

The ABCs of Bodybuilding

SPORT VS. EXERCISE SYSTEM

Bodybuilding as a system of exercise is the most effective and efficient way to strengthen and develop the muscles of the body. Some think bodybuilding is only an intense form of competition but not a sport. However, I think bodybuilding qualifies as a sport for a number of reasons. One is the incredible amount of athletic effort involved in training, in developing the physique to prepare it for competition. Another is the high level of athletic demand involved in the performance part of bodybuilding—that is, posing and flexing onstage. As we'll go into in more detail later, to be able to pose during a contest, to squeeze and flex your muscles, be able to hold poses for as much as an hour or more at a time—and to do it really well, with high energy levels and full control of your entire body the whole time—is an athletic feat comparable to a boxer going twelve rounds for the heavyweight championship of the world.

One reason people have trouble understanding the nature of bodybuilding is that there are two basic kinds of sports—those judged by measurement (how far, how fast, how high, and so forth) and those judged by form (diving, gymnastics, ice skating). *Bodybuilding is a sport of form*, but instead of movement the form involved is that of the body itself—the size, shape, proportion, detail, and aesthetic quality of the physique as developed in the gym, prepared by dieting, and displayed by performing bodybuilding poses.

In any event, although bodybuilding has not yet become an Olympic sport, it has been accepted by the international amateur sports community

and been included in such events as the Asian Games and Pan American Games. So I am not alone in my opinion that bodybuilding is a sport.

PROGRESSIVE-RESISTANCE TRAINING

Of course, the majority of people who train with weights are never going to compete (just as most people who play tennis or golf don't expect to enter Wimbledon or the Masters Invitational). But whether you bodybuild with the aim of sculpting a competition physique or are training to improve your performance at sports, to be healthy and fit, to look and feel better, or to rehabilitate an injury, all muscle-building done correctly depends for its results on the same basic exercise principle, that of progressive-resistance training.

Progressive-resistance training works because the body is designed to adapt and grow stronger in response to greater amounts of stress than it is used to. If you are used to running two miles a day, then running five miles puts more demand on your muscles and the ability of your cardiovascular system to supply enough oxygen and nutrients to keep the muscles functioning under the stress of this greater demand. You may be in shape to run two miles, but you have to get in better shape to run five miles. Improving your conditioning in this case is a matter of increasing how far you run and giving the body time to change and adapt to this increase.

When it comes to muscle-building the same principle applies. The muscles are adapted to dealing with a certain level of demand, specifically to a certain amount of weight in your exercises lifted with a certain degree of intensity. When you increase the amount of weight and/or intensity, your muscles have to become bigger and stronger to deal with it. Once they have adapted to the new level of demand, you increase the amount of weight and/or intensity in your workouts so that they will *continue* to get bigger and stronger. In other words, you progressively increase the demands you make on your muscles over time.

Dr. Lawrence Golding of the University of Nevada explains it this way: "If you have a 10-horsepower motor and you subject it to a 12-horsepower load, it will burn out. But when you have a human body that is the equivalent of a 10-horsepower motor and you subject it to a 12-horsepower load, it eventually becomes a 12-horsepower motor."

But not every kind of training you do with weights is going to end up creating a bodybuilding physique. You have to do the right kind of exercises, using the right techniques, so that you send a *specific message* to the nervous system that tells the body what kind of adaptation you wish to achieve. This is called specificity of training and it is why learning how to train the right way is so important. I like to compare this with working on a computer. Anyone who has used a computer for any length of time has

probably had the experience of the machine not doing what you wanted or expected it to. You try over and over and the same thing happens. You figure there is something wrong with the machine or the software. Then you realize you made some very small mistake, maybe just putting in a period where you should have put a semicolon. But the computer can't think; it just follows your instructions. So if you aren't very specific in what you tell it to do, you're in trouble. The computer doesn't know what you *think* you're telling it to do, only what you are actually telling it to do.

Bodybuilding is based on that same principle. The body doesn't know what you *think* you are telling it to do; it only registers and adapts to the specific instructions you are giving it by the way you are working out. You may feel you are building muscle, you can be working hard, sweating, getting tired and sore, but unless you are sending the right code to the body, you are going to be disappointed in your results. And the code in this case is a correct understanding of the principles of progressive-resistance bodybuilding training.

WEIGHTLIFTING, RESISTANCE TRAINING, AND BODYBUILDING

I have been asked many times whether bodybuilders are really strong or whether their big muscles are just for show. The answer is that some bodybuilders are indeed strong but that strength for physique competitors is a means to an end rather than the ultimate goal. The athletes who are most concerned with ultimate strength are weightlifters.

Weightlifting is a sport which is judged by the amount of weight a competitor can handle for any given type of lift. Over the course of history there have been many types of strength-testing and weightlifting competition. Today there are two basic types of recognized competition weightlifting: Olympic lifting (involving the snatch and clean and jerk) and powerlifting (with three events—the deadlift, bench press, and squat).

Nowadays, weightlifters do a lot of bodybuilding training—that is, they work on balanced development of all the muscle groups—but their primary goal is *strength training*. This is even more true of powerlifters than Olympic weightlifters because their lifts involve a lot less technique, timing, and coordination, and are designed to be a more specific test of strength and power.

The major difference in programs between a weightlifter's strength training and bodybuilding is that the lifter works in a much lower rep range. That is, while bodybuilders (as we shall see in the sections of this encyclopedia on how to train) use less weight and do higher repetition sets, weightlifters are training to do *one maximum rep* in competition, so they frequently pile on the weight in their workouts and do triples (three

reps), doubles (two reps), or singles (one rep) to prepare them for handling huge poundages in a meet.

The Bodybuilding Physique

There are other sports in which athletes develop big muscles, but bodybuilding is about the *maximum aesthetic development of the entire physique*. The ideal bodybuilding physique would look something like this: Wide shoulders and back tapering down to a tight waist; legs in proper proportion to the torso. Big, shapely, and proportionate muscular development, with full muscles tapering down to small joints. Every body part developed, including such areas as rear delts, lower back, abdominals, forearms, and calves. Good muscular definition and muscle separation.

Of course, there is no such thing as a perfect athlete in any sport. Athletes always have strengths and weaknesses. In bodybuilding, all of us who have competed in the sport have had weak points that we strove to overcome by specific types of training and posing techniques. Nature makes some physiques better than others, more ideally proportioned, more responsive to training.

In past years, there have been champions like Frank Zane, who had beautiful aesthetics and was a master poser, but who many thought lacked the mass and density they would like to see in a champion. Franco Columbu won two Mr. Olympias in spite of being much shorter than you'd think would be possible in a champion competing at that level. Dorian Yates won many Mr. Olympias, deservedly, but he has also been continually criticized by some for being much too thick and blocky and lacking the overall aesthetic and athletic look they feel bodybuilding ought to be about.

It may seem strange that having too much muscle can be a drawback, but although bodybuilding is about big muscles, it can be a disadvantage to be too mesomorphic, with thick slabs of muscle rather than aesthetic tapering ones. Many seemingly massive bodybuilders actually have fairly small skeletons and joints, which help to give muscles that more aesthetic shape. Most people are surprised that, even at my heaviest competition weight, the average individual could still nearly close his fingers around my wrist. I had big muscles, not big bones, which is one reason I was so successful in my competition career. Lee Haney, who dominated the Mr. Olympia in the 1980s, got into bodybuilding after twice breaking his leg playing football. Again, he has huge, powerful muscles, but a lighter and more aesthetic skeletal structure.

In any sport—in fact, in any area of life—it's a fact that some people have more talent in specific areas than do others. In the same way, bodybuilding champions are made, but also born. You have to have the right kind of genetics. You can't train to change your skeletal type or proportions (although you build bone strength and size when you do muscle

training). Keep in mind, however, that what kind of genetic potential you have is not always obvious. Sometimes you need to train for a few years to see what kind of potential you may ultimately have.

And it's also a fact that the "race doesn't always go to the swift." Sometimes you need to overcome obstacles to develop to your full potential and it is often the case that the most gifted athlete does not always learn to work hard enough to rise to the top in a sport. Olympic decathlon champion Bruce Jenner told me that when he was in high school he wasn't the best in any sport in which he participated. But by hard work over the years and learning all of the skills involved in the decathlon's ten events he was ultimately able to win the coveted title of "Best Athlete in the World." Sometimes, it pays to remember the story of the tortoise and the hare.

But whatever your genetics, the kind of training you do is what influences the type of muscular development you achieve. To be a really good bodybuilder, you need to create muscle shape, and this happens when you train every part of a muscle or muscle group, at every angle possible, so that the entire muscle is stimulated and every possible bit of fiber is involved. Muscles are really aggregates of many smaller units—bundles and bundles of fiber—and every time you use the muscle in a slightly different way you stimulate different combinations of these bundles and activate additional fibers. The bodybuilder attempts to achieve total development of every muscle in the body, to create the fullest possible shape in each muscle, to have the muscles proportionate to one another, and to achieve an overall symmetry that is as aesthetically pleasing as possible.

Developing the body this way requires a complete knowledge of technique. You may want to change the shape of your pectoral muscles, peak the biceps more fully, or achieve a better balance between upper and lower body development, but these results do not come about by accident. So the best bodybuilders are those who understand how muscle tissue works, how training actually affects the body, and what sort of techniques lead to specific results.

How Bodybuilding Training Works

Imagine you have a barbell in your hands and you press it up over your head. Several things happen at once: First, the muscles of the shoulder (the deltoids) lift your arms upward; then the muscles at the back of the upper arm (the triceps) contract and cause the arms to straighten. Any movement you make, whether pressing a weight overhead, walking, or simply breathing, is the result of any number of complex combinations of muscle contractions.

The action of individual muscle fibers, on the other hand, is quite simple—a fiber contracts when stimulated and relaxes when the stimulation ceases. Contraction of an entire muscle is the result of the contraction of many tiny, individual muscle fibers. Fibers contract on an all-or-nothing

basis. That is, they always contract as hard as they can, or they don't contract at all. However, after a series of contractions a fiber begins to get tired and the amount of effort it can generate diminishes. When you lift a maximum amount of weight one time, you use only a fraction of the total amount of fiber in the muscle. The amount of weight you can lift is determined by three things: (1) how much fiber you are able to recruit; (2) how strong the individual fibers are; and (3) your lifting technique.

When you do only one or two repetitions of a lift, your body never gets a chance to recruit fresh fiber to replace what is getting weak and tired. Weightlifters learn to recruit an unusually large number of fibers in one maximal lift. But they put such an immense strain on those fibers that the body adapts and protects itself by making those fibers bigger and thicker. This is called fiber *hypertrophy*.

No matter how many fibers the weightlifter involves in one maximal lift, he still uses fewer than he would if he used less weight and did more repetitions. Therefore, he trains and strengthens only part of the muscle structure. Also, the weightlifter does a limited number of different kinds of lifts, so there are many angles at which the muscle is never trained at all.

Bodybuilders have learned that you can create greater visual change in the body by a different kind of training. Instead of one maximal lift, a bodybuilder uses less weight and does more repetitions, and does each set to failure—until the muscles are unable to do even one more repetition. Then he rests briefly and continues on to do more sets, perhaps as many as 15 to 20 sets of various exercises for any given body part.

How did bodybuilders arrive at this knowledge of how much weight to lift, and how many sets and reps to do? After all, the legendary Eugen Sandow, who pioneered weight training in the nineteenth century, used to do hundreds of reps! The basic answer is that bodybuilders discovered this training system by trial and error. No expert in the early years of bodybuilding told them to do this; they invented it on their own.

The proof they were on the right track was the bodybuilding physique itself. Could anyone look at the physiques of Steve Reeves, Bill Pearl, Reg Park, Sergio Oliva, Lee Haney, or me and claim we didn't know something pretty special about building muscle? More recently, exercise physiology has confirmed the bodybuilding method. As a general rule, the best way to get maximum development of muscle volume is by lifting about 75 percent of your one-rep capacity—that is, the maximum amount you could lift for one repetition. It should come as no surprise that, for most people, using a weight that is 75 percent of your one-rep maximum allows you to do—that's right—about 8 to 12 reps for the upper body and 12 to 15 reps for the legs.

Of course, stimulating growth isn't enough. To grow, a muscle also needs to rest and to absorb sufficient nutrients for it to recover and recuperate. That's why learning how to do specific exercises and how to put

them together in sets is only part of the information you'll find in this encyclopedia. We will also talk about your overall training program, how much to do in a training session, how often to schedule training sessions, and what kind of diet provides the raw materials your body needs to grow in response to your workouts.

Bodybuilding and Aerobic Endurance

There are two fundamentally different kinds of endurance: muscular and cardiovascular.

- Muscular endurance is the ability of the muscle to contract over and over during exercise and to recruit the maximum number of fibers to perform that exercise. For example, while doing heavy Squats, you fatigue muscle fibers in the leg so quickly that if you want to get through an entire set you need muscle fibers that recuperate quickly and you need to be able to bring many additional fibers into play during the course of the set.
- Cardiovascular endurance is the ability of the heart, lungs, and circulatory system to deliver oxygen to the muscles to fuel further exercise and to carry away waste products (lactic acid).

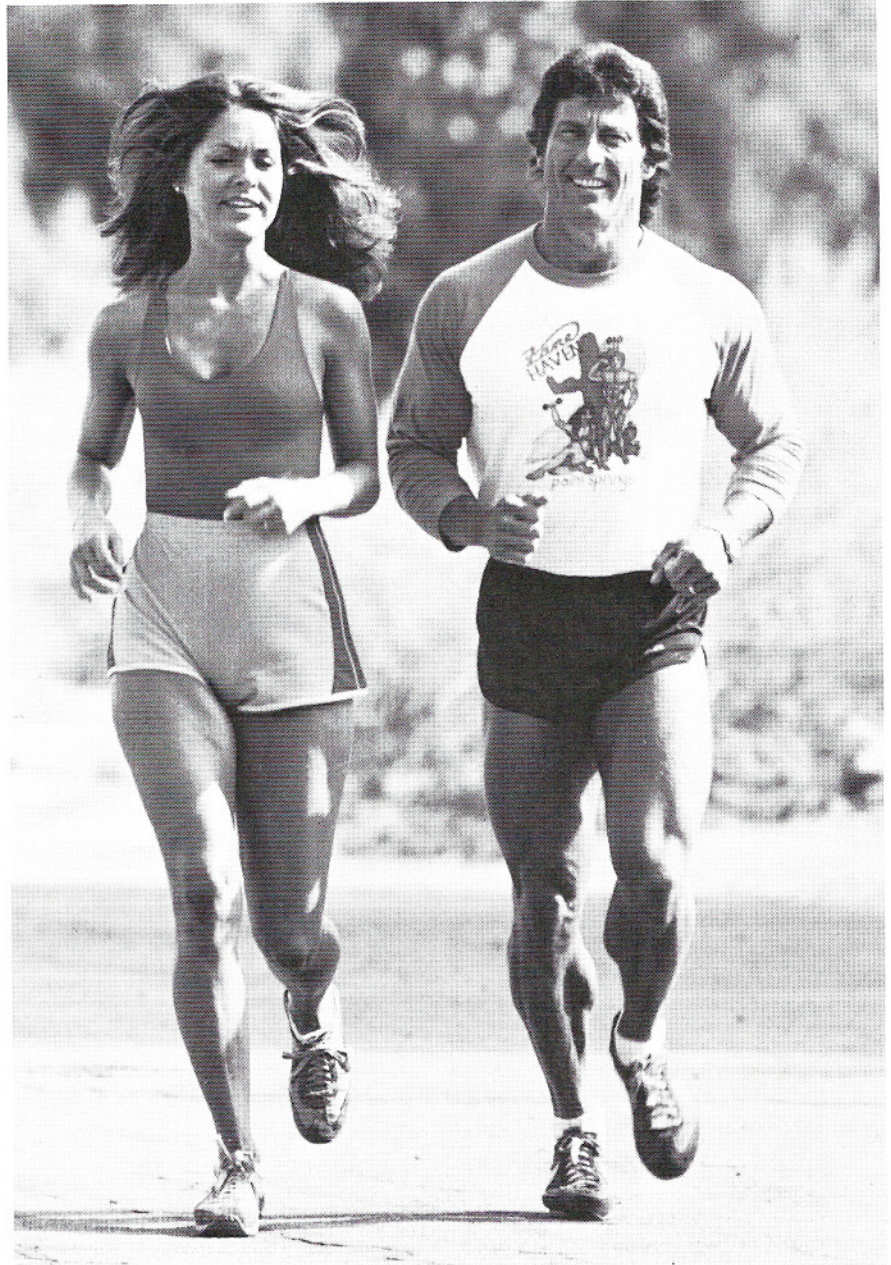
While these two aspects of endurance are distinct, they are also connected. What good is having a well-developed cardiovascular capacity if the muscles you are using in some effort can't keep up the pace and give out? And how well can you perform if your muscles have tremendous endurance ability but your circulatory system can't deliver the oxygen they need?

Just about everyone understands that you increase cardiovascular capacity by doing high volumes of aerobic exercise—exercise that makes you breathe hard, causes your heart to race, and that you can keep up for long periods of time. When you do this you:

- increase the ability of your lungs to take oxygen from the air and transfer it to the bloodstream;
- increase the capacity of your heart to pump large volumes of blood through the circulatory system and to the muscles;
- increase the number and size of the capillaries that bring blood to specific muscles;
- increase the capacity of the cardiovascular system to flush lactic acid (which causes the feeling of burning in the muscles during intense exercise) out of the muscles.

You increase muscular endurance by performing a relatively high volume of muscular contractions. When you do this you:

Frank and Christine Zane



- increase the size and number of capillaries to the specific muscles being exercised;
- increase the ability of the muscles to store glycogen (carbohydrate), which is needed to create energy for muscular contractions;
- increase the mass of the muscle mitochondria (energy factories) that create substances like ATP out of glycogen which are used to fuel muscular contraction;
- increase the development of the type of muscle fiber mostly involved in endurance exercise.

As a reminder, there are basically two types of muscle fiber (as well as a lot of intermediate, in-between fiber types):

1. White, fast-twitch fiber is nonaerobic power fiber that contracts very hard for short periods but has little endurance and a relatively long recovery period.
2. Red, slow-twitch fiber is 20 percent smaller than and not as powerful as white fiber, but is aerobic and can continue to contract for long periods as long as sufficient oxygen is available.

Because bodybuilding training relies on a higher volume (sets and reps) of effort than, say, weightlifting, it has some cardiovascular benefit and also leads to an increase in muscular endurance. Bodybuilders tend to train at a pace which is just below the threshold of cardiovascular failure—that is, they train as fast as they can without overwhelming the ability of the body to provide oxygen to the muscles. This doesn't automatically make them good at endurance activities, such as running or riding a bicycle, but it keeps them in pretty good cardiovascular shape. When it comes to those other types of activity, you are dealing with *both specificity of training and specificity of physical adaptation*. You have to train on a bicycle to be good on one. You have to work at running to improve your ability as a runner. However, a well-trained bodybuilder will usually be in good enough shape to do well at these kinds of exercises and to show considerable improvement very rapidly, providing his size and bodyweight are not too much of a negative factor.

I have always believed that cardiovascular endurance is almost as important to a bodybuilder as muscular endurance. Hard training results in a buildup of lactic acid in the muscles being used—a waste product of the process that produces the energy for muscular contraction. If the heart, lungs, and circulatory system have been able to provide enough oxygen to the area, the lactic acid will be reprocessed by the body into a new source of energy; if not, the buildup will eventually prevent further contraction, leading to total muscular failure.

I have always liked to run several miles a day to develop my aerobic capacity. Some bodybuilders, however, find that running does not suit them or causes them to have problems with their legs and ankles, so they seek other ways of developing cardiovascular conditioning—using Lifecycles, treadmills, steppers, and other types of aerobic equipment. The fact is, the better conditioned your heart, lungs, and circulatory system, the more intense training you will be able to do in the gym and the more progress you will make as a bodybuilder.

AEROBICS AND MUSCULAR DEFINITION

In addition to helping them to stay in top aerobic shape, bodybuilders use aerobic exercise as a way of burning up extra calories in order to achieve the ripped, contest definition they desire while still being able to take in the extra calories necessary to sustain their nutritional needs. So every serious bodybuilder interested in being both massive and lean—that is, developing muscularity as well as size—should do a sufficient amount of aerobic training to help burn off unwanted calories. I remember that Tom Platz, whose leg development was legendary, would work his legs to exhaustion in the gym, then get on a bicycle and ride for twenty miles. In spite of this high volume of training, his legs remained incredibly huge, and his quad definition and muscular separation were awesome.

Using aerobic activity to help you get cut up makes sense. If you metabolize an extra hundred calories doing cardiovascular exercise, that is another hundred calories contributing toward reducing the body's fat stores, or another hundred calories of, say, valuable protein you can eat while continuing to lose weight on your contest preparation diet.

However, the body's ability to tolerate the stresses of aerobic exercise is not unlimited. As we will discuss later, too much cardiovascular exercise can end up being detrimental. *Excessive* aerobics (and there are those who have tried doing endless hours prior to a contest, to their later regret!) can cut into the recuperative ability of the muscles involved and the physical system as a whole, leading to the scavenging of muscle tissue for energy (using the larger white fiber as fuel for the smaller red fiber), and resulting in inducing a state of *overtraining*.

"Overtraining" doesn't mean simply being tired from too much training. It is a condition you get into from too much exercise over too much time in which certain mechanisms in the body that supply you with energy and allow your body to recuperate are depressed or shut down. Overtraining is a chronic state in which you just can't perform no matter how hard you try. If you find yourself overtrained, the only good remedy is rest, sometimes weeks of it. But you can avoid the overtraining syndrome by properly scheduling your training, making sure you get enough rest and enough nutrients in your food. Instructions on how to do all this will be offered in Book 5.

But one good way of preventing overtraining is not to go overboard on the cardiovascular training. Remember, to look like a bodybuilder you need to train like one. To benefit from the concept of specificity of adaptation, you need to make sure that the main influence shaping and developing your body is progressive-resistance weight training—pumping that iron, not aerobics.

BODYBUILDING FOR ATHLETES

Athletes are bigger, stronger, and faster than ever before, and records continue to be broken or even smashed to bits. In my opinion, one cause of this overall improvement in athletic performance is that it's hard to find serious athletes in any sport who don't do at least some kind of resistance training.

But it wasn't very long ago that coaches not only discouraged but pretty much *forbade* athletes to do any kind of training with weights. Iron pumping, it was thought, made athletes "muscle-bound," interfering with their agility and flexibility. It was considered somehow "unnatural," whereas building up your body by straightforward hard work—on a farm or ranch, logging, something outdoors and "manly"—was encouraged. Think of Sylvester Stallone training for the fight with Dolph Lundgren in *Rocky IV*, scrambling through the snow dragging a heavy log, chopping wood in subzero weather, and you've got the picture.

"The belief that weight training would slow you down," explains Frederick C. Hatfield, Ph.D., and Fellow of the International Sports Sciences Association (ISSA), "make you muscle-bound, ruin your touch and coordination, was the prevailing view for decades. This stemmed from associating weight training with weightlifting—that is, increasing your limit strength, your ability to do a one-rep, maximum lift. This kind of weightlifting or powerlifting training is inappropriate for most athletes, who rely much more on speed for increasing performance rather than on absolute strength."

The role of weight training in sports today, Dr. Hatfield says, is to develop the strength of the various muscles to a basic, minimum level that allows the athlete to perform at optimum levels. But this "optimal" strength training should not focus on creating muscle mass or limit strength for their own sakes unless they are specifically required for success in a specific athletic activity. "If you worship strength for its own sake," he adds, "then you can indeed run into problems with speed, mobility, flexibility, agility, coordination, and so forth."

Some sports have been faster to accept the benefits of "optimal" weight training than others. Fred Dryer, actor and former NFL football player, recalls that virtually nobody was training with weights when he began his pro football career in the 1960s, but by the time he retired in the late 1970s *everyone* on the team was spending at least some time in the weight room.

Bruce Jenner, 1976 Olympic decathlon champion, realized in the early 1970s that achieving optimum performance in such a wide variety of different athletic events would require his using weights to substantially increase both his strength and his muscle mass. "The decathlon is designed to test all-around athletic ability," Jenner points out, "with a variety of running, jumping, and throwing events. Starting out, I was very

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lean and strong for my size, but I realized I would have to be bigger and stronger to score the kind of point totals I would need—yet developing size and strength past a certain point would be detrimental to my overall performance.” In those days, track-and-field athletes were only beginning to rely on weight training to build up their bodies, so Jenner tried to be very careful in what kind of program he followed and how much effort he put in with the weights. “Actually,” he recalls, “because a lot less was understood about training back then, I did a lot of exercises that were more like weightlifting than weight training, they felt much more ‘athletic’ to me. But however inefficient some of what I did might have been, my strength did improve, I was able to gain enough solid muscle mass so I was successful in the 1976 Olympic Games in Montreal.”

There tends to be an ideal type of body for any sport (although, as we’ve seen, we can sometimes be surprised by what kinds of bodies succeed in various sports), and any kind of training you do should develop the body in the direction of this ideal rather than away from it. “Body composition assessment has revealed that athletes generally have physique characteristics unique to their specific sport,” report physiology experts William McArdle and Frank and Victor Katch in their 1994 book *Exercise Physiology: Energy, Nutrition and Human Performance*, 4th ed. (Williams & Wilkins). “For example, field-event athletes have relatively large quantities of lean tissue and a high percent body fat, whereas long-distance runners have the least amount of lean body weight and fat weight. . . . Physique characteristics blended with highly developed physiologic support systems provide important ingredients for a champion performance.”

Although getting “too big” can be a problem in many sports, in some instances, athletes need to pack on a substantial amount of muscle mass in order to be successful. For example, if you compare the average size of football linemen in the 1960s with the size of football players today the difference is amazing, not only in size, but also in body composition. A 300-pound football player thirty years ago might well have had a body composition that was 15 to 25 percent body fat. Today, any number of powerful, 300-pound players measure in at under 12 percent body fat, and a few are much leaner than that.

Boxing as well as wrestling is a sport which has traditionally shied away from training with weights. One reason is that building up your muscle mass puts you in a heavier weight division, which means you may be in combat against opponents who are naturally bigger and stronger. Another is that too many young boxers who have worked with weights tend to try to “muscle” their punches, rather than relying as they should on speed, timing, and coordination. But the world of boxing was astonished when Evander Holyfield, originally fighting at the cruiserweight/light-heavyweight level, gained something like thirty pounds of solid muscle and became

Heavyweight Champion of the World—with the help, to a large extent, of Lee Haney, Mr. Olympia.

“Most boxers rely almost entirely on traditional approaches to training and nutrition,” says Haney. “But Evander was very open to new ideas. To become a real heavyweight, he had no choice but to get bigger, and he saw that bodybuilders are the best athletes when it comes to packing on substantial amounts of lean body mass. So he adopted a lot of bodybuilding techniques, as well as a variety of scientific approaches to such things as diet, cardiovascular fitness, and agility.”

Holyfield was successful in part because he never forgot that boxing is a speed sport, as well as one that depends a great deal on muscular and cardiovascular endurance. He recognizes the importance of bodybuilding: “Part of my success comes from maintaining a consistent weight program, which gives me confidence and enables me to be both mentally and physically fit.” So, for Holyfield, building his body up with weights and proper nutrition was simply the first necessary step; then he concentrated on maximizing his boxing skills.

Magic Johnson came to the NBA in an era in which young basketball players were already fully aware of the benefits of strength training to their performance on the court. But interestingly enough, Magic has explained in a number of interviews that exercising and staying in shape have become even more important to him since his retirement as a means of



*Evander Holyfield
defends his title against
Michael Moorer.*

keeping in peak health in his battle to stave off the potential debilitating effects of his illness. I thought I had an active life, but Magic describes a daily regimen that makes even me tired—aerobics classes, weight training, pickup basketball games with an intensity just shy of the NBA, even as he maintains a killer pace in his other business and media activities.

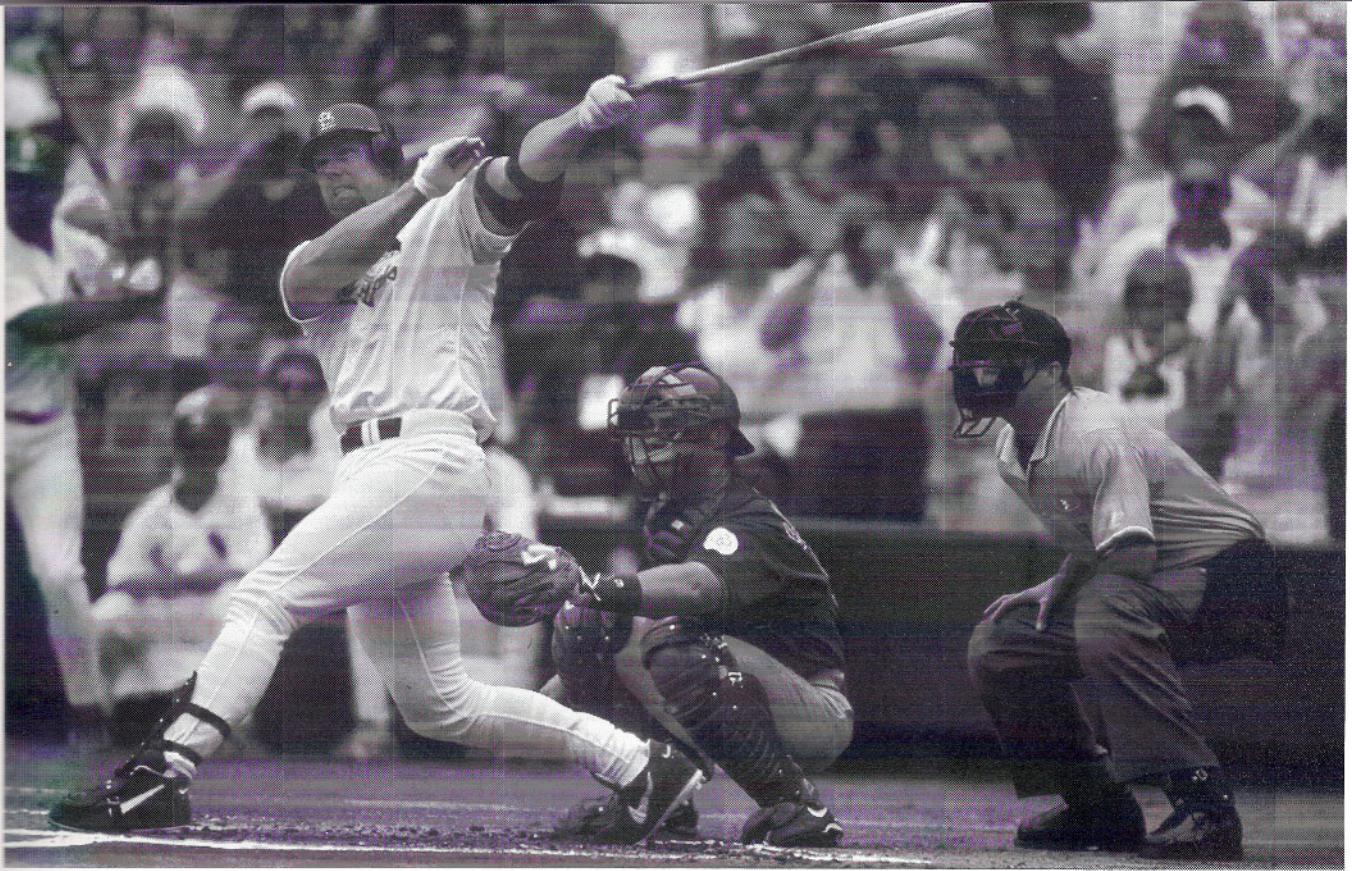
There was an L.A. Lakers coach who for years brought players into World Gym in order to work on their strength and muscular development, Magic Johnson among them. When I worked with Wilt Chamberlain on the sequel to *Conan*, I learned he had started training with weights long before it was generally accepted, when coaches were still warning players to stay out of the weight room. I believe that's one reason why he was such a dominant player during his career.

Even before that, golfer Frank Stranahan was known in the 1950s for using weight training to build up his body and improve his game. Nowadays, a lot of golfers do resistance training as part of their overall conditioning program, although weight training for golf is not yet as accepted as it is in many other sports. So Stranahan was a good thirty years or more ahead of his time when it came to understanding the benefits of training with weights to improve athletic performance.

Another sport which traditionally resisted weight training is baseball. Not very long ago, most baseball players tended to be small and wiry, fast and coordinated, and there weren't many big guys over 200 pounds to be found in the upper ranks of the sport. Today, baseball is full of 230-pound home run hitters who can also run and field their positions. Just look at Mark McGwire, a player so strong that he turns what would have been pop flies into four-baggers. The difference, of course, is the prevalence of weight training, to which athletes are now frequently introduced at the high school or junior high levels, as well as advanced knowledge of how to eat to maximize performance—the science of diet and nutrition.

Traditionally, football teams' weight rooms have been filled with linemen and linebackers who depend on muscle to give them the bulk they need to play their positions. But Dallas Cowboys quarterback Troy Aikman also depends on weight training as part of his conditioning program. Aikman does weight training to increase his upper body strength, including arms and shoulders, but as he explained in *Men's Journal* (September 1998), he also works his legs and hips, since that is where much of the power required to throw the "long bomb" comes from. Aikman wisely does a wide range of exercises for all of the major body parts, which not only strengthens the muscles involved in throwing hard but also creates a better balanced, all around physique that has no areas of weakness that could be overwhelmed and produce injury.

Another believer in the benefits of weight training is the legendary wide receiver for the San Francisco 49ers Jerry Rice. After undergoing knee surgery, Rice dedicated himself to a program of fitness designed to



Mark McGwire hits his record-tying sixty-first home run.

allow him to come back to football better than ever. His six-day-a-week program includes two hours of cardio work in the morning and three hours of weight training in the afternoon.

Weight training for sports is on its way to becoming universal. Michael Schumacher, Formula 1 racing phenomenon, pursues a very disciplined conditioning program that includes training with weights. Soccer great Diego Maradona discovered the possibilities of increased athletic performance through weight training late in his career. Tennis players, swimmers, pole vaulters, and even jockeys are turning to training with weights to improve their chances of athletic success.

Weight training and other conditioning programs are valuable to elite athletes in particular because there is frequently little they can do to further hone their specific abilities in their chosen sports. For example, during the latter part of his competitive career, Dwight Stones, one of the great high jumpers of all time, devoted several days a week to a training program which included training with weights and only short periods to practicing his sport. Why? Because, after all the years of effort he had put into perfecting his jumping technique, he reached a point of diminishing returns. He was so close to his absolute potential in terms of technique and neuromuscular coordination that he couldn't expect much improvement no matter how hard he tried. Instead, what he needed was a better "instrument" through which to express his ability and technique. And that's why he devoted a lot of time to pumping iron.

In addition to making muscles strong, weight training is particularly beneficial in building up areas sufficiently weak that the resulting imbalance could be detrimental to execution of various sports movements. As

Dr. Laurence Morehouse observed in his 1974 book *Maximum Performance* (Simon & Schuster), "The nervous system uses the path of least resistance. If you try to execute a motion with weak muscles, your nerves will tend to enlist stronger ones to take over if possible. . . . The result: muscle imbalance, less than ideal movement—and possible deformity."

When you learn, practice, and play a sport, the muscles involved develop up to the level required, but no more. The muscles not involved, or less involved, tend to *deteriorate* over time, leading to even more muscular imbalance. As a result, after years of playing a particular sport, athletes develop a level of imbalance which makes injury extremely likely. Moreover, performing a sport over time at an intense level tends to wear the body down, and unless some kind of exercise program is used to counteract this, you increase your risk of injury as well as a deterioration in your athletic performance.

For example, runners often tear hamstrings because their quadriceps become too powerful in comparison to the leg biceps. Golf does little to build a lot of muscular strength, and because of the powerful twisting motion of the golf swing golfers often experience back problems, especially as they grow older. Sprinters find their performance is improved when their upper bodies are somewhat more muscular, but sprinting by itself won't give them this kind of development. Tennis tends to develop one side of the body much more than the other—notice how tennis pros have one arm obviously larger than the other—and this kind of imbalance in strength can easily cause physical difficulties and performance problems over time.

Doing generalized weight training—that is, following a basic program of exercises, techniques, sets, reps, and workout schedules outlined in this book—builds up the body, gives the athlete a *better overall physique* to work with, and in doing so tends to even out the imbalances caused by the specific demands and stresses of individual sports. Iron pumping allows you to create, shape, and sculpt the kind of body *best suited to your sport*—mass, strength, overall body weight—as is possible with no other exercise program.

"Making the body stronger," says Mark Verstegen, director of the National Performance Institute, located in Bradenton, Florida, "not only increases performance in sports—in terms of strength, speed, and endurance—but also decreases the chances of injury. It allows the athlete to change his body composition to better suit the demands of his sport—that is, to become bigger and stronger if that's what is called for, or to maintain or reduce body weight but create the maximum amount of strength for any given body size." Verstegen creates individual programs for the pro athletes he trains, programs that can include everything from calisthenics to agility drills to the medicine ball to resistance training with free weights and exercise machines.

Verstegen's clients include NCAA basketball top scorers, an American League rookie of the year, NFL football players, and Los Angeles

Lakers phenom Kobe Bryant. “Once you’ve fully developed your skills,” Verstegen adds, “all you can do is improve your physical ability. You want increased power output for both endurance and explosive sports, core strength so you have better posture, and joint stability to reduce injury.”

But knowing exactly what kind of weight-training program to follow for any particular sport is not that simple. As exercise physiologists George Brooks and Thomas Fahey explain it, “The intensity and duration of tension are the most important factors eliciting strength increases. The strength requirements of each sport must be assessed in order to develop an appropriate, specific program. In general, sports requiring muscular endurance employ strength-training schedules involving a great number of repetitions, while those requiring strength use fewer repetitions.”¹ Therefore, serious athletes need to work under the direction of strength-training coaches who have the knowledge and experience to create the kinds of programs appropriate to any given sport. However, whatever sport you may be training for, there are a few general ideas that I think will apply:

1. Generalized, bodybuilding-type weight training is the ideal system for controlling your body composition—getting bigger and more massive, getting stronger without gaining mass, or losing excess body fat to get lean and hard. This training should be tailored to create the kind of body best suited to your sport. Being “too big” or “too massive” for your sport can be as bad as not being big or strong enough.
2. Diet and nutrition are as important to controlling your body composition as is weight training. You have to eat right to gain, eat right to lose, and eat right to get strong.
3. The basic purpose of weight training for an athlete is to create a better body, a better instrument, to build strength to appropriate levels and to build up weak areas. Weight training done to improve specific sports movements should be done under the direction of a qualified coach.
4. Since the benefit of bodybuilding-type weight training to athletes is due to its “nonspecific” nature, keep in mind that training with free weights produces a much more general adaptive response than does working out with machines.
5. Remember that weightlifting is a specific sport, involving specific techniques and the development of maximal one-rep strength. The purpose of weight training for athletes, on the other hand, is to develop optimal rather than maximum strength, and to bring up weak areas and achieve a better balance of strength among the various muscle groups.

¹ George A. Brooks and Thomas D. Fahey, *Fundamentals of Human Performance* (New York: Macmillan, 1987).

Weight Training and Fitness

Did you realize that, according to *Time* magazine, training with weights has become the number-one athletic activity in the United States? The most popular form of exercise in the whole country?

In the years since this encyclopedia was first published I have seen more and more people making use of weight training who are not competition bodybuilders or professional athletes, but simply want to get fit, to look good and feel better, and to keep their bodies as young and strong as possible as they get older.

Doing bodybuilding to get in great shape and to keep your body fit and strong makes sense. After all, if this method can produce Mr. Olympia winners, it can certainly do wonders for the majority of people whose goals are so much more modest. And if you're going to do something, why not do it the best way possible. To people who say to me, "I want to get fit and firm up, but don't want to get too big," I say in reply, "Do you go to your tennis pro and say you want to learn tennis but don't want to play well enough to qualify for Wimbledon?" Would you tell a golf pro, "Teach me golf, but don't make me as good as Tiger Woods?"

The fact is, most people don't have the genetics, the time, or the energy to create really massive, bodybuilding-type physiques. So if you are bringing less to the table, isn't it important to use the most efficient and effective means of developing your body possible? After all, who wants to waste time and effort exercising without results?

Why is muscular fitness so important? Well, as we have seen, muscles are adaptive; they change according to what and how much they are asked to do. Throughout most of human history, labor was done primarily by the human body. People didn't need exercise; they needed a rest! A hundred years ago the physical exertion of even a relatively sedentary individual would exhaust most people today. In the 1950s and 1960s when I was a kid, we used to run around, climb hills, and engage in all kinds of sports, not sit around and watch television or type on a computer.

So what happens to muscle in our modern, sit-all-day-behind-a-desk world? Our why-should-I-walk-300-yards-when-I-have-a-car culture? Our hand-me-the-remote-control-so-I-don't-have-to-get-up-and-change-channels universe? Simple—when we don't use our muscles they atrophy and shrink. We don't use them, we lose them. This happens slowly in our twenties, more quickly in our thirties, and accelerates after that. "The average man," explained the late Dr. Ernst Jokl, "loses fifty percent of his muscle mass between the ages of eighteen and sixty-five." But the body doesn't have to deteriorate in this fashion. We can do something about it. And the specific program that best counteracts this deterioration of youthful muscle mass is bodybuilding.

Don't worry about "getting big." Concern yourself instead with keep-

ing what you already have. As Alice found in *Alice in Wonderland*, sometimes you have to run faster and faster to stay in the same place.

Having strong and fit muscles keeps you looking and feeling good. It increases your ability to play sports, even if you are only a weekend athlete. Bodybuilding training also tends to stabilize or lower blood pressure over a period of time (using sustained, high-volume training rather than heavy weightlifting), to strengthen the back and so reduce the chances of back problems, and to increase the flow of blood to the skin, keeping it younger-looking and more flexible. Exercise is a stress reducer, and the benefits of lower stress can range from better functioning of the immune system to lowering your risk for cancer or heart disease.

It is a fact that the number of calories you burn up during the day is not just a function of how much exercise you do, but how much muscle you have as well. Muscle burns calories. That's what "burn" means—the oxidation process in the cells that creates energy for exercise. So the more muscle you have, the easier it is to get and stay lean.

Obviously, there are dangers associated with the lifting of excessively heavy weights, and serious weightlifters are prone to any number of more or less serious physical problems due to the demands of their sport. But bodybuilding involves the *controlled* use of weight training, with submaximum levels of resistance and a relatively high volume of training. Therefore, if done properly, with sufficient attention to technique, there is no reason a bodybuilder should ever suffer a training-related injury beyond common muscle soreness or the occasional minor strain or sprain that any athlete comes to expect.

Finally, I'd like to point out that bodybuilding training is also a very good way of introducing more discipline and control in the rest of your life. When you develop your body with training you tend to pay much more attention to your diet and eating habits. After all, why cover up all that nice muscle with unsightly fat? You have to take control of your schedule to make sure you get your workouts in, and that means organizing your time better the rest of the day as well. Bad habits? Smoking, drinking too much, things like that, also tend to interfere with your training discipline and physical progress. Got an early morning workout tomorrow? Don't stay up and waste so much time watching late-night television. If you use bodybuilding as an organizing principle in your life, it can change not only your body and your energy levels, but what you do and whom you do it with as well.