An Introduction to MAF

Maximum Aerobic Function

A systematic approach to building health and fitness while improving overall human performance and preventing injury, illness and disease

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MAF

In a society strongly emphasizing health, well-being and physical performance, it is an unfortunate contradiction that illness, injury and disease are now the norm.

Despite the fact that most common health and fitness problems are preventable, healthcare costs have created a serious worldwide economic burden. There is widespread confusion about how to exercise and how to eat well. Quality of life has stagnated, risk of illness remains high, and the incidence of chronic disease is on the rise.

Defining Health and Fitness

Health is a state in which the aerobic system, along with all others (nervous, hormonal, digestive, etc.), work in harmony.

Fitness is the ability to be athletic — to apply the body's physical abilities towards achieving exercise goals.

For nearly 40 years, the MAF Method has helped individuals in all walks of life pursue well-being. This approach recognizes a key foundation for both health and fitness that is often neglected — the aerobic system, which uses stored body fat to power the body with nearly unlimited energy. To underscore the significance and importance of the aerobic system, we call our program MAF, which stands for Maximum Aerobic Function.

Our philosophy integrates nutrition with exercise to optimize the body's true aerobic, or fat-burning, system.

Any impairment in the aerobic system can create global problems in the body's upkeep and function. The result can be ill health, including common chronic diseases such as diabetes, cancer and heart disease.

For this same reason, athletic or fitness dysfunctions such as recurring injuries, a lack of improvement and the overtraining syndrome, can usually be traced back to aerobic dysfunction. In effect, the MAF Method assesses and intervenes in the aerobic system to reduce risk of poor health and chronic disease, while simultaneously expanding a person's athletic potential.

To that end, this method relies on a variety of unique and simple assessment tools that individuals can use to measure the aerobic system, helping to ensure optimal fat-burning. By improving both health and fitness, the MAF Method is highly conducive to sustaining fitness gains that would otherwise be lost to illness, injury or overtraining, and has been shown to produce a significant rate of personal-best athletic performances.[1,2]

I. An Unhealthy Society

Over the past 40 years, the consumption of junk food, mostly in the form of refined carbohydrates, has increased dramatically, while fat and protein intake has remained almost the same.[3] This dietary change alone has significantly reduced aerobic function in millions of people, and increased their risk for chronic illness.

Changes in Markers of Increased Illness

Global obesity has more than doubled since 1980.[4]

This is associated with increased rates of cardiovascular diseases, cancer and other chronic illness.

Diabetes now affects more than half of all Americans.[5]

There is a dramatic rise in prescription medications.[6]

Most people, including athletes, have moderate and high risks for chronic disease, which accounts for 90 percent of healthcare spending.[7] In the U.S. alone, the Kaiser Family Foundation estimates that 2015 expenditures will be $4 trillion.

II. Fit but Unhealthy

While inactivity is severely detrimental to health, increasing physical activity has not been the panacea it is often assumed to be. Improper exercise actually can create enough physical, chemical and mental stress to cause great harm to the body. In essence, many people try to build more fitness while sacrificing health.

Health Consequences of Inactivity

Almost 80 percent of Americans perform inadequate levels of physical activity.[8]

Physical inactivity is linked to more than 5 million deaths worldwide per year — more than those caused by smoking.[9]

For example, the popular "no-pain, no-gain" trend — high intensity exercise — has been shown to reduce markers of health and fitness: It can create damaging oxidative stress,[10] decrease immune function,[11] promote inflammation,[12] decrease skeletal muscle diameter through increased breakdown,[13-16] impair aerobic function and fat-burning,[17] and cause gait dysfunctions.[18]

Furthermore, those who are physically active, including millions of recreational athletes worldwide, are at high risk for developing overuse injuries and illnesses, including the overtraining syndrome. This is arguably the most serious exercise-induced chronic health problem (and a common result of high-intensity training). Markers of overtraining are commonplace in athletic populations. For example, Division I National Collegiate Athletic Association (NCAA) athletes had significantly more pain, depression, and decreased physical function compared with controls.[22]

Injuries Associated with High-Intensity Training

On average 56 percent of Ironman athletes suffered either an overuse injury or illness while training for races.[19]

The high-intensity "no-pain, no-gain" sport of CrossFit has an estimated injury rate of 73.5 percent with 7 percent of these injuries requiring surgery.[20]

Even those who engage in aerobic dance, group workouts, strength training, and use gym equipment see injury rates of over 50 percent.[21]

For these reasons, the MAF Method recommends a period of low-intensity training and natural movement to improve aerobic function and health before embarking on higher-intensity training. A common criticism of this approach is that it typically cannot match the rate of fitness gains provided by high-intensity exercise. But given the above-mentioned dangers of protracted high-intensity exercise, the MAF Method provides a better return on the investment of time and energy spent exercising than high-intensity programs that provide quicker, often short-term, fitness gains at the cost of health.

Consequences of the Overtraining Syndrome

Muscular injuries, decreased immunity, hormone imbalance, sleep disturbances, depression, neurological dysfunction,[23] and impaired cardiac function.[24]

III. Assessing MAF

In order to monitor progress and help take the guesswork out of making lifestyle improvements, the MAF Method employs a set of tools, metrics and principles to help a coach, health specialist, athlete or any individual find ways to promote aerobic function in order to increase benchmarks of health and fitness. This holistic approach incorporates various ways that individuals can self-assess. The chart below gives some samples of these assessment tools.

Tools of the MAF Approach

Using the 180-Formula to individualize exercise intensity.

Perform the MAF Test to measure progress.

Nutrition using the Two-Week Test to help reduce consumption of refined carbohydrates and overcome sugar addiction.

Overall lifestyle assessment and determination of risk factors using surveys.

These and other tools can be found on www.philmaffetone.com and in the MAF app.

IV. The New Aerobics

The aerobic system generates significant amounts of energy from fat, allowing long periods of optimum performance without fatigue or physical impairment.[25] While the body uses varying amounts of fat and sugar (glucose) at any given time, fat is by far the more health-promoting and reliable fuel source for long-term energy without fatigue.

The aerobic system is implicated in all the processes that result in burning more body fat. Essentially, this makes it a “supersystem”: It integrates components of the cardiovascular, respiratory, musculoskeletal, endocrine (hormonal), nervous and other systems.

For this reason, aerobic function promotes health and fitness by improving the heart, lungs and circulation, controlling blood sugar, reducing excess weight and body fat, increasing muscular endurance and flexibility, and optimizing overall

function in the body and brain. The MAF Method, therefore, develops and monitors the aerobic system, utilizing the level of aerobic activity in the body as a baseline — a common denominator — of its overall health and function.

Aerobic muscles also play an important role in power and team sports. They assist anaerobic fibers by providing much-needed circulation that brings in added oxygen and other nutrients, removing and processing metabolic by-products, and speeding recovery following a hard workout or competition.[26]

There are trade-offs to be made between using fat and glucose in exercise. Fat is far more plentiful, even in lean individuals, but provides more energy at a constant rate. Sugar is not as plentiful and provides less energy but very quickly. Low-intensity exercise, given its lesser energy needs, has been shown to increase the use of fat as fuel, and therefore readily engage the aerobic system.[27]

Two Fuels, Two Types of Muscle Cells

Aerobic "slow-twitch" muscle fibers, which burn fat for energy and are fatigue-resistant, are highly concentrated in the muscles that also provide the main support for joints, bones, and indirectly to all soft tissues such as tendons and ligaments.[24]

Anaerobic "fast-twitch" muscle fibers, which consume sugar at high rates but have limited energy, are primarily utilized for (a) short, high-intensity exertions and (b) quick movements.

Fat- and sugar-burning can be measured in a laboratory setting through a process called respiratory exchange ratio using a gas analyzer during an exercise treadmill or similar test. However, most people are unable or unwilling to perform this test due to availability, cost and other factors. Fortunately, it is also possible to perform accurate assessments through the use of simple questionnaires by surveying the body's abnormal signs and symptoms (for much less cost and without examinations).[28] The aerobic system can be evaluated using this format, and the MAF Method employs such surveys.

IV. Heart-Rate Monitoring, Stress and Energy Utilization

The use of a heart-rate monitor can greatly aid in exercising at a relatively low level of intensity (resulting in a lower heart rate), during which the body secretes hormones necessary for aerobic function and fat-burning. Conversely, high-intensity efforts prompt the release of stress hormones that:

- Raise the heart rate to higher levels.
- Increase the rate of sugar-utilization.
- Decrease the rate of fat-utilization.

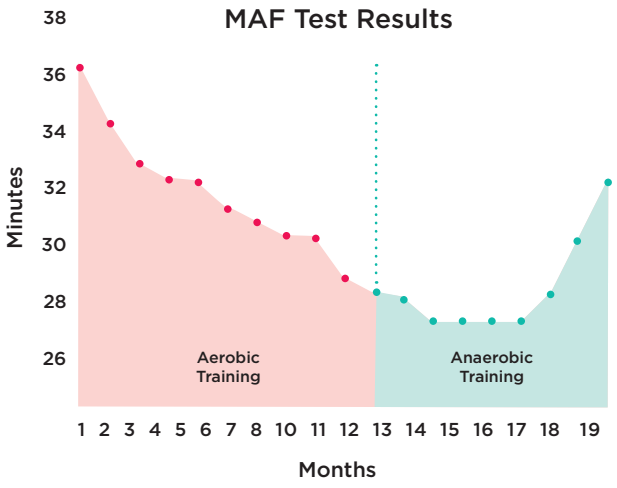
The 180-Formula was engineered as an easy-to-use accurate estimator of an individual's Maximum Aerobic Function Heart Rate (MAF HR), at which stress levels are low enough that sugar is being utilized at a minimum, but fat-burning activity is at its highest.

The 180-Formula

This formula takes an individual's age, personal health (such as frequency of illness, injury and medication), and fitness factors (such as constancy of training and race performance) into account, all of which importantly affect exercise outcomes.

The MAF Test tracks the change in an individual's aerobic speed (at the MAF HR) across time. Increases in speed at the same heart rate indicate aerobic development, while a decrease in speed signifies that aerobic function is impaired. Continuous decreases in MAF speed indicate that the aerobic system is beginning to atrophy. The MAF Test allows its user to easily and accurately measure aerobic function in real time, and adapt their training or lifestyle accordingly. (Other measurements can also be used for the MAF Test, including power/watts, time, laps, etc.)

In the chart below, we show MAF Test results of a runner during a 19-month period using the same 5-km course. The first 12 months were kept exclusively at the MAF heart rate, while the following seven incorporated substantial anaerobic training. The runner's progress plateaued at the onset of anaerobic training, and began to deteriorate after three consecutive months of anaerobic training.



VI. Conclusion

The central observation of the MAF Method remains that any problem with the aerobic system hinders the body's ability to provide for its long-term performance and health. In effect, aerobic impairment sows the seeds for poor health and fitness, and even chronic disease, by forcing the body to rely on sugar, which is the less reliable — and in large quantities, unhealthy — energy source.

A poor diet, along with the extremes of fitness — overtraining and inactivity — can also impair aerobic function leading to reduced fat-burning. This creates a cascade of signs and symptoms common in many individuals: fatigue, high body fat, physical injuries, intestinal dysfunction, reduced immunity (frequent colds, flu, other infections) and increased risk of chronic disease.

In contrast, improving the aerobic system increases fat-burning, reduces or eliminates abnormal signs and symptoms that reflect poor health, and can significantly improve fitness, especially for athletes.

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Special thanks to Ivan Rivera for assistance in writing and editing, Hal Walter for editorial, Simon Greenland for design, and Tracy Høeg MD, PhD, for our early collaboration.