H.I.T. HIGH INTENSITY TRAINING
NEWSLETTER
Reliable and Sensible Information on Strength Training and Conditioning
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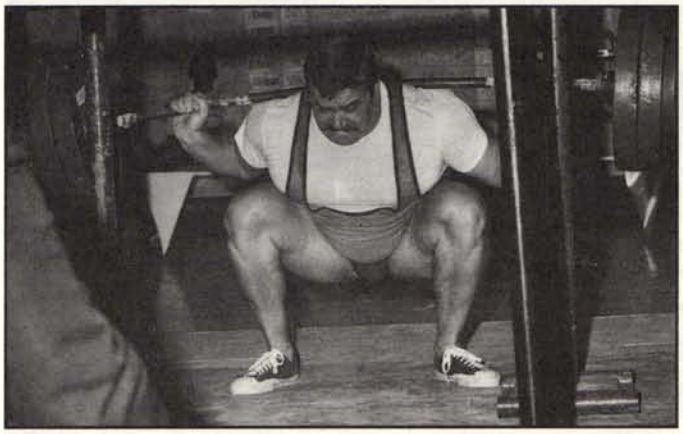
The Squat: Part Two

By Dr. Ken E. Leistner

If Part I of THE SQUAT raised serious questions for those who are torn between encouraging or discouraging the squat exercise, Part II may prove to be even more confusing. Like many aspects of strength training, the "art" and the "science" of the endeavor have failed to provide any definitive answers. However, years of experience and observation have led me to very clear and strong opinions regarding this controversial movement.

There are two primary problems related to the barbell squat. The first lies with the movement itself as many athletes will never be able to perform it safely or efficiently. The second lies with those who consider themselves expert in the field, and insist that everyone can squat, and should. Related closely to this is the competitive nature of the athlete who usually falls prey to allowing any weight training activity degenerate into a lifting contest. Through my many writings, I think I have been clear that the squat is a very "good", effective exercise. While it is difficult for anyone to work as "hard as is possible" on any exercise, it is most difficult as applied to the barbell squat. The exercise is uncomfortable, a combination of supporting the barbell across the shoulders/back; the pounding in the chest as one's altering posture compresses the lungs and makes it difficult to elevate the ribcage; the muscle burning in the thighs; the mid-set cramping in the buttocks; the difficulty of keeping the mind focused as one gasps for breath and struggles up from yet one more repetition. This, more than any other exercise, is not fun!

Those who have, at least in the minds of themselves and their followers, elevated the squat to a "science", have bombarded the popular muscle building press, never a bastion of reliable information, with the "fact" that one has to squat "heavily" if it is to be effective. While I will be the first to admit that one has to squat, or do any exercise at the highest level of intensity, using the heaviest weight possible for whatever the number of reps being attempted, the dangers of squatting in a high force/low rep manner are rather evident. Injury, or potential injury to the low back, hips, knees, and soft tissue structures are only one rep away with anything over five hundred pounds on one's back. I just recently watched a video tape of competitive powerlifter Matt Dimel descending with a weight around one thousand pounds. If this sounds like a lot of weight, remember that Mr. Dimel had worked progressively to the point that this is what it no doubt would have taken to stimulate further gains. While his musculature may have been strong enough to support and perform one or more repetitions with this monstrous weight, his knee was not. One knee buckled and tore, his leg snapped beneath him, and I assume that the muscles in the thigh tore completely loose. In either case, this horrifying injury, one that should not be viewed if one expects to ever again squat with confidence, has terminated this fine lifter's career. Later in the tape, it shows Mr. Dimel limping towards a six hundred pound bar, whereupon he completes a deadlift to the cheers of many. His courage cannot be doubted, attempting any type of heavy lifting, but the permanent physical damage is evident. While one might state that one thousand pounds could snap anyone's leg, a high school student squatting with four hundred pounds or a college athlete squatting with five hundred pounds, might have produced similar results, dependent upon the quality and inherent makeup of their own joint and muscle tissue.



Hugh Cassidy, pictured above, is a former National and World Powerlifting Champion. Hugh squatted 795 lbs. without any supportive gear.

The insistence upon treating the squat as a competitive lift, even in training, and among those who will never compete as a powerlifter, has led to the demise and disrespect of what truly is a wonderful growth stimulating exercise. When college strength coaches and head coaches believe that one must squat for a maximal single rep to "test" one's strength prior to the season and again after spring ball, there is pressure upon the athletes and strength coaches to train so that the players can in fact have the skills to perform heavy maximal single lifts. This leads not only to injury, but to the use of all the supportive gear that contributes nothing to gains in muscular

Organizing a Strength and Conditioning Program For College Baseball

By Joe Kasper, Exercise Physiologist

The Radford University baseball strength and conditioning program is divided into four phases: preseason, inseason, summer and fall season.

Pitchers' programs differ from position players. However, in certain situations, programs are altered to an even greater extent (injury, red shirt, poor fitness level and low skill level).

The preseason program commences two weeks after the fall season has ended and players have been evaluated for their baseball skills. During this time, players are not practicing baseball and can concentrate on increasing muscular strength. The second phase of preseason starts six weeks prior to opening day. Its purpose is physical conditioning and baseball skill development, for injury prevention and performance maintenance, during the season.

The next phase; inseason, can be defined at "that period during which competitive games are played". The purpose is to maintain fitness levels achieved during preseason and to maintain resistance to injury.

The summer phase is defined as "that period after the formal season has ended and before the fall season has begun". The purpose is preparation for the fall season, attainment of high levels of skill and increases in strength capacity.

The fall season in college baseball is a short season (4-5 weeks) which commences at the beginning of the school year. Its purpose is the development of programs for individual aspects of performance. This includes skill, strength, flexibility, and cardiovascular capacity.

Specifics of The Training Regiments

The preseason program (phase 1) is designed to concentrate on muscular strength. Individual programs are designed for players with a deficiency in a specific area. Pitchers and position players' programs vary slightly. The conditioning aspect of the program emphasizes endurance for pitchers and speed for position players.

The preseason program (phase 2—spring training) involves strength training twice weekly, interval training twice weekly, hydrocalistenics and hydroplyometrics twice weekly, as well as flexibility 6 days per week.

Once the season has commenced, players concentrate primarily on playing baseball. However, strength and speed endurance are maintained with a once weekly strength training routine and twice weekly Hollow sprint routine (sprint, jog, walk). For pitchers, Hollow sprints consist of 90, 60 and 30 yard sprints. For position players, Hollow sprints consist of 60 and 30 yard sprints. In addition, pitchers will jog, ride a stationary bike or swim 1-2 times a week to maintain cardiovascular endurance.

The summer season is specific to each players' needs. Programs are designed for athletes who play summer baseball, those who do not and for those players going through rehabilitation.

The fall season is designed for players to work on skills and learn more about the game (teaching aspect). Programs are designed for new players to meet their specific needs (skill, strength and cardiovascular capacity.

Off-Season Strength Training Exercises

Squats
Bent Knee Deadlift
Seated Shoulder Press
Dumbbell Fly's
Barbell Rows
Abdominal Crunches
Shoulder Internal Rotation
Shoulder External Rotation
Seated Calf Raise

Off-Season Conditioning: Pitchers

Schwinn Air-Dyne—3 days a week
1) 20 minute levels 3-4 or 5 with legs only.
2) 10 minute levels 1-2 with arms only.
30 minutes total
* Flexibility after cardiovascular workout.

Off-Season Conditioning Program: Position Players

Speed: Hollow Sprints
1) Sprint 60 yards—jog 60 yards—walk 60 yards
4 to 6 sets—Do in succession Rest 2 minutes
2) Sprint 30 yards—jog 30 yards—walk 30 yards
6 to 8 sets—Do in sucession
* Flexibility after speed workout

Note: For additional information contact Sports Conditioning Association, 718-948-2787.

Recording Workout Data

By Matt Brzycki,
Strength Coach, Princeton University

One of the most frequently asked questions posed by H.I.T. readers concerns the use of the workout card. Essentially, a workout card is a record of what you (or your athletes) have accomplished during each and every exercise of each and every strength session. In a sense, it is a history of your activities in the weight room. As you'll see, a workout card can be an extremely valuable tool to monitor progress and it can be used to identify exercises in which a plateau has been reached. In the unfortunate event of an injury, you can also guage the effectiveness of the rehabilitative process if there is a record of the pre-injury strength levels. For these reasons, it's especially important to maintain accurate data for every strength session.

A workout card can take an infinite number of appearances. However, you should be able to record the date of each workout, the weight used during each exercise, the repetitions performed, the order in which the exercises were completed and any necessary seat adjustments. The card should note the suggested repetition ranges for each movement. In addition, it might be helpful to separate the exercises according to body parts along with the suggested number of exercises that are to be performed for each body part. The card can list specific exercises and the more common movements (e.g. Leg Curl, Leg Extension, Bench Press) or may contain blank spaces so that you can fill in your own menu of exercises.

USING YOUR CARD

Figure #1 represents a sample workout card. Due to space constraints, it's been limited to the lower body

section (hips and legs). It's important to note several aspects of this particular workout card. Notice that the body parts are listed along the far lefthand side of the card accompanied by a recommended number of exercise selections (e.g. "LEG (3)"). A few exercises are listed but a blank space is provided in the event that a person opts for a movement that isn't shown (i.e. Hip Abduction). The suggested repetition ranges are also given for each exercise along with spaces to record seat adjustments.

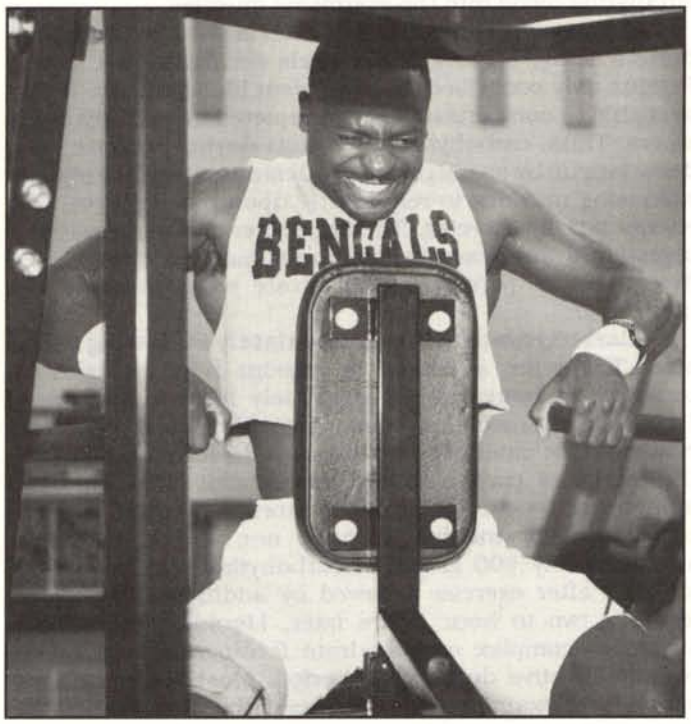
PRINCETON STRENGTH TRAINING

	DATE:			11-5	11-7	11-9	11-12	11-14	
	BODYWEIGHT:			170	171	171	170		
BODY PART	EXERCISE	REP RANGE	SEAT HT	WT / REPS	WT / REPS	WT / REPS	WT / REPS	WT / REPS	WT / REPS
HIPS (1)	Iso-lateral Leg Press	15-20	4	275 18 | 1	275 19 | 1	285 18 | 1			
	Deadlift	15-20					315 20 | 1	325 1	
LEGS (3)	Leg Curl	10-15		180 15 | 2	185 14 | 2	185 14 | 2	185 15 | 2	190 2	
	Iso-lateral Leg Extension	10-15		200 10 | 3	200 11 | 3	200 12 | 3	200 12 | 3	200 3	
	Seated Calf Raise	10-15		160 17 | 4	165 15 | 4	170 15 | 4	175 14 | 4	175 4	

Figure #1: Sample Workout Card (Lower Body Only

The area to the immediate right of this information is where you record your data from your strength sessions. Figure #2 details how to record the weight used, the repetitions performed and the order in which the exercises were completed.

Maybe the best way to illustrate the use of the workout card is to go through several sample workouts. Please refer to Figure #1, where data from four high intensity strength sessions have been recorded for the period between November 5-12.



Bengal Cornerback, Eric Thomas, trains intensely on the Hammer Iso-Lateral Low Row. Eric's remarkable comeback from total knee reconstruction will be the focus of a future article in HIT.

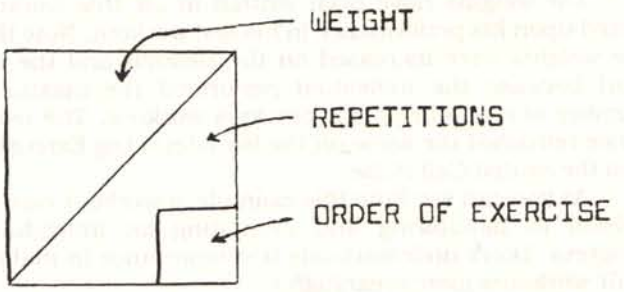


Figure #2: Recording Data

November 5

The individual started this workout using an Iso-lateral Leg Press as his hip exercise. Note that the person used 275 pounds and managed 18 reps with his left leg and 19 reps with his right leg. He then did 15 reps on the Leg Curl with 180 pounds. Using 200 pounds on an Iso-lateral Leg Extension, he performed 10 reps with his left leg and 11 reps with his right leg. His third and final leg exercise was a Seated Calf Raise. In this movement, he did 17 reps with 160 pounds.

November 7

Two days later during the week's second session, the individual again began with the Iso-lateral Leg Press. Because he did not do the maximum number of repetitions (20) during his last workout, note that he used the same weight. This time, however, he was able to perform 20 reps with each leg with 275 pounds—an increase of 2 reps with his left leg and 1 rep with his right leg. In his previous workout, he was able to do the maximum number of reps on the Leg Curl (15), so he increased the weight by 5 pounds—from 180 to 185. He managed 14 reps with the new weight. During the Iso-lateral Leg Extension, he used 200 pounds and did 11 reps with each leg—which was an increase of 1 rep with his left leg. Since he exceeded the maximum number of reps on the Seated Calf Raise in his previous workout, he increased the weight from 160 to 165 pounds and did 15 reps with the new weight.

November 9

The individual started off his third and final workout of the week with the Iso-lateral Leg Press. He increased the resistance by 10 pounds—from 275 to 285—and did 18 reps with each leg. For the second consecutive workout, he managed 14 reps with 185 pounds on the Leg Curl. On the Iso-lateral Leg Extension, he used the same weight as the previous workout—200 pounds—but was able to do one more repetition with each leg. Finally, he increased the weight on the Seated Calf Raise from 165 to 170 pounds and performed 15 reps.

November 12

On the first workout of the second week, the individual decided to change his hip exercise from the Iso-lateral Leg Press to the Deadlift. On this day, he was able to do 20 reps with 315 pounds. Next, he moved to the Leg Curl and performed 15 reps with 185 pounds. Using 200 pounds on the Iso-lateral Leg Extension, he did 12 reps with his left leg and 13 reps with his right leg. He completed his lower body exercises by doing 14 reps on the Seated Calf Raise with 175 pounds.

November 14

The weights have been written in for this workout based upon his performance in his last workout. Note that the weights were increased on the Deadlift and the Leg Curl because the individual performed the maximum number of reps during the previous workout. The resistance remained the same on the Iso-lateral Leg Extension and the Seated Calf Raise.

As you can see from this example, a workout card be helpful in monitoring and evaluating an individual's progress. Don't underestimate it's importance in making your workouts more meaningful!

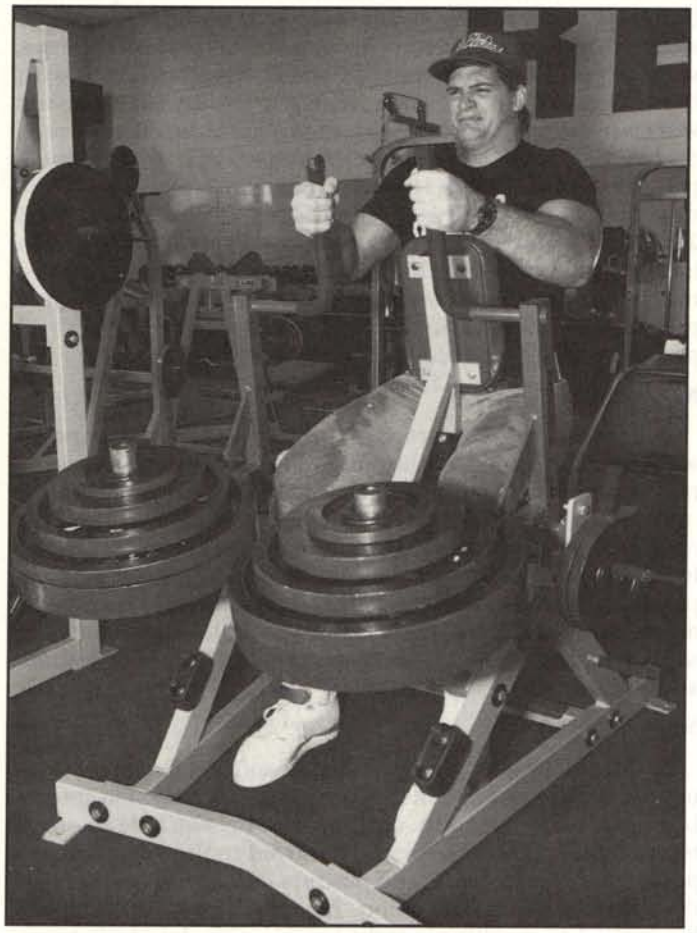
Ergogenic Aids Update

By Ted Lambrinides, Ph.D

CARBOHYDRATES

There has been considerable research performed regarding nutrition and athletic performance. However, most of the studies have examined the effects of nutritional intervention upon endurance athletes. While some of the results from the endurance exercise studies can also be applied to strength trained athletes, other findings require additional research.

This article will review the research findings regarding: carbohydrate intake prior to competition, carbohydrate intake during exercise, and carbodydrate intake following exercise, recommended carbohydrate intake.



Jim Lachey grinding out a set on the Hammer Iso-Lateral Row machine.

Carbohydrate Intake Prior to Competition: Most of the research surrounding carbohydrate ingestion prior to exercise have been performed with endurance athletes. If one is training hard and intense, there is a possibility that muscle and liver glycogen levels may be at suboptimal level. The ingestion of a diet high in carbohydrates will ensure optimal storage of muscle and liver glycogen. When discussing the intake of carbohydrates prior to exercise, the word "prior" can be taken to mean a week before or hours before competing.

The most practical means of increasing muscle and liver glycogen levels or "carbohydrate loading" the week prior to competition is: 1) Train intensely five or six days before competition 2) During the remaining days before competition, one should gradually reduce the amount of training and eat at least 600 grams of carbohydrates on each of the three days prior to competing. By following these steps, one will increase muscle glycogen stores 20 to 40 percent above normal.

If the above steps are followed, the pre-competition meal should consist of a low-fat meal containing 75-150 grams of carbohydrate. This meal should be consumed three to six hours prior to competition. However, if a carbohydrate loading regime is not followed the amount carbohydrate consumed in the pre-competition meal should be increased by approximately 30 percent.

If the above information is implemented, one can expect an improvement in endurance performance.

Carbohydrate Intake During Exercise: During prolonged exercise (one to three hours of continuous exercise at 70 to 80 percent of max VO2) athletes fatigue as a result of carbohydrate depletion. When exercising at this intensity, energy is derived by both fat and carbohydrates, with carbohydrates supplying slightly more. As exercise continues, muscle glycogen supplies are reduced and as a result contribute less to the carbohydrate requirements of exercise. Blood glucose increases its role in being the carbohydrate supplier by being transported from the circulating blood into the exercising muscles.

After two to three hours of exercise without carbohydrate feeding, blood glucose levels decline to low levels. Fatigue may occur because sufficient blood glucose is not available to compensate for the depleted muscle glycogen stores. Thus, carbohydrate feedings during exercise may delay fatigue by as much as 30-60 minutes by allowing the exercising muscles to rely mostly upon blood glucose for energy late in exercise. The recommended carbohydrate ingestion during exercise is approximately 8 ounces of a five to seven percent carbohydrate solution every 30 minutes.

Carbohydrate Intake Immediately Following Exercise: There are a couple of reasons why one should consume carbohydrates immediately following exercise. 1) Increase muscle glycogen resynthesis 2) Decrease post-exercise catabolic activity. Studies have shown that the intake of carbohydrates immediately after exercise influences the rate of glycogen storage. During days of competition or intense training, one should consume approximately 100 grams of carbohydrate within 15-30 minutes after exercise followed by additional 100 gram feedings two to hour hours later. Liquid, solid, simple sugar, or complex carbohydrate feedings appear to be equally effective during this period. Most of the studies which have examined glycogen resynthesis have focused on cycling or running. However, some recent research out of Ball State University has found similar increases in glycogen resynthesis in strength trained athletes who