The complete guide to technique, training, and competition

# POWERLIFTING


DAN AUSTIN • BRYAN MANN

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Human Kinetics

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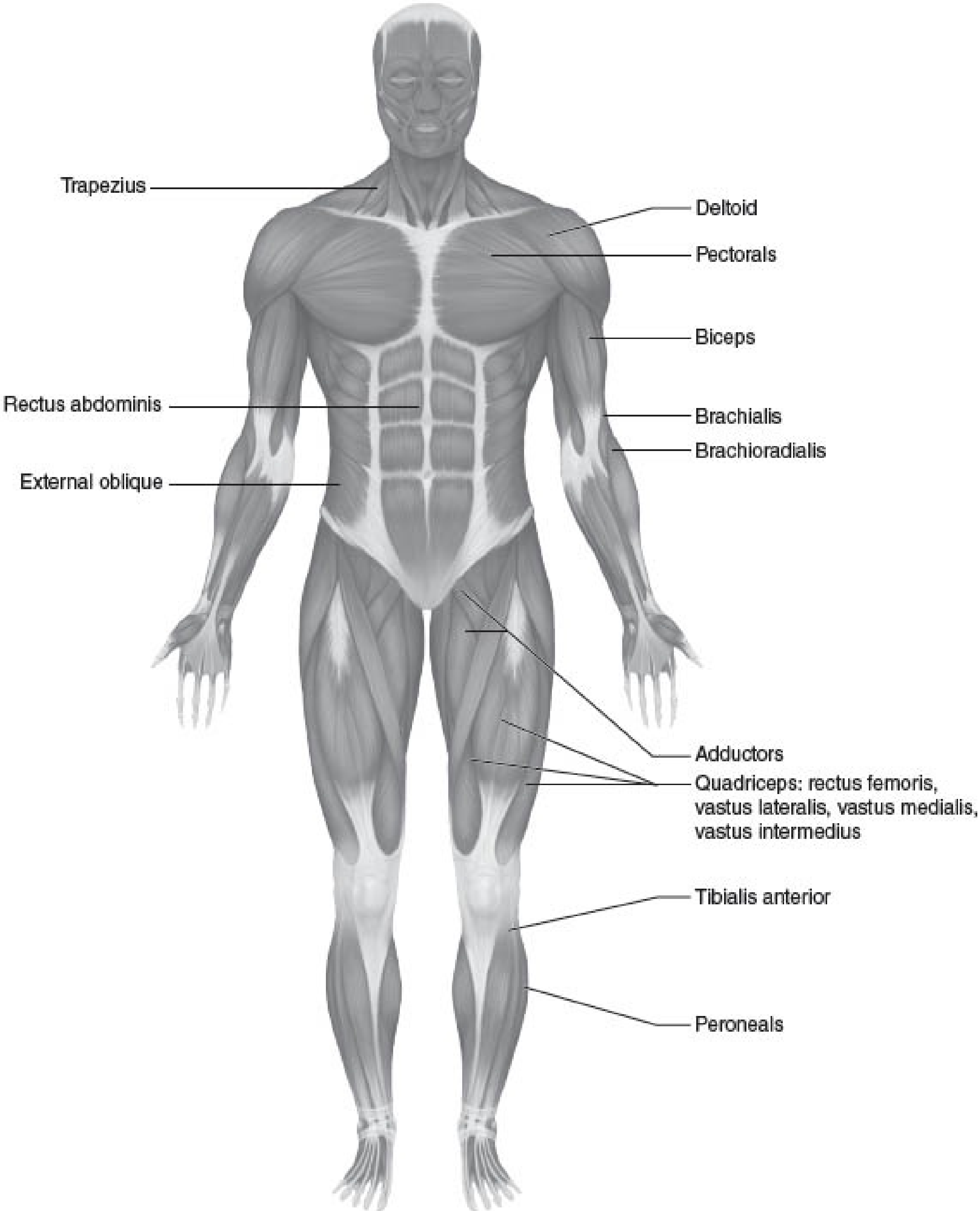
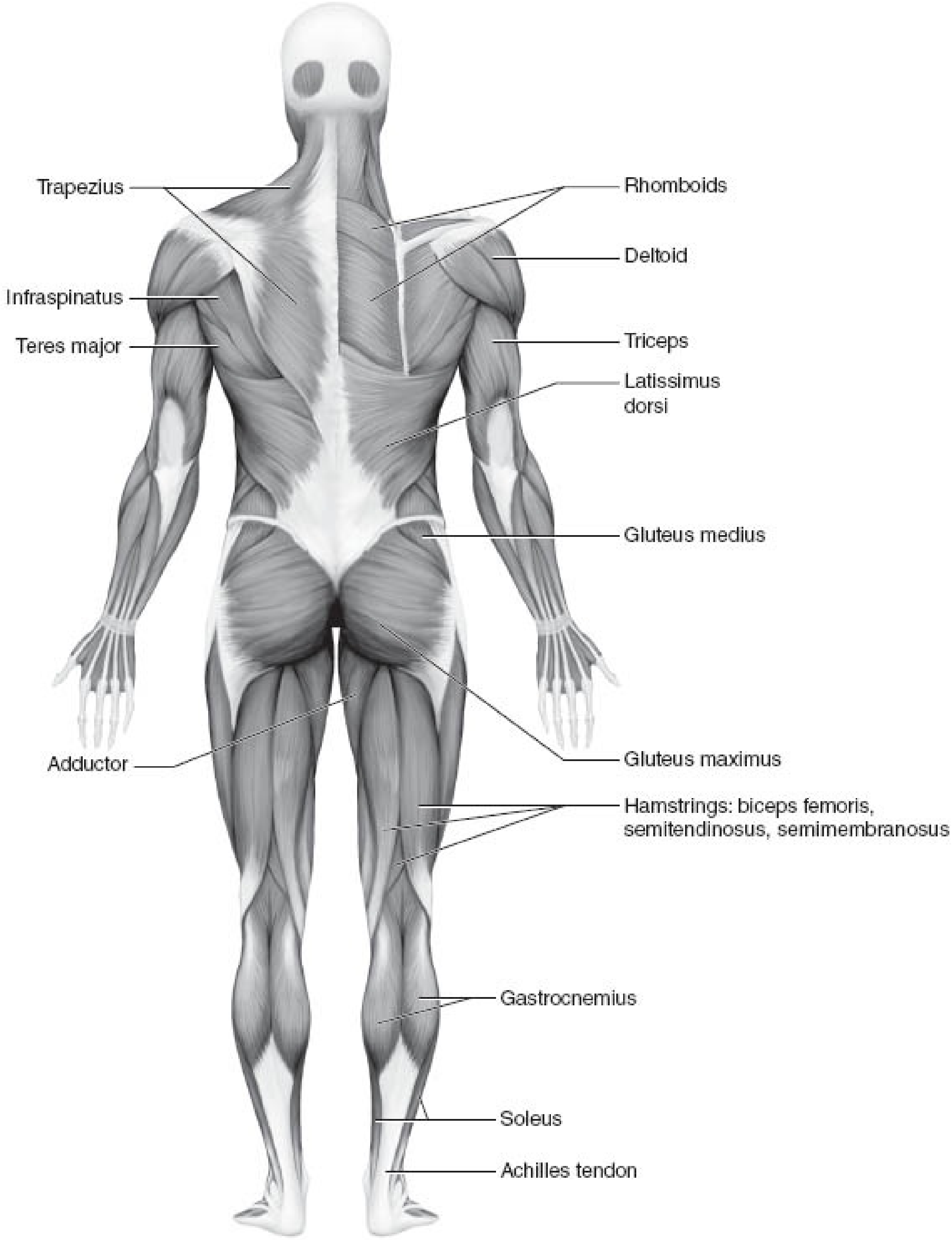



FRONT VIEW



Trapezius
Rhomboids
Deltoid
Infraspinatus
Teres major
Triceps
Latissimus dorsi
Gluteus medius
Gluteus maximus
Adductor
Hamstrings: biceps femoris, semitendinosus, semimembranosus
Gastrocnemius
Soleus
Achilles tendon


## BACK VIEW

CHAPTER 1

# Physiology of Strength and Powe

To understand how the body works in powerlifting, you first must understand some bas physiology. A basic understanding does not include topics such as sliding filament theory, th way the mitochondria work in the cell, or the role of fatty acids in metabolism for a long day at meet. If those topics interest you, you can read books on exercise physiology or even take courses human anatomy, physiology, and kinesiology. This chapter covers the level of physiology you need t know to become as strong as possible and perform optimally on competition day.

## Motor Learning

Knowing how the body learns can help you understand how and why to use various techniques. F example, think about how an infant learns to walk. He observes people walking and he wants to try too. After watching and analyzing others, he begins to try to walk. He slowly pulls himself up to stand, he wobbles, and he falls down. Next he pulls himself up to a stand, he wobbles, and takes a ste or two before falling down. Eventually after persistence, practice, and muscle development, he begi to walk naturally.

In their book *Weightlifting: Fitness for All Sports* (International Weightlifting Federation 1988 Tamás Aján and Lazar Baroga said that every movement, no matter how new it may seem, is based o previously learned movement patterns. So the more motor patterns you possess, the more moveme patterns you can learn and the more quickly you can learn them. Consider two people who sta squatting. Why does one struggle while the other excels? Because one person already possessed th necessary motor patterns and the other did not. The second person may be able to master the techniqu and excel at the squat but needs more time. A coach or trainer must demonstrate the movemen several times so the struggling lifter understands it, then the lifter must get under the bar and do himself. At first the movements feel funny to him, and he does all sorts of funny things as well, just a baby does when trying to walk for the first time. The lifter may crash his knees together then do a impression of the worm break dance, but while standing with a weight on his back. He may perfor something that looks like a good morning with bent legs. All along, he is attempting to put togeth movements that resemble the squat. The coach's job is to teach him to be aware of what he's doin wrong and how to fix it. Eventually he will have a squatlike movement down but will still need refine his technique. Louie Simmons once said that a coach needs to educate each one of his lifters the point at which the lifter is a coach. That way whenever you're doing a lift, you'll have 10 coach watching instead of one.

~~When learning a new technique, it helps if you can watch someone who has great technique~~, b coached on the technique, and then perform the lift yourself. If anything in this sequence has to b dropped, it should be watching someone with great technique. The coaching is crucial. If you don know what it's supposed to feel like, you won't realize when you are doing it wrong.

When someone first begins lifting, he experiences humongous gains in strength. It is not uncommo for someone who just begins lifting to put 30 or 40 pounds on his bench in a month or even less. Th has a lot to do with increasing the efficiency of the neuromuscular system. Essentially the brain is th CPU that runs the entire body. Nothing happens in the body that the brain has not processed eith consciously or subconsciously. When gaining strength at this rate, the lifter does not add any muscl it takes too long to add any significant muscle to improve strength by this much, this quickly. Th body simply learns how to do the movement and recruit more motor units that it already ha Remember the saying, *Use it or lose it*. The body has many high-threshold motor units it has nev used. You must learn to use them or you will never be able to recruit them in regard to weigh training.

Motor units work as all or nothing. When a motor neuron causes a muscle to contract, all the fibe that the nerve innervates will contract. It is impossible for some of the fibers to contract but others n when the nerve impulse is sent. However realize that one nerve doesn't innervate all of any one maj muscle group. Several nerves innervate the muscle, so if it will take more muscle to lift a weight, the more neurons will fire to recruit more muscle.

The entire muscle doesn't work all of the time; only a few units are used at a time. For exampl consider the biceps. When raising a 12-ounce can of soda to the lips, the biceps recruits enough mot units to move the can from the table to the mouth. Now, if the biceps used everything it had to lift th 12-ounce can, the speed at which it was moved and the force generated would not allow the can to sto before the mouth. Instead it probably would bust open a lip and knock out some teeth. Conversely, the biceps had to perform a curl with 40 pounds, which is a load often encountered by the body everyday life, it would be able to recruit the number of fibers to do that. Say you're moving up to personal record curl of 85 pounds. The first time you try it, you may not be able to complete it or may look ugly. However, you try the 85-pound curl again the following week and it goes up smoothl No muscle was added, but the body learned how to recruit motor units that were previously unused.

When dealing with more complex exercises such as the powerlifts, the motor units from differe muscle groups have to work together. These lifts are much more complex than a simple single-joi exercise such as the curl. Think of a single-joint exercise as teaching a task to one 3-year-old chil It's tough at first, but the child catches on and is able to do simple things on his own. A comple exercise is like getting 15 3-year-olds to do one task. When most of them are heading in the rig direction, a few decide to take off and do their own thing. When learning the squat, sometimes lifte can't push their hips back appropriately, sometimes their knees crash in, and sometimes their hips ris out of the hole before their shoulders. It takes time to be able to recruit the motor units in the prop muscles at the proper time in the proper sequence. It takes constant coaching from others for someon to be able to do the exercise properly.

Two types of motor recruitment exist—*intra*muscular and *inter*muscular—and thus two types muscle learning exist too. Intramuscular motor recruitment occurs within the muscle. It is a sing muscle group learning how to do something better and work within itself. In intramuscul coordination, muscle fibers of an individual muscle learn to work together more efficiently in order produce more strength or speed.

In intermuscular coordination, the muscles learn to work with each other to perform gro movements more efficiently. Efficiency is gained when muscles perform the movements over an over again, but while trying to use the best form possible. For instance, think of an uncoordinated k who just finished a growth spurt and is trying to perform a lunge for the first time. Most likely he wi fall over to the side, drop his chest, possibly even fall backward when lunging forward. If he continu with proper coaching, eventually he will be able to lunge with the chest up and body in a straight lin not fall, and look good doing it. At that point of competency, the muscles have learned to perform th task. This phenomenon resembles a worker in a factory. At first a new worker at an auto plant ma take 3 hours to put together a transmission. With repetition, however, he learns how to do it efficientl and the time is cut in half. It is simply learning how to do things. Once you have learned how to d something, you can do it more efficiently and more quickly.

While the body gains strength very quickly by learning how to use its motor units more efficientl gaining muscle is a much slower and more arduous process. You can gain strength more quickly tha muscle.

## Agonist Versus Antagonist Muscle

The muscle that is actively doing the work and producing the force to move the weight is called th *agonist*. The agonist can be a prime mover, secondary mover, or stabilizer. The *antagonist* is th muscle or muscle group opposite the agonist. When the agonist is working, the antagonist is relaxing

Typically agonists and antagonists are on opposite sides of the joint. For example, examine th elbow joint. During a biceps curl, the biceps is doing the lifting so it is the agonist. The triceps, th antagonist, is relaxed, allowing the greatest contraction and range of motion for the biceps. If th agonist and antagonist contract at the same time, the muscle is unable to change its length. In the ra event that the muscle length does change, meaning one muscle group is stronger than the other an wins the tug of war, the bar movement is inefficient and the bar moves very slowly. In this situatio the weight isn't the opponent, the body is.

## Motor Learning Enhancement

Sport psychology for powerlifting will be discussed in great detail later. Meanwhile, this sectio covers an intrinsic portion of learning technique that greatly speeds up the process for any exercis the use of Cook's model (Vernacchia, McGuire, and Cook, 1996, *Coaching Mental Excellence*, Ward Publishers, page 84). This model uses the mental routine "See it, feel it, trust it, believe it, and achiev it." This model works well because the visualization prepares the nerves involved in the movement fire in the proper sequence. Visualization is a proven method. If you are having a hard tim performing an exercise or correcting technique, go back to Cook's model to improve your technique.

The first step is to see it: You have to see yourself doing the technique properly, like a movie i your head. You must see everything—the weight, the crowd, and the judges. You must see yoursel perform the exercise successfully with perfect form, with three white lights on the judges' board.

The next step is to feel it: Feel the weight, the gear, the platform, the crowd, the power, and th muscles firing in proper sequence. Taste the air and smell the ammonia and liniment in the air.

Once those two steps are complete, you must believe you can execute the weight with perfect for and trust yourself to be able to act on it. Next is to simply go achieve it.

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## Muscle Fibers

The body has two main muscle fiber types and an indefinite number of smaller types. The main typ are slow-twitch and fast-twitch fibers. Slow-twitch muscle fibers are slow. They are primari endurance fibers that are set to go all day but can’t produce much force per contraction. Slow-twitc fibers are used in everyday walking and standing.

Fast-twitch fibers are fast and produce power. These fibers are used in activities that require mo effort such as sprinting, jumping, throwing, and lifting weights. How strong or explosive a person ca be greatly depends on muscle fiber type. People are born with predominately one type or the othe This is why some people are naturally good at endurance exercises but can’t bench the bar or ca sprint a 10-second 100-meter dash but can’t run a full lap without getting gassed. Because of the fiber type, some people naturally are able to lift more weight than others who are similarly sized eve with no training. Fiber type is a big reason a guy who weighs 165 pounds can bench 405 pounds f multiple repetitions. He has a high predominance of fast-twitch fibers that produce more force an allow him to move more weight with a smaller muscle mass.

# Building Muscle

Many people think that muscle is built in the weight room because that is where they see it get bi This assumption is both right and wrong. Muscles get big as a function of what is done in the weig room, but they don’t get big in the weight room. They get big in the bedroom.

## Hypertrophy

When weights are lifted, microtraumas occur to the muscle fibers. The concentric and eccentr contractions of the muscles as they lift and lower the weights cause some damage, especially if th lifter is using progressive overload and forcing the muscles to adapt to a new stimulus. Along wi this damage, additional blood and fluid flow to the muscles, providing that pumped-up feelin familiar to lifters. When the muscle is damaged, the body repairs itself by various means. It doesn want damaged muscle fibers, so it will rebuild them. The body also recognizes that it needs mo muscle to meet the demand imposed on it, so it adds muscle. It breaks down proteins in the damage muscle and adds more proteins on top to create the additional muscle. These additions are made small amounts at a time, so it takes time to add any additional muscle. Adding muscle is calle *hypertrophy*.

There are two speculated types of hypertrophy. One is functional, or myofibrillar hypertrophy. Th other is nonfunctional, or cytoplasmic hypertrophy. Myofibrillar hypertrophy develops from the use heavy weights. This is typically a much slower means of gaining muscle size, but the increase in th size of the muscle fiber increases the strength of the muscle fiber. This hypertrophy occurs in th myofibril’s actin and myosin within the muscle, which increases the strength of contraction.

Cytoplasmic hypertrophy develops from using lighter weight and higher volume. It taxes th muscle, but not in how much it is able to move. The damage to the muscle is different. Therefore, th ~~myofibrils don't increase, but the space in between the sarcomeres does. This type of hypertroph~~ does not feature consistency between the size of the muscle and the force it can produce, which is wh it is called nonfunctional.

The goal of powerlifting is to be able to move the greatest amount of weight on the bar with th lightest bodyweight possible. To do this, you want to ensure that you focus on functional rather tha nonfunctional hypertrophy. Bodybuilding relies primarily on high volumes of exercises with short re periods and light weights to get the greatest amount of volume in the shortest time. This metho makes a person bigger, but not stronger. There is an old saying that *big ain't strong, only strong strong*. Many bodybuilders look as if they could bench press 900 pounds, but they struggle with 31 This is because the type of hypertrophy they have induced. The powerlifter, on the other hand, is ofte deceptive. Jason Fry, who competes at either the 181-or 198-pound weight class, looks like an in shape guy. If you saw him in the gym, you'd think he could bench maybe 365 pounds. However, h has benched well over 750 pounds at the 181-pound weight class and 770 pounds at the 198-poun weight class, so obviously his size is very deceptive. His hypertrophy development has all bee functional, and all of the muscle he has gained puts out force.

# SAID Principle

The improvement of strength is based on the **s**pecific **a**daptations to **i**mposed **d**emands, or SAI principle. The body adapts to the stimulus placed on it. For instance, consider someone who gets a jo in construction. He starts out swinging an 8-pound sledgehammer all day. When he goes home night, he is so tired and sore he can't do anything except fall down on the couch and go to slee without showering. Three weeks later, he can swing that 8-pound hammer all day and be fine. H could even go out and play recreation league softball after work without a problem. However, if h breaks his hammer and has to use one a couple of pounds heavier, he is right back on the couch aft work until he adapts to the new hammer weight. This is because his body adapted to the stimulus the 8-pound hammer. The hammer imposed a demand on the body that led to a specific adaptation muscle. The body wasn't ready for more than the 8-pound hammer, so he became fatigued and sore.

# Progressive Overload

The progressive overload principle states that once the body adapts to the imposed demand from th SAID principle, you need a heavier weight. You use progressively heavier weights to impose ne demands on the body, thus making another adaptation. The ancient Greek wrestler Milo of Croton is classic example of progressive overload. Milo decided that to get stronger, he would hoist a calf on h shoulders and walk laps around the arena. He did this every day and as the calf grew in size, Mi gained in strength. He became so strong that he was never pinned by anyone in Greece and finished h wrestling career undefeated.

Progressive overload is how most periodized programs work. They start with a lower weight an over the course of the training cycle, work up to a higher weight through a preplanned increase eac week, causing the adaptation to occur by overloading the muscle. Just like Milo and his calf, you ca get stronger by moving up in weight each week.

# Valsalva Maneuver

When people train with weights for health, they are taught to breathe in on the eccentric contractio and out on the concentric contraction. In powerlifting, this technique is incorrect. In powerlifting, yo use the *Valsalva maneuver.* With this technique, you bring in the air and hold it to create a fluid ba effect. The pressure that usually causes headaches is also the same pressure that protects the spi under maximal loads and allows the force to transfer through the body rather than stop at a soft spo For instance, on the squat, the lifter attempts to draw in as much air as possible to expand the stomac This locks the chest into place, preventing the lifter from rounding over to the front. If the athlete d not hold in the air, the chest would crumple forward from the weight and the legs, no matter ho strong they were, would not be able to drive the bar up because it was already going down from th weakness.

Force transfers most perfectly through hard surfaces. The lifter who can get tight and create th most pressure possible is able to transfer the most force through the body and lift the most weigh Consider pushing a car in the snow or on concrete. Which is easier? On concrete, the force you app to the ground is directly applied back to the car. In snow, however, the force applied toward th ground is dispersed by the snow and not transferred.

This principle is true for all exercises. The more tightness and pressure developed for each exercis the more force can be transferred, even on the bench press. Consider the ageless wonder, Bi Gillespie, as an example on the bench press. Bill turns purple at 135 pounds because he trains the bod to put out the pressure to get tight and transfer the force.

# Blood Pressure

A powerlifter's blood pressure goes up into the zones of a myocardial infarction (heart attack) durin a maximal attempt. Look at nearly any picture of a powerlifter during squat or deadlift maxim attempt; he is purple. All the muscles are contracting maximally, putting pressure on the arteries an veins and making it difficult for blood to flow through the body. This causes the heart to work hard and push the blood harder.

Remember the SAID principle? This is another example of it. Since the heart has to work harder overcome resistive forces and push the blood through the body, the left ventricle greatly increases size and density. Essentially this prevents the left ventricle from bursting. The heart is a muscle lik any other. When it has to work harder, it grows in size.

When the heart increases in size as a result of pumping blood through the body, it also increases contractility, which helps push the blood through without much resistance. In powerlifting, the musc has to push against great pressure, causing it to get stiffer. This effect needs to be balanced throug some sort of cardiovascular work, not necessarily high intensity cardio work, but something th makes the heart work. The heart needs to get its good work in, too.

# Summary

The specific adaptations to imposed demands (SAID) principle governs all types of training. powerlifting, the goal of training is to become stronger, so the demand imposed on the body mu cause the adaptation of greater strength. If the right demands are not placed on the body, th ~~adaptations will never occur and the lifter will never become stronger and achieve personal records~~ any of his lifts.

The concept of progressive overload has been around since Milo of Croton. It involves using heavier weight each week over time to create an overload that gets progressively heavier, causing th body to adapt, again using the SAID principle.

The Valsalva maneuver is key to all competitors. It works by increasing internal pressure, thereb allowing force to be transferred efficiently through the body. If sufficient tightness is not derived b internal pressure, power is not transferred and the amount of weight that can be lifted is decreased.

These basic concepts are true regardless of training philosophy. They are key physiologic concepts that every program is built on. A lifter who doesn't lift heavier weights over time won't g stronger. A lifter who doesn't learn how to do the Valsalva maneuver won't be able to get tight enoug to lift maximal loads.

CHAPTER 2

# Muscle Fueling

Many powerlifters lack general knowledge in nutrition. All powerlifters spend a lot of tim researching exercises and routines to make their squat, bench press, and deadlift go up, but fe spend time reading about what or how to eat. Proper nutrition helps you recover for the next workou have more energy during the workout, and be less likely to get injured. While it may not taste as goo as eating fast food, good nutrition will make you stronger.

This chapter introduces you to the basics of good nutrition. Hundreds of books are available provide more in-depth coverage specifically on nutrition. For the powerlifter, knowing the basics ma be enough.

First, at the chapter covers the macronutrients protein, carbohydrate, and fat. It explains what the are, what they do, and where to find them. Water is also considered as a macronutrient. These ar called *macro*nutrients because they are the big deal of nutrition. If you take care of these things firs most of the smaller things will fall into line.

## Protein

Protein is probably the powerlifter's favorite macronutrient. If not the favorite to eat (which may we be ice cream or pizza, but those aren't macronutrients), it is the most well known. Protein assists building and repairing muscle after trauma occurs. Remember, powerlifting works by causing musc trauma. If you have no protein, you have no muscle repair. If the muscles aren't repaired after they a broken down in a workout, they will not get stronger and will be more likely to tear in subseque workouts. Think of pouring a sidewalk. You can dig down, frame, level, and prepare all you want, bu if you have no cement, you have no sidewalk. Likewise, you can train all you want—prop percentages, volumes, and hard work—but without protein the muscle will not recover and you wi see no results.

In short, protein is muscle. It provides 4 calories per gram. Protein is made up of 24 amino acids f muscle; 8 are essential. The body does not make essential amino acids, so you have to get them fro food or supplements. The body does make nonessential amino acids, so you don't need to get the from external sources such as food.

The main sources of protein are animal based. If it was a muscle of something, it is going to be good source of protein. Beef, chicken, and fish are all good sources of protein. Eggs, dairy product nuts, seeds, and legumes provide protein, too. Vegetables have some protein, but for the most pa they are incomplete proteins, which means they do not contain all of the essential amino acids. F your body to absorb the protein from a vegetable and use it to build muscle, you must get complementary protein from another food that has the essential amino acids the vegetable does n contain. Together they make a complete protein. For instance, beans and rice are complementar because the rice has what the beans don’t.

Protein is often misunderstood. Many people think that you can’t get enough protein. This is n true. The body can process only so much in a day, which is said to be 1.5 to 2.0 grams of protein p kilogram of bodyweight. For example, someone who weighs 220 pounds (100 kilograms) can use 15 to 200 grams of protein per day quite efficiently. This is contrary to the popular belief amor powerlifters and bodybuilders that they need 2 grams of protein per pound of bodyweight, or that 22 pound individual would get 440 grams of protein per day. This amount of protein intake leads to or thing—expensive urine!

Someone who does take in excessive amounts of protein should make sure he has a high intake water. Water is required to help the kidneys process all of this excess protein. Not drinking enoug water over extended periods of time can lead to kidney damage. It is similar to overuse injuries suc as carpal tunnel syndrome. If you type a lot while in poor position for one day, you may be sore th next day but without long-term effects. If you do it day after day for years, you end up with th overuse injury.

### Best Sources of Protein

**Egg whites:** One large egg white has 4 grams of protein.

**Boneless, skinless chicken breast:** One 4-ounce serving has 24 grams of protein.

**Lean beef:** One 4-ounce serving has 22 grams of protein.

**Water-packed tuna:** One 3-ounce serving has 22 grams of protein.

**Skim milk:** One 8-ounce serving has 8 grams of protein.

## Carbohydrate

Carbohydrate is energy. This is the gas that fuels the fire to keep you going through workout Carbohydrate provides 4 calories per gram, the same as protein. Carbohydrate can be broken dov into simple and complex, or even further through the glycemic index.

Simple carbohydrates are sugars; think of juices, candy, sodas, and other sweets. Use them for quic energy. Their energy enters the bloodstream quickly and is gone quickly either by use or storage a fat. This explains those times you felt great at the start of a workout but felt fatigue before you cou finish the workout; the simple carbohydrate energy was used first and zapped your energy quickly.

Complex carbohydrates are sources of extended energy; think of pasta, potatoes, brown rice, swe potatoes, and bread. The energy from complex carbohydrates takes longer to hit the bloodstrear providing a more sustained source of energy. Complex carbohydrates are the best source of energ Consume complex carbohydrates prior to workouts and meets. Before meets, try carbohydrate loadin feeding the body complex carbohydrates three days before competition.

~~Since carbohydrate is the main source of energy, look to it first to provide the energy for workin~~ out. If not enough carbohydrate is left, the body does not immediately look to fat. Instead it breal down muscle for energy. This is why carbohydrate is said to have a muscle-sparing effect whe consumed; it spares the muscle from being broken down for energy. In your entire body, you can stor only about 250 grams of carbohydrate, but you have unlimited storage space for fat.

The glycemic index breaks down carbohydrate even further. The glycemic index is a scale based o how quickly the energy from a food will hit the bloodstream. The quicker the energy hits th bloodstream, the higher the glycemic index value of that food. When sugar enters the bloodstrean insulin is released to store the sugar in the bloodstream. The higher the glycemic index, the mo sugar hits the blood at one time, which stimulates the pancreas to produce insulin. When high amoun of sugar are in the blood, high amounts of insulin are produced to store the sugar as glycogen in th muscle for immediate usage or to store it in fat cells for the long term. When all of the sugar is store the brain signals the stomach to be hungry to bring in more energy.

The lower the glycemic index value of a food, the longer it will take for the food’s energy to hit th bloodstream. The glycemic index considers the fat and fiber content of a food to determine how lon it will take for the sugar to hit the bloodstream. For instance, potatoes and sweet potatoes are bo complex carbohydrates. Sweet potatoes have more fiber, so they have a lower glycemic index valu since it will take longer for the body to digest the sweet potatoes and longer for the sugar to hit th bloodstream. Which is better, a food that is low on the glycemic index or one that is high? Th depends on your goal. If you are in the middle of an intense workout, you need something quick ar readily available. You would pick a carbohydrate high on the glycemic index such as a sports drin However, if you are spending a long day at the office, you want the longest, most sustained energy possible. A sweet potato or other food low on the glycemic index would be a good choice. Nonstarch vegetables are also a source of carbohydrate. They are low on the glycemic index because of their lo sugar and high fiber content.

## Best Sources of Carbohydrate

**Brown rice:** One cup has 44 grams of carbohydrate and a glycemic index of 50.

**Oatmeal:** One cup has 56 grams of carbohydrate and a glycemic index of 61.

**Whole-grain pasta:** One cup has 37 grams of carbohydrate and a glycemic index of 45.

**Sweet potato:** One cup has 41 grams of carbohydrate and a glycemic index of 54.

**Whole-grain bread:** One slice has 11 grams of carbohydrate and an average glycemic index of 71.

Basic sources of carbohydrate include anything made with a grain, tuber, or sugar—bread, past oatmeal, rice, sports drinks, potatoes, corn, tortillas, vegetables, fruits. The source you choose depen on your goal at the time. For instance, if you want to decrease body fat, pick sources of carbohydra with the lowest glycemic index as possible. This way you will feel less hunger and consume few total calories.

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# Fat

Fat is a source of energy. All types of fat contain 9 calories per gram. Fat has been demonized over th years simply because of the word *fat*. People have said that fat makes you fat or that the fat you e goes directly to the fat on the body. Despite some popular beliefs, the fat you consume does n transfer unchanged into body fat.

Fat can be broken down into saturated and unsaturated fats. Saturated fats are considered unhealth and are thought to promote arthrosclerosis, high cholesterol, and abdominal fat. Some examples sources for saturated fats are fried foods, red meat, chocolate, baked goods, and potato chips.

Unsaturated fats are thought to clear out the arteries and veins. Some sources of unsaturated fats a olive oil, almonds, and fish.

Fat is important for many reasons. It helps the body absorb the fat-soluble vitamins A, D, E, and I Body fat keeps you warm and cushions your organs. In terms of athletic performance, the fat you wa to consume primarily is unsaturated fat. It provides the greatest health benefits and the most bang f your buck. Keep fat to 25 to 30 percent of your daily caloric intake.

## Best Sources of Fat

**Olive oil:** One tablespoon has 14 grams of fat (1.9 grams saturated, 11.2 grams unsaturated).

**Almonds:** One ounce has 14 grams of fat (1.1 grams saturated, 12.1 grams unsaturated).

**Salmon:** One 3-ounce serving has 10.5 grams of fat (2.1 grams saturated, 8 grams unsaturated).

**Flax (ground):** One tablespoon has 3 grams of fat (0.3 grams saturated, 2.5 grams unsaturated).

# Water

Water is one of the most important and underconsumed nutrients for powerlifters. The human body made up of 60 percent water. Muscle is 80 percent water. When you are dehydrated, you have les muscle to push with. Dehydration occurs when you lose 2 or 3 percent of your body weight in wate which creates noticeable decreases in the ability of the muscle to produce maximal force and susta force. With a 2 to 3 percent loss in body weight, you can’t lift as much weight or be able to attem several repetitions. Every action in the body to make energy, produce force, or repair itself requir water. Without water, you don’t feel good because your body is not able to perform. When your bod is dehydrated, you are a greater risk of muscle pulls and tears when training at high levels. Wat provides muscle elasticity and flexibility to prevent pulls and tears. When the muscle is dehydrated, doesn’t have these characteristics and is inefficient and unable to perform as normal.

Following are some more negative effects of dehydration:

- Increased heart rate
- Decreased cardiac output; the body works harder per stroke to push the blood through
- Decreased muscular endurance
- Increased muscle cramping
- Decreased strength and power
- Decreased balance
- Increased risk of heatstroke or heat exhaustion

If you feel thirsty, you have already lost about 1 percent of your body weight in water. This alon leads to a decrease in performance. Beyond the scale there is a simple way to check your status make sure you are hydrated properly. Check your urine in the toilet. First make sure you are n peeing into blue water, which obviously affects the color. Next, check the color. Your urine should b as light as possible. It should be the color of lemonade or lighter. If it is darker than that, you a dehydrated and should consume water immediately.

Water is responsible for carrying nutrients to muscles as well as lactic acid and the byproducts exercise away from the muscle, allowing it to repair. If you do not take in enough water, the muscle are not able to repair and you stay sore longer. Did you ever think that by drinking more water, yo would be less sore or sore for shorter periods? This is an amazing result from such a chea supplement. Since water is in every cell, it also is partly responsible for cushioning organs an lubricating joints. Some of the daily stiffness people experience is a symptom of dehydration. Simp drinking more water can help them feel a lot better.

Water is available from anything you drink. Liquids are split into two categories: hydratin beverages and nonhydrating beverages.

Hydrating beverages are any liquids you drink that increase your current water content. Hydratin beverages quench your thirst and actually pass the water on to the body. Since the goal of drinking to hydrate, hydrating beverages are the ones you want to consume the most. Some examples hydrating beverages are water, lemonade, and sports drinks.

Nonhydrating beverages do not increase hydration. These drinks contain one or more diuretic chemicals that tell the body to expel water instead of hold on to it. Caffeine and alcohol are commo diuretics. It is not fully understood if caffeine's diuretic effect translates into an actual dehydration a simple balancing out of the water that was consumed with it. Alcohol, on the other hand, doe dehydrate the body. A good portion of the hangover felt after consuming alcohol is from dehydratio plus a lack of B vitamins and a decrease in blood sugar.

Remember, your body does not produce water; you must consume it.

# Gaining Weight

Back in the old days, the way to gain weight was to eat everything available and get to goal weight quickly as possible. That was considered the best way to get strong. Times have changed, and peop now know more about the human body. When a person gains weight relatively quickly, the primar weight gained is fat. Muscle is gained slowly and lost quickly since it does not store energy well. Fa on the other hand, is gained quickly and lost slowly. It should be pretty obvious that when someon gains 15 pounds in a month, the primary weight gained is fat. When someone puts on 15 pounds of fa he will be stronger. The old adage *mass pushes mass* is quite correct. However, he will not be as stron as ~~possible. Fat has no contractile components, no actin and myosin. Fat does not contract to push th~~ weight. Any strength gains made from gaining fat are simply gains in leverage.

The proper way to gain weight is to do so very slowly. Look to gain no more than 1 or 2 pounc (0.45 or 0.9 kg) per week to ensure that as much of the weight gained as possible is muscle. Consid the caloric composition of a pound of fat versus a pound of muscle. A pound of muscle and a pound c fat are both about 3,500 calories. However, they are not the same size. A pound of fat is much larg than a pound of muscle. Next time you are grocery shopping, compare the size of a pound of lea ground beef to the size of a pound of lard. You will notice a large disparity in the sizes; the lard much larger. If the goal is to increase muscle by 1 pound per week, the lifter needs to go 3,50 calories over his basal metabolic rate (BMR) per week, which would break down to about 500 ext calories per day. That's not a lot of calories when you think about it. It's about a 20-ounce (0.59-lite regular soda, a small hamburger, or a small shake. In the old days of the "see food" diet *(you see foo you eat it)*, calorie consumption increased by 2,000 to 3,000 calories per day. It's easy to see how the gained weight so quickly. It was mostly stored as fat.

No set calorie standard exists for weight gain such as taking in 3,000 calories a day. Some may los weight, some may gain, and some may stay the same on 3,000 calories a day. You can determin caloric needs in multiple ways, ranging from the highly specific bomb calorimeter that cos thousands of dollars to much simpler, less costly ways. Following is a simple way to estimate wh you need to gain weight: Take your body weight in pounds and multiply it by 18 and 19 to give target caloric range. This is how many calories you need to consume per day to gain weight. F example, let's say a lifter is 220 pounds and trying to gain weight to get to be a full 242 pound Multiply 220 by 18 (220 × 18), which equals 3,960 calories per day. If the lifter stays at this calor level or higher, he should gain weight. He doesn't want to go too much over this or he'll just end u getting fat.

More accurate means exist to determine caloric intake, but they often require additional testi such as body composition or the amount of expired carbon dioxide. If these tests are available to yo by all means use them. However, if you just need an estimate, the one provided previously sufficient.

The types of food consumed greatly affect a lifter's ability to gain muscle as weight. For exampl he needs to have lean sources of protein, such as chicken, turkey, fish, venison, and steak.

Carbohydrate is a little trickier. Some people are easy gainers and some are hard gainers. Eas gainers should primarily stick to low to moderate glycemic index sources of carbohydrate to contr blood sugar and minimize fat gain, especially if they have no problem with the increased foo consumption. Make sure blood sugar stays relatively stable and you never get hungry. If you are tryi to gain weight and allow yourself to get hungry, you'll end up binge eating. This will go toward th weight gain, but binge eating typically leads to more weight stored as fat instead of turned in muscle.

Hard gainers typically find it difficult to keep up with the required food consumption. This grou should stay with carbohydrate of higher glycemic index. This may seem counterintuitive since means they are consuming foods that are less healthy. The reason lies in what happens to hig glycemic index carbohydrate. Blood sugar spikes relatively quickly, and the body signals the pancre to pump a high amount of insulin into the bloodstream. This causes a sharp drop in blood sugar. A this point, the brain signals the stomach that it is hungry and leads to eating another meal. For tho who have a hard time eating, sugary foods may be the way to go because they essentially make yo

hungrier in a shorter time. This helps the hard gainer gain weight. It’s not often that someone is told t
eat brownies, donuts, and cake, so enjoy it while you can.

# Losing Weight

To avoid losing muscle when you lose weight, you need to lose weight slowly as well. Many peop are able to drop weight quickly, but typically they lose water first and then muscle, not fa Remember, fat is quickly gained and slowly lost. Aim for the slow loss of about 1 pound (0.45 kg) week. Losing weight more quickly than that typically means losing muscle.

Fat is around 3,500 calories per pound. So to lose 1 pound (0.45 kg) per week, you need to cut o 500 calories per day. To keep up with this loss, choose appropriate foods. For protein, select th leanest sources possible: egg whites, skinless chicken breasts, or protein powder. These sources protein are much lower in fat, so you get more protein for fewer calories.

For carbohydrate, choose those with the lowest values on the glycemic index. You want to kee your blood sugar as steady as possible. If blood sugar spikes, you’ll feel hungry and may binge ea You may have created a 3,000-calorie deficit throughout the week, but if you get hungry and consum 4,000 calories of ice cream and pie, you have a 1,000-calorie surplus to go toward weight gain, n loss.

How many calories per day should you take in to lose weight? You need 12 to 13 calories per poun of body weight to establish the appropriate target caloric range. For example, if you weigh 210 poun (95 kg) and want to get down to the 198-pound (89-kg) weight class, multiply your body weight of 21 by 12 calories to get an intake of 2,520 calories per day or by 13 calories to get an intake of 2,73 calories per day. This gives you a calorie range of 2,520 to 2,730 calories per day to lose weight. Th is a simple estimate, and there are more accurate ways of determining calories.

In weight loss, a person’s body composition greatly impacts the calorie count needed. Fat is n significantly metabolically active, so someone with more body fat burns fewer calories. For instanc two people both weigh 250 pounds (about 113 kg). Person A has a body fat percentage of 16 percen and person B has a body fat percentage of 28 percent. Person A is more metabolically active since h has more muscle and less fat than person B. This means person B will have to take in fewer calori than person A to be able to lose weight since he has less active muscle to burn calories. Which wi burn more gas at 50 miles per hour (80 bkph), a four-cylinder or an eight-cylinder engine? Because th eight-cylinder engine is bigger, it requires more fuel to do the same thing. Having greater musc mass is essentially having a bigger engine. Muscle produces more force, can move more quickly, an needs more gas to be able to operate. Because weight loss is tied to so many aspects of the body and so individual, you may need a more specific estimate of caloric needs to lose weight. If you are havin a hard time losing weight, see a registered dietitian (RD) to help you achieve your goals. An RD certified in nutritional techniques and can help you find exactly how many calories you need to me your goal and help you make changes to get there.

Good carbohydrate sources for those trying to lose weight are green leafy vegetables, crucifero vegetables such as broccoli and cauliflower, grapefruit, apples, oranges, grapes, cantaloup watermelon, sweet potatoes, steel-cut oats, quinoa, beans, onions, peppers, and whole grains such oatmeal. These are all very low glycemic index sources of carbohydrate and help prevent binges bett than higher glycemic index foods.

With weight loss, calories aren’t just calories. You may have a goal of 3,000 calories per day to los weight. If you take in high-calorie and high glycemic foods, you are hungry because you haven't eate ~~much, and what you have eaten causes blood sugar to spike and then drop off quickly~~, setting you u for a binge. However, if you take in low-calorie and low glycemic index foods, you are not as hung because you are eating a greater volume of food each day and blood sugar is more stable.

Often when someone is trying to lose weight he experiences a loss of strength. A decrease i strength always occurs with weight loss, but a massive disparity doesn't have to exist. Following are few things to remember when losing weight.

First, do it slowly. Be sure that you are sticking to a loss of 1 to 2 pounds (0.45 to .9 kg) per wee Your goal may be to lose 15 pounds (6.8 kg), but you want to lose that weight primarily in fat t maintain strength. Remember that fat is gained quickly and lost slowly; this is a survival mechanism Lose the weight slowly to keep as much muscle and strength as possible.

Second, keep your protein intake high. Try to keep the muscle in repair as much as possible. If yo don't take in enough protein because of cutting calories, the muscle cannot repair itself and it will b broken down as energy. Cut out the fat first, then look to carbohydrate, but keep protein intake inta as much as possible. As you lose weight, you can begin to cut down on protein. For instance, if you g from 300 pounds to 240 pounds (136 to 108 kg), your protein needs become lower and thus you don have to take in as much protein or calories in general.

Third, do cardio but keep it at lower intensities. You should burn extra calories with cardio, but yo don't want to break down the muscles and prevent yourself from being able to train hard or recover f the next workout.

## The Magic Key

For either weight gain or weight loss, the magic key to success is consistency. This surprises many people. If you are consistent and diligent about your eating plan, you will achieve your goal. Weight loss or weight gain doesn't happen in just a few days. It happens over weeks and months and years. If you need to lose 30 pounds (13.6 kg) and you decrease your calories for three days, then give up because you didn't lose weight, guess what? You'll never achieve your goal. It takes time and effort to be consistent. Consistently follow the guidelines for six weeks. If you aren't seeing progress, it may be time to consult a registered dietitian. Give it a chance and make sure it happens.

An old Japanese proverb, called the butterfly effect, says that a butterfly flapping its wings in Japan will cause a tsunami in India. While this is not an absolute truth, it does show how small things can lead to unpredictable outcomes. For instance, not eating properly for two meals a week could drastically impact your goal. You may be trying to lose weight, and in those two meals a week end up with a 1,000-calorie surplus for the week. Well, during that one week that doesn't translate much on the scale, but 1,000 calories a week over a year is around 15 pounds (6.8 kg) of fat. Little things can make a big difference. Stick with your plan and be consistent.

Finally, for weight training, keep volumes moderate to low. Higher volume leads to an increase