

American Alpine Institute^{Ltd.}

PHYSICAL CONDITIONING INFORMATION FOR EXPEDITIONS

When climbing peaks of high altitude, the limiting factor is usually the inability to supply muscle tissue with sufficient oxygen. Generally speaking, oxygen delivery at altitude is dependent upon two things: first is the strength and capacity of the heart and lungs, and second is the degree to which one is acclimatized. When you acclimatize to altitude, your oxygen delivery system becomes more efficient through a number of changes. These changes can only come about by a lengthy exposure to high altitude and as a result most of us go through the process of acclimatization after we've arrived on the mountain. If you are fortunate enough to have some high peaks (12,000' plus) near your home, remember that the beneficial effects derived from a lengthy stay at altitude usually are eliminated by a stay of the same length at a lower elevation. In other words, if you camp out on the summit of Pike's Peak (14,000') for a week prior to the beginning of your climbing trip, you'll lose most of the good affects if you descend to a lower elevation for a week before the trip.

Lacking large mountains close at hand, most of us must be content with working on enlarging the capacity and strength of our heart and lungs. There are many excellent exercises and activities which can accomplish this (can be outlined below), but the important thing to remember is to begin your exercising well in advance of your climb. The body takes a long time to make significant changes in its oxygen delivery capabilities. Also, some people's exercise regimes are so strenuous that they need time to stretch out and heal those over-exercised parts. In any case, if you spend a long time increasing your aerobic capacity, it will stay with you long after the climb.

It's best to begin your chosen activity at least a month before the climb. If you haven't exercised much in the last year or so, starting six weeks or two months before your trip would be even better. Start slowly to avoid exhausting yourself, working up to more exercise when your body can handle an increase. You should perform your chosen exercise about every other day. Once you begin, avoid going without exercise for more than a few days. You should maintain a heart rate of 60-80% of maximum in order to actually strengthen the heart. Maximum heart rate can be calculated by subtracting your age from 220. Try to work to the upper end of the 60-80% range by the time you arrive for your program.

Every time you exercise you should stretch, both before and after the activity.

Suggested stretches include:

1. Stand with your feet together, arms stretched above your head, and slowly stretch from the waist forward and down to your feet, stretching both back and leg muscles. It's important not to bounce, but instead try to hold your lowest stretch as long as you can. You'll find that in three weeks you'll see an amazing difference in your ability to stretch out.
2. Stand with feet about shoulder width apart and hands on hips. Bend sideways at the waist first in one direction, then in the other. Repeat this exercise, but with your left hand on your hip and your right arm extended above and over your head as you bend toward your left side. Repeat for the right side.
3. Sitting or standing, clasp your hands behind your back, left hand reaching over your left shoulder and right hand reaching up from your lower back; repeat using opposite hands.

4. To stretch calf muscles, stand at least arm's length from a wall, extend one leg out behind you and drop your heel slowly as far as possible. Repeat for the other leg.
5. To stretch out fingers, gently pull back fingers one at a time with your other hand.

The best exercise for climbing is, of course, climbing. However, very few of us can afford to go climbing every other day. A good long hike or climb done at a fairly quick pace whenever possible can only help. When you do spend all day hiking, try to maintain a steady pace at which you are just short of breath. Don't push yourself to gasping as you'll never be able to keep it up for long. The following list of activities are only suggestions. In order to vary your activities and avoid becoming bored with them, you may wish to alternate.

1. **Bicycling:** This involves the thigh muscles in a short, downward stroke similar to the short steps taken when climbing slopes. Using the downward curving handlebars on your bike will encourage the use of back and shoulder muscles. You may find that your calf muscles are somewhat overlooked in this activity. Working with weights in this area will help you develop strength here. Cycling is a good activity for people who want to avoid the jarring associated with running. Be sure to keep a fast cadence, approximately 90 revolutions/minute. To avoid placing undue stress on your knees, gear down. To measure your cadence, take a watch with you and time yourself. Before beginning a cycling program, be sure to consult your local bike shop to make sure that your bike fits you properly and is in safe working order.
2. **Running:** This activity is great for strengthening both heart and lungs. It requires very little equipment and can be done almost anywhere in any weather condition. The stride used in running is normally a bit longer than the one used for climbing. Running hills is good and will improve all of the thigh and leg muscles used in climbing. Take care to avoid jarring injuries. Investing in the best possible pair of running shoes and avoiding running down steep hillsides and on pavement and other hard surfaces will help you minimize possible injuries. A program that includes moderate paced runs interspersed with sprints and uphill sections will put you in excellent condition. The muscles in your back and shoulders will be neglected with a running program, so you may want to supplement this with another exercise program or weight training.
3. **Swimming:** This exercise is very good for the heart and lungs when done with vigor. There are almost no stress-related injuries with swimming, so it's well suited to people with sensitive joints. Swimming strengthens primarily the shoulders and back, so combining it with a program that works on developing leg muscles is recommended.
4. **Racquet sports:** These are especially good during spells of bad weather. Played rigorously, they strengthen the heart and lungs and are good for toning and strengthening the shoulder, back, and leg muscles.

Knees are the most abused parts of the body. In order to avoid knee problems later it is worth taking a few precautions now to strengthen them. If you are a relatively active person chances are that an exercise program won't lead to any knee problems. If you have had knee problems or are afraid you might, the following exercises are designed to increase knee strength. The best insurance against knee injury is to have strong quadriceps, the large muscles on the front of your thigh. They're connected to ligaments, which pass over the knee joint, keeping everything in place. The following exercises will strengthen your quads and therefore your knees. Do 5-10 repetitions of each exercise several times a day.

1. **Quad muscle setting:** With your legs straight, either lying on your back or sitting, pull your kneecap toward you as you push the back of your knee down. Hold the muscle tight a few seconds and release.
2. **Straight leg raises:** Lie flat on your back with one leg extended flat and the opposite leg bent with the knee raised. Raise the entire straight leg, keeping it straight, 12 inches off the floor. Hold the position a few seconds and then slowly lower the leg. Repeat with the opposite leg. This one is fairly strenuous, so take care not to strain yourself.
3. **Terminal knee extension (lying):** Lie on your back with a rolled towel under one knee. Straighten your leg, raising the foot. Hold straight a few seconds, then lower. Repeat with the opposite leg.
4. **Terminal knee extension (sitting):** Sit on a firm surface with a rolled towel under the back of one knee and hang your leg freely. Straighten you knee all the way. Avoid leaning forward, backward, or sideways. Hold the leg straight for a few seconds, then slowly lower. Repeat with the opposite leg.

If you haven't been involved in physical activities for a while, consult your physician prior to any physically demanding conditioning program.

Remember, it's important to set a realistic goal for yourself. A number of moderate workouts give superior results to several extreme workouts that result in injury. If you're not having fun or getting satisfaction from your workout, then scrutinize your activities and attitude toward your training program. Perhaps changing your activity would better suit you. After the initial period when muscles are sore, activities very tiring, and motivation is low, a program involving the entire body and integrating a number of activities will be both fun and exciting, and you'll find yourself motivated to spend time on your training. The better condition you come in, the more you'll enjoy your climbing.

Good luck on your training program!