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Emerging Cardiovascular Health Concerns Among Serious Athletes

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Introduction

Epidemics throughout history have exacted an astonishing toll of human life. Over the last 10 years scientists, physicians and filmmakers have turned each epidemic into a medical detective story as they reached back in time to conduct these important investigations. From the expected H5N1 bird flu pandemic that will emerge from China, to the expanding global AIDS crisis, with other investigations focusing on polio, Legionnaires disease, and the Spanish Flu pandemic of 1917. To unravel these mysteries the modern science of epidemiology is charged with determining the relationships of the various factors that examine the cause, frequency and distribution of diseases in the human community. Epidemiologists have done an excellent job investigating these epidemics and one of the most important lessons we have learned from this substantial body of research is to define the problem as early as possible so medical resources can be mobilized and healthcare professionals can implement plans and treatment protocols to curb the epidemic.

At the present time we are in the early stages of a growing problem within the athletic community and during the last 20 years there has been an alarming increase in the number of cardiovascular deaths among professional, Olympic, collegiate, high school and serious recreational athletes. When athletes as young as 13 years old are dying from hypertrophic cardiomyopathy (HCM), we need to get serious about our investigation. As the data continues to accumulate it is becoming obvious that no athlete regardless of their age, gender, size, or level of athletic prowess is immune from the negative impact related to the following five factors.

1. Nutrient deficient foods that contain chemical additives.
2. Environmental toxins that permeate our food supply, water and air.
3. The negative impact on health of electromagnetic pollution.
4. The stress damage of exercise.
5. Society's overuse of prescription drugs and medical technology for treating all health and injury related problems for athletes.

Unfortunately, the recommendations that are emerging from the sports medicine community regarding cardiovascular disease reflect the limited treatment perspective of the American Medical System (AMS), the American Heart Association and their pharmaceutical and medical technology partners. As a result, all serious athletes will continue to be at risk for premature mortality from cardiovascular disease until the five factors presented above are seriously included in this important epidemiological detective story.

To emphasize the magnitude of this problem, the Orange County Register (CA) newspaper published an article on September 25, 2005 entitled "Heart of the Matter," that chronicled the death of 14 young athletes who recently died from heart disease and 10 of the 14 deaths were male athletes who were under 21 years of age. The youngest was just 13! Research reports have shown that over 50 percent of the athletes who suffer sudden cardiac death have a condition called hypertrophic cardiomyopathy (HCM), which is the pathological

Continued on page 2

Inside this issue

enlargement of the heart. Doctors within the AMS and specifically within the sports medicine community are at a loss to explain what causes this abnormal heart condition beyond a possible hereditary factor, exercise stress and excessive dietary cholesterol. Unfortunately, there is no national data base that collects athlete-specific morbidity and mortality. As a result, the emerging epidemic of cardiac mortality among serious athletes has existed under the radar of medical orthodoxy and this fact will result in increased heart-related deaths in the absence of pro-active healthcare programs based on nutritional science and clinical ecology.

After the death last year of Jason Collier at age 28, who was the NBA Atlanta Hawks all-star center, a panel discussion on the sports news program ESPN began to address this alarming trend. The sports medicine doctor on this program blamed the development of HCM on genetic factors, stressing family history as an important determinant of this disease. When pressed for recommendations to prevent this increasingly fatal heart deformity, he said better pre-season medical screening programs should be instituted and possibly prescribing cholesterol lowering drugs (Lipitor, Zocor, Crestor, etc.) to all athletes who weigh over 200 pounds. Unfortunately, these recommendations will do little to stop the emerging epidemic of cardiovascular disease and premature death among serious athletes. The reason for this is the lack of attention to the nutritional health of the athlete and the health-negative effects of the five factors presented above. Currently in sports medicine there are three primary protocols for determining an athlete's fitness to participate in sports and to provide treatment if HCM or other heart related problems are diagnosed. They include;(1) Preparticipation Physical Examinations (PPE), (2) Cardiac and cholesterol lowering drugs, and (3) Implantable Cardioverter Defibrillators (ICD).

1. Preparticipation Physical Examinations (PPE)

Although preparticipation screening of all athletes is important, many of the serious problems relating to cardiac abnormalities can not be detected by the current testing methods. Katherine Dec, M.D. is a member of the American Medical Society for Sports Medicine's board of directors who recently addressed this issue; "This is a very touchy subject because we all wish these tragedies could be prevented, but the reality is that even with more comprehensive and costly testing, the small amount of findings they offer aren't that conclusive."

The death of San Francisco 49ers lineman Thomas Herrion emphasizes this point. After Herrion's death in August of 2005 at age 23, the coroner concluded that he suffered from premature coronary heart disease which was the cause of death. Dr. John DiFlori, an associate professor and chief of the division of sports medicine at UCLA helped to create guidelines for physicians PPE heart exams. Dr. DiFlori commented on Herrion's death, "The blockage in the player's heart would have been undetectable under any measure, even under the most extensive screening because Herrion apparently had not complained of heart problems and his fitness as a football player suggested he would have done well in a stress test."

2. Cardiac and Cholesterol-Lowering Drugs

Cardiac drugs can be critically important in the management of non-fatal myocardial infarction, serious arrhythmias, resuscitated cardiac arrest, recurrent severe myocardial ischemia, and other acute and chronic heart-related problems. However effective these drugs are in managing crisis situations, they do little to help restore the health of the cardiovascular system or its functional capacity. It has been this author's experience over the last 25 years working with professional and other classes of athletes that physicians within sports medicine almost never consider the nutritional status of the athlete regarding the pathogenesis of heart disease or other chronic degenerative diseases. In addition, the nutritional constitution of the athlete is disregarded in the treatment of both injury and illness which will negatively impact all athletes facing recovery from injury, surgery or illness.

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An example of this treatment myopia was presented by Sheldon Hendler, M.D., Ph.D., professor at University of California, San Diego School of Medicine and nutrition advisor to the U.S. Olympic Committee. Dr. Hendler cited a study that demonstrated the value of the essential nutrient coenzyme Q10 (CoQ10) in the treatment of heart failure. This study in 1985 involved the Methodist Hospital in Indianapolis and the Institute for Bio-Medical Research at the University of Texas. Heart failure patients were treated with CoQ10 with measurable success and the researchers reported that 91% of these patients showed marked improvement. The benefits of CoQ10 included supporting the pumping capacity of the heart, increased energy production in heart-muscle cells, and a significant reduction in the major side effects associated with conventional heart failure drugs.

There are literally hundreds of studies in the medical literature that demonstrate the value of essential nutrients (particularly vitamin E, vitamin C, and coenzyme Q10) in supporting cardiovascular health. Vitamin E has also been extensively studied in its multidimensional role as an essential nutrient in facilitating human health. It is a powerful antioxidant which emphasizes its importance in clinical medicine for supporting the health of the cardiovascular system. Vitamin E's primary role in human biochemistry is to mitigate the destructive effects of free radicals that are implicated in almost all chronic degenerative diseases. It also helps prevent the oxidation of both vitamins A and C, which are nutritional antioxidants that act synergistically with vitamin E.

In 1996 the Cambridge Heart Anti-Oxidant Study (CHAOS) proved the significant value vitamin E has in lowering some destructive forms of cholesterol which have been implicated in heart disease. This study was published in the British medical journal *Lancet*. It involved 2002 patients with angiographically-proven coronary atherosclerosis and was a double-blind, placebo-controlled trial that covered the median time period of 510 days. The study group was given up to 800 IU of vitamin E (alpha-tocopherol) per day. This study successfully demonstrated the value of vitamin E supplementation. There was a 66 percent reduction of non-fatal heart attacks, and a 36 percent reduction in the combined risks of cardiovascular death and non-fatal heart attack. The primary action of vitamin E, which works synergistically with other nutritional antioxidants like vitamin C, coenzyme Q10, selenium and zinc, is to mitigate free radicals allowing cellular biochemistry to optimize it functions without being damaged by free radicals and other chemicals like reactive oxygen toxic species (ROTS).

Vitamin C deficiency was shown to be one of the key risk factors in the pathogenesis of cardiovascular disease in the early 1940s. A study published in 1941 by Canadian cardiologist, J.C. Patterson, found that more than 80 percent of heart disease patients had vitamin C deficiency as a major risk factor. Another study published in 1948 by two American doctors, Trimmer and Lundy, found that 70 percent of their patients with coronary artery disease had very low blood vitamin C levels. Dr. Willis, another Canadian physician, conducted a study in 1954 which showed that supplementing the diet with vitamin C could support the integrity of blood vessels which in turn improved the long term prognosis for the patient. The study group received 1,500 milligrams of vitamin C per day and the control group received no supplement. In 1955 American scientists Chope and Bresloe published a study in the *Journal of Public Health* which showed that vitamin C supplementation was the most important factor in supporting cardiovascular health.

An epidemiological study published in 1992 by Dr. James Enstrom and a group from UCLA School of Medicine investigated the vitamin intake of more than 11,000 Americans over a ten year period. In this government sponsored study the subjects who took at least 300 milligrams of vitamin C per day from their diet or from nutritional supplements were able to support their heart health. This study also showed that increased vitamin C consumption was associated with an increase in life expectancy of up to six years.

The current AMS recommendation for the use of cholesterol lowering drugs to help mitigate the emerging epidemic of cardiac mortality among serious athletes is ill advised. Cholesterol is such an important compound that every cell in the human body can make it because it serves critically important functions, including its use as a structural component in tissue and its role in the development of hormones, particularly the sex hormones testosterone and estrogen. During the last ten years cholesterol was also found to be a powerful antioxidant that protects the body from damage caused by free radicals and toxic chemicals. Since most Americans have chronic deficiencies of important dietary antioxidants like vitamins C, vitamin E, coenzyme Q10, zinc and selenium, cholesterol serves as the only endogenous (made within the body) antioxidant that humans can manufacture to protect themselves when dietary antioxidants are deficient. Scientific proof that lowering cholesterol levels in the blood does not reduce heart disease was presented by Dr. Richard Passwater in 1977. He reviewed 17 international clinical trials that started with the Sr. Mary's Hospital study in 1965 and ranged thought the Honolulu-Japanese Study in 1975. These studies showed that cholesterol was incidental to heart disease and not its primary cause. In addition, Dr. Passwater commented on cholesterol lowering drugs, "The Coronary Drug Project in 1974 showed that drugs that reduced blood cholesterol were of no value in preventing heart disease."

MR. FIT was a landmark study that also questioned the direct link of cholesterol with heart disease. The Multiple Risk Factor Intervention Trial, or MR.FIT, ranks as one of the largest and most demanding clinical trials ever performed on a group

of human subjects. This study lasted more than 10 years and involved 28 medical centers across the United States. The cost exceeded $115 million and involved the evaluation of 361,662 men just to get 12,866 perfect candidates for this study, which were divided into two groups. They used the risk factor equations developed in the earlier Framingham Study (1970) to limit the experiment to the risk factors they though they could control and would provide the greatest benefit to the American people at the conclusion of the trial if it was successful. The Special Intervention group (6,428 men) had programs designed to reduce three risk factors that were the focus of this study, including; (1) lowering cholesterol levels through dietary modification, (2) controlling high blood pressure with drugs, and (3) stop smoking. The Usual Care group (6,438 men) were on their own and received no special treatment, serving as the control group for the study. The Special Intervention group had impressive results from their dietary modification program and cut their intake of cholesterol by 42 percent, lowering their saturated fat by 28 percent and reduced total calories by 21 percent. Sadly, these significant changes in diet had little effect on cholesterol levels in the blood, reducing it by only 5 percent by one analytical method and 6.7 percent by another.

When this lengthy and expensive clinical trial was over it was a complete failure. There were no significant differences in cardiac mortality between the two groups. There were actually a few more deaths in the Special Intervention group which was a very disturbing finding for the researchers who set up this study. One fact was very clear however; some of the best medical researchers in the United States did not know as much as they though they did about heart disease. As a result, the health advice given to millions of Americans over decades had been tested in a 10 year, $115 million research project that produced no measurable result. Other international trials which failed to link cholesterol reduction and heart disease risk included the Coronary Primary Prevention Trial (CPPT) in 1984 and the World Health Organization's study (1978) of the cholesterol-lowering drug clofibrate. Although these lengthy clinical trials did not focus on serious athletes, the message is clear that authorities within the AMS are failing in their mission to reduce cardiovascular mortality in the United States. The recommendations that recently emerged from the sports medicine community, particularly linking hypertrophic cardiomyopathy (HCM) and cholesterol-lowering drugs is scientifically weak and medically inappropriate. Since professional, Olympic, and collegiate athletes are among the healthiest members of society cholesterol lowering drugs should be expected to have negligible effects on cardiac mortality among this elite group, especially since heart disease has been more strongly linked in numerous scientific studies to essential nutrient deficiencies over the last 60 years.

3. Implantable Cardioverter Defibrillators

The third recommendation emerging from the mainstream medical community and its technological partners is the use of Implantable Cardioverter Defibrillators (ICD), particularly for hypertrophic cardiomyopathy. Many athletes who are diagnosed with HCM have unstable heart rhythms which are known to contribute to cardiac failure and premature mortality. These electronic devices are implanted in the chest to monitor the heart so when a dangerous arrhythmia occurs the ICD delivers an electrical shock to restore a normal sinus rhythm (NSR). Any athlete with this degree of cardiac problems, requiring the implantation of an ICD, spells an end to his or her athletic career and probably a poor prognosis for their future life expectancy since the ICD does nothing to restore the functional health and pumping capacity of the heart, which was previously demonstrated in the studies of coenzyme Q10.

Exercise Induced Pathology

One fallacy that is being perpetuated in the news media in light of the national epidemics of heart disease, obesity and type II diabetes, is that vigorous exercise at least four days per week for one hour per day will help curb these destructive health problems. The origin of these recommendations comes from government health authorities and medical correspondents with all the major TV networks. As more and more serious athletes find themselves dealing with cardiovascular complications, it is time for the medical community to acknowledge the fact that vigorous exercise is another stress-related risk factor which contributes to these mortality statistics. Just as doctors within the National Institutes of Health failed with their theory that cholesterol causes heart disease, which has been documented in over 20 international clinical trials; it is time to revise our perspective about vigorous exercise as a cure all for the current health crisis in America.

One way to gain a better perspective on this important issue, which has been missed by doctors in sports medicine, is to evaluate professional athletes as a unique occupational group. Pro-athletes come into their profession as the healthiest members of American society who not only are very healthy but have special genetic gifts, including great eye-hand coordination (which has been shown in studies to indicate superior intelligence), physical power and endurance, less routine illnesses, and the capacity to handle the stress of competition in front of thousands of fans. In addition, they have very low scores on other health risk factors including; few of these athletes smoke, they are not sedentary, only a small percentage are overweight or obese, generally do not have hypertension, and they have much better diets than the average American. This elite group also has constant medical supervision which is more prevention oriented and is superior to the medical care available to the average American who exists within our managed care (HMO) system. Pro-athletes also have

a short career with early retirement if they have reasonable financial planning. They enjoy celebrity status and are loved by millions of fans, which has positive self-worth and psychological benefits. The collective inventory of these positive benefits is called the healthy worker effect. In the case of the professional athlete this extensive inventory of health and career benefits should translate into a 15 to 20 percent increase in longevity. Since the average male in America has a life expectancy of 76 years, professional athletes should live to be 87 to 91 years based on their occupational health profile.

The author's study of mortality data taken from the Major League Baseball Hall of Fame showed that this elite group of athletes born in the modern era of professional baseball (after the year 1900) had a mortality experience between 62 and 72 years. The 12 acknowledged superstars during this era in MLB had the shortest average life of 62 years. The median life lived was 72 years, or about 19 percent below what should be expected for this group. Exercise stress related to frequent vigorous training and competition is responsible for this significant reduction in occupational life expectancy. The author has been defining a new sports disease "Exercise Induced Pathology (EIP)" for the last five years. The author is convinced that EIP is responsible for over 80 percent of the stress damage to an athlete's body that contributes significantly to the expression of heart disease as well as other chronic degenerative diseases like, multiple sclerosis, and ALS or Lou Gehrig's disease. Space limitations in this report prohibit a complete discussion on these factors which will be presented in a future edition of *NutriNews*.

Exercise Induced Pathology Factors

1. Free Radicals (Exercise produces millions of these destructive elements which damage the heart).
2. Acids (Disrupt the energy chain and directly damage tissues throughout the body).
3. Ammonia (Headaches, blurred vision and cellular damage which preferentially impacts brain function).
4. Inflammation (C-reactive protein CRP, a health negative consequence of vigorous exercise).
5. Thermogenics (Heat kills athletic performance, releases toxins and starts free radical reactions).
6. Direct Cellular Damage (Compression hemolysis damages muscle and blood cells).
7. Hormonal Disruption (Catabolic hormones liquefy muscle tissue and stops the anabolic drive).
8. Chemical Toxicity (Chemical-induced free radical pathology which starts at birth).

Orthomolecular Sports Medicine

"Exercising without nutritional protection is downright unhealthy." The preceding quote by Dr. Michael Colgan, an internationally respected authority on exercise and nutritional science, is a powerful expression of the important codependent relationship between exercise and nutrition. Dr. Colgan published this remark more than a decade ago and it is truer today that ever because of the increasing sophistication and physical demands of sports training, and the increasing daily stress of nutrient-deficient foods, and the health-negative impact of environmental and electromagnetic pollution.

The Germ Theory of Disease founded by the great Dr. Louis Pasteur in 1880 has dominated orthodox medical practice for over 125 years and was largely responsible for the development of the pharmaceutical and medical technology industries. Many of the drugs developed during this period have had enormous value in treating infectious diseases and managing life threatening situations. Medical technology has tremendously advanced surgical skill and contributed to our understanding of how the human body functions from both diagnostic and treatment perspectives. However, over the last 50 years chronic degenerative diseases like heart disease, cancer, stroke, type II diabetes, and the neurodegenerative diseases have increasingly taken a toll on the lives of the average American, including serious athletes. As a result, it is time to implement a new medical model for building the health of all classes of athletes which is based on the productive research that has emerged in clinical nutrition and clinical ecology over the last 65 years because good nutrition is the foundation of both health and life.

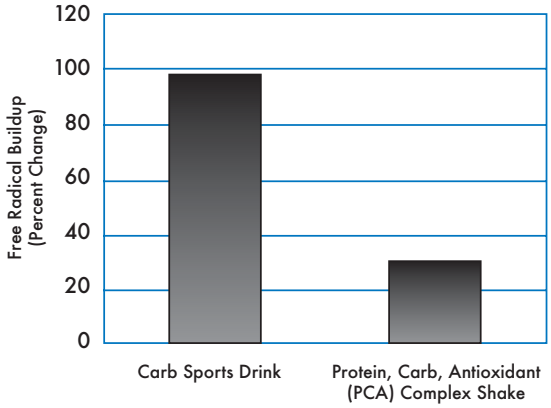
Orthomolecular Medicine (OM) is a new paradigm in medicine and was founded in 1968 by one of America's greatest scientists, Dr. Linus Pauling. Dr. Pauling is the only scientist in history to win two unshared Nobel Prizes, as well many other American and international scientific awards. Today OM is one of the sub-specialties in medical practice (Allopathic Medicine) which uses the powers of clinical nutrition to create treatment programs that focus on the patient's nutritional status which employs individual nutrients (amino acids, vitamins, mineral, essential fatty acids, probiotics, vitamin co-factors, etc.) as medical treatment to correct underlying deficiency states. One important note that has been missed by the media, authorities in mainstream medicine and the public regarding OM; is the productive work that emerged from the Germ Theory of disease is not abandoned in this new medical specialty. That is why Andrew Weil, M.D., one of OM's most outspoken advocates, calls this new era in medical practice "complementary medicine." Over the last 35 years, a robust body of scientific research has developed which supports OM with over 300,000 reports and studies in the medical literature. Unfortunately, leaders within American Medical System have been resistant to acknowledge the effectiveness of OM in the prevention and treatment of almost all disease states, which contributes significantly to the morbidity and mortality of the average citizen and put all serious athletes at risk for heart disease. This resistance to change (RC Factor) must be overcome if we are to protect the health of the millions

of American athletes while advancing their performance ability and ensuring their longevity.

The previous studies and perspective on the essential nutrients vitamin C, vitamin E and coenzyme Q10 are just the smallest fraction of the productive work that has emerged from clinical nutrition and orthomolecular medicine which has been published in the *Journal of Orthomolecular Medicine*, the *American Journal of Clinical Nutrition*, and *International Journal of Sports Medicine*, etc. Recently, an increasing number of studies have addressed this changing paradigm and demonstrated the significant health benefits that can be garnered by serious athletes who adopt the dietary and nutritional supplement recommendations reflected in this research.

The stress caused by Exercise Induced Pathology accounts for about 80% of the systemic damage to an athlete's body during their career. Millions of free radicals are produced during exercise which is a major component in the destructive processes that lead to extensive muscle damage, which is particularly damaging to the heart – the most stressed organ in an athlete's body. A recent study with athletes that involved using a post-exercise supplement of protein, carbohydrate, and antioxidants (PCA) in the form of a shake showed a significant reduction in free radical formation resulting from vigorous exercise. Figure 1 below graphically demonstrates the benefits of PCA supplementation post exercise.

Figure 1
Protein, Carb Antioxidant (PCA) Sports Drink
Reduced Free Radicals by Nearly 70%



PCA Supplementation Reduced Free Radical and Muscle Damage
The PCA Group had a significant reduction in free radical production which also reduces the health-negative impact on the immune system.

In the above study, two groups of athletes were administered either a carbohydrate sports drink or a protein/carbohydrate/antioxidant (PCA) shake immediately after exercise. Free radicals were reduced 69 percent at twenty-four hours post-exercise in the group receiving the PCA shake. This study demonstrates the significant biochemical and physiological advantage an athlete would have by instituting a nutritional program that included a PCA post exercise recovery shake immediately after a training session. The PCA shake was vastly superior in mitigating free radical buildup when compared to the carbohydrate sports drink. In a similar study using PCA nutrient supplementation Ready and colleagues at St. Cloud University reported a 37 percent reduction in blood creatine phosphokinase (CPK), which is an important biochemical marker for muscle damage. Since all serious athletes train at least four times per week, these findings have significant implications for the long term health of every athlete. Failure to use this powerful preventive health and performance strategy will increase the probability of injury and the expression of chronic diseases.

Conclusion

The focus of this *NutriNews* report was on the emerging epidemic of sudden cardiac death among professional, Olympic, collegiate, high school and serious recreational athletes. Although this is a very complex and controversial subject, the author wanted to present evidence that leaders of American Medical System and its pharmaceutical and technological partners are on the wrong tract to curb this growing epidemic which is taking the lives of athletes as young as 13 years old! Medical and historic evidence shows that we should expect between 70 to 80 percent of serious athletes will suffer some cardiac related damage due to the five factors presented in the Introduction. Consider the following historic points.

1. During the Korean War autopsies of the men killed in battle showed an alarming 77 percent of war casualties had gross evidence of coronary heart disease (CHD). The most shocking finding for medical authorities who compiled these statistics was that the average age of these war casualties was just 22 years.
2. Fifteen years later mortality and autopsy data from the Vietnam War showed the same percentage CHD profile as the Korean War with advanced coronary artery disease found in men in their early 20s who were presumed to be in good health prior to their untimely deaths.
3. Recent studies of male children as young as three years old who died of infectious diseases or traumatic injuries showed the early development of coronary artery disease including atheromatous plaque formation.
4. Since the 1950's there has been a progressive increase in the total quantity of toxic food and environmental chemicals which negatively impact the health of all Americans. The Environmental Protection Agency's (EPA) Scientific Advisory Board issued a report (2003) stating that 78,000 synthetic man-made chemicals found in our environment are responsible for over 80 percent of human cancers which also contribute to heart disease. Dr. Lynn Goldman reported that there are over 80,000 metric tons of carcinogens released every year into the atmosphere in North America alone.

5. Thousands of physicians and scientists all over the world have published articles supporting the fact that nutritional deficiencies are implicated in almost every chronic degenerative disease, including heart disease, cancer, stroke, multiple sclerosis, arthritis, ALS, etc. This emerging body of research represents the new paradigm of orthomolecular medicine.
6. The American Red Cross sponsored a study in 2005 that showed new-borne babies had an average of cover 280 chemical toxins in their systems at birth. By classification there were 217 chemicals that are toxic to the brain and nervous system, 208 that are known to cause birth defects, and 180 that are carcinogenic to humans. This bioaccumulation of toxins contributes to the formation of free radicals and a wide range of chronic diseases, including heart disease, cancer and autism.

These historic factors combined with escalating mortality statistics increase the urgency to implement clinical nutrition programs for all classes of athletes in the United States to curb this emerging epidemic. One of the reasons athletes have turned to steroids and other illegal and potentially harmful performance enhancing drugs is because of the lack of leadership generally within the American Medical System and specifically within the sports medicine community regarding nutritional science education and programs based on clinical nutrition. Physicians in the United States receive little training in nutritional science and no training in clinical nutrition. All athletes, coaches and trainers look to sports medicine physicians for advice and leadership on both injury treatment and health care issues. Since these doctors have little training in the nutrition field, how can they be expected to design clinical nutrition programs to help build the health and performance capacity of the athlete while ensuring their longevity? In the media circus surrounding steroids the athlete is characterized as a bad person and a cheater when caught using these banned substances. In reality, the athlete is a victim of both a failed health care and educational system that has overlooked or intentionally disregarded the tremendous value and power of nutritional science which has been proven over the last 60 years and is reflected in the medical literature.

In the next Sports Nutrition edition of *NutriNews* Dr. Skee will explore the complex interplay between the ecologic factors that damage the health of every athlete and the clinical nutrition factors that have proven in research studies to optimize their endurance, strength and ergogenic capacity. The only way to safely improve an athlete's health, performance and longevity is through dietary modification and nutrient supplementation. These same nutrition-based protocols will also curb the emerging epidemic of cardiac mortality among all classes of athletes.

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