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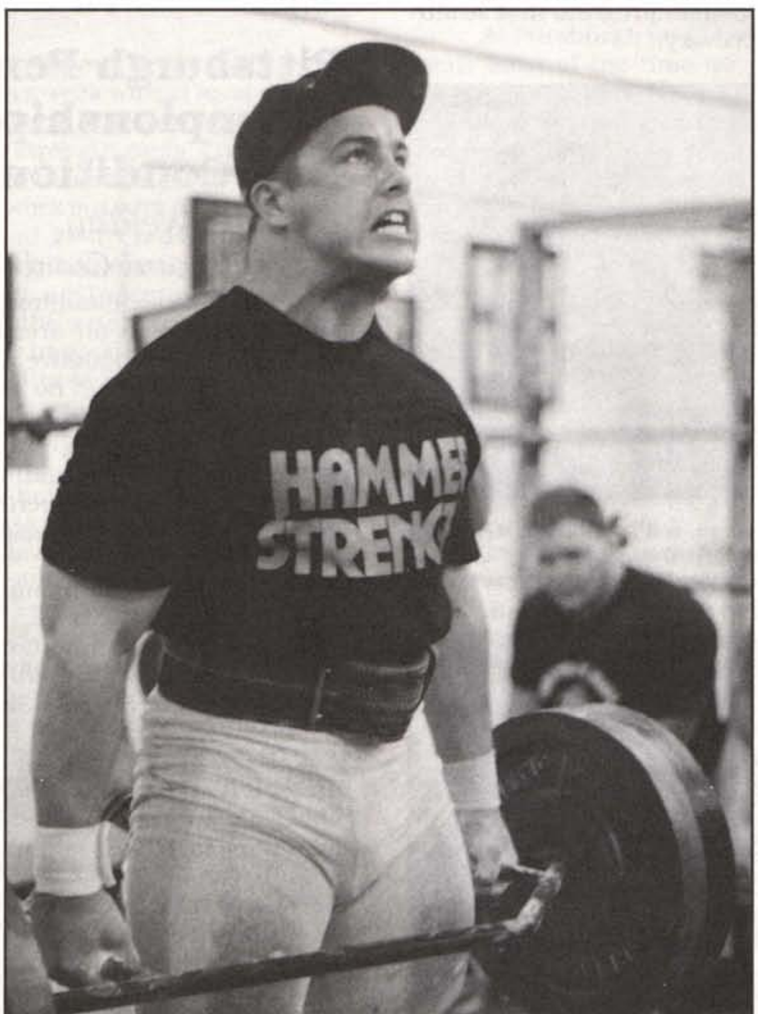
Successful Results: Part I

By Dr. Ken E. Leistner

Both Ted Lambrinides and I have often and loudly stated that the area of strength training and increasing the muscular mass of any particular individual, is more "art" than "science". While the legitimate scientific research and literature has supplied some useful information, much of it is contradictory and/or not applicable to the average or typical trainee. "They say . . .", or "I read that . . ." is perhaps worse because there are numerous examples, both positive and negative, for almost anything and everything related to the nutritional and training aspects of strength and muscle building.

One of the things that we hear most at the Iron Island Gym is "I heard that you can't improve doing one set per exercise". This of course, is nonsense to us, as we have had great success over many years doing one set per exercise. One of the problems that many coaches and trainees have is related to the "need to know" and the need to have "the answer". Part of the art of strength training is the fact that there is no one answer to any of the questions related to the activity. Ken Mannie of the University of Toledo, Ray Oliver of the Tampa Bay Buccaneers, "Mother" Dunn of the San Diego Chargers, Bod Rogucki of the Phoenix Cardinals and myself are examples of five individuals who are recognized as having successful strength training programs. Each of us is a very different personality, although Ken and I are possibly more vocal and volatile than the others. Yet, the common theme relative to personality is that we are all very enthusiastic about training and able to impart that to our trainees. This is done differently by each, yet it is done and it is a requisite for the success of the program.



Ed Ash, a 6' 245 lb. all OAC DT from John Carroll University, performs a set of Trap Bar deadlifts at the Iron Island Gym. Successful results require progression and maximum effort.

All of us use different equipment. I use Hammer Strength machines, Kell, and Nautilus equipment with an emphasis on high rep barbell squats, deadlifts, and overhead pressing movements. Ken uses Hammer and conventional leg sleds and benches. Rock has tons of Hammer Strength machines and dumbbells as does Bobby and I don't believe either uses the barbell squat. Bobby used a Trap Bar for deadlifts when he was at West Point. In all cases, however, the emphasis is on safe and productive exercise. Basic, multi-joint movements that work the large muscular structures of the body are emphasized with injury prevention work of the joints involved in the specific sporting activity done with "isolation type" movements.

All of us use one and perhaps two sets of an exercise although John Dunn's program as does some of the others, allows for a bit more freedom and a larger number of sets in the bench press. This is done to accommodate the player's and staff's psychological needs. At the Iron Island Gym, we often have to use multiple sets of selected movements so that an adequate warmup can be accomplished be-

Dr. Ken Leistner spots Greg Roman on a set of squats. Few strength training research studies involve the supervision and motivation one would observe while watching Dr. Ken train one of his subjects.

find the best program may now be wondering what to do. I think a number of training methods will increase strength. My philosophy, however, is to choose a program that increases strength with the least amount of work. Dan Riley, strength coach for The Washington Redskins, says that a person should try to find, ". . . how little exercise (not how much)" will produce results (Riley, 1992). This does not mean that the work will be easy. Getting stronger always requires consistent effort. But instead of performing three, five, or more sets of twenty exercises, it is more efficient to do one or two sets of six to twelve exercises that directly affect the muscles that need to be trained.

Never forget that there is no magic. No training routine will produce instant, dramatically superior results. So far, not even scientific study can refute that statement.

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Predicting Oxygen Uptake And Caloric Expenditure

By Matt Brzycki,

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Your oxygen uptake—or how much oxygen you consume—is a very reliable indicator of your level of cardiovascular conditioning. There are a number of ways to accurately measure your oxygen uptake in a laboratory. One way is to step up and down from a bench of a standard height at a fixed rate of stepping. Another way is to pedal a bicycle ergometer in an upright or supine position using your legs and your arms. Perhaps the most widely-used laboratory device is the motor-driven treadmill. Each of these devices makes it possible to exercise an individual at different levels of intensity while maintaining the body in a relatively stable position. This allows a person to be instrumented to measure various physiological responses. For example, expired air can be collected to determine the exact amount of oxygen being consumed as well as the heart rate, blood pressure and body temperature responses.

Laboratory tests are great in terms of accuracy and validity. However, such tests can be expensive, time-consuming and impractical for the typical member of a commercial fitness center. A much more practical way of assessing oxygen uptake is to have a person run 1.5 miles as fast as possible on a level surface. (A 1.0 mile run is more appropriate for adolescents and the elderly.) This type of test can be given on your club's indoor track or at a local outdoor track. The results of this test are an excellent predictor of oxygen uptake.

Table #1 lists predicted values of oxygen uptake for various running times between 8:00 - 15:55. These values are an absolute measure of how much oxygen was consumed in milliliters of oxygen per kilogram of bodyweight per minute (or ml/kg min). Table #2 shows norms for oxygen consumption in absolute terms based upon age and gender. Finally, Table #3 lists norms for oxygen consumption in relative terms based upon age, gender and bodyweight.

Oxygen Consumption—Absolute

Let's suppose that one of your members is a 30 year old male who weights 198 pounds and can run 1.5 miles in 12:30. Note in Table #1 that his oxygen uptake for this particular running time is 42.12 ml/kg min—or simply 42.12. In other words, he consumed about 42.12 milliliters of oxygen for every kilogram that he weighed during each minute of his 1.5 mile run. Referring to Table #2 (under 30-39 year old males), you'll see that this value (42.12) falls between the range of 40-47. This indicates that his level of aerobic fitness would be considered average.

Table #1 is only valid for determining oxygen uptake during a 1.5 mile run. But, what if you wanted to know someone's oxygen consumption for a run that was longer or shorter? Well, the American College of Sports Medicine offers this formula for determining oxygen uptake in ml/kg min:

oxygen uptake = (speed in m/min) x (.2 ml/kg min per m/min) + 3.5 ml/kg min

Suppose one of your female members just completed a 5000 meter race in 20:00. First, to determine her speed you must divide the distance (5000 m) by her time (20:00) which is 250 meters per minute (or m/min). Next, multiply her speed (250 m/min) by .2 ml/kg min per m/min and add 3.5 ml/kg min. This calculation yields a value of 53.5 ml/kg min [250 x .2 =3.5 = 53.5]. For this formula to be accurate, a person must run at a speed of at least 5 mph (or 134 m/min) and it must be on a level surface.

Oxygen Consumption—Relative

Oxygen uptake can also be expressed in relative terms in liters per minute (or L/min). This is usually a better indicator of aerobic fitness because this value takes into consideration differences in bodyweight. For instance, if two people ran the same distance in the same time, they would consume the same amount of oxygen per unit of bodyweight in absolute terms. However, in relative terms a larger individual would actually consume more oxygen than a smaller individual because he or she had to move a greater body mass.

To determine oxygen uptake in L/min, you must first convert the person's bodyweight to kilograms. To do this, divide the bodyweight by 2.2. Using the earlier example of the 30 year old male, if he tipped the scales at 198 pounds then he is 90 kilograms [198 divided by 2.2 = 90. Sounds lighter, doesn't it?] Next, multiply his bodyweight (in kilograms) by his oxygen uptake (in ml/kg min) and divide by 1000. Staying with the same example as before, your bodyweight (90 kg) multiplied by your oxygen uptake (42.12 ml/kg min) is 3790.8. To divide by 1000, simply move the decimal point three places to the left. This means that he consumed about 3.79 liters of oxygen during every minute of his run. Referring to Table #3 (again under 30-39 year old males), you'll find that this value (3.79) is considered to be an excellent level of fitness for males of his age relative to his bodyweight. As you can see, your oxygen uptake gives you a truer indication of your fitness level when it is expressed in L/min.

Estimating Caloric Expenditure

A person uses about 5 calories for every liter of oxygen that is consumed. So, simply take the oxygen uptake value in L/min and multiply it by 5. Staying with the same example, 3.79 times 5 is 18.95. This means that a 198 pound individual would use up almost 19 calories per minute when running 1.5 miles in 12.30.

To determine the total number of calories that were used during his run, multiply his calories per minute by his running time. In this case, multiply 18.95 by 12.5 (12:30 in decimal form). This indicates that he used about 237 calories during his run . . . and perhaps you even used a few calories doing these calculations!

References

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Table #2: Norms for Oxygen Uptake in Absolute Terms

WOMEN

Age	Low	Fair	Average	Good	High
20-29	<28	29-34	35-43	44-48	49+
30-39	<27	28-33	34-41	42-47	48+
40-49	<25	26-31	32-40	41-45	46+
50-65	<21	22-28	29-36	37-41	42+

MEN

Age	Low	Fair	Average	Good	High
20-29	<38	39-43	44-51	52-56	57+
30-39	<34	35-39	40-47	48-51	52+
40-49	<30	31-35	36-43	44-47	48+
50-59	<25	26-31	32-39	40-43	44+
60-69	<21	22-26	27-35	36-39	40+

Table #3: Norms for Oxygen Uptake in Relative Terms

WOMEN

Age	Low	Fair	Average	Good	High
20-29	<1.69	1.70-1.99	2.00-2.49	2.50-2.79	2.80+
30-39	<1.59	1.60-1.89	1.90-2.39	2.40-2.69	2.70+
40-49	<1.49	1.50-1.79	1.80-2.29	2.30-2.59	2.60+
50-65	<1.29	1.30-1.59	1.40-2.09	2.10-2.39	2.40+

MEN

Age	Low	Fair	Average	Good	High
20-29	<2.79	2.80-3.09	3.10-3.69	3.70-3.99	4.00+
30-39	<2.49	2.50-2.79	2.80-3.39	3.40-3.69	3.70+
40-49	<2.19	2.20-2.49	2.50-3.09	3.10-3.39	3.40+
50-59	<1.89	1.90-2.19	2.20-2.79	2.80-3.09	3.10+
60-69	<1.59	1.60-1.89	1.90-2.49	2.50-2.79	2.80+

Table #1: Predicted Values of Oxygen Uptake Based Upon the Time to Complete a 1.5 Mile Run

Time	Value	Time	Value	Time	Value	Time	Value	Time	Value	Time	Value	Time	Value	Time	Value
8:00	63.84	10:00	51.77	12:00	43.73	14:00	37.98	9:00	57.13	11:00	47.38	13:00	40.63	15:00	35.68
8:05	63.22	10:05	51.37	12:05	43.45	14:05	37.77	9:05	56.64	11:05	47.05	13:05	40.39	15:05	35.50
8:10	62.61	10:10	50.98	12:10	43.17	14:10	37.57	9:10	56.16	11:10	46.73	13:10	40.16	15:10	35.33
8:15	62.01	10:15	50.59	12:15	42.90	14:15	37.37	9:15	55.68	11:15	46.41	13:15	39.93	15:15	35.15
8:20	61.42	10:20	50.21	12:20	42.64	14:20	37.18	9:20	55.21	11:20	46.09	13:20	39.70	15:20	34.98
8:25	60.85	10:25	49.84	12:25	42.38	14:25	36.98	9:25	54.76	11:25	45.78	13:25	39.48	15:25	34.81
8:30	60.29	10:30	49.47	12:30	42.12	14:30	36.79	9:30	54.31	11:30	45.47	13:30	39.26	15:30	34.64
8:35	59.74	10:35	49.11	12:35	41.86	14:35	36.60	9:35	53.87	11:35	45.17	13:35	39.04	15:35	34.48
8:40	59.20	10:40	48.75	12:40	41.61	14:40	36.41	9:40	53.43	11:40	44.87	13:40	38.83	15:40	34.31
8:45	58.67	10:45	48.40	12:45	41.36	14:45	36.23	9:45	53.01	11:45	44.58	13:45	38.61	15:45	34.15
8:50	58.15	10:50	48.06	12:50	41.11	14:50	36.04	9:50	52.59	11:50	44.29	13:50	38.39	15:50	33.99
8:55	57.63	10:55	47.72	12:55	40.87	14:55	35.86	9:55	52.18	11:55	44.01	13:55	38.19	15:55	33.83