Master Trainer

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Just Do It?

Many years ago when I ran for cardiovascular fitness, I often would run at the high school's track because (even then) I liked doing interval training. I would often arrive absolutely "pumped" and just raring to go.

Not surprisingly, with the adrenalin flowing, my warm-up was very brief. I would simply do a series of four to five short 50 yard or so runs, ending with a sprint. Then I would start running the interval workout.

Other runners did not follow this approach. Instead, often dressed in pretty elaborate gear, they would do about 10 minutes of stretching, an elaborate warm-up, only to run a mile or two at an easy pace and call it quits. All the special tracksuits and shoes and stretching and warming-up and really they didn't want to do it.

"Science + Dedication + Motivation = Great Training"

In the end, the essence of great training is, in fact, really wanting to do it. If you don't have the dedication and motivation, not much is going to happen.

However, I've come to realize that just wanting to do it is not enough. We need to build our training around the science of training. Science is not going to replace dedication and motivation but all the dedication and motivation in the world won't be properly channeled if we ignore exercise science.

Let me provide some past and current illustrations. One reason I was so pumped for those interval workouts was that I always had a large cup of expresso and two Exedrin (more caffeine) before running. I was constantly sore from the kind of running I was doing and this bit of self-medication let me continue. An hour or two after running I often suffered gastric distress and the next day I often felt pretty awful.

Why was that the case? Well, I was great at just doing it. The workouts often involved 20- 25 400 meter repetitions with about 200 meters between them. That seemed to make sense at the time for "gaining fitness". By way of contrast, I could have run two or three 400 meter repetitions, perhaps with a shorter interval between them, and probably gotten even fitter. Why do I say that? Current work in exercise science suggests that intensity but not duration of training is critical. With only 2 or 3 400 meters to do, I would have run them faster than the 20 to 25 I was running, and I would have had few injuries or any problems recovering. For some of us, just wanting to do it can lead us in the wrong direction.

The current issue has a number of articles that are science based and point us in directions that are counter to how many people train or the nutritional supplements they may use to try to enhance performance and strength and muscle gains. For example, exercise science research indicates that effective high intensity training does not necessarily entail high resistance and high force. In fact, it appears possible to have a much higher intensity and safer stimulus by using less resistance and impeccable form.

From day one, everyone has been told to gauge the success of a workout by the "pump". But, as it turns out, getting pumped may be meaningless as far as the effectiveness of the workout and may even be a negative part of the workout.

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Master Trainer focuses on information about lifetime bodybuilding, master athletics, and health and fitness. Information reflects the author's opinions as well as summaries of books, articles, and recent scientific news. This publication does **not** provide medical advice for specific medical problems. Medical advice should be obtained from medical personnel.

43 Years of Training

by Bobby Myers

It was in the summer of 1957 that the iron bug bit me and I was hooked. I was able to save up enough money to purchase a 110 lb. barbell set and with a hammer and a few boards to build some benches. I began what has been a long enjoyable journey. I have trained on a regular basis for the last 43 years with little in the way of breaks except for the time I spent in basic training for the army and a forced lay off about 4 years ago when I came down with Rheumatoid arthritis.

From 1957 until 1970 I trained only with weights and used about every routine and way of training that you could ever consider. Every month there was some magical new routine that would come out in the magazines, nothing much has changed in this respect, and right there I would be doing the latest superset by the newest super champion. Bring back any memories or maybe that's still you today!

One day one of my favorite magazines arrived on the newsstand, *IronMan*, and there was this article that I just couldn't stop reading. It was by a man down in Florida. by the name of Arthur Jones and the title of the article was, "The upper body squat". The article was talking about a machine that this man had invented and some new kind of training that was called "high intensity". The more I read, the more I was convinced that this fellow knew what he was talking about. Thus started an adventure that has lasted to this very day.

I started calling Mr. Jones on the phone and asking all kinds of questions about training and with great enthusiasm this man answered each and every question. Yes! You guessed it. Next came the many, many trips to Florida and training at the Nautilus compound.

This was a big change in my training life. Suddenly, I was going from 5 and 6 days a week workouts to 3 days a week with only 1 set of 12 reps for around 12 exercises and the workouts lasted only about 30 minutes. There was no playing around time, it was from one exercise to another without any rest. I can assure you that if done properly, you will not want anymore and neither can your body stand anymore.

Here we are in the present time and you are probably thinking .."do you still train this way?" The answer is "yes".

It was not so long ago that I asked Mr. Jones an important question. I asked him what was the one mistake that he thought he had made about training. Hid answer was training too much. He said that no one needed to train more that two times a week. So guess what?

My routine consists of two workouts per week. I like Monday/Friday. I work the total body each workout. I use two different routines. This allows me to do a larger amount of different exercises if I divide them into two groups. That way I can keep my workouts to eight exercises each. I do all my movements with a super slow speed, 10 seconds up 5 seconds down. I use enough weight so that I can only get between four and six reps. This gives me a 60 to 90 seconds time under load for the muscle groups. My routines are made up mostly of compound movements that give me more bang for the buck.

I purposely didn't put down the routines that I use because everyone has his favorite exercises that work best for him. After many years of training I know the ones that work for me and those are the ones that I do.

You can make up your own routine with what works for you or if you like e-mail me at trainer@gamewood.net and I will be happy to help you.

Remember for training to be productive, it must be hard but brief and you must build into your training plenty of recovery time- a muscle must recover before it grows.

Train hard/recover/grow ◆

Creatine Supplementation: Effective and Safe?

by Matt Brzycki, Coordinator of Health Fitness, Strength and Conditioning Programs, Princeton University

In recent years, there's no question that the most popular supplement has been creatine. The two most important questions concerning creatine supplementation are:

1. Is creatine effective?
2. Is creatine safe?

Is Creatine Effective?

Promoters of creatine supplementation often cite the "solid research" showing that [creatine] increases strength, improves endurance, and builds lean muscle mass." What does the "solid research" really say about the effects of creatine on these three variables? In addition, what does the "solid research" say about the effects of creatine during the performance of actual sports, realistic events or competitive situations?

Does It Increase Strength?

While it is true that there is "solid research" showing that creatine "increases strength," there is roughly an equal amount of "solid research" showing that it does not produce significant increases in strength or other strength-related measures. For example, a study by Vandenberghe and others (1996) using 9 healthy males showed that creatine did not increase maximal isometric strength of the quadriceps. A study by Goldberg and Bechtel (1997)

involving 34 football and track athletes found that creatine did not significantly improve low-body strength or one-repetition maximum (1-RM) strength in the bench press. A study by Hamilton-Ward and colleagues (1997) using 20 female athletes revealed that creatine did not affect 1-RM strength in elbow flexion, peak velocity (of the shoulder) or torque. A study by Kirksey and others (1997) study involving 36 track athletes found that creatine did not significantly improve performance in the vertical jump. A study by Stout and associates (1997) using 24 football players showed that creatine (and a glucose supplement) did not significantly increase 1-RM strength in the bench press or performance in the vertical jump. A study by Kreider and associates (1998) involving 25 football players found that creatine did not significantly improve squat or power clean lifting volume. A study by Miszko, Baer and Vanderburgh (1998) using 14 softball players showed that creatine did not significantly improve performance in the vertical jump. A study by Wood and colleagues (1998) involving 44 males revealed that creatine did not improve 1-RM strength in the bench press. A study by Van Leemputte, Vandenberghe and Hespel (1999) using 16 physical-education students showed that creatine did not alter the rate of maximal force production. A study by Gilliam and others (2000) involving 23 active males determined that creatine did not improve peak torque of the quadriceps. A study by Mihac and colleagues (2000) study using 30 subjects found that creatine did not significantly improve handgrip strength. A study by Quackenbush and associates (2000) involving 23 male high-school athletes revealed that creatine did not significantly improve 8-RM strength in the bench press, leg press or shoulder press or performance in the vertical jump.

Taking into account this and other "solid research," the effect of creatine on strength and other strength-related measures is inconclusive.

Does It Improve Endurance?

Considering the fact that creatine is an energy substrate used during maximal, short-term efforts with essentially no role during long-term efforts, it would not be expected that it "improves endurance." And, in fact, there is very little "solid research" showing that creatine has any positive effect on endurance other than during activities that involve *repeated* maximal, short-term efforts (Mujika and Padilla 1997; Williams and Branch 1998).

Does It Build Lean-Muscle Mass?

What many studies have shown is that creatine can increase body mass, not *lean*-body mass (LBM) or lean-muscle mass. And the most likely reason for the increased body mass is primarily due to water retention (within skeletal muscle cells) that – needless to say – isn't necessarily desirable.

The truth of the matter is that there is no pill, powder or potion currently in existence that, by itself, "builds lean-muscle mass" in healthy individuals. None. There is only one thing that "builds lean-muscle mass": exercise. When *combined* with exercise – particularly progressive-resistance exercise – some studies found that creatine increased LBM. In all cases, the subjects in those studies were engaged in some type of strength-training activity. Interestingly, a study by Kirksey and others (1997) found that a group who used creatine increased their LBM by 4.8 kilograms . . . but a group who took a placebo increased their LBM by 3.5 kilograms. Moreover, it is important to note that the LBM of the subjects in this study was *estimated* by skinfold measurements – an assessment that can be greatly influenced by varying degrees of human error.

Finally, numerous studies have shown that creatine – even when used in conjunction with progressive-resistance exercise – failed to significantly increase LBM (Godly and Yates 1997; Hamilton-Ward et al. 1997; Stout et al. 1997; Terrillion et al. 1997; Ensign et al. 1998; Miszko et al. 1998; Wood et al. 1998; Quackenbush et al. 1999). Therefore, the "solid research" examining the effect of creatine on LBM is inconclusive.

Does It Improve Athletic Performance?

Much of the research investigating creatine – including that which has been mentioned earlier – has been done in an extremely well-controlled environment, namely a laboratory. In a controlled laboratory setting, the best evidence for performance enhancement from the use of

creatine is in repeated maximal, short-term sprints on a stationary bicycle (and even then, some studies have shown no improvements). Unfortunately, there are no competitions for repeated maximal, short-term sprints on a stationary bicycle. Of the research that has been done outside a laboratory – or "in the field" – very few studies have shown that creatine had any beneficial effects during the performance of actual sports, realistic events or competitive situations (Mujika and Padilla 1997; Williams and Branch 1998; Juhn 1999). Simply consider the following studies – many of which used highly trained athletes:

As of 1998, a total of five studies had investigated the effects of creatine on actual sports performance *done outside a laboratory* in high-intensity efforts lasting 30 seconds or less. All five studies found no significant improvements in performance from creatine supplementation. For example, a study by Burke, Pyne and Telford (1996) involving 32 elite male and female swimmers from the Australian National Team showed that creatine did not enhance performance in swim sprints of 25 and 50 meters. A study by Mujika and others (1996) using 20 male and female swimmers found that creatine actually *worsened* performance in swim sprints of 25 and 50 meters. A study by Redondo and associates (1996) involving 24 highly trained male soccer and female field hockey players revealed that creatine did not enhance running velocity in a 60-meter sprint. A study by Goldberg and Bechtel (1997) using 34 football and track athletes showed that creatine did not significantly improve performance in a 40-yard dash. A study by Stout and colleagues (1997) involving 24 football players found that creatine did not significantly improve performance in a 100-yard dash.

> *"Creatine may* **NOT** *be effective."*

As of 1998, a total of seven studies (including two that were also mentioned in the previous paragraph) had investigated the effects of creatine on actual sports performance *done outside a laboratory* in efforts lasting 30 – 150 seconds. Six of the seven studies found no significant improvements in performance from creatine supplementation. For instance, studies by Burke, Pyne and Telford (1996) and Mujika and associates (1996) using a total of 52 elite male and female swimmers found that creatine did not improve performance in a 100-meter swim. A study by Terrillion and others (1997) involving 12 trained female runners showed that creatine did not improve performance in a 700-meter run. A study by Ensign and colleagues (1998) using 24 U. S. Navy Special Warfare personnel (SEALs) determined that creatine did not significantly improve the time taken to complete an obstacle course (which took roughly two minutes).

As of 1998, a total of four studies had investigated the effects of creatine on actual sports performance *done outside a laboratory* in long-term efforts lasting more than 150 seconds. Three of the four studies found no significant improvements in performance from creatine supplementation. Actually, a study by Balsom and others (1993) using 18 well-trained male runners showed that creatine produced significantly *slower* times in a 6,000-meter run. Additionally, a study by Myburgh and associates (1996) involving 13 cyclists found that creatine did not increase the distance cycled in one hour.

To summarize: As of 1998, a total of 14 different studies had investigated the effects of creatine on actual sports performance *done outside a laboratory* in efforts ranging from a handful of seconds to more than 150 seconds. In 12 of the 14 studies, creatine supplementation did not produce significant improvements in performance. Collectively, this "solid research" shows that any improved performance that *may* occur in laboratory settings does not translate into improved performance in realistic situations. This is especially true of highly trained or elite athletes (Mujika and Padilla 1997).

Is Creatine Safe?

Promoters of creatine supplementation feverishly insist that there are no adverse side effects reported in the scientific literature when it is consumed in the recommended dosages, typically 20 - 25 grams per day for 4 – 7 days for "loading" and then 2 grams per day for "maintenance." And for the most part, their contention is true. The fact of the matter is that there have not been any adverse side effects reported in studies using 20 - 30 grams of creatine per day for up to seven days. Nor have there been any adverse side effects reported in studies using smaller dosages of 2 – 3 grams of creatine per day for longer periods up to seven weeks. However, this is nowhere near the months – or years – that an athlete might use creatine. Countless scientific, medical and nutritional authorities agree that the long-term effects of creatine supplementation are unknown (Clarkson and Rawson 1998; Williams and Branch 1998; Juhn, O'Kane and Vinci 1999). In fact, Kreider and others (1998) stated that "little data are available evaluating the medical safety of supplementing the diet with creatine during training for prolonged periods of time." There is also a concern that many individuals typically exceed the "recommended dosage" – undoubtedly putting them at greater risk for incurring negative side effects.

And while there have been no adverse side effects reported in scientific studies conducted in a laboratory setting, those of us "in the trenches" have heard an endless exchange of anecdotal accounts from around the world concerning athletes who have taken creatine and experienced

an abundance of adverse side effects. Although these observations are anecdotal, their sheer volume is such that they cannot be ignored. It is also important to consider a study by Juhn, O'Kane and Vinci (1999) published in a peer-reviewed journal that surveyed 52 baseball and football players who voluntarily took creatine. Of the 52 athletes, 14 (26.9%) did not report any adverse effects. Stated otherwise, 38 (73.1%) reported at least one adverse side effect.

Due to individual variability, some may be more susceptible to adverse side effects than others. However, the following potential side effects are of greatest concern:

Water Retention

During the first few days of the "loading phase," there is an increase in the retention of water within muscle cells and a concomitant – and significant – decrease in the production of urine (Hultman et al. 1996). As noted previously, the retention of water probably accounts for the rapid increase in body mass that accompanies creatine supplementation. In all likelihood, a rapid increase in body mass would hinder performance in mass-dependent activities such as running and swimming (Juhn and Tarnopolsky 1998; Juhn, O'Kane and Vinci 1999). In addition, unintentional weight gain may be a concern for wrestlers and other competitive athletes who must "make weight."

"Research results are inconclusive."

Intracellular water retention would also result in muscle enlargement. This muscular hypertrophy is transient, however, and unrelated to the long-term, adaptive increases in muscular size that occur in response to progressive-resistance exercise.

Muscle Cramping

One of the most frequently reported side effects of creatine supplementation outside a laboratory is muscle cramping — which is often described as being "severe." In the study by Juhn, O'Kane and Vinci (1999), 13 of the 52 athletes (25.0%) who used creatine reported muscle cramps. The large fluid shift into skeletal muscle (intracellular water retention) that is caused by creatine supplementation is thought to dilute electrolytes, thereby increasing the potential for muscle cramps. If creatine does induce an electrolyte imbalance, athletes who are not well hydrated and/or are training intensely in hot, humid environments where sweat rates are high would have a greater-than-normal risk of muscle cramping.

Dehydration/Heat-Related Illness

In 1998, the wrestling community was shocked by the deaths of three wrestlers in a period of 32 days: Freshman Billy Jack Saylor of Campbell University (NC) on November 7, senior Joseph LaRosa of Wisconsin-LaCrosse on November 21 and junior Jeff Reese of the University of Michigan on December 9. One common thread connecting the wrestlers is that all three died while trying to lose a fairly substantial amount of weight in a relatively short period of time. The manner in which all three attempted to lose weight was certainly unsafe and they were severely dehydrated. But the methods that they used in an attempt to lose weight had been quite commonplace in wrestling: restricting food and fluid intakes, wearing "sauna suits" and exercising in hot environments. Yet, there's no record of a similar death in collegiate wrestling. Actually, according to the National Collegiate Athletic Association (NCAA) there's *no* other instance of *any* college wrestler *ever* dying in *any* manner.

Think about it: No deaths in a period of about one century and then three in a period of about one month. The Centers for Disease Control and Prevention (1998) determined that the wrestlers died because they "used vapor-impermeable suits and exercised vigorously in hot environments" which "promoted dehydration and heat-related illness."

At the time of their deaths, many quickly pointed an accusatory finger at creatine. The reason is that one of the most commonly reported side effects related to the use of creatine is dehydration. In the study by Juhn, O'Kane and Vinci (1999), 7 of the 52 athletes (13.5%) who took creatine reported dehydration. Ironically, the increased water retention within muscle cells that is associated with the use of creatine increases the risk of dehydration and heat-related illness. This is because the fluid shift into skeletal muscle reduces blood plasma volume that, in turn, reduces the ability to dissipate heat. Although it was not linked to the deaths of the wrestlers, some believe that creatine could intensify an already dehydrated state, resulting in heightened thermal stress and a resultant life-threatening situation.

Muscle Strains/Dysfunction

It is speculated that the intracellular water retention related to the use of creatine increases the intramuscular pressure that could contribute to muscle strains and/or dysfunction.

Gastrointestinal Distress

Creatine may cause a variety of gastrointestinal disturbances. In the study by Juhn, O'Kane and Vinci (1999), 16 of the 52 athletes (30.8%) who used creatine reported diarrhea. Other gastrointestinal afflictions that are often cited anecdotally include an upset stomach, gastrointestinal pain, flatulence, nausea and vomiting.

Liver Function

Research has shown that when the consumption of exogenous (foreign) creatine is increased, the production of endogenous (natural) creatine by the liver is decreased.

It is unclear as to how the long-term use of creatine might influence the function of the liver with respect to endogenous creatine synthesis.

Kidney Function

There is a limit as to how much creatine can be extracted from the bloodstream and stored in muscle. Once this saturation point is reached, additional amounts are excreted by the kidneys (Juhn 1999). Creatine supplementation can produce astronomical increases in the urinary excretion rate of creatine. In a study by Poortmans and others (1997), subjects ingested 20 grams of creatine per day for five days (a typical "recommended dosage" during the "loading phase") and – in comparison to their "placebo condition" – experienced an average elevation in their urinary excretion rates of *8,856.7%*. The percentage of this "massive urine excretion" – in the words of the authors – may have been even greater since this study only used a two-week "washout" period which may not have been enough time to normalize the baseline readings for the placebo condition. There is concern that the increased urinary excretion rate of creatine places excessive strain on the kidneys.

A study by Kreider and others (1998) using 25 "healthy" football players found that 28 days of creatine supplementation (15.75 grams per day) produced changes in muscle and liver enzymes — which are often used as indicators or "markers" of kidney (and liver) function. In this study, a group who took creatine experienced an average increase in their levels of creatine kinase by 155.8%, lactate dehydrogenase by 24.1%, aspartate aminotransferase by 16.5% and alanine aminotransferase by 16.6%. On average, those who received a placebo increased their levels of creatine kinase by 70.1% and lactate dehydrogenase by 11.4%; their levels of aspartate aminotransferase and alanine aminotransferase *decreased* by 2.4% and 7.4%, respectively. (Analysis of a fifth enzyme – g-glutamyltransferase – showed a very slight elevation in both groups.) Further, two reports of the same study by Almada, Mitchell and Earnest (1996) and Earnest, Almada and Mitchell (1996) showed that eight weeks of creatine supplementation (20 grams per day for five days and 10 grams per day for 51 days) produced significant elevations in muscle and liver enzymes. Although the elevated levels returned to normal following a four-week withdrawal of creatine, it still raises fears – particularly for individuals with impaired kidney (or liver) function.

Case in point: Pritchard and Kalra (1998) reported that a 25-year-old soccer player with a history of kidney disease experienced a sudden and substantial deterioration of his condition while taking creatine. After being advised to stop taking creatine, his kidney function returned to normal. Incidentally, his intake of creatine did not exceed the "recommended dosage." Kuehl, Goldberg and Elliot (1998) reported "renal insufficiency" – a functional disorder of the kidneys – in a 19-year-old football player that was induced by regular creatine supplementation. Although his intake of creatine exceeded the "recommended dosage," the grim reality is that many athletes routinely do the same. The physicians who authored this report recommended that athletes who use creatine should have their kidney function assessed.

The sole end product of the breakdown of creatine is creatinine. Serum creatinine is used indirectly as an indicator of kidney stress. The aforementioned study by Kreider and colleagues (1998) involving 25 "healthy" football players found that creatine supplementation significantly increased serum creatinine levels. Specifically, the group who took a placebo experienced a 4.8% increase in their serum creatinine levels while the group who took creatine (15.75 grams per day for 28 days) had a 22.55% increase. The authors noted that despite the increase, the levels "remained within normal limits for individuals engaged in intense training." The fact is that those who took creatine had serum creatinine levels that were – on average – 8.7% higher than the upper limit of "normal." And if the standard deviation of the average value is considered, 16% of those who took creatine had serum creatinine levels that exceeded the upper limit of "normal" by 20%. Regardless of whether or not the increases "remained within normal limits for individuals engaged in intense training," it is clear that creatine supplementation produced a markedly greater elevation of serum creatinine levels. Along these lines, some have argued that the serum creatinine levels are elevated because creatine supposedly gives athletes the ability to train more intensely or to maintain greater training volume. This appears to be flawed thinking since the subjects in this study (who underwent the same training) did not know whether they were receiving creatine or a placebo and, therefore, would not train any differently.

Plisk (2000) stated that "...short-term creatine supplementation seems to have no detrimental effect on hepatic or renal function in healthy subjects." Two points: First, any comment concerning the effects of "short-term creatine supplementation" on liver or kidney function (or anything else) is irrelevant – and not very comforting – due to the fact that the majority of individuals probably do not use creatine on a "short-term" basis. Second, his statement isn't exactly true. Koshy, Griswold and Schneeberger (1999) reported that a previously "healthy" 20-year-old man who consumed creatine (20 grams per day for four weeks) developed nausea, vomiting and bilateral flank pain. A physical examination revealed dehydration and diffuse abdominal tenderness. The man was hospitalized and a renal biopsy found a kidney disorder known as "acute focal interstitial nephritis." This rare disorder – which occurs in roughly 1 out of 25,000 people – causes a reduction of kidney function ranging from mild dysfunction

to acute kidney failure. His condition improved after he stopped taking creatine. The physicians who authored this report warned that the use of creatine may be associated with injury to the kidneys.

Cautionary Positions

In May 1998, the Association of Professional Team Physicians reported that 85% of its members did not recommend creatine. In June 1998, a survey published in *USA Today* revealed that only five teams in the National Football League approved the use of creatine by their players. A number of teams have written stances on creatine supplementation. For instance, the Tampa Bay Buccaneers distribute a position paper to all of their athletes that details the many potential side effects from creatine supplementation. Their position paper concludes that their organization "does not endorse creatine supplementation as a training adjunct to [their] players" (Asanovich 1998). It's safe to say that the reason for such cautionary positions by those entrusted with overseeing the health and safety of professional athletes is because of the potential for side effects from creatine supplementation.

But cautionary positions aren't only recommended for professional athletes. In April 1999, the American College of Sports Medicine conducted an official roundtable on creatine supplementation. The roundtable – which included 12 individuals with either a doctoral or medical degree – concluded that the data on the side effects of creatine supplementation in those less than 18 years of age are "grossly inadequate" and, therefore, that it is not advised for individuals in that age group (Terjung et al. 2000). Finally, a large number of authorities – including the Food and Drug Administration – have advised consumers not to use creatine without the approval of a physician (Williams and Branch 1998).

The Bottom Line

Contrary to the claims of some individuals, the "solid research" concerning the effectiveness of creatine supplementation on strength, endurance and lean-body mass in a laboratory setting is inconclusive. And any research that has shown an increase in strength or other performance measures cannot be generalized or applied to athletic situations that are done outside a laboratory. Indeed, the "solid research" concerning the effectiveness of creatine supplementation outside a laboratory has found that it rarely improved the performance of highly trained subjects in actual sports, realistic events or competitive situations. It is also important to note that those who would benefit the most from creatine supplementation include vegetarians and individuals with unusually low levels of creatine in their bodies.

Keep in mind, too, that studies investigating creatine are often funded by grants from supplement companies or have one or more authors who serve as "consultants" for such companies (Juhn 1999). Needless to say, it's difficult to have faith in the results of studies that have the monetary backing of companies that have a direct financial interest in the outcome of the research.

At this point in time, literally no one knows the long-term effects of creatine supplementation. Promoters of creatine supplementation insist that there are no negative side effects when it is consumed in the "recommended dosage" – typically 20 - 25 grams per day for 4 – 7 days of "loading" and then 2 grams per day for "maintenance." The unmistakable reality, however, is that the majority of individuals –- thinking that "more is better" – undoubtedly exceed the "recommended dosage" of creatine on a regular basis. While on the subject, the "recommended dosage" should be relative to body weight. For example, a 140-pound individual should have a lower "recommended dosage" than a 240-pound individual. Finally, the potential side effects from combining creatine with one or more of the countless nutritional supplements on the market are unknown.

Plisk (2000) stated that "...it may be more appropriate to compare creatine supplementation with the practice of carbohydrate loading." Perhaps in the sense that in both types of "loading," there is an attempt to "load" the stockpiles of an energy substrate. But that's where the similarities between creatine loading and carbohydrate loading end. There is really no concern with incurring any adverse side effects from consuming too many carbohydrates as there is with creatine – unless, of course, the carbohydrate loading is based upon the classical glycogen supercompensation model as proposed by Ahlborg and colleagues (1967) which was found to be physiologically distressful.

When it comes to creatine supplementation, the bottom line is to be cautious, not careless.

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Have a question about training, fitness, health, or aging?

Send your question to the *Master Trainer*, Ageless Athletes, Suite 221, Memorial Building, 610 N. Main St., Blacksburg, VA 24060-3349

I will try to answer as many questions as possible in future issues.

Watching Dr. Ken Leistner Train

By now, I'm sure many readers have seen a tape made by Dr. Ken Leistner showing him going through what for him is a typical workout. Ken made the tape perhaps less as an instructional aid and more as a means to raise some funds for the work he continues to do with children on the streets with the Lakeview Youth Federation.

I can argue (as I have in a letter) that with more controlled movements and less time between sets that Ken's workout would be even higher intensity and more effective. But, I can't argue with his strength (almost beyond belief) and dedication. The tape shows Ken training in his garage gym, clearly the picture of a person in full glow and harmony with his friends, family, and environment. The man is an inspiration!

Here are some comments from a letter Ken wrote to me that are cited with his permission.

"I agree with you that one's workouts must be exciting as well as fulfilling. My satisfaction comes for the completion of the task at hand and the excitement comes from the act of training. I love to train and find everything about the prelude to training, the actual workout, and the intrinsic feeling afterward (both physically and psychologically) exhilarating. My excitement comes from my enjoyment. I have found that specific rep ranges in specific individual exercises either adds or detracts from that enjoyment. Thus, I use a higher then usual range in squats and a lower than usual range in the press. However, it is a blessing just to be able to train and be in touch with one's self".

Ken then made a number of points about the tremendous weights he was using in the workout such 407 x 23 in very, very deep squats but the lack of corresponding great size in his legs and other body parts. Ken obviously has great leverage for some movements and probably high neuromuscular efficiency. Ken said: "I realized early on that I would never be muscularly large unless I gained inappropriate amounts of bodyweight, but that I could get stronger. While one can always improve strength and appearance, it is best to be realistic and not beat oneself psychologically for falling short of an impossible goal".

Some personal notes: I'm about the same size and age as Ken so watching this master at work gave me some comparison points. I thought I was pretty strong but Ken's squatting and overhead pressing ability (253 x 4) were both humbling and motivating. Ken was doing a routine that was quite similar to one he wrote about in a 1976 classic article in *IronMan* that I've kept for all these years. It was probably the most productive routine I've done, "simply" 8 to 10 basic movements done as hard as possible. ◆