

Balancing Act: Athletic Performance and pH Health

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Why elite and endurance sport athletes need to understand and maintain pH balance

Introduction

Elite and endurance sport athletes continually push at the boundaries of physics, trying to compress time into ever-smaller increments or beat gravity at its own game. In the process, they often redefine what is “humanly possible,” not only for themselves but, in some cases, for all of us. This article discusses the problem of acidity in endurance sports, and proposes a very powerful solution – alkalizing the body. Discussed are some very attainable methods, through diet and supplementation that can significantly improve the adverse affects of acidity and set the stage for breaking performance barriers. -Ed.

As every athlete knows, in the sports world a millisecond or the slightest internal or external physical advantage can mean the difference between victory and defeat, a repeat performance or a new world record or personal best. And, unfortunately, sometimes it is a world where athletes destroy their careers, health or reputations trying to dope their way to new physical feats.

Life in the balance

Currently, athletes competing in elite, endurance, individual and team sports are breaking performance barriers at a record pace. There are a number of reasons for this: advancements in training, athletic equipment, sports medicine and physical therapy, as well as a deeper understanding among coaches and athletes of human body chemistry and the role nutrition plays in athletic performance. For the purpose of this paper, we will focus on one particular—and often overlooked—physiological and nutritional aspect of maintaining health and athletic performance: balanced pH.

Athletes who are committed to legal, healthful ways of increasing performance, reducing fatigue, and compressing recovery time need to understand balanced pH and the negative impact of imbalanced pH. Endurance and elite sport athletes should be particularly concerned with maintaining healthy pH, as they regularly place themselves under physical and dietary stresses that can lead to imbalances in pH, most commonly lactic acid which indicates hydrogen ion buildup. Whatever your level of athletic intensity, healthy pH levels can mean the difference between greater athletic achievement and being brought up short by muscle “burn.”

A pH primer ~ or ~ what every athlete needs to know about balanced pH

Proper balanced pH is a key component of good health and it is absolutely essential to athletic performance. pH is measured on a 14-point scale, with 7 being neutral. The lower the pH value, the higher the acidity; the higher the pH value, the more alkaline. pH values vary throughout systems in the human body. So, as you might imagine, stomach acid has a very low pH value, ranging from 1.0 to 3.0. Pancreatic excretions are very high in pH value, ranging from 8.0 to 8.3. The pH value of arterial blood in a healthy human is balanced around the middle of the 14-point scale at a narrow range of 7.35 to 7.45, or just slightly alkaline.

As the body metabolizes fuel (i.e. food), acid wastes are created. To sustain a healthy blood pH, acid wastes must be removed from the body or neutralized. The body has numerous ways to flush acid waste out of the system: the lungs vent carbon dioxide; our kidneys filter blood and excrete acids through urine (urine pH value

can be as low as 4.5); skin sweats acids out of the system. In addition to its various acid-flushing functions, the human body also has built-in chemical buffers that help to neutralize imbalances in pH, including calcium, phosphorus, bicarbonate, hemoglobin, and phosphate cycles. When, because of diet, prolonged aerobic exercise, and/or aging, we exceed the body's ability to flush out or neutralize acid wastes, acid buildup—or acidosis—occurs.

Crossing the threshold, managing the “burn”

Most serious athletes are familiar with the phenomenon known as “muscle burn.” Muscle burn is largely the result of lactic acid which indicates hydrogen ion buildup in the system. Acid concentration increases when an athlete exceeds what is called the “lactate threshold,” the point at which the body can no longer flush or neutralize acid wastes as fast as they are being produced. When an athlete crosses the lactate threshold for a sustained time, acid accumulates in the muscles and can lead to cramping, severely compromising athletic performance. Contrary to popular belief, lactic acid is not, in and of itself, the cause of acidosis. However, elevated levels of lactic acid in the system are an indicator of acidic pH imbalance.

Prolonged aerobic exercise is not the only contributing factor to acidosis. Diet and aging also play key roles. As we age, the systems that rid the body of acid waste don't work as efficiently. Furthermore, the western world's diet, with its overemphasis on animal protein, fats, processed sugar and flours, is likely a contributing factor in acidosis. Because elite and endurance athletes often burn through exponentially more calories than the average person does in a day (a 175-pound athlete can burn approximately 6,000-8,000 calories in the course of a 60-mile bike race alone), they should be particularly concerned with balanced pH and dietary health. Also, the endurance athlete's often-accelerated intake of protein and carbohydrates can produce surplus acids.

Prevention is the best medicine

So, how can athletes protect themselves from imbalanced pH? A healthy diet is the best place to start. Cutting back on acid-producing foods and beverages such as animal protein, coffee and wine, can help. But remember: just because a food is chemically acidic doesn't automatically mean it's an acid producing food. (So, for example, citrus fruits actually have an alkalizing effect on the body, as do most fruits and vegetables.) To maintain healthy pH levels, many natural medicine practitioners recommend a diet comprised of anywhere from a 60/40 to as much as an 80/20 ratio in favor of alkalizing foods over acid-producing foods. However, that's not always easy to achieve—especially for people who don't want to pay obsessive attention to their diet. And, as we discussed earlier, even with the best diet, human beings naturally become more acidic as we age and our metabolic functions slow.

Supplemental solutions?

Can supplements help maintain healthy pH levels and bolster the body's natural chemical buffers? Can they help athletes—especially older athletes—improve their performance by raising their lactate threshold? These are questions that can only be decisively answered by extensive clinical studies. We know that calcium, magnesium and potassium carbonates and hydroxides can help combat low-grade acidosis, but simple carbonate forms of minerals are not alkaline enough to be effective on most organic acids. However, there have been some very interesting—if not yet conclusive—pilot test results using a compound comprised of potassium hydroxide, magnesium hydroxide and calcium carbonate to buffer both organic and inorganic acids. Two pilot tests conducted by the Seattle-based supplement company Tamer Laboratories found that subjects who used this compound for five days experienced an average decline in urinary acidity of 53 percent. Another Tamer

Laboratories pilot test conducted at Seattle Performance Medicine showed that this acid-buffering compound significantly reduced muscle burn, increased time to fatigue, lowered lactate levels in the blood, and increased muscle strength and recovery in cyclists who participated in the pilot test. It will be interesting to see what future clinical studies will reveal in this area of inquiry. In the meantime, what we do know is that balanced pH and acid buffering are crucial to human health and slowing the aging process. Certainly, pH health—and strategies for maintaining it—is an area that is garnishing more and more attention from practitioners of traditional and holistic medicine as well as athletes and coaches. By addressing pH health as an essential aspect of human wellness, we may be able to buffer or slow the negative effects that acidosis has on athletes, as well the many disparate maladies that share acidosis as a common thread.

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Robert Burns Ph.D. is President of Tamer Laboratories, a Seattle-based supplement company dedicated to pH health. Dr Burns served as Chief Scientific Officer for pH Sciences from 2003 to 2005. He has directed numerous studies at Tamer Laboratories and pH Sciences analyzing relationships between pH balance, health, and athletic performance. He has more than 30 years experience in research and product development, engineering management, operations, and general management for a number of successful Northwest companies.