

METs and Me

Why is my MET score important?

Let's say you get to choose one parameter of health. Would you want to know your blood sugar? blood pressure? cholesterol? pap smear? mammogram? prostate specific antigen? or your MET? Turns out that according to a huge body of research from Stanford and the Institute for Aerobics Research, published in the *Journal of the American Medical Association* and the *New England Journal of Medicine* between 1989 and 2002, the most important parameter is your physical fitness as measured by your MET score. For every 1 MET increase in exercise capacity, mortality decreases by 12% ("Survival of the Fittest," editorial in the March 14, 2002 *NEJM*). And that's for all-cause mortality-- cancer, Alzheimer's, hip fractures, everything lumped together-- not just cardiovascular disease.

What is a MET?

A MET is the ratio of the metabolic rate of the average person while seated and resting, to the metabolic rate of a particular person while performing some task. The symbol MET comes from **M**etabolic **E**quivalents of **T**ask. It is commonly used in medicine to express metabolic rates measured during a treadmill test. Two definitions of the MET are encountered, and are essentially the same: (1) 1 MET is equivalent to a metabolic rate consuming 3.5 milliliters of oxygen per kilogram of body weight per minute. (2) 1 MET is equivalent to a metabolic rate consuming 1 kilocalorie per kilogram of body weight per hour.

How does a MET measure conditioning?

When we say to ourselves, "I've got to get in shape," we are thinking of going hunting without getting tired, climbing stairs without shortness of breath, or working a full day without being exhausted. In scientific terms, "getting in shape" means growing new blood vessels into our muscles under the stimulus of cardiovascular exercise. That means we can **use more oxygen**. When I was a high school student running cross country, I would hyperventilate before a race, thinking I would run faster. But I didn't. The limiting factor is not our lung function, but our circulatory system. METs are measured in a laboratory where subjects are hooked to a mask which measures oxygen consumed and carbon dioxide exhaled. By definition, 1 MET is the oxygen consumption of an adult at rest (a "couch potato"). Your peak MET score is a multiple of the couch potato; walking 2 miles per hour consumes twice as much oxygen as watching TV, so it is 2 METs of activity. Jogging 6 miles per hour is 8 METs, and so forth. We know METs scores of every activity, although if you aren't strapped into a mask we are approximating from scientific evidence.

How does a MET relate to calorie burning?

We all know that exercise burns more calories than sleeping. According to the formula above, a 70 kg man (154 lbs) would burn 1 MET times 70 calories per hour at rest, or 1680 calories per day. If he spent an hour jogging at 6 miles/hour, that would be 8 METs times 70 calories per hour, or 560 calories for that hour. If the other 23 hours were sitting or sleeping, the total for the day would be 560, plus 23 times 70, for a total of 2170. See how that works? *Two lessons*: the benefit of an hour of jogging can be canceled by one Snickers bar; and a day of moderate occupational exercise (say, an average of 2 METs) is equal to an hour of jogging in additional calories expended. Since most people aren't going to jog, staying as active as you can during the day is more practical. If you're stuck in front of a computer, you're going to have to do supplemental exercise. *In either case, you still can't have the Snickers bar.*

How does my peak MET score relate to my risk of dying from all causes?

| MET max | Relative Risk (compared by age and sex) | Terror Risk | Activity Advice |
|------------|--|-------------------|--|
| 13 or more | 1 (as low as anybody) | Green (low) | OK to assault Mt. Everest |
| 10 to 13 | 1.2 (20% higher) | Blue (guarded) | Running, racquetball, NordicTrack, rowing, basketball |
| 8-10 | 1.8 (80% higher) | Yellow (elevated) | Walk-jog-walk, inline skating, cycling, swimming, tennis |
| 6-8 | 2.4 (140% higher) | Orange (high) | Start with a progressive walking program |
| 6 or less | 4.5 (350% higher) | Red (severe) | Supervised program recommended. No snow shoveling! |

How do I find my MET?

You can do a treadmill test under a doctor's supervision (and you should, if you are over 50 and have never done one). Or you can walk the 5K trail at the Iliff Commons as fast as you can. The Commons is entered on the **south** side of **NE 31st**, 50 feet **east** of **Kincaid** at the crest of a hill, and 1/2 mile **west** of **K-4**. Be sure you find the Start/Finish line and begin there (walk past the "No Motorized Vehicle" sign, and turn right at the "Service Trail" sign; it will lead you to the start in about 150 yards). **Watch the directions carefully**-- the **5K** markers are **blue**. At junction 9 you will go **right** the first time you pass (top arrow) and **left** the second time. **Read your time at the finish:** _____

16 METs or more: less than 38 minutes
15 METs: 38-40 minutes
14 METs: 40-42 minutes
13 METs: 42-44 minutes

12 METs: 44-46 minutes
11 METs: 46-48 minutes
10 METs: 48-50 minutes
9 METs: 50-52 minutes

8 METs: 52-54 minutes
7 METs: 53-56 minutes
6 METs or less: more than 56 minutes

If you get lost, here's another way to stay on track:

From the start, go **left at Junction 1**. Pass the 0.4 K and 0.8 K markers on your right. Go **left** at Junction 2 into the woods. Pass the 1.2K marker, go **right at Junction 9**, and **left at Junction 3** out of the woods. Stay **left at Junction 4**, and pass the cabin on your left and the 1.6 K marker on your right. Stay **right at Junctions 6 and 7**. *Don't turn left onto the dam service trail.* Pass the 2.0 K marker on your right, and go **right at Junction 1**. Pass the 2.4 K marker, and turn **left at Junction 2** into the woods for the second time. Pass the 2.8 K marker on your left, and turn **left at Junction 9** down the Ryun Hill, pass 3.2 K, and climb the very steep Santee Hill. Pass 3.4 K on your left, go down Mills and up Lawson Hills, and go **left at Junction 8**. Pass 3.8 K, down Cunningham Hill, cross the bridge, follow around Wild Cat Hollow Switchback, cross the creek, pass 4.2 K on the way up Cushman Hill, and turn **left at Junction 7**. Now pass the pond a second time, the 4.6 K marker on your left, turn **left at Junction 1**, and speed to the finish.

Is this information the same for women as for men?

Basically, yes. METs are METs. But men, in general, are at higher risk of death than women at any age-- so the **relative risk** is going to be the same for men compared to men and women compared to women, but the **absolute risk** (the risk of dying per 10,000 patient years) is always going to higher for men than women of the same age and MET score. However, I should add that some of the data on which this information was based was collected on men only (Stanford), and the rest had more men than women (Institute for Aerobics Research).

How do I make best use of this information?

Knowing your fitness level doesn't guarantee you won't be killed in an automobile accident on the way home. It only tells you the relative odds. I think the best use is as a motivation to develop your Inner Athlete. We are all motivated by scores. If you found out that you could walk the Commons 5K in 52 minutes, and 6 months later you walked it in 47 minutes, you would be very pleased with yourself. You might be stimulated to try for 42. That's developing your Inner Athlete. I'm not a big fan of the anti-competition movement in education. Competition motivates us to improve ourselves. As the Marines say, "pain is weakness leaving the body," and there's a lot of truth to that. Maybe "no pain, no gain" is an overstatement; but there's no way to improve our fitness without learning to embrace a little discomfort. You get used to it, and it becomes your friend. The apostle Paul said, "all discipline is painful for a little while, but afterwards yields the peaceful fruit of righteousness." Physical discipline does not produce righteousness, but you do get the energy to live life to the fullest.

Can I use my MET score to compare my fitness level to other men or women of my age?

Yes, but remember that you are comparing yourself to a poorly conditioned group of Americans; the **relative risk** data is far more significant, because it compares your risk of disease to that found in the best-conditioned Americans:

| Fitness Category | Age | 20-39 | | 40-49 | | 50-59 | | 60+ | |
|--------------------|-----|-----------------|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|
| | | Men | Women | Men | Women | Men | Women | Men | Women |
| 1 (low) | | <9.9 | <7.7 | <9 | <6.8 | <8.1 | <6 | <6.5 | <5.5 |
| 2 | | 10 | 7.8 | 9.1 | 6.9 | 8.2 | 6.1 | 6.6 | 5.6 |
| 3 (average) | | 11 | 8.7 | 10.3 | 8 | 9.2 | 6.7 | 8 | 6 |
| 4 | | 12 | 9.6 | 11.2 | 8.7 | 10.3 | 7.7 | 9 | 7 |
| 5 (high) | | >13.3 | >11 | >12.5 | >9.8 | >11.6 | >8.7 | >10.4 | >8.1 |

Look: I'm a couch potato. How do I get started on a walking program?

Here's the Cooper Clinic program. Frequency is **4** times per week. If you have chest or abdominal pain, stop. If you feel exhausted, or can't recover quickly, stop. You must have a measured course, either by car odometer, track, or Commons markers.

| Week | Distance (miles) | Time Goal (min.) | Week | Distance (miles) | Time Goal (min.) |
|------|------------------|------------------|------|------------------|------------------|
| 1 | 1.0 | 20:00 | 7 | 2.5 | 42:00 |
| 2 | 1.5 | 30:00 | 8 | 2.5 | 40:00 |
| 3 | 2.0 | 40:00 | 9 | 2.5 | 38:00 |
| 4 | 2.0 | 38:00 | 10 | 3.0 | 47:00 |
| 5 | 2.0 | 36:00 | 11 | 3.0 | 46:00 |
| 6 | 2.0 | 34:00 | 12 | 3.0 | 45:00 |