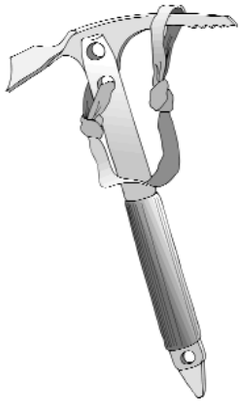
Climbing is supposed to be fun. Bad weather and accidents aside, the major deterrents to success or a good time are fatigue and the discomforts of mountain sickness. The first step in their prevention is understanding why they occur; the next is planning to avoid them.

If 11,235' Mt. Hood is climbed with the same constant intensity of exercise that one uses to run a marathon, the round trip ascent form Timberline Lodge (6000') , under good conditions, takes the same amount of time as a flat sea level marathon. The two activities should require comparable energy expenditure. For the 60 kg. (130 pound) person, this is around 2500 kcal (calories). This energy must come from the body's stores which are in the form of blood glucose (10 kcal), liver glycogen (200), muscle glycogen (400), muscle (25, 000) and fat (100,000).

The blood glucose stores will get us out of the parking lot (6,000') and the glycogen alone will carry us to the end of the Palmer Ski Lift (8,600') at most. Fortunately for the brain (which needs glucose to keep the show going) the blood glucose is continuously replaced, but once the glycogen is gone, we have "hit the wall" or whatever phrase you like to describe the feeling that the Lodge quite suddenly seems far more appealing than the summit. This is because muscle contraction depends on some glycogen. We really oughtn't consume the muscle itself, so the key to avoiding fatigue (and the discomfort, accidents, and hypothermia associated with it) is to increase our glycogen stores, and much more importantly, encourage the early use of fat as an energy source.

We can increase muscle glycogen by depleting the same muscles we will use in the climb a few days before (an hour of steep hill running or walking), then loading them with glycogen by eating high carbohydrate meals, and resting them for a couple of days. Liver glycogen is optimized by eating a high carbohydrate meal about 8 PM if you plan to leave Timberline at 1 AM. Early release of fat into the blood stream cam be stimulated by drinking two to three cups of coffee or tea about midnight, or by taking the equivalent amount of caffeine in tablet form (2 or 3 NoDoz). In order to further increase the ratio of fat to glycogen consumption, the climb must begin very slowly (so that blood flow can be distributed to the working muscles and bring with it released fat) and continue fairly slowly (since glycogen consumption increases as we raise the intensity of exercise). Going at a constant pace which can be maintained for hours is the most efficient energy-wise and, funny thing, time-wise also. If worse comes to worst and you anticipate having energy stores run out before the summit or during the descent, do what marathoners are not permitted: stop and eat your lunch and enjoy the view. But do this long before you deplete your glycogen.

Let's assume you are bursting with energy, but now a headache or nausea from the altitude is making the Lodge more and more appealing. The reason for the symptoms is that you are not breathing enough. We are all breathing less than we would if we took 24 to 48 hours to acclimate, and some of us are predisposed to breathe even less. Few of us can afford to make climbing Mt. Hood a 2-3 day venture, but there are some ways we can minimize the problems without acclimating.



Intentionally breathing harder may help, but it's hard to concentrate on that when so many other things are going on and overdoing it makes us dizzy. It is likely that the most uncomfortable moments will be during rest stops when exercise is no longer stimulating breathing and the oxygen level in our blood drops. The continuous slow pace which helps conserve glycogen and saves us time in the long run may also prevent the headache by eliminating rest stops.

*"Few of us can afford to make climbing Mt. Hood a 2-3 day venture, but there are some ways we can minimize the problems without acclimating."*

If you repeatedly have trouble with symptoms of mountain sickness, a trial of acetazolamide (Diamox) to stimulate your breathing, might be helpful. If okayed by your physician, take 125 mg 1-2 hours before reaching the altitude at which you previously developed the symptoms. Remember though, that acetazolamide is a weak diuretic (causes a little bladder fullness) and by making you breathe faster may also cause some tingling in your fingers. Oddly enough, the individuals who need to have their breathing stimulated also tend to be fluid retainers at altitude, so the diuresis is not an unwanted side effect. It just means that if you don't need it, don't take it.

So, hold on to your glycogen; don't forget to breathe; and enjoy the sunrise from the summit.



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## About Steve Boyer, M.D.

Dr. Steve Boyer speaks with particular expertise on the subject of energy and respiratory requirments in aerobic mountaineering. Currently a Portland emergency room physician, Dr. Boyer is also an accomplished climber and athlete. He has participated in 3 Mt. Everest expeditions and has summited Annapurna via the South Face route. Dr. Boyer has set several speed records for Mt. Hood climbs (round trip from: Portland, bike/climb - 10:16; Government Camp - 3:14; Timberline Lodge - 2:06) and in 1992 was nationally-ranked in several Masters Track and Field steeplechase events (1st in the 3000m event.) We are proud to claim Dr. Boyer as a Portland Mountain Rescue alumnus.

**Portland Mountain Rescue** is a group of dedicated Portland-area climbers that provides search and rescue services on a volunteer basis. We do not charge for our services and receive no money from government agencies.We rely on contributions from the public to fund our activities. Your tax-deductible contributions are greatly appreciated and can be mailed to the address below.

*The **Safety Essentials Series** Educational Brochure is produced by Portland Mountain Rescue as a service to climbers.*

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***Safety Essentials Series***

# Energy and Respiratory Requirements in Aerobic Mountaineering