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Ronald Stanko, PhD, from the University of Pittsburgh School of Medicine, has found generally positive effects of pyruvate on modifying body composition. One study in the October 1992 issue of the American Journal of Clinical Nutrition reported that 14 obese women taking 36 grams of pyruvate daily over a 21-day period lost significantly more weight (3.5 pounds) and fat (2.8 pounds) than the placebo group while on a 1,000-calorie-a-day liquid diet.<sup>3</sup> You might not think this fat/weight loss is too impressive, but the idea is that if pyruvate continued to promote weight loss over a longer period, the fat loss might become more significant. But then again, we wouldn't want you to eat only 1,000 calories a day, so let's keep investigating.

Another study conducted by Stanko four years later involved 17 obese women on a very high-calorie diet for three weeks after a three-week calorie-reduced diet.<sup>4</sup> When subjects were given 15 grams of pyruvate and 75 grams of dihydroxyacetone (DHA) daily, they gained 3.9 pounds less weight and 2.2 pounds less fat than those not receiving this supplement combination.

A logical extension of this work would be to see what might happen in regard to cholesterol levels, particularly LDL ("bad") cholesterol. Frankly, most research seems to find nothing here,<sup>5-7</sup> with an exception in subjects who eat a high-cholesterol diet and consume 36-53 grams of pyruvate per day.<sup>8,9</sup> Richard Kreider, PhD, faculty member at the University of Memphis, Tennessee, theorizes pyruvate may actually prevent the positive effects of exercise on blood lipid levels. John Ivy, PhD, a sport-science researcher at the University of Texas, Austin, believes pyruvate may somewhat lower blood lipid levels in people eating poor diets but has little effect in those who eat healthfully.<sup>10</sup>

### Endurance Boost

As a fitness enthusiast you want to become and remain lean and healthy, but you want to get bigger, stronger and have more endurance, too. Where does pyruvate fit into the picture with regard to increasing your capacity for work? In terms of strength and size, it doesn't directly correlate; I'm not familiar with any research that looked at this connection.

Some evidence indicates, however, that pyruvate can increase endurance. In fact, it has been shown to increase aerobic endurance when untrained individuals exercised with the arms or legs. Both of these studies, conducted by

### Bottom Line

Several different forms of pyruvate are being researched or marketed, including pyruvate linked with sodium, potassium or calcium. Some researchers have used forms of pyruvate other than sodium pyruvate simply to avoid large intakes of sodium, but in the final analysis, the inclusion of any of these salts would have little impact on pyruvate's effectiveness. Some pyruvate products also contain dihydroxyacetone (DHA), a three-carbon sugar. While the exact reason for this isn't clear, some research indicates that pyruvate without DHA may actually be more effective.

### Promising Areas

**AS** you exercise and use energy, your body tries to replenish used fuel by a process called glycolysis. Basically what happens is that glucose (blood sugar) is broken down to make adenosine triphosphate (ATP), which enables your muscles to contract. This happens directly in anaerobic exercise like pumping iron. The final product in glycolysis is pyruvate. What happens with pyruvate depends on whether you're doing high-intensity anaerobic exercise such as bodybuilding or aerobic exercise such as jogging. If you're pumping out the reps, pyruvate will be converted to lactic acid. But if you're only sweating it out in your favorite aerobics class, pyruvate is shuttled directly into oxidative metabolism to make ATP. We're talking a crucial energy production compound, here.

Though more research is needed and certainly under way, pyruvate, at least in theory, may have health benefits in the form of:

- Decreased bodyfat
- Decreased bodyweight
- Improved blood lipids
- Improved muscle glucose uptake.

**'Early research found promise in obese individuals who took large quantities of pyruvate, and scientists are now looking more closely at the effects of lower dosages in healthy and relatively fit people.'**

Stanko as lead researcher, basically found that subjects receiving 25 grams of pyruvate and 75 grams of DHA daily for seven days increased their exercise performance by 20%.<sup>11,12</sup> The interesting thing is that subjects in the leg-endurance study ate a high-carbohydrate diet (70% of total calories), while those in the arm-endurance study fol-

lowed a standard carbohydrate protocol (55% of total calories). With these different diet strategies in mind and almost equal performance enhancement, the scientists concluded that pyruvate may help working muscles take up more glucose from the blood and use it for energy.

### Reality Check

Pyruvate has shown results for certain subjects, but will it help you? Can this information be generalized to a bodybuilding population? That is still an issue of debate and ongoing examination.

William Sukala, MS, CSCS, from San Diego State University, raises several issues regarding pyruvate research.<sup>13</sup> One of the more important is that very high doses of pyruvate were used and DHA was included. Most pyruvate manufacturers will recommend taking 1-6 grams per day, markedly less than what's used in the research. Besides, if you were to copy the research amounts in your supplementation regimen, you'd spend \$20-\$40 a day. And at that high a dosage, research has recorded various forms of gastrointestinal distress.

As far as DHA goes, this three-carbon sugar could conceivably confound the findings, and you'd be hard-pressed to find a pyruvate product out there

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