



Cultural Health Solutions  
*Optimal Health for All Cultures*

[Start Here](#) [Programs](#) [Podcast & Media](#) [Free eBooks](#) [Blog](#) [Contact](#) [Login](#) [Q](#)

# The Real Risks of Exercising Too Hard and How to Exercise-Part 1 of 2

NOVEMBER 7, 2017 | IN ANTI-AGING, EXERCISE, HEART HEALTH, WEIGHT LOSS | BY DR. RONESEH SINHA, MD

## Background

This is the first of a 2-part series on exercise and how to do it in a way that maximizes fitness and enjoyment without increasing health risk and injury.

I feel there's been a shift over the years where many of my existing and new patients are now engaging in different types of exercise. There are so many different options out there as people are becoming more health conscious. Now that's the good news.



The bad news is when I watch most individuals exercising in the gym, or evaluate the types of exercise regimens my patients are participating in, I realize that they are unsafely elevating

their heart rates to excessive levels while moving their bodies in ways that make them prone to injury.

In many cases I can already predict an impending injury like knee pain, plantar fasciitis, back pain, etc. which will negate any beneficial effects of exercise by preventing individuals from even doing normal everyday activities. Sound familiar to anyone out there?

***In addition to physical injury, I've come across too many individuals through my clinical practice and my work with corporations and the community who have directly experienced or known someone who had a heart attack during intense exercise.***

A tragic and fatal heart attack in the parking lot of a fitness facility after a highly intense workout. Another near fatal heart attack on a treadmill during an intense sprinting session at the company fitness facility.

Now don't get me wrong. These individuals had plaque forming in their heart for decades prior, due mostly to lifestyle habits and possibly some genetic risk. The intensive workout was the straw that broke the camel's back or in this case....heart. However, regularly exercising at an intensity that exceeds your cardiovascular endurance capacity does nothing to improve your overall health and only increases heart attack risk.

# Health Risks of Triathlons and Overexercisers

**This study** from September 2017 in the prestigious British Medical Journal showed an increased risk of sudden death in men over 40 during triathlons. I have taken care of patients who train for triathlons and their weekly regimen is absolutely brutal. Just think of our primitive ancestors who would have infrequent episodes of intense physical activity followed by long periods of rest. They weren't running, biking, and/or swimming every day in addition to having a day job and multiple other responsibilities contributing to chronic stress and sleep deprivation.

Now you may not be a triathlete, but if you are sedentary and out-of-shape, then engaging in a boot camp or training intensively for a marathon, a half marathon or even a 5K might have the same adverse impact on your heart (and rest of your body) as someone in great shape who decides to train for a triathlon. So in this week's post we will be focusing on properly fine-tuning your exercise intensity.

# Brief Primer on Aerobic vs Anaerobic Exercise

To keep things as simple as possible, let's go over the 2 types of metabolism when we exercise...aerobic and anaerobic. It is essential you have a basic understanding of these 2 processes so my practical recommendations later on make the most sense.

1. **Aerobic Metabolism**– The greek root of “aerobic” comes from “aer” which means air or oxygen. Aerobic metabolism involves the combustion (or burning) of glucose, fats and amino acids, in the presence of oxygen (“aer”), to produce between 36-38 energy molecules called ATP. The byproducts of aerobic metabolism are CO<sub>2</sub> (carbon dioxide) and water. The site for aerobic metabolism are the mitochondria, which are the energy-producing power stations inside your cells.

Exercises where you breathe a little heavy, but not too heavy are in the aerobic zone. This could be a fast walk, light jog, or a swim. It's an exercise that you can do while breathing mostly through your nose. You can carry on a conversation with some effort, but no huffing and puffing is necessary.

2. **Anaerobic Metabolism**– The “An” means without, so anaerobic metabolism means in the absence of oxygen. Glucose is the only fuel source for anaerobic metabolism and the byproduct is lactic acid which is the substance that causes that burning sensation in your muscles. In terms of energy production, you only produce 2 molecules of ATP (vs 36-38 in aerobic metabolism). Anaerobic metabolism does not take place in the mitochondria, but instead in the cytosol or fluid-filled portion of the cell. This is an important distinction from aerobic metabolism.

***If we want to increase athletic performance/endurance, improve energy levels, reduce disease and increase lifespan, we need to predominantly train, multiply, and improve the health of our mitochondria and anaerobic exercise pales in comparison to aerobic when it comes to doing this.***

Anaerobic exercises tend to be short and high intensity like heavy weightlifting, sprinting, interval training, or cross-fit style workouts. These are exercises that are inherently uncomfortable and you can't do them just breathing through your nose. You will be huffing and puffing through your mouth and if you were talking to someone you'd only be able to get out 2-3 words at a time..."Hey Joe->(exhale-exhale)->how's it going?->(exhale-exhale)...I'm great." Metabolically these workouts burn a smaller proportion of fat and a larger proportion of glucose.

***A key point I want to make is that if you are mostly sedentary and not used to working out, a simple jog, a brisk walk or even climbing a few flights of stairs might be anaerobic activities where you're breathing mostly through your mouth.***

On the other hand an elite athlete like let's say basketball phenom Steph Curry, even in the 4th quarter of a basketball game looks totally comfortable, often smiling and chatting with teammates while chewing comfortably on his mouthguard, meaning he is in supreme aerobic shape.



Occasionally he taps into anaerobic metabolism when he sprints full speed during a fast break, but then he's able to quickly shift back into an aerobic zone where he's focused and comfortable enough to drain 3 point shots from any distance.

When you are in poor aerobic shape, you have limited aerobic reserve due to fewer and weaker mitochondria and very rapidly enter anaerobic metabolism where you're breathing heavy and your muscles burn from the accumulation of hydrogen ions (not lactic acid as popularly thought).

## **Listen to Your Heart...Heart Rate That Is**

In the early days I also succumbed to the temptation of spiking my heart rate as high as I could for as long as possible. If I went for a run, my heart rate would often be 170+ for the duration and I just got used to the pain and heavy breathing. I never really enjoyed running for long periods so when the whole field of HIIT (high intensity interval training) came out with the idea of shorter burst workouts with intervening rest intervals, I jumped in head first.

I loved the idea that I could do a 15 minute HIIT type workout and get the benefits of 30 minutes of continuous steady-state training. I also read several articles that said HIIT can be an efficient way to improve aerobic fitness. However over the years I watched my aerobic endurance deteriorate. My overall strength and anaerobic fitness had improved, meaning I



could sprint really fast for short periods, but I noticed that I just didn't have the same level of endurance during long basketball games.

There is a bit of a battle in the fitness world with one camp consisting of weightlifting, anaerobic exercisers who do mostly exercises like **Crossfit** or high intensity bootcamps, while on the other side you have the endurance exercisers who run, swim, and/or bike long distances with little emphasis on strength and anaerobic training. I've come to realize like all things in life, that neither extreme is optimal. Rather it is a blend of both sides and the amount varies depending on your individual make-up.

Some of us are genetically gifted with strong aerobic machinery, including more type 1 slow twitch muscle fibers, which allows us to gain endurance fitness quickly and effortlessly. While others (like myself) can quickly put on strength and speed but take longer to build aerobic endurance, especially as we age.

***The one thing I didn't realize is that in an effort to rebuild the aerobic fitness of my youth, often excessive anaerobic workouts can actually get in the way.***

In fact if you want to build a very strong aerobic foundation, often referred to as a period of aerobic base building or **ABB** (I'll keep using this acronym throughout the post), then you should completely avoid anaerobic style exercises (sprints, heavy lifts, etc.) during the ABB

period. Anaerobic metabolism can actually diminish your ability to develop your aerobic machinery during the ABB phase.

A pioneer in the field of aerobic fitness is Dr.Phil Maffetone, who has trained some of the greatest endurance athletes on the planet. I strongly recommend you check out Dr.Maffetone's blog [here](#). His research and experience focuses on the modified use of heart rate as a signal for when you are flipping between aerobic and anaerobic exercise. The traditional approach is taking a specific percent of your max heart rate (220 minus your age) to determine your target heart rate zone. See [this](#) for reference ranges which are commonly printed on exercise machines.

I prefer Maffetone's "180 Formula" which is simply 180 minus your age. When your heart rate exceeds this level, you are in the anaerobic range. Read about his 180 formula [here](#) which also lists some minor modifications to the formula based on your health status and existing fitness level. I find this formula to be much simpler yet still elegant enough to help define your target aerobic zone. I also strongly recommend you listen to my podcast interview [here](#) with Dr.Maffetone himself where we really get into the nuances of MAF training.

For example, I'm 46 years old, so according to his equation I should not exceed a heart rate of 134 (180 minus 46) during my ABB period. Because I had spent so many years exercising at a much higher heart rate, jogging at this pace seemed like a joke. It was a very light jog mixed

with periods of walking when my heart rate would get too high. Even Dr.Maffetone's elite athletes initially get frustrated at having to train for months in what seems like a ridiculously low intensity level...that is until they start shattering their own personal records thanks to building a huge aerobic base in the absence of any anaerobic setbacks.

Also keep in mind that for most of us mortals who are simply trying to exercise for health and longevity by conditioning our mitochondria, the Maffetone aerobic heart rate (aka MAF heart rate) is exactly the zone at which you not only build the most aerobic fitness over time, but also gain the most health benefits in terms of reducing the risk of heart disease, strokes, cancer, Alzheimer's disease and most other chronic health conditions. You also burn more body fat during these extended aerobic sessions. Yes anaerobic also burns fat, but we can't sustain that level of exercise intensity for very long compared to a longer, lower intensity hike or a slow jog.

In addition, you are not overtaxing your heart when you stay at or just below your MAF heart rate, nor are you raising levels of the stress hormone cortisol for long periods of time, which means you aren't accelerating aging either.

***I've noticed that my chronic over-exercising patients often look much older in age with sunken eyes, wrinkles and unhealthy appearing skin. They don't have that youthful glow that my other patients with a more balanced, less intensive exercise regimen seem to exude.***

In addition, remember from my science primer that with aerobic exercise your body produces significantly more ATP energy...36 ATPs vs only 2 ATPs for shorter anaerobic bouts. I've personally noticed that my energy levels are higher and more consistent throughout the day as I've gradually built up aerobic fitness, and with most of my aerobic exercise done early in the morning I'm sleeping consistently better at night.

Below is a summary table I made that compares aerobic/anaerobic metabolism with the content we just covered. Now even though for the fuel source in the table for aerobic I put in glucose and oxygen, which are necessary for the mitochondria to produce energy, keep in mind that the glucose and oxygen actually provide the spark or ignition for the mitochondria to burn its predominant fuel source, which is fat. This is where we get the saying, "fat burns in a carbohydrate flame."

	ANAEROBIC	AEROBIC
Fuel source	Glucose	Glucose and Oxygen
Energy Yield	2 ATP Molecules (low yield)	36-38 ATP molecules (high yield)
Byproduct	Lactic Acid (produces muscle burn/fatigue)	CO2 and Water
Heart Rate	Above MAF Heart rate zone	Within MAF Heart Rate Zone
Types of Exercise	High intensity: sprinting, interval training, weightlifting or any exercise requiring mostly mouth breathing	Lower intensity: jogging, swimming, cycling, hiking, brisk walking or any exercise that can be done comfortably while breathing through nose

I spent a lot of time on this section because it's important and I think teaching people to exercise properly in their aerobic, predominantly fat-burning zone, will help them enjoy and stick to exercise longer, with steady progress and minimal risk of injury.

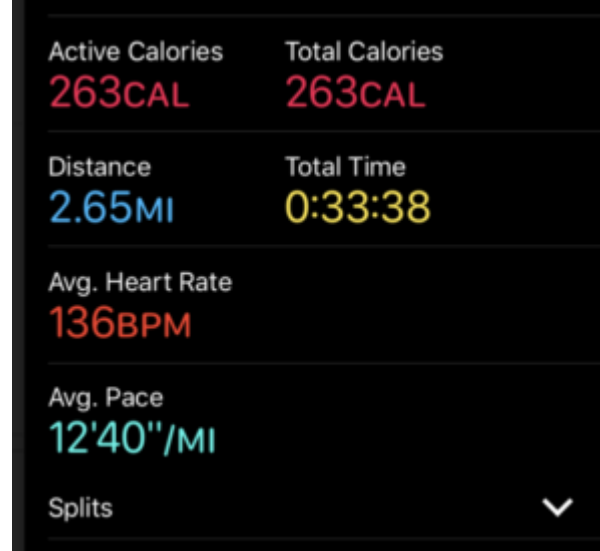
## **Getting Aerobically Fit Without Compromising Your Health**

I had a long time patient see me in the office for follow-up telling me he set a personal best during a 5K competition where he averaged 7 minute miles...a huge accomplishment for someone who used to be an overweight, sedentary engineer before he met me 2 years prior. He was wearing a Garmin fitness watch and I asked him to show me his running data. His heart rate average during the run was 173 beats per minute. I had a long discussion with him about spending a 3 month period dedicated to ABB in a safe way so he can learn to run faster at a lower, less stressful heart rate. I told him it would take some humility since he would be jogging around the neighborhood or local track at a speed far slower than his usual training speed.

If you exercise regularly and are interested in building aerobic endurance safely, I recommend you purchase a wearable heart rate monitor. The most accurate ones involve wearing chest straps that communicate with your wrist watch. However the newer generation of wrist

monitors now register heart rates that are pretty close. I recently transitioned from my Omron chest strap to an Apple watch and tested its accuracy by comparing it to my Omron chest strap. Despite minor variations, the Apple watch heart rate has been very accurate at rest and during exercise, so I'm more than happy to no longer wear a chest strap. I also used to use an older Fitbit, but the heart rates were all over the map. I've heard the newer generation monitors are better. There are other wrist-based heart rate monitors on the market, so feel free to shop around for the one you like best...just be sure it's accurate.

Below is a reading from my Apple watch when I first started my ABB period. I ran 2.65 miles at a not so respectable pace of 12 min and 40 seconds to keep my heart rate in my MAF zone of 136 bpm. If I ran at what I used to think was my normal intensity, I could have run much faster but my heart rate would have been 160+. This means I would be spending over 30 minutes running in the anaerobic zone which would leave me more mentally and physically exhausted, in addition to actually impeding the healthy development of my aerobic system.



My workouts are meant to alleviate the stress of my daily life rather than make it worse through persistently elevated heart rates and cortisol (stress hormone) levels. Unfortunately this is what most of the exercisers I come across are doing to their bodies. Chronic life stress compounded by chronic workout stress, in addition to the presence of chronic health conditions like diabetes, heart disease and autoimmunity. Not a good combination.

So now I tell patients and friends that if they really want to impress me, don't just show me their running times. Instead show me the average heart rate paired with the running time as a better reflection of true aerobic fitness. Show me your 7 minute mile with an average heart rate in the 130s (for someone in their mid-40s) and then I'll buy you dinner!

# Other Health Effects of Excess Intense- Anaerobic Exercise

In addition to the adverse impact on cardiovascular health mentioned in the triathlon studies, my chronic over-exercisers are susceptible to more fatigue, excessive sugar cravings since glucose is primarily being burned during these workouts, and often lack of weight loss or even weight gain. This is because chronically elevated stress hormones promote more fat storage, and the sugar and carb cravings lead to persistent elevations in fat-storing insulin.

Inflammation levels are also higher because anaerobic exercise produces more free radicals, substances that damage and age our cells and blood vessels. Small amounts of intermittent free radical formation can be adaptive, but chronic production is a serious health risk.

I also mentioned that sleep disturbances may be a sign of too much anaerobic and not enough aerobic exercise as I noticed in my own case. My over-reliance on anaerobic exercise may have contributed to persistently elevated cortisol levels which in turn impaired sleep. I have seen this pattern in my patients as well. As they become more aerobically fit, they sleep longer and deeper.

Again, keep in mind that most amateur exercisers are working out in the anaerobic zone without even knowing it. Ironically most “aerobic fitness classes” are actually more anaerobic



with participants desperately trying to keep up with the instructor. You may need to use a heart rate monitor to see where you fall, or at the very least pay attention to your breathing. Again, mostly mouth breathing through the class is a sign you are getting a predominantly anaerobic workout.

Now keep in mind that after you've built a strong aerobic base, you can start adding on some anaerobic workouts as well. When used intermittently, anaerobic workouts like sprints and interval training can burn fat, clear out excess glucose stores from muscle and liver, and improve insulin sensitivity (reduces diabetes risk). I will often spend a 2-3 month period each year working on ABB with predominantly aerobic level activity.

When I'm done with my ABB phase, my usual weekly regimen is 4-5 days of aerobic training (~45 minutes) at my MAF heart rate and 1-2 days a week of anaerobic HIIT (high intensity interval training) which might be a structured workout or play (basketball, sprints with the dog, etc.). When you layer intermittent anaerobic workouts as tolerated onto a strong aerobic base, then you can further optimize fitness.

***However when your aerobic foundation is weak, excess anaerobic exercise can break you in the form of injuries, fatigue, chronic inflammation and weight gain.***

There are some weeks where I'm extra tired or sore and then I will exclusively do lower intensity aerobic training and work on recovery (stretching, foam rolling, yoga, sauna, etc.)

before I add on any anaerobic workouts. Your body is not a machine. Be intuitive with your workouts.

I see the pattern of excess anaerobic training often in my female patients who fail to lose weight and may actually gain weight despite attending multiple exercise classes a week. Their well intentioned efforts to work harder in order to burn more fat are completely backfiring since their bodies are constantly in the higher stress anaerobic zone which over time can produce more hunger, increased fat storage, fatigue, pain in joints and muscles, and even depression since such efforts often lead to no beneficial results. Torturing your body 4-5 days a week with intense exercise and then watching the needle on your weigh scale move up instead of down can be highly discouraging.

On a side note, I am a fan of most personal trainers but some unnecessarily push clients into anaerobic zones on a regular basis. Same with well-intentioned exercise class instructors who may yell at you to keep up or work harder. In both cases I would rather have you listen to your own heart rate over an exercise professional who likely doesn't have much insight into the aerobic capacity or physical limitations of each participant. He or she may also be an avid member of the pro-anaerobic exercise only camp.

Again, it's all about balancing both sides of your metabolism and working on the the side that may be intrinsically weaker. I've noticed that individuals who have good aerobic endurance

tend to do more endurance workouts, but could benefit with some anaerobic activities and vice versa.

## Ways to Monitor Progress

So how do you know you are improving your aerobic fitness? Below are a few measures you can follow to keep you motivated:

1. **Resting Heart Rate:** Your heart rate at rest should gradually trend downward as you gain aerobic fitness. Monitor your resting heart rate when you wake each morning. Improved cardiovascular fitness means your heart does not have to pump as frequently to generate energy for the rest of your body. It can relax and beat fewer times a minute. By the way, higher resting heart rates are correlated with an increased risk of heart disease so lowering your resting heart rate through improved fitness lowers your disease risk.

2. **Heart Rate Recovery (HRR):** How quickly your exercising heart rate drops after you stop exercising is a measure of fitness and cardiovascular health. An elite athlete can finish a long basketball game or an endurance event and immediately be interviewed, speaking normally in full sentences. Someone out of shape will continue huffing and puffing with a much slower drop in heart rate.

This [research paper](#) in the New England Journal of Medicine shows that slower heart rate recovery times are a powerful predictor of death from heart disease. Specifically if your heart rate drops by 12-15 beats or less 2 minutes after stopping exercise, then your risk of death is higher. Go [here](#) to learn how to measure your HRR or if you have an Apple watch it measures it for you automatically.

Click on the image below to enlarge for my Apple watch readings. I circled in yellow pen my heart rate immediately at the end of exercise which is 142 beats per minute (bpm) and my heart rate after 2 minutes which is 105 bpm. My heart rate dropped 37 bpm, which is my HRR value. Those of you who have been doing predominantly aerobic exercise for a while should see greater drops. A drop of only 12-15 bpm or less would be a poor sign of cardiovascular fitness with an increased risk of death.



3. **The MAF Test:** This was developed by Dr.Phil Maffetone and is another great way to assess your aerobic progress by tracking your activity performance times. Read about the MAF test [here](#).

4. **Heart Rate Variability (HRV):** This is a more specific heart rate measure that I have blogged about [here](#) and [here](#). When HRV is low, it's a sign that your sympathetic stress system is in overdrive and often that would indicate a rest day rather than a training day. Conversely if HRV is high, then your body is rested and ready to train.

**5. Subjective Measure:** Putting all the above specific measures aside, as aerobic endurance improves you will feel more energy and less fatigue with your routine every day activities. Climbing the same flights of stairs at home or work, washing your car, walking 18 holes of golf, gardening in the backyard, taking your usual neighborhood walk or run will all be noticeably easier. You will have plenty of residual energy left to take on other physical and mental activities throughout the day. This to me is the most rewarding measure of improved aerobic fitness.

I also strongly recommend you assess your baseline aerobic fitness level using a simple standardized test that anyone can perform. I did a detailed blog post on fitness testing and VO2 max [here](#) which I recommend you read, and towards the end are tests that adults, children and seniors can perform. Knowing your baseline status and then noticing progress with intermittent follow-up assessments is extremely rewarding.

## Summary and Trailer for Part 2

In my next post I'm going to discuss another important factor that immediately throws individuals prematurely into anaerobic metabolism, and that is a lack of basic strength and proper form during exercise. If you've got weak legs and core strength from sitting all day,

your muscles will fatigue early while you train for a run or participate in a high intensity exercise class.

This will drop you quickly into the anaerobic zone with your muscles burning from excess lactic acid, leaving you panting to catch your breath. Once you are in the anaerobic zone, your form will further break down and put you at risk for injury. We'll review some basics in our next post on improving your form and basic strength so when you do start to engage in your optimal mix of mostly aerobic and some anaerobic activity, you will get maximal output and enjoyment with the least risk of injury.

My overall philosophy towards exercise has shifted over the years in parallel with my life philosophy. An "anaerobic life" is analogous to fast-paced, competitive, adrenaline-driven, sacrifice sleep and rest for productivity, etc. This was kind of how I exercised too...lots of weights, sprints, bootcamps, burpees, etc.

A more "aerobic life" means slowing down, knowing your limits, listening to your heart and body, not pushing beyond pain, minimizing risk and conserving energy and productivity for the long haul. The heart and brain are intimately connected. As you change the way you exercise and improve aerobic fitness, your entire approach to life may actually shift along with it.

You can continue onto [Part 2](#) to learn some of my favorite exercises to prevent injury and improve performance.

---

## You May Also Like...







**Accelerating Strength and Muscle Mass**



**Is It Time to Rethink Omega-3 Supplements?**



**The Glycemic Impact of Stress**

---

**Optimal Health and Performance for the Entire Family**

CHECK OUT THE PROGRAM

## Sign-Up for Dr. Ron's Newsletter

Get the latest on your regularly programmed health and lifestyle tips as well as what you need to know regarding Covid

---

Your Best Email Address\*

SUBSCRIBE

## Follow Dr. Ron on Social Media

