

Low-Altitude Training for High-Altitude Climbing

By Ryan Taylor

Altitude and Performance

Recently, as climbing gyms have boomed, more and more climbers from low elevation areas, are seeking higher grounds and traveling to much higher elevations to climb. Mountains like Orizaba (18,404ft) in Mexico and Mount Rainier (14,411ft) in Washington state are at altitudes where the oxygen pressure is low enough to limit aerobic performance, which is necessary in climbing. Training methods and the problems associated with this type of altitude are of great importance for climbers in these areas because they have to train at such low elevations. Fortunately, there are ways to prepare for this type of excursion in order to maximize performance, limit the danger of high altitude disorders and sicknesses, and increase the enjoyment of the climb.

One's aerobic performance can best be measured in terms of his or her VO₂ max--the maximum amount of oxygen that one's body can consume. The amount of oxygen consumed by your body is directly proportional to the amount of work or exercise your body is performing. For example, walking up a mountain at a certain speed requires a certain amount of oxygen. Increasing the speed of walking requires even more oxygen. When you are walking or running as fast and as hard as you can, you are likely consuming the maximum amount of oxygen that is possible for your body, i.e., your VO₂ max. The higher a person's VO₂ max, the harder or more intense they can work. Conversely, altitude lowers a person's VO₂ max which then lowers work capacity.

The problem of oxygen consumption is compounded at altitude because of the reduced pressure of oxygen. Walking up main dome on a 30 degree slope at 3 mi/hr with a 40 pound pack is easier than walking up to the summit of Mount Rainier on a 30 degree slope at 3 mi/hr with a 40 pound pack. You are doing the same amount of work, but since your body's ability to deliver oxygen to the working muscles at altitude is lower than at sea level, you are working closer to your maximum capacity.

Training

This is where training comes in. Everybody is born with the ability to reach a certain VO₂ max. One person may be able to reach a certain VO₂ max but another person, no matter how hard they train, will never be able to reach a comparable VO₂ max. If you are genetically able to reach a certain VO₂ max, and you don't train, your VO₂ max is not as high as it can be. Therefore, by training to increase your VO₂ max, a certain amount of work like hiking up Mount Rainier on a 30 degree slope at 3 mi/hr with a 40 pound pack is easier, and the maximum amount of work you can do is increased. Proper training, directed at increasing your VO₂ max, makes it is easier to climb and you can climb harder.

Let's look at training for this incredible trip that you have been saving for. The best type of training is highly aerobic activities like running and cycling. You need to start out slow and short if you have not trained before. Eventually work your way up to doing one of these exercises 3-5 days a week for 30min to an hour at 70-85% of your maximum heart rate. Your maximum heart rate can be estimated by subtracting your age from 220. For example, a 24 year old person will have a maximum heart rate of 196 beats per minute and 70-85% of this is 137-167 beats per minute. While doing this aerobic type of exercise you can throw in one minute intervals of higher intensity in order to push your limits. Also, you can supplement this exercise with your regular weight and climbing workouts.

Another good training technique is to, at least one day a week, do an exercise that resembles what you will encounter while climbing. This can include hiking, or running stairs with your pack on. When training for a climb, my regular weekly work out consists of running 3 days, lifting weights 1 day, running stairs 1 day, sport climbing 1 day, and resting on the last one. Generally you should allow a minimum of three months in order to get the most out of your training, but even longer if possible. All of the normal dietary and hydration concerns are the same as with any training program.

On the Climb

Several months of training in the flatlands have passed and the big climb is arriving. As soon as you drive to basecamp on Orizaba (approx. 10,000ft), the acclimatization period begins. Coming from such a low altitude, you need to rest for 2-5 days at this altitude in order to maximize your acclimatization period. Any longer than this and you may actually detrain from lack of activity. Typically, waiting the full 5 days is best for your performance, but the time is highly dependent upon the person because some people have more difficulty in acclimatizing than others. An acclimatization period is necessary for your body to make adaptations that will help your body deal with the altitude better.

Another important factor when climbing is remaining hydrated. Your body's natural response to altitude is to dump fluid by urinating, plus the dryer air speeds evaporation from your breath. It should be noted that consuming alcohol prior to or during your climb also has a dehydrating effect. These factors will make your ascent more difficult and increases your risk of the different types of mountain sickness.

Many problems associated with altitude, such as acute mountain sickness, pulmonary edema, and cerebral edema, can be better dealt with and prevented by having a higher VO₂ max and remaining hydrated. A more complete discussion of these illnesses can be found in a book called *Medicine for Mountaineering 4th ed.*, edited by James A. Wilkerson, M.D., published by the Mountaineers 1992. This of course is not all of the information available on altitude and training for altitude, but I hope it is a good overview.