that threatens to bankrupt every industrialized society with runaway medical costs.

This isn't hyperbole or fear mongering. Our nation really is going broke from medical costs that consume nearly two trillion dollars in annual spending — and most other industrialized nations are not far behind us.

It's as if we're witnessing one of those slow-motion train wrecks in which three tracks are converging. On track one roars the runaway train of synthetic chemical production. On track two comes the runaway train of health-care costs. On track three barrels the runaway train of environmental effects that are diminishing human and animal fertility. When the wreck debris finally settles, a powerful synergy of unpredictable social forces will be unleashed.

Medical scientists rarely make alarmist statements or apocalyptic predictions in public for fear of ridicule or being ostracized by their peers. That tendency toward caution makes the joint declaration known as "The Vallombrosa Consensus Statement on Environmental Contaminants" all the more startling in its directness and import. Sounding an alarm about the link between synthetic chemicals and infertility, forty U.S. and Canadian physicians and scientists representing the National Institute of Environmental Health Sciences, Stanford University's School of Medicine, Harvard's School of Public Health, and a dozen other prominent research institutions signed and released a public statement in October 2005 affirming key findings in this book:

- 12 percent of the U.S. reproductive population now experiences infertility, and that rate is rising overall, particularly among women under twenty-five years of age.
- A "growing body of literature and research" implicates "a wide array of modern chemicals" in this infertility trend.
- Similar effects of infertility, along with desmasculinization and birth defects, are being documented among wildlife populations.
- Low levels of exposures to chemical contaminants are causing these effects in both humans and animal life.
- Current technologies to measure the health impacts of multiple chemicals in the human body "significantly underestimate effects of chemical mixtures."
- The link between synthetic chemicals and infertility "is a question of profound human, scientific and public policy significance, and the scientific evidence for such a connection is reproductive health."



Athlete Nutrition

Conventional athletic trainers, and orthodox books on fitness, often recommend a high-carbohydrate diet to enhance performance. Clinically, due to the numerous nutrient and mineral needs and variables between individuals, we find that a single simplistic dietary approach does not work for everyone. Some athletes may benefit from carbohydrates in their diet. Others may experience carbohydrate intolerance, especially when the diet is high in *simple* carbohydrates (sugar, fruit, sports drinks, refined grains, etc.). Another problem with a high-carbohydrate diet is that these diets are frequently too low in protein. While a person may do well for a while on such a diet, symptoms of protein deficiency may develop that are not easy to reverse.

For the slow oxidizer, a high-carbohydrate diet may work fairly well provided adequate protein is included in the diet. For the fast oxidizer, a better source of calories are fats and oils. An excessive carbohydrate intake in fast oxidizers can lead to irritability, muscle cramps, hypoglycemia, diabetes, addictive tendencies and worse.

Sugar

Sugar has no place in a healthy diet. It is toxic and needs to be eliminated and avoided. This includes, sucrose, fructose, anything with the suffix “-ose.” The research condemning sugar is overwhelming.

“Refined sugar is lethal when ingested by humans because it provides only that which nutritionists describe as empty or naked calories. In addition, sugar is worse than nothing because it drains and leeches the body of precious vitamins and minerals through the demands its digestion, detoxification, and elimination make upon one’s entire system. So essential is balance to our bodies that we have many ways to provide against the sudden shock of a heavy intake of sugar. Minerals, such as sodium (from salt), potassium and magnesium (from vegetables) and calcium (from the bones) are mobilized and used in chemical transmutation; neutralizing acids are produced, which attempt to return the acid alkaline balance factor of the blood to a more normal state. Sugar taken everyday produces a continuously over acid condition, and more and more minerals are required from deep in the body in the attempt to rectify the imbalance. Finally, in order to protect the blood, so much calcium is taken from the bones and teeth that decay and general weakening begin.”

— William Dufty, author: *Sugar Blues*

Vegetarian Diet



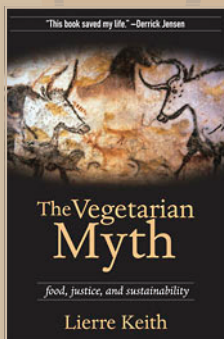
Vegetarian Diet

As part of a high-carbohydrate diet, some athletes move toward vegetarian diets. Many studies indicate that vegetarian diets are damaging. Vegetarians develop deficiencies in zinc and B vitamins, and most develop copper toxicity after a period of time on the vegetarian diet (due to zinc deficiency). Iron deficiency also may develop because iron is better absorbed from animal foods. Vegetarians eventually develop low energy levels, likely due to protein deficiency and copper toxicity.

Eating a vegetarian diet without compromising your health is complex and challenging. Though not *impossible*. Most people are unwilling to take the time necessary to preserve health while on a vegetarian diet. And even when the proper precautions are observed, without professional guidance and the technical support of a hTMA lab analysis, you cannot be sure you are giving your body what it needs.

People commonly feel better when they first switch to a vegetarian diet. This is usually because they have eliminated the toxic junk foods and started eating more vegetables, or because they have a compromised digestive system which was making animal proteins difficult to digest. However, after a few years on this diet, they start to become exhausted and develop a host of health problems. Vegans get to this state of exhaustion even faster than vegetarians. If you are a vegetarian and want to know whether your body is absorbing and retaining the nutrients it needs, we recommend you work with an experienced hTMA practitioner.

Excerpt from *The Vegetarian Myth* by Lierre Kieth:



(p. 152) And just as agriculture has displaced species-dense communities with its monocrops, its diet has displaced the nutrient-dense foods that humans need, replacing them with mononutrients of sugar and starch. This displacement led immediately to a drop in human stature as agriculture spread—the evidence couldn't be clearer. The reasons are just as clear. Meat contains protein, minerals, and fats, fats that we need to metabolize those proteins and minerals. In contrast, grains are basically carbohydrates: what protein they do contain is low quality—lacking essential amino acids—and comes wrapped in indigestible fiber. Grains are essentially sugar with enough opioids to make them addictive.

The biological truth will be hard to face if, like me, you built the entire superstructure of your identity on a foundation of grain. But these are the facts. There are essential amino acids, the so-called building blocks of protein. They're essential because humans can't make them; we can only eat them. Likewise, there are essential fatty acids fats—which, despite being vilified, can only be ingested, not made.

And carbohydrates? There is no such thing as a necessary carbohydrate. Read that again. Write the Drs. Eades, "the actual amount of carbohydrates required by humans for health is zero."



Phytates: Grains, Beans, Seeds and Nuts

Phytates found in grains, beans, seeds and nuts lower tissue levels of calcium, magnesium and zinc. These elements tend to be low in a fast oxidizer metabolism. A high-carbohydrate diet aggravates nutritional deficiencies.

Excerpt from *Living With Phytic Acid* by Ramiel Nagel

PHYTATES IN FOOD. Phytic acid is present in beans, seeds, nuts, grains — especially in the bran or outer hull; phytates are also found in tubers, and trace amounts occur in certain fruits and vegetables like berries and green beans. Up to 80 percent of the phosphorus — a vital mineral for bones and health — present in grains is locked into an unusable form as phytate. When a diet including more than small amounts of phytate is consumed, the body will bind calcium to phytic acid and form insoluble phytate complexes. The net result is you lose calcium, and don't absorb phosphorus. Further, research suggests that we will absorb approximately 20 percent more zinc and 60 percent more magnesium from our food when phytate is absent.

DETRIMENTAL EFFECTS. High-phytate diets result in mineral deficiencies. In populations where cereal grains provide a major source of calories, rickets and osteoporosis are common.

Food containing phytic acid have phytate-reducing effects in other important minerals, including iron, magnesium and zinc. The zinc- and iron-blocking effects of phytic acid can be just as serious as the calcium-blocking effects. For example, one study showed that a wheat roll containing 2 mg phytic acid inhibited zinc absorption by 18 percent; 25 mg phytic acid in the roll inhibited zinc absorption by 64 percent; and 250 mg inhibited zinc absorption by 82 percent. Nuts have a marked inhibitory action on the absorption of iron due to their phytic acid content.

Over the long term, when the diet lacks minerals or contains high levels of phytates or both, the metabolism goes down, and the body goes into mineral-starvation mode. The body then sets itself up to use as little of these minerals as possible. Adults may get by for decades on a high-phytate diet, but growing children run into severe problems. In a phytate-rich diet, their bodies will suffer from the lack of calcium and phosphorus with poor bone growth, short stature, rickets, narrow jaws and tooth decay; and for the lack of zinc and iron with anemia and mental retardation.



Mental Clarity and Focus

Coordination, clarity, awareness, judgment and a quick response time are a major part of all athletic performance. The brain is a chemical organ, and requires a vast array of nutrients for proper functioning. *All* toxic metals interfere with the central nervous system, leading to impaired mental functioning. Correcting biochemical imbalances leads to improved mental focus and functioning.

Injury Prevention and Recovery

Chronic fatigue and burnout physiology are common conditions among athletes. Particularly later in the season. Colds, flu, pneumonia and other illnesses plague many athletes, especially those who travel and train hard.

A strong immune system and resistance to infection depends on a healthy, balanced body chemistry and the availability of a variety of vital nutrients. Nutritional imbalances cause weak joints, tendons and ligaments, excessive inflammation and muscle tears. Properly balancing body chemistry can help avoid injuries by maintaining stronger and more flexible ligaments, tendons and muscles. Balanced mineral ratios speed recovery from fractures, sprains, strains and other injuries.

A low sodium/potassium ratio or an abnormal phosphorus level is associated with excessive protein breakdown or catabolism. A chronic catabolic state can impair or even prevent the normal healing of sports injuries. (See *Protein Catabolism* later in this document.)

The body requires many nutrients for healing injuries, including zinc, manganese, copper, calcium, magnesium and a variety of vitamins. When provided in the correct amounts and combinations, healing results are appreciably improved.

Dietary Supplements

Most athletes take a variety of nutritional supplements, some of which are unnecessary, incorrect, or may be dangerous. A thorough assessment and analysis of the athlete's diet, nutrient mineral balance, and toxic load provides important parameters to help determine the correct supplementation needed to balance and enhance body chemistry.

Virtually all of the essential vitamins and minerals are involved in building up muscle mass. Zinc is very important among these elements. Zinc is needed for RNA transferase; an enzyme involved in all protein synthesis in the body. If a training program is not working, zinc may be deficient. In some cases, copper or cadmium may be excessive.

Imbalanced levels of calcium and magnesium can interfere with the transport of nutrients across cell membranes. Zinc, manganese and chromium are involved in the burning of glucose in the cells, which is necessary to generate biochemical energy. Chromium is considered an important anabolic mineral. Many toxic metals can interfere with these essential minerals, impairing critical enzyme systems and interfering with maximum performance.

Body chemistry is complex and always being adjusted based on changing variables. A healthy, balanced body will make these adjustments as needed if the nutrients are available to do so. Our biology has evolved to recognize and use vitamins and minerals provided in their natural form, not as synthetic derivatives. Synthetic products can, and frequently do, disrupt this delicate balance.

Vitamin E is an important vitamin to protect delicate enzyme systems from oxidant damage. Vitamin E given to athletes has been shown to enhance their energy levels. The B-complex vitamins enhance the oxidation rate. For the slow oxidizer, additional B-complex vitamins may be essential to enhance performance. Fast oxidizers should beware of taking an excessive amount of B-complex vitamins. Vitamin C is excellent for the slow oxidizers, as it enhances adrenal gland activity. Excessive vitamin C in fast oxidizers can cause a copper deficiency that would hinder performance. Vitamin A is synergistic with zinc and therefore is an aid in building up muscle tissue.



"Supplies of vitamin A are so vital to the human organism that mankind is able to store large quantities of it in the liver and other organs. Thus, it is possible to subsist on a fat-free diet for a considerable period of time before overt symptoms of deficiency appear. But during times of stress, vitamin A stores are rapidly depleted. Strenuous physical exercise, periods of physical growth, pregnancy, lactation and infection are stresses that quickly deplete vitamin A stores. Children with measles rapidly use up vitamin A, often resulting in irreversible blindness. An interval of three years between pregnancies allows mothers to rebuild vitamin A stores so that subsequent children will not suffer diminished vitality. One aspect of vitamin A that deserves more emphasis is its role in protein utilization. Kwashiorkor is as much a disease of vitamin A deficiency, leading to impaired protein absorption, as it is a result of absence of protein in the diet. High-protein, low fat diets in children induce rapid growth along with depletion of vitamin A supplies. The results—tall, myopic, lanky individuals with crowded teeth and poor bone structure—are a fixture in America. Growing children in particular actually benefit from a diet that contains at least twice as many calories as fat than as protein. Such a diet, rich in vitamin A, will result in steady, even growth, a sturdy physique, and high immunity from illness."

Sally Fallon, *Vitamin A Vagary*, <http://www.realmilk.com/vita.html>

FOUR MYTHS ABOUT FITNESS AND EXERCISE



1. Myth: Strong muscles and a beautiful body indicate you are in good health.

Health goes far beyond muscle and fat content. Strong muscles may make you feel like you have health, and everyone may tell you how wonderful you look. However, it is not unusual for people to look great, but have cancer or some other disease. Physical strength is only *one* parameter of health.

2. Myth: A healthy heart and healthy arteries indicate you are healthy.

This is a current fallacy. Clinical experience with many patients demonstrates that when body chemistry is in balance, the arteries and heart will be healthy as well. Gentle exercise is beneficial for everyone, but an obsessive focus on cardiovascular fitness does not improve health.

An example is the case of a 25-year old woman complaining of fatigue and depression. She was doing aerobic exercise 3-5 evenings a week. Her heart and arteries were probably fine, but her glandular system was so exhausted she could hardly get out of bed in the morning. hTMA test results and analysis indicated a depleted, exhausted body. Her exercise was aggravating the problem. This is a typical consequence of an 'exhausted exerciser' pathology.

3. Myth: Exercise rebuilds your body.

Exercise assists circulation of the blood and oxygenation of tissues and can help in biological rehabilitation. Higher levels of exercise stress the heart, arteries and glands, which are forced to respond to stress and use up vital energy.

Muscles enlarge as a response to, or accommodation to, stress damage. Optimal healing and rebuilding is a biochemical phenomenon requiring proper nutrients and adequate rest. Research supports the hypothesis that moderate exercise provides the same benefits as vigorous exercise.

To perform exercise when you already feel good is excellent. But exercising *in order to* feel good is detrimental to your health and fitness. Today, most people are malnourished due to consumption of a denatured, depleted food supply that is high in energy and low in nutrients. No amount of exercise will make up for nutritional deficiency and mineral imbalances. You cannot compensate for a *biochemical* problem with exercise. The consequence is that you may feel well temporarily, but eventually will find yourself *addicted* to exercise. You may experience that if you skip your routine for a couple of days, you will feel depressed, irritable or exhausted. This occurs because exercise stimulates the adrenal glands and can keep exhausted glands functioning. Like whipping a tired horse, when you stop the whipping, the horse will naturally not feel like getting up.

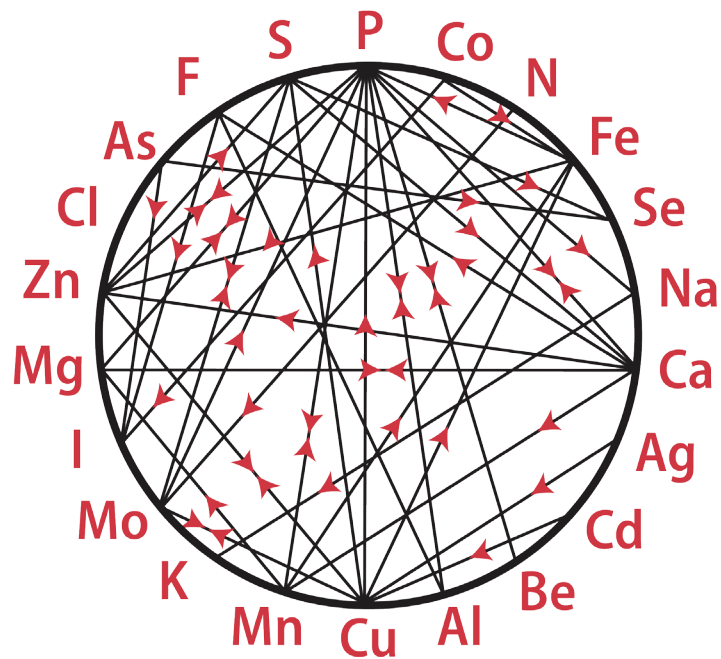
4. Myth: Exercise cannot be harmful.

Most marathon runners are good for several years, then they must retire because they are burned out. Many professional athletes die young, and have one of the shortest life spans of any group of adults. The slow heartbeat of professional runners promoted as evidence of health, is due *in part* to a healthy heart, but also to a protective compensating mechanism enlisted to slow metabolism, *because* they put such strain on their heart. Cysteine is released from muscle tissue and slows the thyroid. When applied to exercise, the popular notion that “if a little is good, more must be better” is actually destructive — and can be lethal.

From a Chinese medicine perspective some exercise helps athletes become more *yang*, resulting for some as a positive effect, and can positively enhance oxidation rate. Nevertheless, too much exercise wears out the glands, the kidneys, and the body in general, making the body more *yin* and potentially contributing to illness and degeneration. This may be one reason that many professional athletes do not live long lives.

Four wizards and longevity God, by Shang Xi





Mineral interrelationships

Elite level professional athletes push the limits of their biology. It is important these athletes manage stress properly and provide the adequate physical support via proper training, rest, and high-performance nutrition.

Hair Tissue Mineral Analysis (hTMA) and the science of *Nutritional Balancing* can benefit athletes in many ways, and can even make the difference between a mediocre season and a winning one!

The *Nutritional Balancing* protocol can be used to guide diet and supplement recommendations for athletes. hTMA enables the monitoring and correction of mineral imbalances *before* one gets sick, and helps the athlete maintain excellent health during the rigors of training and traveling.

Benefits of hTMA Nutritional Balancing

- enhanced strength and stamina,
- better mental clarity, awareness and focus,
- prevention of injuries and burnout,
- rapid and more complete recovery from injuries,
- better weight control,
- and improved overall health.

Athletes, hTMA and Weight Management

One reason professional athletes have shorter life spans, is they learn to eat a lot of calories while training, but then when they stop training hard they keep eating the same way, which can lead to weight gain.

Stubborn problems with food cravings and weight control plague some athletes. *Nutritional Balancing* offers a scientific and individualized method of approaching this issue in a safe and effective manner. An hTMA guided nutritional balancing program can assist with both weight gain and weight loss.



Guidelines for Training and Exercise

1. Do not push past exhaustion, forcing your body beyond its natural limits will lead to burnout, illness and tissue damage. Listen to your body before you listen to any coaches, “experts” or friends.
2. Don’t use your pulse as your only guide. Many people are not that healthy, in spite of a normal pulse rate.
3. If you skip exercise for a few days, you should still feel good. If you are depressed, exhausted, constipated or irritable, reduce your exercise intensity and frequency and look into other reasons why you are feeling this way. If you have to exercise to feel good, you may be addicted to it because of adrenal fatigue. Any addiction is unhealthy.
4. hTMA diagnosis can identify if you are overdoing exercise. For example, low sodium and potassium levels or a low sodium/potassium ratio indicate adrenal exhaustion. A patient with these lab results would be encouraged to perform gentle exercise only, vigorous exercise in this condition slows regeneration and can exacerbate nutritional deficiencies.
5. Recent research indicates that gentle to moderate exercise regimens provide as much benefit as vigorous exercise. Exercise outside in the fresh air whenever possible. Flexibility and adequate joint range-of-motion are as important as strength and endurance. Stretching and deep breathing are excellent for promoting and maintaining health.

PROTEIN CATABOLISM

Metabolism is the sum of the chemical processes of the body, and may be divided into two phases:

1. **Anabolism** refers to chemical processes which are constructive, or synthesizing of body tissues, enzymes and other body components.
2. **Catabolism** generally refers to those processes in which body tissues and components are breaking down into simpler metabolic constituents.

These two processes always coexist, although one may dominate at times over the other. For example, at night during sleep, anabolic processes tend to dominate, while catabolism tends to dominate during the day.



Causes of Catabolism

The catabolic state refers to a specific condition in which catabolic processes are dominant. The main cause of this is a prolonged stress response. In response to stress, the body secretes epinephrine, norepinephrine, cortisol and other hormones. The glucocorticoids (such as cortisol) have a catabolic action by suppressing the synthesis of protein, glycogen and triglycerides. During catabolism, proteins, nucleic acids and complex carbohydrates are mobilized from storage and broken down to amino acids, simple carbohydrates and other monomers.

This process is a normal response to stress. However, if the process is prolonged, the resulting catabolism is damaging to the body, causing tissue breakdown at a faster rate than it can be repaired and rebuilt. Also, a prolonged stress response suppresses the immune system, the digestive organs, growth hormones and other important body systems.

There are numerous causes for a prolonged stress response, including;

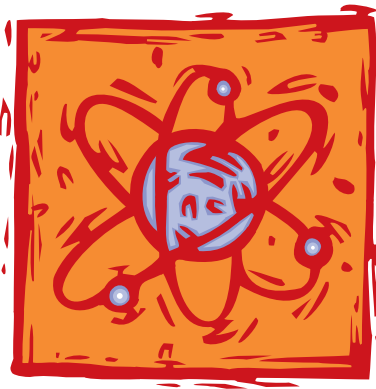
- Nutritional deficiencies.
- Emotional attitudes of fear, guilt, worry, resentment, frustration and hostility.
- Fatigue and other health conditions.
- Toxic exposure and body burden.

Nutritional deficiencies lower stress thresholds and impair the production of cellular energy. When a body is not able to properly metabolize sugars, starches and fats for fuel, it will digest its own tissue proteins in order to produce energy.

Catabolism and Health

A predominantly catabolic state can affect any organ or body system. For example, if excessive tissue breakdown occurs in the joints, the result may be painful joints or arthritis. If excessive tissue breakdown occurs in the stomach, the result may be an ulcer. If it is in the heart muscle, cardiomyopathy can result.

Tissue breakdown can affect any organ or system. Correction has less to do with applying symptomatic treatment to a particular affected organ and more to do with reducing stress and improving cellular energy production so that the tendency for catabolism can be reversed. Dietary and lifestyle changes help restore cellular energy production.



The Sodium/Potassium Ratio

hTMA research has shown that a hair sodium/potassium ratio below 2.4:1 is an indicator of a catabolic state. This is also referred to as an inverted ratio or inversion. It is a chronic stress indicator. There are several reasons the ratio inverts:

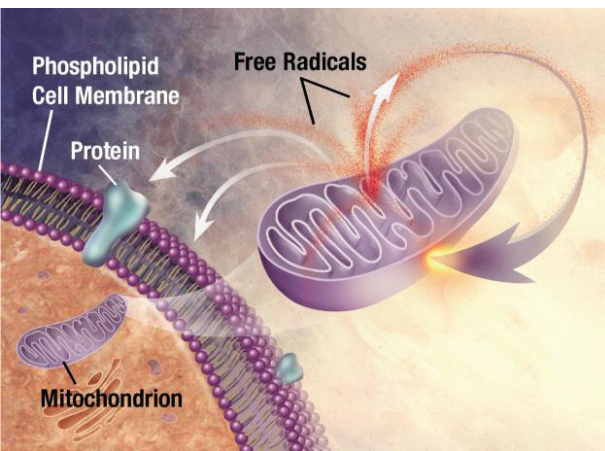
- Aldosterone is associated with the tissue sodium level and with acute stress.
- Cortisol levels are more associated with the potassium level and with chronic stress.
- The inverted ratio (higher potassium in relation to sodium) occurs when the chronic stress hormone, cortisol, begins to become predominate.
- As cells are destroyed at a rapid rate, potassium is released from the cells, leading to an increase in the free potassium.

The lower the sodium/potassium ratio, the more severe the catabolic state. A ratio between 2:1 and 2.4:1 is considered mild. A ratio of 1.5:1 to 2:1 is considered moderate. A ratio less than 1.5:1 and especially less than 1:1, is considered extremely low.

hTMA nutritional balancing research has determined that a tendency for conditions such as carbohydrate intolerance, cardiovascular disease, impaired immune system, ulcers, arthritis and malignancy exists when there is a low sodium/potassium ratio.

Correcting a Catabolic State

There are many causes of muscle degradation. These include muscle misuse, insulin resistance, hormonal disorders, inflammatory disease, dietary abuse, nutritional deficiencies and chemical toxicity. Physical aging is typically associated with some of the above. But while each of these causes play a role in physical degeneration, there is growing evidence that they all relate to one underlying cause: oxidative damage by free radicals.



Evidence of oxidative damage has been observed in post mortem examination of brain tissue from sporadic Parkinson's Disease (PD) patients (Jenner, 2003). A number of causes are hypothesized to contribute to increased oxidative stress: oxidized dopamine resulting in the generation of reactive oxygen species (ROS); reduction of glutathione levels in PD brain; and mitochondrial dysfunction leading to production of ROS. Observation of post mortem PD tissue has revealed increased iron (also associated with ROS) and activated mitochondria (DADPH) as evidence of increased oxidative stress.

Free radicals, known as reactive oxygen species (ROS), are toxic by-products of metabolism. They also invade your body in the form of chemical toxins or rancid food substances. Free radicals lack subatomic particles and are consequently highly reactive as they seek to bind and destroy your cells and tissues. When the cumulative concentrations of free radicals overwhelm your body's defenses, oxidative damage to cells and tissues starts taking its toll, destroying cellular proteins, lipids and DNA.

To defend against these destructive particles, your body uses its endogenous antioxidants such as glutathione and SOD along with dietary antioxidants. Scientists know that strenuous and/or prolonged exercise depletes glutathione. This is one cause for the fatigue that comes with exercise.

The body, in producing the extra energy or ATP (adenosine triphosphate) needed for vigorous exercise, produces many more singlet oxygen atoms or free radicals. Cleaning these up uses up the body's reserves of glutathione. (Banerjee et al, 2003 and Chang et al., 2006). Animal research indicates that after strenuous exercise, anti-oxidant damage can be observed in the liver (Leeuwenburgh et al., 1995) and endurance is significantly decreased (Sen et al., 1994)

Glutathione, the master anti-oxidant, is made inside each cell, which is far better than taking anti-oxidant supplements. Anything that increases glutathione is helpful. Selenium is required to make glutathione, along with several amino acids. These are found in meats, eggs, green vegetables, raw dairy products, and a few other foods.

Correction of a catabolic state includes getting plenty of rest *and* sleep, avoiding emotional stress, and eating the correct diet for your oxidation rate. Eating excessive carbohydrates and not enough protein and other nutrient-dense foods places damaging stress on the body. Other natural therapies may also be beneficial. Specific supplements are often essential to raise the threshold for stress and help improve cellular energy production and vitality.

RESTORING THE SYMPATHETIC NERVOUS SYSTEM

Because of modern stresses, many athletes and people who exercise frequently or intensively end up in an unhealthy state of sympathetic dominance. Over time, this leads to physical degeneration and illness.

The peripheral nervous system has two major divisions;

1. the somatic (or voluntary) nervous system
2. and the autonomic nervous system.

The somatic nervous system is concerned mainly with cognition, movement and sensation. It regulates body movement through control of skeletal (voluntary) muscles and relates the organism with the environment through the reception of external stimuli, such as through the senses of vision, hearing, taste, and smell.

The autonomic nervous system (ANS) largely acts independent of conscious control (involuntarily) and consists of nerves in cardiac muscle, smooth muscle, and exocrine and endocrine glands. It is responsible for maintenance functions that have a reputation for being outside of conscious control. These include the digestion of food and regulation of blood pressure and heart rate. ANS nerves connect to the major organs and glands, either inhibiting or stimulating their activity.

The autonomic nervous system is typically divided into two main subsystems;

1. the sympathetic nervous system
2. and the parasympathetic nervous system.

These tend to balance each other, offering opposite and yet complementary effects reflective of the Oriental medicine philosophy of yin and yang.



The Sympathetic Branch

The sympathetic branch of the autonomic nervous system activates the glands and organs that defend the body against attack. It is commonly called the *fight-or-flight* system. The sympathetic nervous system controls the response to stress and danger, releasing epinephrines (adrenaline) and increasing activity and metabolic rate. The sympathetic nervous system:

- Directs more blood to the muscles and the brain.
 - Causes the heart rate and blood pressure to increase.
 - Diverts blood flow away from the gastro-intestinal tract and skin via vasoconstriction.
 - Blood flow to the skeletal muscles and lungs is not only maintained, but enhanced (by as much as 1200 percent, in the case of skeletal muscles).
 - Dilates bronchioles of the lung, which allows for greater alveolar oxygen exchange.
 - Increases heart rate and the contractility of cardiac cells, thereby providing a mechanism for the enhanced blood flow to skeletal muscles.
 - Dilates pupils and relaxes the lens, allowing more light to enter the eye.
 - It also activates the thyroid and adrenal glands to provide extra energy for fighting or running away.
- When in a sympathetic state of readiness you may feel nervous, irritable, anxious or panicky.

The sympathetic system is *catabolic*, which means it tears down the body. Energy is used to prepare for defense, rather than for nourishment or for elimination of wastes. The feeling of an 'adrenalin rush' is a product of the sympathetic system. It may feel good at first, but is always followed by a feeling of fatigue, as this system uses up energy and depletes the body.





The Parasympathetic Branch

The parasympathetic nervous system acts as a counterbalance to the sympathetic system, and is dominant during rest, sleeping and digesting food. It lowers metabolic rate, slows activity, and restores blood pressure and resting heart rate. The parasympathetic nervous system is anabolic and controls the nourishing, healing and regeneration systems of the body.

The parasympathetic nervous system:

- Dilates blood vessels leading to the gastrointestinal tract, increasing blood flow. This is important following the consumption of food due to the greater metabolic demands placed on the body by the digestive system.
- Can constrict the bronchiolar diameter when oxygen demand diminishes.
- Causes constriction of the pupil and lens.
- Stimulates digestion and salivary gland secretion, and accelerates peristalsis. Appropriate PNS activity mediates digestion of food and the absorption of nutrients.
- Stimulates the immune and eliminative organs. These organs include the liver, kidneys, pancreas, stomach and intestines.
- When activated by rest, relaxation and a calm mind, is essential for all healing.

The sympathetic and parasympathetic systems are antagonistic. Either one or the other is activated most all of the time. The sympathetic system always takes precedence because it is concerned with one's survival. A healthy parasympathetic state helps reverse all physical degeneration and stabilize emotional imbalances.

Autonomic Nervous System Imbalances

Most people who are not well have exhausted their sympathetic nervous system. Stressful lifestyles, overworking, fearful thinking, electromagnetic pollution, toxic metals and toxic chemicals in the food, air and water all disturb the functioning of the autonomic system. Restoring balance to the autonomic nervous system is important for resolving all health conditions.



Sympathetic Dominance

Overuse of the sympathetic nervous system is common. Many people do not spend enough time in a parasympathetic state to fully rebuild their bodies. Their bodies eventually become nutritionally depleted and they physically degenerate and *burn out*. Even children are often burned out due to stress, poor diets, toxic exposure and the nutritional deficiencies and toxins they are born with.

Causes for sympathetic dominance include;

- Nutritional deficiencies.
- Toxic exposure.
- Excessive exercising.
- Talking, thinking, eating or working at a rapid pace.
- Overwork.
- Thinking and analyzing too much.
- Excessive worry.
- Living in fear, anger or resentment.

Once accustomed to sympathetic dominance, a second vicious cycle often occurs. A person can become so used to being tired that if, by chance, they get a lot of rest one day, they will often use up their energy the next day, instead of continuing to rest. They do not use the energy they accumulated for healing and rebuilding because the concept and feelings involved in resting and rebuilding have become foreign. As a result of these two vicious cycles, people tend to stay in sympathetic dominance and remain depleted and out of balance and continue to degenerate.

The early signs of staying in a sympathetic dominant state include fatigue, anxiety and feelings of exhaustion. As the condition progresses, one may feel more anxious, depressed, moody or apathetic. Other symptoms include aches and pains, weakness, disturbed digestion and insomnia. If this state of the nervous system continues, the resulting physical degeneration can lead to serious or chronic illness.

Parasympathetic Dominance

A healthy parasympathetic dominate state is uncommon. It occurs in people who live in the present moment, are almost always relaxed, do not overreact to stress and live in a state of peace and contentment.

Much more common today is an unhealthy parasympathetic state. It is basically an end stage result of long-term sympathetic dominance. People in this condition have exhausted their sympathetic systems so much, they have flipped into a parasympathetic state by default. They cannot fight back as well as they used to. The causes of healthy and unhealthy parasympathetic states are quite opposite.

Healthy parasympathetic dominance is due to what may be called personal development. This is the discipline to think and live differently. One reduces stress and strain on the body by resting and nourishing it so that it can rebuild. Meditation and other practices can help to discipline the thoughts and emotions to remain in a balanced state of mind.

Whereas, unhealthy parasympathetic dominance is the result of overworking the sympathetic nervous system until it no longer functions adequately. Coupled with nutritional imbalances, this creates the conditions leading to physical and emotional disorders.

Sympathetic/Parasympathetic Balance

Understanding the basics of the autonomic nervous system is important for health and well-being. Over-stimulation, and eventually exhaustion, of the sympathetic system is a common problem that contributes to most health conditions by impairing nutrition, elimination and immune system activity.

Sympathetic and parasympathetic systems complement each other and are both necessary to create overall harmony and balance. When the sympathetic and parasympathetic systems are working as they should, the tendency is to rest often and easily. The parasympathetic system reduces the activity of the brain, the muscles, and the adrenal and thyroid glands. When no situation is pressing, the balanced person can comfortably choose to rest and can sleep soundly. When challenged by stress, the balanced person is able to respond with vigor and fortitude and can perform at top speed with equal ease.



NATURAL FITNESS. NATURAL NUTRITION. NATURAL HEALING.

