

Building Power and Strength

The term *powerlifting* means different things to different people. The average person will immediately think of big people and heavy weights, and someone who knows nothing about the sport will think of *Olympic lifting* due to the exposure it has received on television during the Olympic Games. Those who are familiar with the sport of powerlifting are aware that Olympic lifting and powerlifting are completely different and require different training techniques. Olympic lifting is a two-lift sport—*snatch*, and *clean and jerk*—requiring speed, strength, and technique. Powerlifting is a three-lift sport—*squat*, *bench press*, and *deadlift*—requiring strength and technique but no time constraint or speed.

In powerlifting terms, *power* means movement of weight in a short period of time. This movement includes one's own body weight. *Strength* means the maximum force that a muscle or muscle group can generate to move a load through a full range of motion during one repetition. This is commonly expressed as the *one repetition maximum*, or *1RM*. The term *strength lifting* is a more appropriate name for the sport of powerlifting because strength does not have a time factor. However, the term *powerlifting* is firmly associated with the squat, bench press, and deadlift competition, so from this point on, the terms *power* and *strength* will be used interchangeably.

Factors Affecting Power and Strength Gains

There are many myths and confusion surrounding the meaning of strength, the fastest and easiest way to gain both muscle mass and strength, and how to determine the difference between a good program and a bad one. The first thing to remember is that strength is not easy to develop and that you cannot gain strength in a short period of time. A valuable commodity such as strength comes slowly and must be achieved with dedication and patience. There is no easy way to do this that is also safe. Strength is the foundation on which we build other things, such as muscular endurance, power, coordination, and proper technique. Many of my colleagues think that strength is not the foundation—it is only one of the factors of physical fitness and sport skill. I base my argument on the following facts:

1. Strength is the ability to lift something once; muscular endurance is the ability to lift that weight many times, but you must first be able to do it the first time.
2. Power is strength in the shortest period of time. An example of this is moving your own weight quickly. If your legs and hips are very strong, it is easy to move your body weight quickly, but if your legs and hips are weak, it is difficult, or impossible, to move quickly.
3. Coordination and proper technique are developed only after adequate strength is gained. You can concentrate on proper technique if the weight is easy to handle. For example, if you are shooting a basketball from a distance and you can barely get the ball to the basket, you will not be able to aim for the small opening of the goal. Remember that if strength development were as easy as some people think, everyone would be strong.

Neural Changes

When you began to train with weights you were probably excited at how fast you improved at first, but the quick gains began to taper off and improvements began to come much more slowly. The initial rapid improvement is known as *neural change*, which is also commonly known as *coordination*. Remember your first attempts at bench pressing and how the weight wobbled all over the area above your chest, and when you lowered the bar it never touched your

chest in the same place twice? Your body was trying to do what you wanted but did not know which muscles were necessary to perform the move. Therefore, the muscles of the arms, chest, deltoids, and upper back were all trying to help out but were actually interfering with, or working against, the muscles that were necessary to do the lift. However, in a short period of time you became steady and consistent with the movement, and the amount of weight you were lifting increased dramatically. Your body learned which muscles were necessary to perform certain lifts and which muscles were not involved. Neural and coordination improvement can only be developed by repeating the exercise many times using proper form and technique. Coordination not only makes it a more efficient task, allowing you to lift more, but also conserves energy needed for additional training. This period of neural changes is also the time you are developing proper lifting techniques, increasing your lifting ability, and decreasing the possibility of injury. Proper technique will be discussed in more detail when the exercises are presented in chapter 8.

Gains in Muscle Mass

The factors that determine increased muscle mass, or size, and increased strength and power are not fully understood. However, factors that are often discussed and generally accepted by physiologists and researchers are hypertrophy, hyperplasia, and genetic potential.

Hypertrophy

Scientists have believed and taught that people are born with a certain number of muscle fibers and this number cannot be increased. This means that you must increase the size of the existing fibers to become larger and stronger. Very thin protein, myofibril (actin and myosin), within the fibers increases in size as a result of strength training, and the protein builds a larger fiber, which produces bigger muscles and greater strength. This increase in the size of the existing muscle fiber is called *hypertrophy*.

Hyperplasia

Hyperplasia is defined as the increase in size caused by an increase in the number of muscle fibers. This is believed to occur as a result of a very intense long-term exercise program causing the involved fibers to split lengthwise and form additional fibers. The increase in number of muscle fibers has been observed in elite bodybuilders

and powerlifters who have trained intensely for years. Researchers are still investigating this idea, but due to the painful process involved in obtaining muscle fiber samples, limited research has been performed involving human subjects. The process of obtaining muscle fiber samples involves cutting a small piece of muscle fiber from the center of the muscle. The subject then participates in a strenuous training program, and again another sample of fiber is cut from the same muscle. The two muscle fiber samples are then compared.

You might be asking the question, "Does the training program change if I am trying to increase fiber size or number?" The answer is no. The training programs necessary to develop either hypertrophy or hyperplasia are the same.

Genetic Potential

If we accept hypertrophy as the main process causing fibers to increase in size, then we must also accept the idea of genetic limitations regarding the extent to which muscle will increase in size. Just as we know that some people are born with muscle-tendon attachments favoring force development, the same is true in regard to the number of muscle fibers. Some people are born with a greater number of muscle fibers than others, and therefore their genetic potential for muscle size, strength, and power is greater. Some people will take this information and use it as an excuse for giving up when their improvement is slow or stops altogether. However, this is not a reasonable excuse for giving up, because anyone who truly develops what they have to the fullest extent will be successful. Your challenge is to eliminate negative thoughts and design an effective program of training that is best for you and to train with a realistic goal in mind so that you will develop your full potential.

Muscle Changes as a Result of Resistance Training

The human body is *not* a machine. A machine constructed of metal, plastic, or rubber wears out from use. Parts must be replaced periodically even if you don't misuse the machine. A machine will not improve with use, especially if you push the machine past its normal operating capacity. The harder and more often you use it, the faster it wears out. However, this is not true with the human body. The body not only responds best when used but improves when it is pushed past what it is normally accustomed to doing. When the muscles are overloaded, the body responds by making the muscles

larger and stronger in that area. If you continue to overload, the muscles will continue to improve, which is the philosophy behind resistance training for added strength. Remember how it feels after an intense training session when the muscles burn? Two days later the muscles are very sore and you wonder if this should happen. Yes, this should happen if you are training intensely enough to increase the size of your muscles. The soreness you feel is the tearing down and rebuilding process, which produces bigger and stronger muscles each time they are torn down and rebuilt. You will quickly learn to associate the discomfort with a positive feeling of a good workout and a productive training session. As you associate more and more with people who are dedicated to becoming stronger, you will hear many times, "I am so sore I can hardly move." This can be considered a way to brag about a good training session. However, the nonlifters among us will think you are a little crazy if they hear you bragging about how great it is to be sore.

Selecting a Training Facility

Selecting the proper training facility can mean the difference between success and failure in your powerlifting program. There are several things to consider before joining a club, such as quality and types of equipment, location, time, atmosphere, cost, and availability of training partners.

Equipment. Does the club have the proper equipment for a powerlifting program, and is enough equipment available? Take a quick inventory to determine if the following items are offered:

- Several Olympic power bars that can withstand weights over 1,000 pounds
- Two or more safety squat racks
- Various sizes of Olympic weight plates totaling at least 2,000 pounds
- Locks of various sizes to secure the plates while lifting
- Bench press benches sturdy enough to support 800 pounds
- Chalk to use for maintaining a good grip

Location. How far do you have to drive for your workout? Pick the club closest to where you live or work if it meets all other criteria for a good training program.

Time. Even the most dedicated lifters usually have a full-time job, a family, and other obligations, making the time necessary to get a

proper workout very important. Make sure that you do not have to spend valuable time waiting for equipment. Also take into account a club's hours of operation; make sure it is open when you are available to work out.

Atmosphere. Is the facility set up for powerlifting, or is it a fitness center that really prefers not to cater to powerlifters? There has to be a special area for powerlifters because of the safety factor. The area should be set apart from other areas, and it should have a specially constructed floor, in case the weights are dropped, to protect against structural damage to the building.

Cost. Cost of membership at a club can vary greatly depending on where you live. The range will be from \$400 to \$1,000 per year. Extra luxuries, such as steam, sauna, whirlpools, and massages, will drive the prices up and they are not necessary for a good training program. However, if you have the money to spare, treat yourself—you deserve it.

Training partners. Perhaps the most important requirement is a facility where other powerlifters regularly work out. This is a sport where the participants need encouragement from others. When you train to your maximum each session you will have your off days, and the urge to quit will happen often. Encouragement from experienced powerlifting friends who have worked through the same difficulties can mean the difference between quitting and continuing to train.

Learning Proper Spotting and Safety Techniques

Safety in the weight room is a must. When you have hundreds of pounds on your back or over your face, throat, and chest, you want to be certain that all people involved are trained in the proper spotting and safety techniques. When a person spots you in a bench press with your maximum weight, you are literally putting your life in his or her hands. Know your spotter and his or her capabilities. Determine whether your spotter is easily distracted or knows how to spot, or perhaps he or she is too weak to safely handle the weight. If you have the slightest doubt concerning your spotter, get another one, or an additional one. If someone volunteers to spot you but you don't know the person or have little faith in his or her abilities, politely refuse the offer and get someone you trust. If you are worried about your safety, you cannot get a good workout. Be a good spotter yourself. Earn the reputation of being safety conscious and

you will become the person that others seek out as a training partner and spotter.

Selecting a Training Partner

The ideal training partner would be someone who is trustworthy, punctual, knowledgeable, sincere, similar to you in lifting abilities, close in age, and the same gender. However, the perfect partner is not always waiting for you to appear in the weight room, so look for the best partner you can get. I have had many good training partners who did not fit these criteria, and I was happy to have them. I learned something from every one of them, and I hope they learned from me.

The person you select should also choose you as a training partner so that both of you will feel comfortable with the relationship. You will spend as much as six to eight hours per week together so you must be compatible. Having the same interests, such as type of job, could be a good thing or a bad thing. The good thing about this is that you have something interesting to talk about during the brief rest periods, but the bad thing is that you might talk too much and neglect your workout. You need to remember to maintain your concentration during your workout.

Your workout partner should be able to give and take constructive criticism without being too harsh. If you feel that your partner's criticism is meant as an insult, discuss this with your partner and let him know your feelings. He probably did not realize how he was coming across to you and will change immediately.

Using Assistive Equipment

Assistive equipment is anything that helps the lifter that is not part of his or her own body, such as a body suit, a bench press shirt, knee wraps, lifting briefs, a lifting belt, footwear, wrist wraps, gymnastics chalk, baby powder, and smelling salts. This subject will be discussed in detail in chapter 7, Lifting Ergogenics.

General Rules of Powerlifting

The International Powerlifting Federation (IPF) has a set of general rules that other powerlifting organizations agree with. The other organizations are the Natural Athlete's Strength Association (NASA), USA Powerlifting (USAPL), and the Amateur Athletic Union (AAU). These rules will be listed here but you should consult the rulebook

of the organization you are competing in for specific rules. Throughout these rules, wherever "he" or "his" occur, such reference applies to either sex.

1. A. The International Powerlifting Federation recognizes the following lifts, which must be taken in the same sequence in all competitions conducted under the IPF rules:
 1. Squat
 2. Bench press
 3. Deadlift
 4. Total
- B. Competition takes place between lifters in categories defined by sex, body weight, and age. The Men's and Women's Open Championships permit lifters of any age in excess of 14 years.
- C. The rules apply to all levels of competition whether it be World, Regional, International, or any competition that states that it is conducted under IPF rules.
- D. Each competitor is allowed three attempts on each lift. Any exceptions are explained in the appropriate section of the rulebook. The lifter's best valid attempt on each lift, disregarding any fourth attempts for record purposes, counts toward his competition total. The winner of a category shall be the lifter who achieves the highest total. The remaining lifters shall be ranked in descending order of total. Lifters failing to achieve a total are eliminated from the competition. If two or more lifters achieve the same total weight, the lighter lifter ranks above the heavier lifter.
2. The IPF through its member federations conducts and sanctions the following World Championships:
 - Men's Open World Championships
 - Women's Open World Championships
 - Men's and Women's Combined Junior World Championships
 - Men's and Women's Combined Master World Championships
 - Bench Press World Championships
3. The IPF also recognizes and registers world records for the same lifts within the categories described hereunder:

Age categories

Men

1. Senior: From 14 years upward (some of the U.S.-based federations and associations have lowered the minimum age qualifications for participation in sanctioned competitions)
2. Junior: From 14 years to and including 23 years of age
3. Master I: From 40 years to and including 49 years of age
4. Master II: From 50 years upward

Women

1. Junior: From 14 years to and including 23 years of age
2. Senior: From 14 years upward
3. Master: From 40 years upward

Competitive lifting shall be restricted to competitors aged 14 years and over. The lifter must have attained minimum age on the day of the competition where age limits are imposed. A lifter may remain in the junior category throughout the full calendar year in which he reaches the stated upper limit of that category.

Age grouping for Master lifters is determined by their actual birth date.

Men over 60 years of age competing in the "from 50 years upward" and women over 50 years of age competing in the "from 40 years upward" categories shall be eligible for first-, second-, and third-place medals based on their Schwartz/Malone formula. (This formula is considered obsolete by the IPF and has been replaced by the Wilks formula. However, not all federations and associations have made the change, despite the fact that Dr. Schwartz has indicated that his formula is overdue for correction.) This will not affect the competition point scoring system of their placing within the "from 50 years upward" category for men and the "from 40 years upward" category for women.

Age categories and their further subdivisions may be adapted for use nationally at the discretion of the national federation.

Body Weight Categories

Men

1. Less than 52 kg up to 52 kg
2. 56-kg class: 52.01 to 56 kg
3. 60-kg class: 56.01 to 60 kg

4. 67.5-kg class: 60.01 to 67.5 kg
5. 75-kg class: 67.51 to 75 kg
6. 82.5-kg class: 75.01 to 82.5 kg
7. 90-kg class: 82.51 to 90 kg
8. 100-kg class: 90.01 to 100 kg
9. 110-kg class: 100.01 to 110 kg
10. 125-kg class: 110.01 to 125 kg
11. 125+ kg class: 125.01 to unlimited

Women

1. Less than 44 kg up to 44 kg
2. 48-kg class: 44.01 to 48 kg
3. 52-kg class: 48.01 to 52 kg
4. 56-kg class: 52.01 to 56 kg
5. 60-kg class: 56.01 to 60 kg
6. 67.5-kg class: 60.01 to 67.5 kg
7. 75-kg class: 67.51 to 75 kg
8. 82.5-kg class: 75.01 to 82.5 kg
9. 90-kg class: 82.51 to 90 kg
10. 90+ kg class: 90.01 to unlimited

Note: Lifters with disabilities have different starting and ending body weight limits than other lifters.

4. Each nation is allowed a maximum of 11 competitors distributed throughout the range of the 11 body weight categories for men and ten competitors throughout the range of 10 body weight categories for women. There must not be more than two competitors from one nation in any particular body weight category.

However, women's master lifters may be entered to a maximum of nine competitors distributed throughout the three combined body weight categories of 44-52 kg, 56-67.5 kg, and 75-90+ kg. Not more than three competitors from any nation shall be in any particular combined body weight categories.

5. Each nation is allowed a maximum of two alternates or reserves. These alternates or reserves may be substituted at any time prior to the commencement of the weigh-in for a body weight category. Each nation must submit a team roster giving the name of each lifter, a body weight category, and highest total achieved at

national or international level during the previous 12 months. The date and title of the competition in which the best total was achieved must also be stated.

The details must be submitted to the responsible official prior to the commencement of the weigh-in for the lowest weight category, i.e., 52 kg for men and 44 kg for women. The names of the alternates or reserves with their body weight categories and best totals must also be submitted at this time.

6. Point scoring for all World, Continental, and Regional Championships shall be 12, 9, 8, 7, 5, 4, 3, and 2 for the first eight placing in any body weight category. Thereafter, each lifter who makes a total in the competition shall be awarded 1 point. Point scoring for all national competitions shall be at the discretion of the national federation.

7. Only the point scores of the six best lifters of each nation will be counted for the team competition at all international championships. In the case of a tie in points scored, a final team placing shall be decided as described for team awards in item 10.

8. Any nation having been a member of the IPF for more than three years should endeavor to include at least one international referee among its team officials at world championships. If a referee from that nation is not present or, if present, does not officiate during the championships, then only the four best lifters from that nation will be counted for the team competition.

9. Teams shall be nominated to the Secretary of the IPF or Region and also the Meet Director at least 21 days before the commencement date of the championships. Failure to comply with this requirement may result in disqualification of the offending team.

10. Team awards shall be given to the first three places. In the case of a tie in the classification of a team or a nation, the team having the largest number of first places will be ranked first. In the case of a tie between two nations having the same number of first places, the one having the most second places will be classified first, and so on through the placings of the six scoring lifters.

Summary

This chapter gives you an overall look at the sport of powerlifting, including rules and regulations, tips on choosing a workout facility and finding a training partner, and the physiology of muscle gains. Reread this chapter after you have ventured into the world of powerlifting and you will discover something useful each time.

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