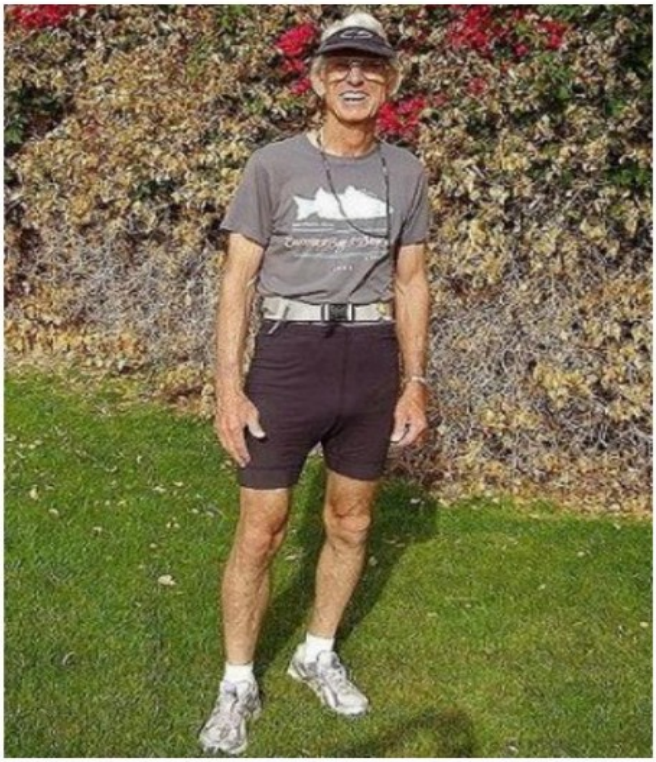
« TRAINING TIPS FOR RUNNERS »

Billy Dean



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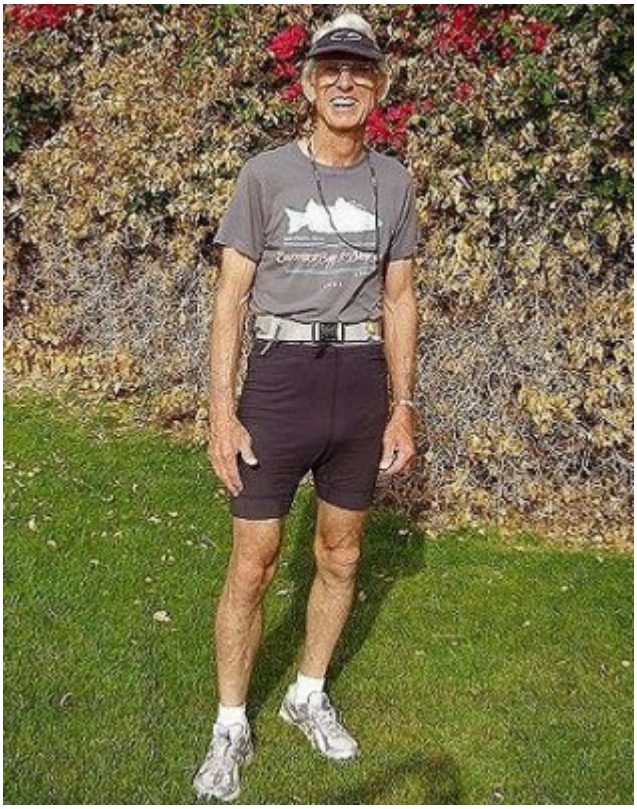

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« INTRODUCTION »

In running, as in nature, function follows form. When form fits function, your running becomes a whole greater than a mere sum of its parts.

If you are satisfied with your personal records and competitive success, or just glad to have gained enough fitness to enjoy running rather than dreading it, you've reached a plateau, a zone of comfort where it takes less effort to avoid backsliding than it takes to continue up the mountain.

If you are not satisfied with your personal records and competitive success, your eyes are on the mountain and you'll continue climbing until you reach your peak.

Whether you remain on the plateau or to continue up the mountain, running will be honest with you if you are honest with yourself. Keep your training aligned with your goals, and you'll get back exactly what you put into it. How do you align training and goals? Pay attention to **HOW** you train and **WHY** you run.

Specificity

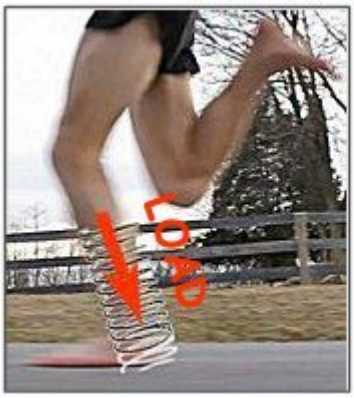
Even people blessed with world-class genes must develop their natural talent by training consistently and effectively. That means being specific about ***how*** you train and race. How do you get to the finish line ahead of runners who have as much or more raw talent than you have? Train and race more ***specifically*** than they do.

Passion

Even people who train and race specifically must have a passion for running. That means tapping into ***why*** you run and race. How do you get to the finish ahead of runners who train as well or better then you do? Train and race more ***passionately*** than they do.

« YOUR FORM »

Videos are better than words, anecdotal stories or scientific evidence. Click the link below and watch how and why good form is a harmony of mind and body, stride rate and stride length, muscle groups cooperating with each other—all the variables of good form coming together in one efficient, flowing style.



Click to Watch Video

Notice the loading and unloading effects of a mid-foot landing. Notice how Mark achieves an efficient balance between stride length and stride rate. Notice how a mid-foot landing blends perfectly with the other factors of an efficient running style.

- Erect Posture: Lean from the ankles, not the waist.
- Strong Core: You can't fire cannons from a canoe.
- Flexible Hip: Lengthen stride with your back stroke.
- Strong Glutes: Butt muscles are prime movers.
- Form Drills: Hills are form drills in disguise.

Hills reinforce proper movement patterns because it's almost impossible to run uphill with bad form. Your body will insist on searching for and finding the most natural, efficient form. You'll learn how to integrate hill training into your weekly schedule later in this guide.

Heel Striking

Your foot strikes the ground in front of your body with your knee straight. Ouch! The jarring result is you decelerate as your feet hit the ground. You suffer a longer-than-natural stride length and a slower-than-natural stride rate because it takes longer for your body to come over your foot so you can push off than it takes if you land under your body. Increasing your stride rate to cure over striding ignores its cause: bad form and high-heeled shoes. Landing on your heels is occasionally appropriate, but if you are stuck in a heel-striking sequence, you are limiting your skill as a runner, hampering your form and risking injury.

Mid-Foot Landings

Your foot lands under your body. The springy result is that your momentum continues as your feet meet the ground. You enjoy a more natural, efficient stride length, higher cadence and improved proprioception (feel) of the trail. Your legs operate like springs to load and unload as you run, making it easier to achieve a higher cadence and a longer, more naturally efficient stride length. You are able to run farther and more efficiently because you are using less energy than a heel striker. The leg is bent at the moment of impact, which reduces impact and risk of injury, especially to your knees.

« YOUR STRIDE »

Speed

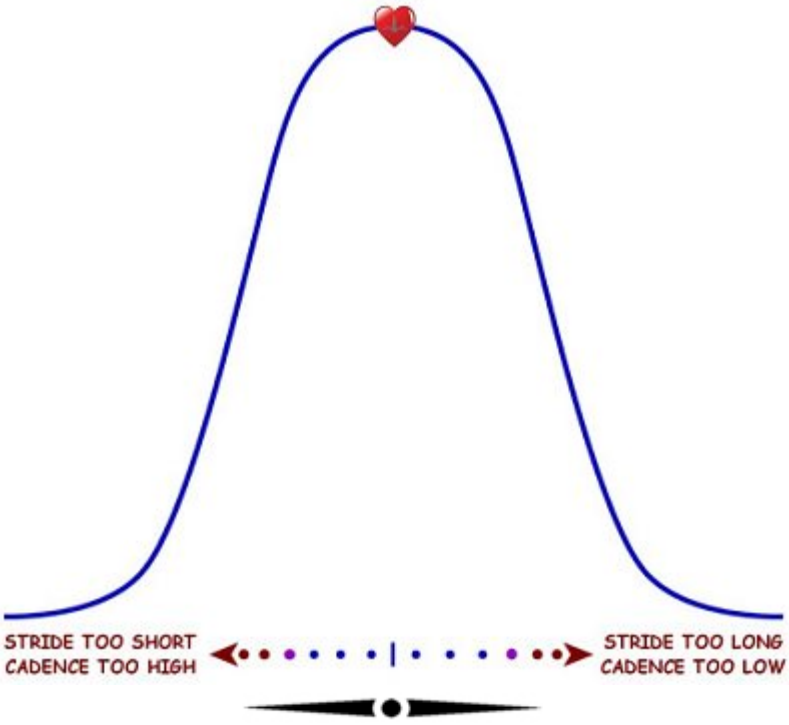
Your speed equals stride length times stride rate. Both are effects of good running form and proper shoe choice—the result of how you run, not the cause. So focus on improving form, not on the dynamics of stride. Reaching out, applying more force or altering cadence will take you away from your natural running style.

Length

Let's say your stride is 42.2 inches and your best 10K is 50:15. If you increase your stride to 44.3 inches (5% change) your new PR would be 47:44!

Rate.

You'll find anecdotal and scientific evidence that a cadence of 180 steps per minute (90 for each leg) is the "magic" number. Find your own magic numbers for stride rate and stride length that are biomechanically and metabolically efficient for you. Your feet, legs, head and heart will love it!



« YOUR MUSCLES »

When your leading leg meets the ground »

Glutes bend hip joint from forward to rearward;
Calves contract, pushing toes down as foot pushes off;
Hamstrings bend knee, moving heel toward buttocks;

When your trailing leg leaves the ground »

Hamstrings unbend hip joint from behind to straight down;
Quads/Hip Flexors bend hip joint forward, moving thigh toward abdominals as your trailing leg swings forward;
Quads begin to straighten your knee for foot landing;
Shins contract to pull toes up before foot meets ground;
Quads contract, keeping knee from buckling at foot plant;

Glutes propel you forward, support the hip joint and keep you erect. The largest glute (gluteus maximus) propels you forward by straightening (unbending) your hip joint as your leading leg pushes off. The gluteus maximus is a big gun on flat surfaces, but an even bigger gun on hills, because you need more extension (straightening) of the hip. Weak glutes can't keep your hip joint straight, so you lean forward at the waist, then over stride to keep from falling forward. Your form worsens as your lower back muscles and hamstrings struggle to keep you upright. A weak gluteus medius can't keep your hips level, so your swinging leg drops down, causing your knee to bend excessively so your foot can clear the ground.

Quads straighten your knee joint and bend your hip joint as your leg swings forward; they also keep your knees from buckling at foot plant. Weak quads cause that survival shuffle near the end of long runs, and that up and down bobbing in runners with poor form.

Calves contract (plantar flexion) to push your toes down as your foot pushes off. Calves and ankles work together to give your stride spring. Like glutes, calves work harder on hills.

Shins contract (dorsiflexion) to pull your toes up as your foot lands. Heel striking is an extreme toe-up position that decelerates forward motion, destroys form, and causes injury.

Hamstrings bend (flex) the knee joint to move your leg back and your heel toward your butt, then unbend (extend) the hip joint from behind you as your trailing leg moves forward. Your hamstrings must cooperate with your quads to move the hip and knee joints. But hamstrings are typically weaker than quads, especially in runners who cycle. As your quads and hip flexors swing your trailing leg forward, your hamstrings contract to decelerate the forward swing. But it must also expand to not restrict the quads from straightening the knee and bending the hip forward. If your hamstring can't keep up with your quads, it can tear.

Hip Flexors move your thigh toward your stomach as your trailing leg swings forward. Weak hip flexors cause the hips to sway outward on foot plant, which can injure the connective tissue on the outside of your upper leg (iliotibial band) by pulling it too tight.

« YOUR FEET »

Pronation is a good thing. Unless we pronate too much or too little. And there's the rub: doing too much or too little of a good thing. When the foot meets the ground, the arch flattens so the foot can roll inward to absorb shock. It's a cause-and-effect relationship. The flattening initiates the roll, and the degree of roll is proportional to the amount of flattening. The amount of flattening is also affected by the type of foot you have. The higher your arch, the more resistant your foot is to rolling inward.

Supination is the opposite of pronation and it's good too if you don't supinate too much. The foot turns slightly outward, changing from a flexible foot to becoming rigid so it can propel the foot and push off from the ground. During this phase the foot inverts slightly, and the arches become higher, thus enabling the foot to properly roll over the big toe. The higher your arch, the more your feet will roll outward.

Low Arch > foot tends to roll inward and thus pronate excessively. Low-arched feet are often described as flat feet. Runners with flat feet typically require shoes with more cushioning and motion control features...

Medium Arch > foot does not roll inward or outward excessively. Medium-arched feet are often described as neutral or normal feet. Runners with medium arched feet can usually wear a wider range of shoes than low or high arched runners.

High Arch > foot tends to roll outward and thus supinate excessively. Runners with high-arches require shoes with curved lasts to allow pronation, lighter weight to allow foot motion and more flexibility on the inner, arch side of the shoe.

« YOUR SHOES »

Cushioning >shoes should allow you to feel the ground (proprioception) so your nervous system can tell your body which muscles to activate and how hard and how long each muscle should fire. Thick/soft shoes prevent that feedback.

Flexibility > shoes should allow your foot to bend up, down, left and right, just as it does when you are barefoot.

Toe Box > shoes with a narrow toe box compress the big toe out of alignment, which prevents it from aiding balance, stability and propulsion. A narrow toe box will also prevent your toes from "splaying" as your foot comes in contact with the ground, which will limit feedback and balance.

Heel-to-Toe Drop > the heel and the ball of your foot are designed to support your arch in a level plane, just as they do when you are barefoot. If your heel is excessively higher than the ball, your arch will be tilted and unbalanced.

Traditional shoes > have a high heel relative to the forefoot, typically 10mm and up, a common cause of heel striking, knee injuries and poor running form.

30 - 18 = 12mm

Minimalist shoes... are typically 8mm or less, which encourages us to run more naturally, the way we evolved to run: with a mid-foot landing, not a heel strike.

- Let your feet and legs deal with cushioning and stability, *not* your shoes:
- Less cushioning means more flexibility and foot-to-ground "feel"
- Less drop means less heel striking and more mid-foot

landing
- Mid-foot landings mean more natural stride rate and length
- Wider toe box allows your toes to "splay" on contact

25 - 18 = 7mm

23 - 19 = 4mm

The debate over which is better, a traditional or a minimalist shoe, like most arguments, tends to push people into mutually exclusive positions. It's not an either/or choice. Choosing one over the other depends on your goals, running history and a host of other factors. Heavier runners, for example, might never want a minimally cushioned shoe. Even light runners might choose a more traditional shoe for certain types of running.

Inherited traits and acquired habits are not always compatible. Most runners have therefore been pampering their feet with heavy, overly cushioned, high-heeled, motion-control shoes far too long to make the switch to minimalist shoes without giving their feet and legs time to adjust. Below is a chart to help you make the transition gradually. It's only a general guide—your mileage may vary. Also note that for the same heel-to-toe drop, the actual slope from heel to forefoot varies with shoe size.

12-14 mm > Most runners will not be able to keep from coming down on their heels. But shoes in this range almost always come with lots of cushioning. And steep heel-to-toe slopes are easier on the Achilles tendon and the calves.

8-10 mm > Most runners will notice the heel in this range of heel-to-toe drops but it's a good place for heel strikers to begin their transition to minimalist running.

6-8 mm > Mid-foot runners might still notice the heel but light-weight heel strikers could probably use shoes in this range to transition from a traditional to minimalist running style. At this range and below, stretching is recommended to help the Achilles tendon and calf muscles adapt to the lower heel.

4-6 mm > Mid-foot runners won't notice the heel at all but most minimalist shoes in this range lack enough cushioning to accommodate the occasional heel strike.

0-4 mm > Even mid-foot and forefoot runners will need weeks, perhaps months, to adapt to this range of relatively flat running shoes.

« YOUR TRAINING »

Training methodically and regularly will bring out the best in every runner. But training techniques are like ice cream. Before Baskin & Robbins there was chocolate, strawberry or vanilla. Now there are 31 flavors, and more.

- No Pain, No Gain ~Percy Cerutty
- Intervals ~Franz Stampl
- Speed Play (fartleq) ~Gosta Homer
- Endurance, Strength then Speed ~Arthur Lydiard
- Long Slow Distance ~Joe Henderson
- Oregon System ~Bill Dellinger
- Altitude Training ~Lassi Viren, Kenyans
- VO2 Max Testing ~David Costill
- VO2 Max Training ~Jack Daniels
- Target Heart Rates ~Martin Karvonen

My favorite is Arthur Lydiard's philosophy that getting from one fitness level to the next is a sequential process with each phase depending on the previous:

- Build endurance with Long Slow Distance (LSD)
- Build strength with long and short Hill Repeats
- Build speed with Fartleq, Strides and Intervals
- Then Race with confidence you'll meet your goal

Endurance

Long slow runs strengthen the slow-twitch muscles you need for aerobic endurance. Focus on time, not distance, and build this base for six months before you begin any race-specific training. Your long runs should also target strength and speed, because your racing goal is to improve how long you can run fast.

So don't slog along mile after mile at the same pace. A 60 minute run in the low aerobic zone (long slow distance) with surges in the high aerobic zone (speed play) will give you much

more training effect than a constant-speed run of the same duration. So include Long Hills and Speed Play to recruit the intermediate fibers you need for aerobic strength and the fast-twitch fibers you need for anaerobic speed. Doing so will make it more likely that you are prepared for the race-specific phase of your training.

- Long Runs at your current marathon pace (1 X 60 minutes)
- Tempos at your current 10K pace (1 X 90 seconds)
- Strides at your current 5K pace (2 X 60 seconds)
- Surges to your current 3K pace (3 X 30 seconds)
- Long Hills at your current 1/2M pace (1 X 3 minutes)

Some critics of LSD want us to replace the long slow distance phase of training with shorter, faster runs. Their reasoning is that slogging along mile after mile at the same pace can hinder race performance by lulling our legs and cardiovascular system into a low-aerobic zone. That might work if you already have a solid endurance base. And even if you do, my advice is to add speed to your long slow runs, not eliminate them completely.

Even mature runners should respect the importance of progressing from endurance to strength and then speed—it's basic, Arthur Lydiard wisdom. My cross country coach in high school knew most of us had goofed off in the summer and that we would therefore have to get some miles on our legs before he could ask us to do hills and then intervals.

Strength

Hill repeats improve strength which improves stride length and therefore speed. Long hills recruit intermediate and slow-twitch fibers, and short hills recruit all three types of muscle fibers. Sprinting up a steep hill at 90 to 95 percent maximum effort demands the widest range of motion from your stride and increases the flexibility of your ankles. This teaches

opposing muscle groups and fiber types to cooperate.

Just as the muscles on the back of your arms must relax when you flex your biceps, your hamstrings and quadriceps must coordinate contraction and relaxation when you run. The result is a smoother, longer, faster stride.

Running erect is especially good for running uphill, because you can engage your glutes more effectively to power yourself up the hill. Your hamstrings power you up hills and your quadriceps steady you down. Lean at your ankles, not your waist. Leaning at the waist strains the lower back and overworks the hamstrings. Hill training targets your muscles, not your lungs, so maintain good form and full range of motion. Focus on form, not time. Hills are speed work in disguise:

- Hill Sprints at 200 meter pace (4 X 30 seconds)
- Hill Strides at 800 meter pace (4 X 3 minutes)

Speed

Fartlek, strides and intervals improve your ability to run faster. Fartlek and strides are usually done on your long runs and on hill repeats, whereas Intervals are typically high-intensity runs on a track. But don't use Intervals to practice the race distance or the race pace. Use Intervals ***at*** race pace to condition you to stay on pace. Use Intervals ***slower*** than race pace to increase your ability to train at higher intensities. Use Intervals ***faster*** than race pace to prepare you for the start of a race, surging during a race and the sprint to the finish:

- Sprints faster than race pace (4 X 200M)
- Strides at your race pace (4 X 400M)
- Tempos slower than race pace (4 X 800M)

Racing

Racing is the most specific training you can do, and it involves both ***how*** and ***why*** you run. As I mentioned in the Introduction, even if your competitors have more natural talent or more

training than you have, you can get to the finish line before they do if you train more ***specifically*** and race more ***passionately*** than they do.

Warm Up

Warmup with exercises that prepare your muscles to work, such as Squats, Step Ups and Lunges, which complement the muscles and movements of running. Stretching relaxes muscles, so don't stretch before you run. Check your heart rate, then walk briskly or jog for a few minutes before you begin your run.

Cool Down

Cool down with exercises that help your muscles relax, such as Dynamic Stretching . Transition into a jog and then a walk until your heart rate is back to where it was before you began your training run.

Hydration

Goes beyond drinking while you run because there is a limit to how fast we can absorb water, glucose and electrolytes. So hydration begins before you run and continues after you run. But water is not the best fluid before, during or after because it has no glucose, electrolytes or protein.

Before a run use a ***Hypo***tonic sports drink to store a reserve of water, sugar and salt without risking a Sugar-Insulin Bonk or a Sodium-Overload Bong.

During a run use an Isotonic sports drink like E-Fuel which has complex carbohydrates and balanced electrolytes so fluids and electrolytes lost by sweating and glucose used by running are rapidly replaced.

After a run use a ***Hyper***tonic sports drinks with high levels of glucose, electrolytes and protein to speed recovery and restore muscle glycogen. Protein eaten after a run can enhance recovery but during a run it slows absorption of water, glucose

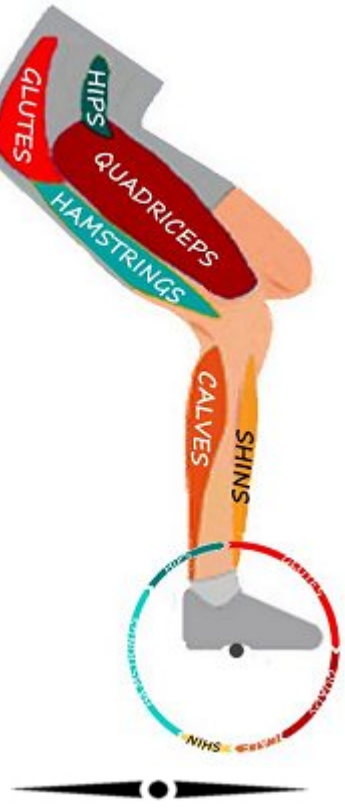
and electrolytes.

Recovery

Involves more than just hard/easy days or jogging between 400 meter intervals. Fitness is a cycle of running and resting. Your body does not rebuild itself stronger when you are racing and training. It rebuilds itself when you are not running. And recovery involves cycles of hard/easy weeks, hard/easy months and hard/easy seasons.

Cross Training

Cross training is exercise that ***complements*** the muscles and movements of running and one you'll ***keep*** doing. Cycling works muscle groups complementary to running, does it more effectively than running, and gets you outside with friends, not inside with machines.



« ZONE TRAINING »

Training in specific zones is a results-oriented way to align your heart, your training and your goals. Each zone is a Training Level (TL) associated with a range of heart rates and training effects. The range of heart rates for each zone are percentages of your Heart Rate Reserve (HRR). Your heart rate reserve is the range of heart beats between your Resting Heart Rate (RHR) and your Maximum Heart Rate (MHR). Your maximum heart rate can be approximated by subtracting your age from 220. You can get closer to your actual MHR by running near your anaerobic redline on a treadmill.

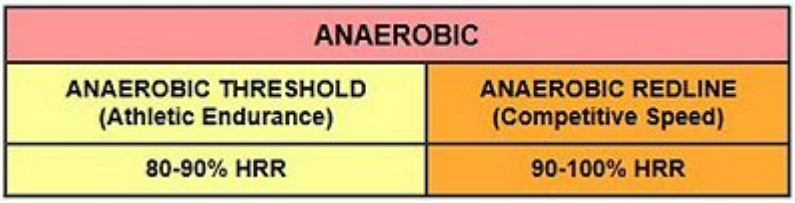
AEROBIC	
LOW AEROBIC (Cardio Endurance)	HIGH AEROBIC (Cardio Efficiency)
60-70% HRR	70-80% HRR

Low Aerobic

You burn fat (low octane fuel) and your heart delivers all the oxygen your muscles need. Exercise in this range of heart rates builds cardiovascular endurance. It's the Fat-Burning Zone but you'll lose more weight by burning fat and glycogen and that requires a mix of low and high aerobic exercise.

High Aerobic

You burn fat and glycogen (high-octane fuel), and your heart delivers all the oxygen your muscles need. Exercise in this range of heart rates builds cardiovascular efficiency ~ the ability to transport oxygen to and carbon dioxide from your muscles. Stroke volume, the amount of blood your heart pumps with each beat, is the key to improving fitness. You notice improvement as an ability to exercise longer before dropping back to the low aerobic zone.



Anaerobic Threshold

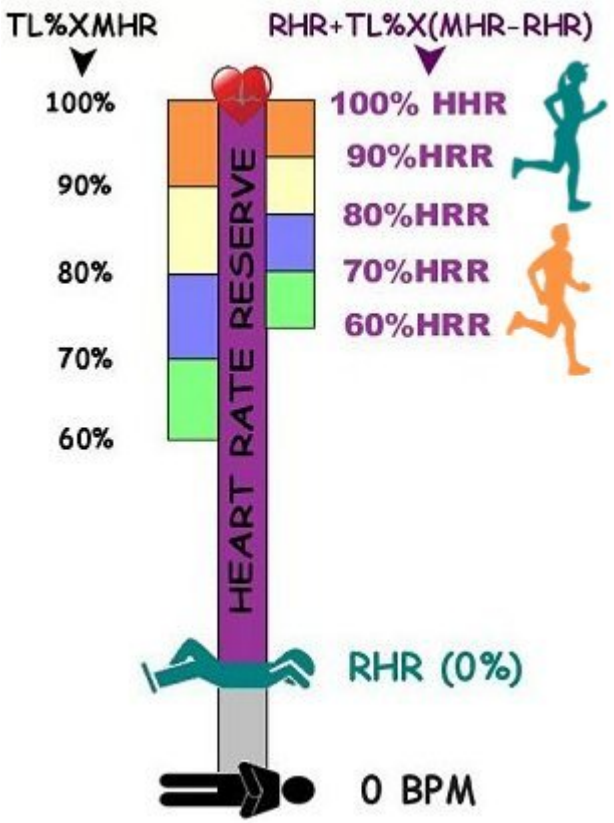
You are at or beyond the point where your heart can no longer deliver all the oxygen your muscles need. You are burning only glycogen but cannot burn it down to just carbon dioxide. This leaves a lactic acid "sludge" of unburnt sugar that causes your muscles to fatigue. Exercise in this zone builds tolerance to lactic acid accumulation and therefore athletic endurance. You notice improvement as an ability to run longer in this zone before your muscles shut down.

Anaerobic Red Line

You are near your maximum heart rate (MHR). Exercise in this zone builds competitive speed by training fast-twitch fibers in your muscles. You notice improvement as ability to run faster over a given distance.

Zone Training Calculations

The most accurate way to determine your target heart rate (THR) for a training level (TL) is to base your calculations on a percentage of your heart rate reserve (HRR), ***not*** on a percentage of your maximum heart rate (MHR). The diagram below shows you why.



The left side shows zone training calculations based on your **maximum** heart rate. The right side shows zone training calculations based on your heart rate **reserve**. If you compare the training levels on the left with the training levels on the right, you'll notice that using your maximum rate ***instead*** of your maximum ***and*** resting rates results in ***under*** training.

The calculations on the right side of the diagram reflect the understanding that your heart operates between your RESTING and MAXIMUM heart rates, not between DEAD and MAX. The calculations on the right side of the diagram reflect:

- How your heart actually operates
- Your fitness, not just anyone your age
- Lowered resting rate as fitness improves
- Goals you seek by not under exercising

Do-It-Yourself MHR Test

The calculations on both sides of the diagram use 220–AGE to

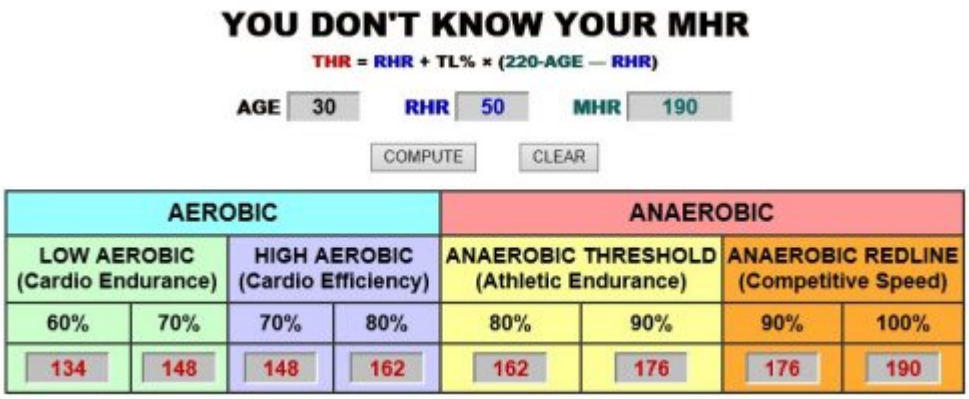
determine your maximum heart rate. But the 220–AGE is a **general** formula for the **average** person. So your zone training calculations will be even more precise if they're based on your actual maximum heart rate.

Find a gradual hill about 2 miles long. Warm up for 15 minutes, then start climbing the hill. Increase your effort gradually until you're within one or two hundred yards of the top, then sprint as fast as you can. Record the highest number displayed on your heart rate monitor. Rest, then repeat this test a few times to get an average value.

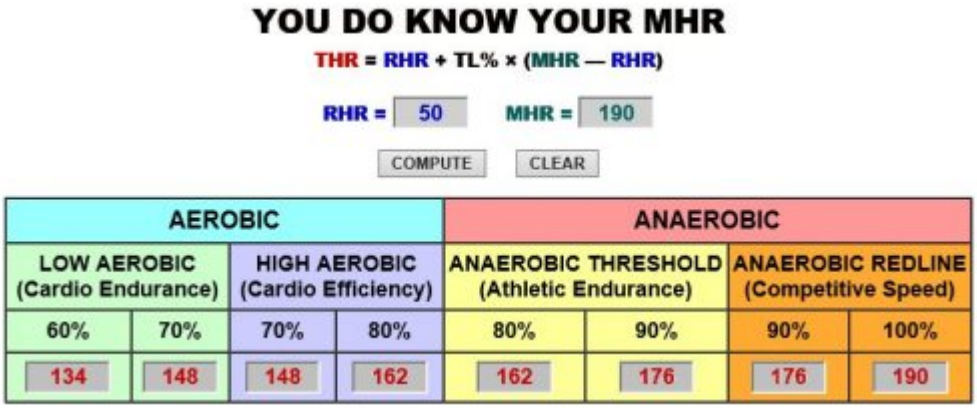
Training Zone Calculators

Below are ***screen shots*** of two calculators I designed so you don't have to do your heart rate calculations manually. Both calculators are small HTML files that quickly and accurately display the heart rates for each training level. You don't have to know your MHR to use them, but you do have to measure your RHR. Use the AGE calculator if you do ***not*** know your maximum heart rate. Use the MHR calculator if you ***do*** know your maximum heart rate because you performed the Do-It-Yourself MHR Test.

The screen shot below is for a 30-year old runner who does ***not*** know his MHR. He enter his AGE and RHR and clicks CALCULATE and the calculator displays the calculated MHR for a 30-year old runner (green) and the heart rates for each training level (red).



The next screen shot is for a 30-year old runner who ***does*** know his MHR. He enters it and his RHR and clicks CALCULATE and the calculator displays the calculated heart rates for each training level (red).



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You can ***download*** these calculators to your computer from my website. Both are **free** web-based files that will run on your browser. The link below will take you to my download page. Right click each calculator and save it to a folder on your computer. Then go to that folder, double click the filename, and enjoy the convenience of not having to do the calculations manually.

DOWNLOAD MY CALCULATORS

« ABOUT THE AUTHOR »

Billy Dean came out of the womb saying, "Let's run!" And he did until his knees gave out in his 70s. Before that, his focus on training specifically and racing passionately yielded personal records of 9:14 (3K), 16:09(5K), 34:09 (10K), and 2:43:36 (M). You can find the other books he has published, and make comments about this one, on his Author Page at Amazon.