Metabolic Conditioning for Volleyball—Two Models:
Collegiate and High School Scholastic / Club

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Conditioning is a blanket term used to describe all aspects of activity beyond the technical and tactical aspects of volleyball. The reason for conditioning is to improve performance and prevent or reduce injury. Metabolic, or energy system conditioning, represents the ability of an athlete to be metabolically conditioned (or “in shape” as it is commonly referred to) to perform at optimal levels throughout a match. The amount or degree of this form of “conditioning” is specific to the demands of the sport of volleyball; the periodization model, which includes the entire calendar year of competitions; rest; and training/practice time available to devote to conditioning and the individual needs of the athletes, including: training history, response to exercise, playing status/injury history, etc. This article addresses this form of conditioning as part of the entire conditioning process.

What are the Demands of the Sport of Volleyball

To train a player you have to start with what is expected of that individual. Here’s some information on the physical requirements of the sport of volleyball.

**Jumping attempts:** In 10 games, outside and middle hitters (the front row) jump about 850 to 900 times.

**Rally time:** The average rally time is from 4.4 to 6 seconds. The time between rallies is 11 and 15 seconds. This makes volleyball a 3 units of rest to every unit of work sport or a 3-to-1 rest-to-work ratio.

**Game time:** The average match lasts from 84 to 110 minutes.

This puts things into perspective as far as the physical demands of the game are concerned. The ATP-PC energy system is dominant in the first 4 to 10 seconds of work. So this short burst energy system plays an important part in the game of volleyball. The key is to be explosive and be able to recover to repeat this quality explosive trait for 84 to 110 minutes. This energy system is replenished by 50 percent within 30 seconds. This is where the anaerobic energy system and its development is important for top performance throughout a match. The question becomes how do you condition enough to provide the proper recovery necessary to play winning, explosive volleyball for the entire match?

The Two Volleyball Conditioning Models

The process of effectively training volleyball athletes with consideration to sound periodization models of the annual plan happens on two levels. One level (model) is the high school scholastic and club model; the other collegiate.

**Collegiate Model**

The collegiate model offers fewer challenges than the high school scholastic and club model. This model is subject to uniform NCAA rules and regulations, which dictate practice time and the personnel who can work with the volleyball athletes. Some times during the year are devoted entirely to strength and conditioning, which limits contact time with the volleyball coaches. During the season strength and conditioning is limited to 30 to 40 minutes twice a week due to the demands of the competitive season. Because of the limited time the strength aspect of the process is maintained with metabolic conditioning left to practice/match situations.
Practice can be designed to create a “conditioning” effect while emphasizing the technical/tactical aspect of the sport. For example, one can have 20-second rallies over an hour and a half with limited recovery, which will stress the aerobic energy system over the duration of the session. A different design can yield more of an anaerobic energy component. In the weight room, focus is on strength and power development.

This process is done in close communication between the volleyball coach and the strength and conditioning coach. The goal is to achieve peak performance based on the season and avoid fatigue and overtraining and possible injury.

As control is the hallmark of the collegiate model, lack of control exemplifies the fate of the high school scholastic and club models. In the collegiate model, one can start with a metabolic conditioning program with the 3 units work to one unit rest and progress over a 12 week period to a 2-to-1 and finally a 1-to-1 program. This allows the athletes to be in great shape coming into the demanding preseason regiment. Unlike the sport of football where maximum strength is necessary to play the sport effectively, the max strength contribution in volleyball is less and, therefore, the coach can devote the time to metabolic conditioning during the strength/power development period of the off-season. Designed properly, this “mixed” training doesn’t impede necessary strength/power development.

High School Scholastic and Club Model

In the high school scholastic and club model things are different. The difference is that athletes at this level are always “in-season”, playing club and scholastic on an alternate basis. Because of this one doesn’t have to devote as much time such as 12 weeks in the collegiate model to developing strength, power and metabolic conditioning. In the collegiate model one can do strength/power on Mon, Tue and Wed, and speed/agility/metabolic Tue-Thur.

The lacks of control sources are many at this level. For example, transportation—one may only have a kid two days a week, which is absolute minimum for conditioning in the club setting. Another issue is the number of sets played. In high school, it’s 5 sets while in club it’s 3. Since the demands of the game are different, the conditioning considerations are also. What all this equates to is open and direct communications between all involved. There can be one athlete with a club coach, a high school coach, perhaps a private gym personal trainer and throw in an athletic trainer, you can begin to see the complexity and lack of control. There can be four to six different people at various locations working with the same athlete and everyone is giving him a different opinion as to what s/he needs work on. Because of this lack of a single voice in overall development, the metabolic aspect for the high school scholastic and club model is almost non-existent.

This really becomes obvious as athletes come to college. The first year, most struggle with the workload placed on them. Table 1 has a program that coaches can follow to insure their athletes are metabolically conditioned both on the collegiate and the high school scholastic and club models. One of the traditional tests done in volleyball is the 300-yard shuttle run (See Table 2). This is one activity I’ve removed from my program because nowhere in volleyball does an athlete run continuously for 50 seconds to a minute and 15 seconds (standard time for a volleyball athlete).

Alternative to the 300 Yard Shuttle

Earlier it was stated that a rally usually last from 11 to 15 seconds. My philosophy of training is to prepare the athletes for a 20-second rally with 30 seconds the absolute max. This is an overload but does occur fairly commonly in today’s game.

Here’s the alternative our athletes do. We run “40s” from the end line to the net and back twice in 10 seconds. That is the basis of the entire metabolic program. We might do 10 to 20 of these with rest between each attempt. A spin off of this is to do 100 yards (back and forth 5 times), which takes the athletes about 25 seconds. We also do a 60, which is 3 times and takes about 15-16 seconds (same average time of a rally on the high end).

In our program we will do a combination of these distances over the training week. To increase the “fun” we do randoms wherein we include all distances in a single workout.

The rest ratio follows the 3 units of rest to one unit of work at a specific distance. This is a starting point and I’ll work down to a 2-to-1 and finally a 1-to-1 rest-to-work ratio. Doing the randoms, I’ll vary the rest period on a random basis as well. This gets very match specific. One point of emphasis: a coach might be tempted to do a volleyball skill with these runs. This is wrong because we are working metabolic conditioning so skill work would compromise the quality aspect of the exercise. The mindset should be conditioning, not skill work. This training system has really worked for us. A coach asked for our athletes to run a 300-yard shuttle and our entire team passed the test easily without having done any 300-yard shuttles in the past. So, I’m confident our system works and is more volleyball specific.

More Information Please!
Contact Robert at www.rbrownsports.com or e-mail to robert@rbrownsports.com

<table>
<thead>
<tr>
<th>Week 1-3</th>
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<tbody>
<tr>
<td>Day One</td>
<td>Ten 40 yard sprints Rest – 30 seconds</td>
</tr>
<tr>
<td>Day Two</td>
<td>Ten 100 Yard Sprints Rest – 1:00 minute</td>
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<tr>
<td>Day Three</td>
<td>Fifteen 60 Yard Sprint Rest 45 seconds</td>
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Table 1 Metabolic Conditioning Program for Collegiate/ High School Scholastic and Club Models
Week 4-6
Day One Twelve 40 yard sprints Rest – 20 seconds
Day Two Twelve 100 Yard Sprints Rest – 45 seconds
Day Three Twelve 60 Yard Sprint Rest 30 seconds

Week 7-9
Day One Fifteen 40 yard sprints Rest – 30 seconds
Day Two Fifteen 100 Yard Sprints Rest – 1:00 minute
Day Three Fifteen 60 Yard Sprint Rest 45 seconds

Week 10 – 12
Day One Twenty 40 yard sprints Rest – Random selection between 10 – 15 seconds
Day two Twenty Random Sprints (40’s, 60’s, and 100’s) Yard Sprints Rest – Random selection between 10 – 15 seconds
Day Three 20 Minutes Sprint Intervals Sprint the length (must be less than 6 seconds per) of the court jog back and repeat for 20 minutes total

Table 2: 300 yard shuttle test (note rest time between attempts can be altered depending on the sport.)
An entire team can run the test at once or it can be broken into two groups. Players run the first trial as follows: from the starting line they sprint to a point fifty-yards distant and back; then forty-yards and back; then thirty and back; twenty and back; and finally, ten-yards and back to finish the first trial. Players take two minutes rest (the second group can run their first trial during this rest interval if the team has been broken into groups). The second trial is run in reverse order: ten-yards and back; twenty and back; thirty and back; forty and back; and finishing with a fifty-yard and back sprint.

<table>
<thead>
<tr>
<th>Distance</th>
<th>50</th>
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A timer must call out times (second-by-second) as runners come to the finish line (“fifty-eight! fifty-nine! sixty!). Players must remember the number called as they finish and deliver their result to whoever is recording. -Steve Myrland