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What's New This Year

Last month we reviewed the latest studies concerning the effects of aging, the limited benefit of altitude training, a number of devices marketed for cyclists, cycling biomechanics, and hormone changes associated with exercise. We also reviewed the results of studies about cramps, stretching, and asthma.

This month I'll discuss the latest on nutrition and research about drugs, medications and so-called ergogenic aids—performance-enhancing substances.

Nutrition

Hydration

Dehydration may reduce not only current performance but also subsequent training effectiveness. It is associated with a decrease in metabolic rate and a shift to carbohydrate energy use at rest—resulting in less carbohydrate available for high-intensity exercise.

Oral rehydration is associated with less perception of thirst than intravenous replacement.

Most commercial sports drinks contain too little sodium (salt). Higher concentrations of sodium (up to 40+ mEq) are more effective for rehydration.

Calories

Carbohydrates

Carbohydrates are confirmed to be the preferred fuel source of high-intensity exercise.

A number of studies have reconfirmed that glucose ingestion before or during exercise—usually about 6% liquid sugar

solutions—improves performance. It improves both intensity and volume of exercise, and not only aerobic, but also anaerobic performance.

Getting calories in before and during training and competition results in the best performance.

The body is able to take in about 60 grams of carbohydrate (about 250 calories) an hour. This glucose can contribute to about 25% of energy production.

One study examined whether the menstrual cycle changed this effect. Performance was improved at all phases of the menstrual cycle.

Refueling after exercise continues to be a proven strategy. The sooner the better. For aerobic and anaerobic work. For endurance athletes and for strength athletes.

For example, one study showed feedings immediately following weight training reduces muscle damage, speeds recovery and improves protein balance.

Studies are beginning to look at which type of carbohydrate improves performance best. Pre-race feedings that include some fiber improve endurance cycling. A post-race study found glucose and amylopectin better than amylose—words you'll likely hear more about if these studies are confirmed.

Branched chained amino acids

The commercial product Amino-Vital was shown to have mixed performance effect in 30 female college students. These students were fed 30 minutes before exercise with branched chain amino acids.

Unfortunately the placebo group received no calories. And we know that calories of cheap table sugar 30 minutes before an exercise test improves performance.

After three months of steady supplementation, no effect on aerobic capacity was found.

Methionine

No change in strength was found in 21 well-trained weight lifters

Weight Loss

Remember not to lose too quickly. Reducing daily caloric intake from about 2800 calories to 800 calories in weight lifters resulted in a significant loss of muscle mass even though weight lifting was continued.

Eating disorders

These occur at about the same rate in cyclists as non-cyclists—about 10% of college females studied. Eating disorders are more common in runners, gymnasts and ballet dancers.

Vitamins & Minerals

Most Americans think more vitamins and minerals can't hurt, and might help. This is the popular wisdom.

The scientific evidence is different. The scientific wisdom is that vitamin and mineral supplements are just as likely to worsen than help performance. Studies over the years have shown that perhaps half a dozen vitamins and minerals might help performance, and about three times as many are likely to hurt.

Recent research hasn't changed this view.

Fifteen highly trained cyclists (5+ racing years) were studied for vitamin and mineral status. Self-selected diets without supplements maintained blood vitamin and mineral at normal levels. Diets had more

than the RDA for almost all nutrients (the exceptions were vitamin E and magnesium).

Niacin

A current study showed that supplemental niacin reduced performance and time to exhaustion at moderate-, but not high-intensity exercise.

Antioxidants

Possible exercise-induced oxidative damage, and the possible benefit of antioxidants have helped antioxidants sales take off in the country the last few years. Although the initial research was interesting, as is often the case, subsequent studies have either not confirmed the initial theory, or been mixed.

Does exercise lower the levels of antioxidants? A study this year showed that neither vitamin E nor glutathione levels in muscle were affected by endurance training.

A study of Ironman athletes showed supplemental vitamin E had no effect on muscle damage, susceptibility to oxidation or performance.

Yet another study showed some oxidative damage.

Inosine

Supplementation had no effect in 10 competitive male cyclists.

Salt

Ultra-endurance athletes, training or racing many hours daily in the heat may need more sodium—up to one gram per hour (about one-half a teaspoon)—to replace sweat losses.

Chromium

No effect of supplementation on percent body fat or metabolic rate was found in a study of six women.

Another study found 5% fat loss and 3% muscle gain in 40 collegiate swimmers after 24 weeks of supplementation.

Km

This potassium-mineral supplement was found to have no effect on performance in 30 subjects.

Drugs, Medications, Ergogenic Aids

There are very few substances that have been shown, over time, to improve performance.

Most “new substances” prove disappointing. Occasionally a study looks promising. More often than not, follow-up studies show little, if any effect.

Indeed, if you were a betting man/woman and always took the position that the latest thing was useless, you’d probably end up ahead.

Caffeine

Caffeine has been one of the exceptions. Studies over the years have almost always shown that caffeine improves performance, and a half dozen new studies in 1996 bolster this view.

Specifically, studies of older women, like older men, showed an increase in their ability to expend energy following the ingestion of 5 mg/kg of lean body weight—about 16 ounces of coffee. These women also noticed a feeling of vigor following caffeine ingestion.

The way in which caffeine works continues to be subject to controversy. Originally caffeine was believed to increase free fatty acids in blood and spare glycogen. Recent studies have not supported this view.

Beta-blockers

Many riders take beta blockers for high blood pressure, migraine or heart disease. Examples of beta blockers include Inderal (propranolol) and Tenormin (atenolol). If your blood pressure medicine ends in “alol,” it’s probably a beta blocker.

Physicians have said for years that these substances decrease performance. Two new studies quantify the decrease.

One study found that the time to exhaustion cycling (at 70% of VO₂ max after 80 mg Inderal) was reduced from 79 to 23 minutes. Heart rate was reduced from 163 to 129 beats per minutes.

100 mg of Tenormin had a similar effect.

So here’s proof of conventional wisdom: You can’t perform to athletic potential and take beta blockers.

Calcium Channel Blockers

This is another class of high-blood pressure medicines. One study found Amlodipine did not reduce VO₂ max and peak heart rate in modestly active subjects. But these were not athletes. Their VO₂ max averaged about half that of most USCF racers.

And because different calcium channel blockers have different cardiovascular effects, you can’t generalize and say all calcium channel blockers don’t affect performance—I believe some do.

Anabolic Steroids

Past research was aimed at showing either performance-enhancing effects or side effects. For good reason, athletes, the press, sports governing bodies, etc., are so down on steroids that very little scientific research is being pursued.

An interesting study—of some relevance to us in Southern California—found many border-town athletes obtained steroids from Mexico

Clenbuterol

This is a popular abused drug, used as an anabolic agent. Although I'm more interested in reviewing human performance, a study in rats demonstrated that clenbuterol's can worsen heart action. The finding serves notice that this drug may harm more than it helps.

Creatine

This substance showed a lot of potential for enhancing performance in early studies. Now some of its limitations are being understood.

A study in runners found no effect on performance in a 700-meter race that lasted about 110 seconds.

One week of creatine increased body mass in lifters. And they were able to jump squat about 50 more watts.

A study in football players which involved creatine as well as a mix of carbohydrates, protein, RNA, amino acids, and α -ketoglutarate showed a two to four pound increase in lean body mass. But little effect on performance was noted.

A study in cyclists found that one week supplementation with 20 grams per day had no effect on one-hour cycling distance. But type IIB muscle fibers (a fast-twitch fiber) increased, and peak and mean power as well as 30-second sprint performance improved.

But another study of cyclists found no change in peak or mean power.

The bottom line for cyclists: The consensus seems to be that endurance aerobic exercise is not helped with creatine. Anaerobic

muscle performance, as found in track sprinting, may be.

Ephedrine

A high dose showed no effect on running performance.

Anti-inflammatories

Aspirin

This simple product lowered perceived exertion at 40 and 50% of peak power output in 19 subjects.

Naproxen

A single dose of this now over-the counter product (Aleve) decreased exercise-related muscle soreness in 62 subjects

Zoloft

The new antidepressants such as Zoloft and Prozac have been shown in recent years to work for much more than just depression.

A few studies have suggested that these prescription medicines enhance athletic performance, although one study found worsened performance.