

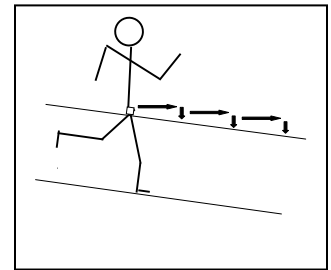
The Ups and Downs of Hill Running

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Imagine racing stride for stride with a runner who is just a bit stronger than you. With heart rate redlined, breathing right on the edge, and legs burning, you know you won't last much longer. The road turns downhill and you squirt forward as if propelled by a rocket-booster, gapping your stunned opponent. By the end of the downhill, you have a 20-yard lead, heart rate and breathing have recovered and your legs feel bouncy again. This doesn't have to remain a fantasy.

Stair Stepping

Most runners use the stair-step technique on down-hills, pushing out horizontally and allowing gravity to pull them down. This wastes energy and increases risk for injuries. This brake-propel-brake-propel slows a runner and wastes energy. If you hit the ground much harder running downhill than on flats, you are definitely a stair-stepper. Learn to roll down hills. You'll run much faster, use less energy, and reduce the damage of hard landings.

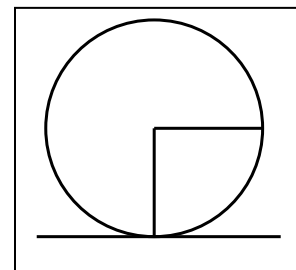


Roll Down the Hills

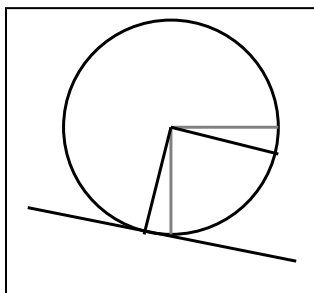
Efficient downhill runners avoid using much energy in either braking or propulsion. Gravity provides plenty of power if you learn how to use it.

Running down hills slowly requires much more energy than running them fast.

The wheel provides the best insight into optimal downhill biomechanics. On a flat road, a wheel's center of support is directly under its center of mass and provides perfectly horizontal movement.



Downhill, however, these dynamics change. The orientation between a wheel's support and center of mass rotates with the grade. The wheel's support is behind its center of mass. It will roll parallel to the slope instead of perfectly horizontally.



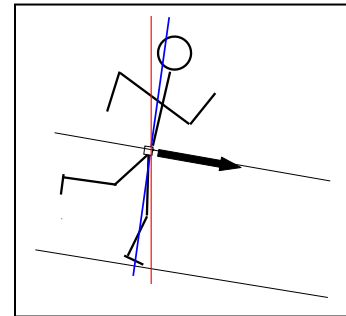
Efficient downhill runners actually place their foot down *behind* their hip. This is difficult to perfect



because it feels like falling forward. Efficient runners do, in fact, fall forward in a controlled manner with minimal braking. As the grade gets steeper, they lean slightly further forward and maintain a somewhat similar body position relative to the ground as when running on a flat road.

With optimal run technique, the runner's center of mass always travels in a line almost parallel with the slope of the ground. The force of gravity is used to provide propulsion instead of causing a harder landing.

As your leg swings forward, pull your foot back a split-second earlier than you do now. You'll feel yourself squirt forward at foot-strike with no attempt to provide propulsion.



This can feel scary at first, but maintaining balance does not have to mean slowing down. Put the other foot down behind the hips and squirt forward again. Learn to stay light on your feet, turn your legs over very quickly, and avoid braking. Let gravity do the work.

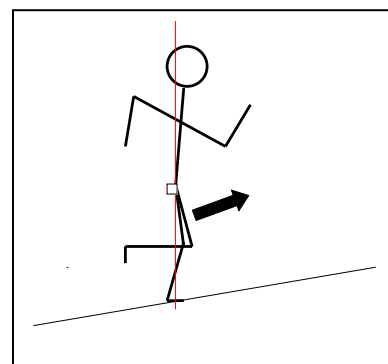
When coasting downhill on a bike, your orientation to the road is no different from when riding on the flats and the wheels serve only to hold you up. Gravity provides propulsion. Learning to run downhill this way is extremely efficient. Lean forward, allow your legs to support your weight, and let gravity pull you forward. Let your legs just be your wheels.

Bounce Up Hills

Most triathletes realize that maintaining cadence during uphill cycling is critical. They watch beginning cyclists struggle up hills at 60 rpm, wondering mockingly why they don't shift gears. Then they run up hills doing the same thing as the cyclist they just scoffed at.

Maintain High Turnover: Keeping turnover high on up-hills is important for the same reasons as in cycling, plus a major additional one. Runners gain significant power from the elasticity of the tissues in their feet and calves, their springs. If turnover slows on up-hills, you lose a major source of propulsion when you can least afford to.

Drive the Knee Up the Hill The knee must be brought up much higher during leg recovery on up-hills. Driving the knee powerfully upward puts the leg in position to drive downward into





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the ground, pre-stretch the muscles, and provide both upward and forward propulsion. Using the gluteus maximus, hamstring, quadriceps, and calf muscles together is critical.

Kick the Ground. When running up hills, pull your foot back and down into the ground. Don't just wait for gravity to pull you down, initiate the contact aggressively. Get this right and you'll feel the same bounce as on flat roads.

Concentrate on your technique on hills, both up and down, in training. A little bit of specific work on your technique will pay huge dividends on race day.

Ken Mierke, coach to some of the fastest runners in triathlon, is author of The Triathlete's Guide to Run Training and has produced a DVD about running technique, Evolution Running. His next book Evolution Running: Run Faster and Farther Without Injury is due out in June. Join Ken for Evolution Running clinics in Fairfax or Annapolis later this month.
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