



## A Comparative Study of Cardiovascular Fitness of Bodybuilders and Athletes During 50's Age

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Received 8<sup>th</sup> Jul 2022,  
Accepted 9<sup>th</sup> Aug 2022,  
Online 14<sup>th</sup> Sep 2022

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**Abstract:** The popularity of natural bodybuilding and athletics during age 50's is increasing; however, evidence-based recommendations for it are lacking. Here competition between bodybuilder and athlete cardiovascular fitness at age 50's is discussed based on preparation on nutrition and supplementation, resulting in the following recommendations. Caloric intake should be set at a level that results in bodyweight losses of approximately 0.5 to 1%/wk to maximize muscle retention. Within this caloric intake, most but not all bodybuilders will respond best to consuming 2.3-3.1 g/kg of lean body mass per day of protein, 15-30% of calories from fat, and the remainder of calories from carbohydrate. Eating three to six meals per day with a meal containing 0.4-0.5 g/kg bodyweight of protein prior and subsequent to resistance training likely maximizes any theoretical benefits of nutrient timing and frequency. However, alterations in nutrient timing and frequency appear to have little effect on fat loss or lean mass retention. Among popular supplements, creatine monohydrate, caffeine and beta-alanine appear to have beneficial effects relevant to contest preparation, however others do not or warrant further study. The practice of dehydration and electrolyte manipulation in the final days and hours prior to competition can be dangerous, and may not improve appearance. Increasing carbohydrate intake at the end of preparation has a theoretical rationale to improve appearance, however it is understudied. Thus, if carbohydrate loading is pursued it should be practiced prior to competition and its benefit assessed individually.

**Keywords:** bodybuilders, athletes, sports, cardiovascular, comparative, age 50, weight, fitness, education.

Cardiovascular function is important in supplying the muscles with fuel and oxygen, the more efficient the cardiovascular function, the longer a person will be able to sustain work. It represents the ability of circulatory, respiratory, and other system of the body to put forth and extended and persistent effort. Cardio vascular function is regarded. Physical fitness by bodybuilding is central to all objectives of physical education. It is an essential for reconstruction and enjoyment of life. The movement like "Fitness for all and sports for all" are formed the basis of community building that is directive for fitness awareness among the people. Everyone agrees that physical fitness by bodybuilding is a basic necessity without which one cannot perform or carry out assigned task comfortably.

## Introduction

Bodybuilding is the use of progressive resistance exercise to control and develop one's muscles (muscle building) by muscle hypertrophy for aesthetic purposes. It is distinct from similar activities such as powerlifting because it focuses on physical appearance instead of strength. An individual who engages in this activity is referred to as a bodybuilder. In professional bodybuilding, competitors appear in lineups and perform specified poses (and later individual posing routines) for a panel of judges who rank them based on symmetry, muscularity, size, conditioning, posing, and stage presentation. Bodybuilders prepare for competitions through the elimination of nonessential body fat, enhanced at the last stage by a combination of extracellular dehydration and carbo-loading, to achieve maximum muscular definition and vascularity; they also tan and shave to accentuate the contrast of their skin under the spotlights. Bodybuilding takes a great amount of effort and time to reach the desired results. A bodybuilder might first be able to gain 8–20 pounds (4–9 kg) per year, if he or she lifts for seven hours on a weekly basis. However, gains begin to slow down after the first two years to about 5–15 pounds (2–7 kg). After five years, gains can decrease to just 3–10 pounds (1–5 kg).[1,2]

An athlete (also sportsman or sportswoman) is a person who competes in one or more sports that involve physical strength, speed or endurance. Athletes may be professionals or amateurs. Most professional athletes have particularly well-developed physiques obtained by extensive physical training and strict exercise accompanied by a strict dietary regimen. Athletes involved in isotonic exercises have an increased mean left ventricular end-diastolic volume and are less likely to be depressed. Due to their strenuous physical activities, athletes are far more likely than the general population to visit massage salons and pay for services from massotherapists and masseurs. Athletes whose sport requires endurance more than strength usually have a lower calorie intake than other athletes.

Cardiovascular endurance, also know as cardiorespiratory endurance or aerobic fitness, describes your body's ability to deliver oxygen from your lungs to the cells of your body where it can be used for energy production. This, on the other hand, is dependent on several physiological factors, including heart rate, stroke volume and maximal oxygen uptake ( $VO_2\text{max}$ ). Naturally, the longer or more intense you exert yourself physically, the more important your cardiovascular endurance becomes. This is especially apparent if you consider yourself an endurance athlete that requires energy for extremely long performances. However, this does not mean that cardiovascular fitness is not needed in faster-paced sports as well. Cardiovascular endurance is closely connected to your aerobic energy production, that's also the reason why people often refer to it as "cardio". Basically, it describes your body's ability to perform a task for a prolonged amount of time at a certain intensity.[3,4]

An improvement in bodybuilder and athlete cardiovascular fitness at age 50's is due to several different factors, such as

increased aerobic ( $VO_2\text{max}$ ) and anaerobic capacity, faster metabolism, increased stroke volume, enhanced venous return, higher hemoglobin and higher lactate threshold. Each of these factors will have a direct impact on your muscular endurance as well as an indirect effect on your strength and flexibility.

Aerobic capacity, or maximal oxygen uptake ( $VO_2\text{max}$ ) is the maximum rate of oxygen consumption during an increasingly intense exercise. Endurance athletes and bodybuilders usually perform at around 75-85% of their peak aerobic capacity whereas athletes from faster-paced sports perform close to 100% of their maximum.

Aerobic capacity is also commonly used as an indicator of cardiovascular fitness of bodybuilders during athletic performance. In theory, the higher your maximum oxygen uptake is the better your heart can move oxygen to the muscles.

Anaerobic capacity, on the other hand, refers to the total amount of energy you can produce anaerobically (without oxygen). This energy production method often occurs in high-intensity exercises where aerobic energy (with oxygen) is simply not enough. While anaerobic energy production provides much-needed energy for the muscles during exercise, it produces lactate as a side product which hinders athletic performance significantly. Thus, improving your anaerobic capacity in case of being bodybuilder or an athlete can provide better performance without less fatigue.

Metabolism refers to the chemical processes that occur inside your body in order to maintain bodily functions. Simply put, the more energy your body uses for physical exercise, the more energy you will need to maintain homeostasis or balance inside the body. Thus, raising your resting metabolic rate as well which also helps maintain healthy body composition.

Stroke volume describes your heart's ability to pump more blood on each heartbeat. As a result of cardiovascular endurance training, your heart rate will be lower while resting or even during exercise. In fact, your resting heart rate can be a great indicator of your cardiovascular fitness level.

Venous return describes your veins' ability to efficiently return blood back to your heart. This is essential for performance because improving your venous return increases the total blood flow in the body, making it easier to fill with oxygen again.[5,6]

Hemoglobin is the protein molecule in the red blood cells that carries oxygen into the muscles and carbon dioxide out of them. While you can boost your hemoglobin with iron-rich foods, exercise is also a great way to increase blood cell volume (hematocrit) for better cardiovascular endurance.

Lactate threshold describes the highest level of performance where energy can be produced without a significant rise in blood lactate. Thus, training at your lactate threshold will make your body more efficient in clearing lactate from the muscles leading to better endurance performance.

While good cardiovascular endurance of bodybuilder and of athlete during age 50's is one of the main building blocks in athletic ability, it also has an immensely positive effect on overall wellness in everyday life. It is well known for improving heart health, lowering cholesterol and blood pressure, increasing bone strength and maintaining healthy body composition. It has even been linked to better school results among children.

As far as bodybuilder and of athlete performance goes, cardiovascular endurance training increases the number of energy molecules inside the muscles, increases your heart's stroke volume, lowers overall heart rate, enhances venous return from the muscles to the heart and increases the amount of oxygen-filled red blood cells in your bloodstream. It even builds up more capillaries within the muscle for an even better blood flow in and out of the muscle. As a result, your body will use less energy to achieve the same level of performance as before and recover faster from it.[7,8]

However, the best part of cardiovascular endurance training during age 50's is its versatility. You can pretty much do it anytime and anywhere yet it's still able to provide benefits regardless of your fitness level. It is essential in building a foundation for more advanced training methods like strength and power training. Cardiovascular endurance exercises can even be used for rehabilitation purposes after an injury!

Cardiovascular endurance during age 50's is not only meant for endurance bodybuilder and of athlete either. In fact, it is also needed in high-intensity sports as well. After all, you need to be able to perform at your best even during the last minutes of the game. Cardiovascular endurance is important in a variety of sports such as running, dancing, swimming, football, basketball, biking etc. Actually everyone, whether you are physically active or not, can benefit from enhanced aerobic fitness.

### Discussion

To enhance oxygen delivery to your working muscles, you must also train in a way that builds up the energy storage needed in your sport. This is often referred to as metabolic training, which can be further divided into aerobic and anaerobic exercises. Both of which can be effectively trained through a well-planned workout program.

Cardiovascular endurance training for bodybuilder and of athlete consists of low-intensity exercises that utilize weights of around 0-30% of your maximum. As cardiovascular endurance focuses on performing for a longer time, it also needs more repetitions and shorter recovery periods between sets.[9,10]

Cardiovascular endurance for bodybuilder and of athlete during age 50's can also be trained through bodyweight exercises like jogging, cross-country skiing, rowing, cycling and swimming which also makes them suitable for a huge variety of people. These sorts of exercises can range anywhere from a few minutes to several hours, making them great for beginners and experienced athletes alike.

Whether you are an athlete or bodybuilder, here's no denying that cardiovascular endurance is a crucial part of your physical performance. In fact, good cardiovascular fitness has a significant benefit for overall wellness in pretty much every age group out there. This is also the reason why there is a growing need for physical activities in our increasingly passive and aging communities.

If you want to improve your cardiovascular endurance, you need to train it accordingly. Luckily, improving your cardio is both relatively simple and inexpensive. It also doesn't need an extensive sports background which means that everyone can start getting in better shape with little or no planning at all. Furthermore, endurance training even helps you build a foundation for more advanced training methods such as strength training.

As always, training is not the only thing you need to consider if you're looking to improving your performance. You also need to balance is out with proper nutrition and sufficient rest if you want to keep improving in a safe manner.[11,12]

Physical fitness leads to better athletic performance and bodybuilding, during age 50's and persistent training will usually develop physical fitness. Detailed analyses of the anatomic and physiological characteristics of famous athletes show that it is possible to make fairly reliable predictions of athletic performance. Scores obtained by various static and dynamic tests exhibit various degrees of correlation with the scores made in competition, and it has been easy to pick out the tests that give the highest coefficients of correlation. Dynamic tests thus are shown to have higher predictive value than static tests. Type of physique, strength and power, respiratory efficiency, and cardiovascular components are among the factors that determine performance, but no two, or three, or four factors, even when combined in an optimum manner, measure all aspects of fitness. Fitness tests applied to

former champions gave the best results in those athletes who were in continued training. Endurance training makes marked improvements in cardiovascular function. Ability of the endurance athlete to use oxygen is related to circulatory and respiratory capacity, but in sprints, weight lifting, and swimming there are many other important specifics.

One of the misconceptions in the sports world is that a sports person gets in shape by just playing or taking part in their chosen sport. If a stationary level of performance and consistent ability in executing a few limited skills is your goal, then engaging only in your sport will keep you there. However, sportsmen and women must participate in year-round conditioning programs if they want the utmost efficiency, consistent improvement, and balanced abilities. The bottom line in sports conditioning and fitness training is stress, not mental stress, but adaptive body stress. Sportsmen and women must put their bodies under a certain amount of stress (overload) to increase physical capabilities." [13,14]

The World Health Organization (WHO) defined health in its constitution of 1948 as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity".

Fitness is the ability to meet the demands of a physical task.

Basic fitness for bodybuilder and athlete can be classified into four main components: strength, speed, stamina and flexibility. However, exercise scientists have identified nine components that comprise the definition of fitness:

1. Strength - the extent to which muscles can exert force by contracting against resistance (e.g. holding or restraining an object or person)
2. Power - the ability to exert maximum muscular contraction instantly in an explosive burst of movements. The two components of power are strength and speed. (e.g. jumping or a sprint start)
3. Agility - the ability to perform a series of explosive power movements in rapid succession in opposing directions (e.g. Zigzag running or cutting movements)
4. Balance - the ability to control the body's position, either stationary (e.g. a handstand) or while moving (e.g. a gymnastics stunt)
5. Flexibility - the ability to achieve an extended range of motion without being impeded by excess tissue, i.e. fat or muscle (e.g. executing a leg split)
6. Local Muscle Endurance - a single muscle's ability to perform sustained work (e.g. rowing or cycling) [15,16]
7. Cardiovascular Endurance - the heart's ability to deliver blood to working muscles and their ability to use it (e.g. running long distances)
8. Strength Endurance - a muscle's ability to perform a maximum contraction time after time (e.g. continuous explosive rebounding through an entire basketball game)
9. Coordination - the ability to integrate the above-listed components so that effective movements are achieved.

Of all the nine fitness elements, cardiac respiratory qualities are the most important to develop as they enhance all the other components of the conditioning equation.

Physical fitness refers to an athlete's capacity to meet the varied physical demands of their sport without reducing the athlete to a fatigued state. The components of physical fitness are :



- Body Composition
- Endurance
- Flexibility
- Strength
- Speed

#### Motor Fitness

Motor Fitness refers to an athlete's ability to perform successfully in their sport. The components of motor fitness are :

- Agility
- Balance
- Coordination
- Power (speed & strength)
- Reaction Time

#### Improving your condition

Identify the most important fitness components for success in your sport or event. Then, design sport/event specific conditioning and training programs to enhance these fitness components and energy systems.[17,18]

#### Conditioning Exercises

The following are examples of general conditioning exercises:

- General core stability exercises
- General all-around body conditioning exercises using dumbbells
- General conditioning exercises for the upper body
- General and specific leg conditioning exercises
- Specific exercises to develop lower leg strength and foot speed

### Results

#### Tests for fitness components

<b>Fitness Component</b>	<b>Recognised Test</b>
Agility	Illinois Agility Test
Balance	Standing Stork Test
Body Composition	Skinfold measures
Cardiovascular Endurance	Multistage Fitness Test
Flexibility	Sit & Reach test
Muscular Endurance	NCF Abdominal Conditioning Test
Power	Standing Long Jump or Vertical Jump
Speed	30-metre Sprint
Strength	Handgrip Dynamometer

It has been found that the following tests appeared to provide acceptable reliability as methods for the field assessment of health-related fitness for adults:

- Standing on one leg with eyes open for balance
- Side-bending of the trunk for spinal flexibility
- Modified push-ups for upper body muscular function
- Jump and reach and one leg squat for muscular leg function

Cardiovascular fitness for bodybuilder and of athlete during age 50's is impacted by the health and capability of both your heart and lungs. Physiologically, this means that components of cardiovascular fitness include things like your heart rate, stroke volume, cardiac output and maximal oxygen consumption (VO2 Max).[19]

With that in mind, any type of training or intervention (aerobic or anaerobic) that improves these qualities will improve your cardiovascular fitness. Within body adaptations include...

- General metabolism increases
- Improved muscle metabolism
- Rises in haemoglobin
- Increased bloodstream buffers
- Improved venous return
- Improved stroke volume
- Plus your blood bed becomes more adaptable to varying demands

Many sports require a significant base of cardiovascular fitness in order to perform at a good or even half-decent level. Even in sports such as archery that seem far removed from what we traditionally think of as cardio, there are noticeable benefits to cardiovascular fitness. In the archer's case, a slower heart rate makes it easier to shoot in between heartbeats, improving accuracy.

Then we have to consider that there are sports like running, swimming and cycling in which cardiovascular fitness is more or less the main determining factor for success.

There are hundreds of different ways to test cardiovascular fitness.

Most commonly, maximum oxygen uptake (VO2 max) is tested, as it forms a major component of cardiovascular fitness. For best results this test is conducted in a sports science lab setting. However, for most fit and healthy people we can use gym and field-based submaximal tests to estimate VO2 max with a good degree of accuracy. Common tests include...

- The Astrand treadmill test
- The 2.4 km run test
- The Yo-yo intermittent recovery test

For sedentary individuals who cannot manage these tests, we might use something like the Cooper 1.5-mile walk-run test. It's not quite as good of an estimator as the above tests, but it's still accurate enough to be a useful test.

Alternatively, a more practical measure of cardiovascular fitness would simply be to track your performance in exercises and types of sessions that are relevant to your goals and interests. A simple example might be...

If you're a runner (athlete), how fast can you run 5k? If you run it in 30 minutes today and then run it in 25 minutes in a few months time, you can be pretty sure that your cardiovascular fitness has improved.[20]

### Conclusions

Many athletes and bodybuilders during age 50's claim their sport reigns supreme in terms of physical demand. However, to truly assess the cardiovascular benefit of a particular sport, objective data is required. One way to evaluate the cardiovascular benefit of a sport is to determine the maximal oxygen consumption, or VO2 Max, of elite athletes within the sport. VO2 Max refers to the maximum amount of oxygen an individual can process during exercise, and is predominantly determined by the size and strength of the heart and the efficiency of the cardiovascular system. VO2 Max values are presented as the number of liters of oxygen present in an athlete's system per kilogram of body weight.

Elite runners who specialize in middle to long distances exhibit VO2 Max estimates of 60 and greater. Interestingly, middle distance runners tend to have slightly higher values than long-distance runners because of the higher intensities of their events. High-intensity training has been shown to produce greater cardiovascular adaptations than long slow distance training. However, sprinting is not very taxing on the cardiovascular system because short distances are fueled anaerobically, or without use of oxygen.

In what is now an official sport of the Summer Olympic Games, racewalkers are gaining increasing respect for their physical prowess. Racewalking provides very similar cardiovascular adaptations to running, although the reduced intensity and lesser muscular demand provides for slightly lower VO2 Max values. Elite racewalkers tend to display VO2 Max estimates in the mid- to high 50s. Distance running pushes the aerobic system and skeletal muscles to extreme thresholds. Unlike cycling, running is a weight-bearing activity that adds a different demand to the muscles involved. The weight-bearing like bodybuilding and impact nature of running engages the muscles and soft tissue of the deep longitudinal subsystem. This support system is responsible for transferring force from the trunk to the ground throughout the running stride. The deep longitudinal system along with larger muscles in the quads, calves, core and upper body all withstand repeated force and require immense endurance to continue functioning optimally throughout the duration of a distance run.

Although less common, some track races exceed the marathon distance of 42.195 meters and are called ultramarathons. Some ultramarathons are run on roads and trails, but other races take place on a track. Track races commonly involve seeing who can run the farthest in a given time, for example, 24 hours.

Runners (athletes) who specialize in ultramarathon running tend to be extremely fit and possess a high degree of both mental and physical endurance. As economy of effort is vital for successful ultramarathon running, runners must also have a good understanding of race tactics and pacing to ensure they do not go too fast too soon and end up dropping out prematurely. Ultramarathons are only suitable for experienced runners who have a history of distance running training.[20]

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