

The Talk Test and Ventilatory Threshold

Created by Jennifer Sage

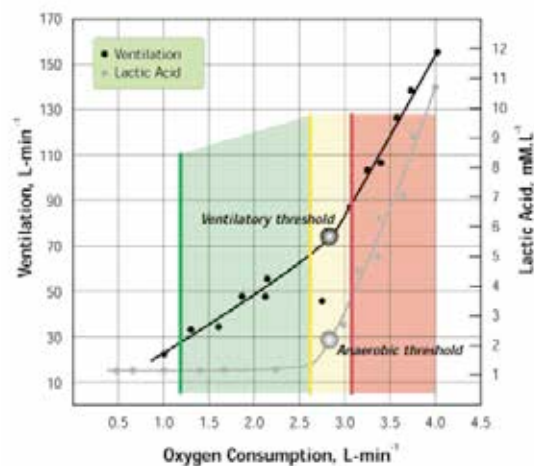
Training Type: Assessment: Ventilatory Threshold Graded Exercise Test

Working HR Zones: Zone 1/5a

Total Test Length: About 30 minutes

The Ventilatory Threshold (VT) is the point when respiration increases significantly due to the accumulation and expiration of metabolic by-products. It is not the same thing as Lactate Threshold, but they both happen about the same intensity. (For a full explanation of LT, please see the Audio Master Class on Two Threshold Tests).

Before VT is reached, VO_2 and VCO_2 (Volume of O_2 and CO_2 respectively) tend to rise at roughly the same rate. Once a metabolic acidosis develops and the VT is reached, expired VCO_2 rises at a faster rate than VO_2 . In a lab, this can be measured through several methods, by plotting VO_2 and VCO_2 , or plotting minute ventilation (how fast you breath) and VCO_2 . Both methods show a linear relationship until intensity reaches a certain point where breathing deflects away from this linear increase. That deflection point is the Ventilatory Threshold. In layman's terms, it is the point where your breathing becomes decidedly more heavy than it has been up to that point. (Graph from Validating the Talk Test as a Measure of Exercise Intensity, Carl Foster, Ph. D., ACE Certified News)



Studies have shown that a Talk Test can be a fairly accurate predictor of VT, and by extension, of LT/AT (as depicted in the above graph). The basic tenets of the Talk Test are that if you can talk conversationally, you are below threshold. If you can't talk, you are above threshold. If you can say a few words at a time but would rather not talk, then you are pretty close to threshold. Exercise Scientists have identified the three levels as a "Positive Talk Test" (below threshold and can talk easily), a "Negative Talk Test" (above threshold and cannot talk) and a +/- Talk Test, or "equivocal Talk Test", which is in the middle. It is this mid-point that roughly equates to VT/LT/AT.

This is a simplification, but it is such a low-tech and simple method of determining this crucial point that it can be used easily in your indoor cycling classes or with personal training clients. As Dr. Jennifer Klau likes to say, "it gets you into the Ball Park." Further testing and fine-tuning

can help you find your seat in that ball park and narrow down a threshold number, but at least you have a personalized and relevant place to start with that client or student.

The reason why I find it so useful in indoor cycling classes is because using the Maximum Heart Rate charts or equations results in so much confusion and leads exercisers to the faulty conclusion that MHR is something that can or should be tested, and that their training intensity should be somehow related to this maximum HR. This is simply not the case, despite decades of adherence to MHR charts and zones.

I know many of you reading this have heard me bemoan how unfortunate this is, when there is science available to us that shows that MHR is not only *not* relevant, and not related to age, but that the single most important intensity for a person to know is their threshold (lactate, anaerobic, ventilatory) and not their maximum heart rate. But the problem has been multifold; instructors lament:

How do I teach my students about it?

It's too complicated. They won't understand!

I don't understand!

Field Tests are too hard to teach, or for my students to do.

Enter the Talk Test! Finally, an easy way to not only teach them about this important physiological marker, but an incredible way to increase their own awareness of their heart rate, of their body's response to intensity and to lay the groundwork for additional education later on. Because mark my words, once they realize how helpful this is, how much more relevant it is to them over using MHR, I bet they will actually be interested in learning much more.

Using a Talk Test helps riders find a meaningful exercise intensity around which they should train. Sometimes below it for basic fitness, sometimes right at it (threshold training) and every now and then, above it for performance improvement and calorie burning. For your beginner students with basic fitness goals, these three levels, or zones, might be all they need to train intelligently. For students with more athletic aspirations, such as improving endurance in a variety of sports or pursuits, raising their threshold (the ultimate cardiovascular fitness improvement), improving their outdoor cycling skills, including climbing hills, or those interested in any kind of competition, then fine tuning their threshold through a field test or metabolic test and using a 4 or 5 zone-system is more appropriate.

How to perform a Talk Test

In the many years that I did metabolic tests, I would always stand beside my client, whether on a treadmill or a bicycle ergometer, and record the data. But I was also listening to their breathing. I could tell the steady increase in ventilation as we increased the intensity (grade on the treadmill or power on the bike). I got to be pretty good at predicting their AT by noting the heart rate at which their breathing became significantly more pronounced. If you are a trainer doing this with clients, then it will only take a few times before you can identify what you hear as a likely VT. As you guide your client through the following test, you will stand next to them and record the data while listening carefully. [On ICA, I've provided a video of me doing a one-on-one Talk Test on a bike with a client. Even if you don't plan on doing one-on-one tests, it is helpful to watch the video, and see how you can apply that to a class, using the protocol below].

One-on-one is more accurate, because of your ability to guide them. However, it is not always practical. You want to be able to do this in your cycling classes, perhaps once every 6 weeks or so, or if you have beginner classes, that is the perfect place to do a Talk Test with new students. In a class setting, if you have a higher percentage of beginners or less fit students, I would keep the class size on the small size, less than 8 or 10 students. I've done this with as many as 18 students, but they were all pretty aware of perceived exertion.

In order to do a Talk Test, a heart rate monitor is necessary. You are going to identify the heart rate at which they become "equivocal" about being able to talk. But there is no need to take any kind of average, as with a field test.

Provide everyone in the class with a piece of paper and something to write with. A small clipboard is very helpful - they will sit on the aero-bars of the Keiser M3, but typical Spinner or Schwinn-style bikes, you can attach the clipboard to the handlebars with a string, and then tie a pencil to the clipboard.

You don't have to have them write it down if you don't want to. The most simple Talk Test that you can do in almost any class, simply notes the heart rate at which they are challenged in talking. For this, you may not even need a pencil and paper; you just ask them to remember that HR, and then record it after class for them. (You do run a risk they will forget though).

Another option is to write down RPE and HR at every level in the graded test. If you have power meters, you can add watts to the list (although, power at VT is not necessarily their functional threshold power, or FTP). This is easier and more practical with smaller groups. Seeing the progression helps them become even more aware of their body's reaction to increases in intensity, and is nice to compare to future tests. [Please see the attached sample log.]

If you are recording RPE, make sure to either give them an RPE chart (on their clipboard) or make sure it is very visible at the front of class, or if you have a screen, project it on the screen.

For the "Talk" part of the test, you will ask them to recite a quotation, song or pledge with several sentences that everyone knows. In the US, the Pledge of Allegiance is most often used. In other countries, you will need to find something that everyone can recite. It is possible to have them recite the alphabet, but I've also found that people will try to spit out a lot of letters at once, whereas when forced to recite a few sentences with actual words, they are even more aware of their limitations.

The following is the suggested protocol for a Talk Test in an indoor cycling setting:

1. Warm up for 7-10 minutes. Explain the purpose and protocol of the Talk Test.
2. Do a 3-4 minute "Hard" push, to where they are breathing pretty heavy (RPE of 6-7). This helps wake-up the legs and reminds them what effort level they will be shooting for in the Talk Test.
3. Recover for 3-4 minutes. Tell them that during the test, once they reach the point of "can't talk", they should sit up and pedal easily, and to make note of the HR just before they cannot talk.

4. Have everyone pedal at the same cadence (80-90rpm). Use music or a cadence meter to set cadence. Establish a “Somewhat Easy” perceived exertion before starting the test. Everyone is at the same relative, subjective effort level.
5. Progress through 2 minute levels, as many as needed until everyone is sitting upright. Do these levels in the following manner:
 - a. Raise resistance just enough to feel it, enough to elicit a 5-7 heart beat increase. Allow a minute for it to level out.
 - b. After a minute, ask them to assess how they feel.
 - c. At about 1:30 - 1:40 have them recite the Pledge of Allegiance and note whether it is “positive”, “equivocal” or “negative”.
 - d. If recording the data, have them record HR, RPE and if applicable, Power, just before the two minutes are up.
 - e. At 2 minutes, increase resistance again.
6. When they reach the “equivocal” stage, where they have trouble reciting more than 3-5 words, ask them to proceed to one more level just to make sure.
7. Once everyone is sitting upright, you end the test. At this point, you may continue with a ride.

It is important to remind students not to feel bad or concerned if they finish the test earlier than anyone else. Someone who continues much longer may or may not be more fit. They simply may have started off at too low of an intensity, and their increases may have been less than others. It may take some students 3-4 levels, others might go for 6-7 levels. Taking any longer than that is not advised – it only means they aren’t following instructions.

References:

The Talk Test and its relationship with the ventilatory and lactate thresholds. Quinn TJ, Coons BA. Department of Kinesiology, University of New Hampshire. Journal of Sports Science, August 2011. <http://www.ncbi.nlm.nih.gov/pubmed/21774751>

ACE-Sponsored Research: Validating the Talk Test as a Measure of Exercise Intensity, Carl Foster, Ph.D., and John Porcari, Ph. D. <http://www.acefitness.org/certifiednewsarticle/888/>

ACE IFT Model for Cardiorespiratory Training, By Todd Galati, M.A.
<http://www.acefitness.org/certifiednewsarticle/709/ace-ift-model-for-cardiorespiratory-training/>

IDEA Fitness Journal, February, 2005. The Talk Test, by Phil Block, MS and Len Kravitz, Ph.D.
<http://www.idealit.com/fitness-library/talk-test>

The Audio Master Class for the Talk Test

Music: your music can be anything that is not distracting. If you want to use songs with a constant bpm to help them ride at a certain cadence, then choose songs with a bpm that corresponds to an rpm of 80-90. However, don't have the music too loud, you want them to hear their own breathing. In this test, music only serves as background. I've even done this test with no music.

Warm-up and explanation.

Today we are doing our Talk Test. As I've explained leading up to this, our goal is to identify a point that is known as the Ventilatory Threshold or VT. You can have it determined in a lab, but they've discovered that it is very simple to identify through a graded, progressive exercise test known as the Talk Test. Something we can do right here in class. You've all felt that point where you are riding and you don't want to talk anymore, right? And then sometimes there's that point when you cannot talk at all. When you are at that point, you are predominantly anaerobic. It is the by-products of anaerobic metabolism that makes it so you can't talk – exercise scientists refer to this as acidosis, when your body becomes much more acidic due to the anaerobic breakdown of glycogen (carbohydrate) as a fuel. It's because you're creating so much CO₂ as a result of that glycogen breakdown, you have to breathe really heavy to get rid of it. Paying close attention to your breath can help identify where this transition takes place. Trying to talk, helps you identify that point much more easily. So, today we're going to talk through various levels of intensity – and at some point, you won't want to talk anymore!

We'll use the Pledge of Allegiance (or whatever is well-known in your country). I hope you all remember it! (BTW instructors, you don't need to recite the whole thing – just a few sentences)

If you can say it easily without having to take a breath, you are fully aerobic.

When you start to breathe much more heavily, you reach a point where you are not very comfortable talking. You would prefer not to, but you can talk, however you can only manage about 3-5 words. You will sound more like this:

*I pledge allegiance to the flag, (breath)
Of the United States (breath)
of America. (breath)
And to the republic (breath)
Etc...*

When you exceed your threshold, you don't want to talk more than a word or two. It will sound very breathy, more like this:

*I pledge (breath)
Allegiance (breath)
To the flag (breath)
Of the U- (breath)
Nited States (breath)*

We want to identify that point just below that "cannot talk" level, where you start to feel uncomfortable talking, but aren't sucking wind. We call it the "equivocal" level.

We will start off fairly easy, then gradually get a little bit harder and harder. I'll give you two minutes at each level, allowing you to settle into the new intensity. Then after 90 seconds, you say the Pledge of Allegiance. Say it out loud. All of you will say it at once. Don't care about anyone else but yourself. I'll ask you to assess how you felt talking. Then we'll move to the next level. When you reach that equivocal point, where talking becomes challenging but not impossible, then I want you to notice your HR, remember it (or write it down), then sit up and pedal easy until everyone else is done.

Now, sometimes you have to pass your exit on a highway to know that's where you wanted to go, right? Ever done that? If you are not quite sure if you are there, then go one more level. You may discover that 'yes, indeed, it was that last level that was my VT, because I really can't talk now!' Or, you might discover that you can go one more level.

Instructors, depending on what data you want to collect, let them know what they will be writing down, or whether they simply need to remember that one HR that corresponded to the equivocal Talk Test.

Are you ready? Any questions?

3 minute hard push

Now, we are going to push hard for three minutes. This will better prepare your body for the test. Get yourself to a level that feels "hard", and RPE of 7. I want you to be breathing pretty hard. Let's get out of the saddle and go for it!

(Lead them through a 3 minute segment, standing climb or fast flat, allowing them to get out of the saddle as much as they need. They will be seated during the Talk Test, so make sure they know that in advance.)

Easy 3-4 Minutes

Now sit back and let that HR drop back. Breathe and relax, get your HR down to a level that feels "Somewhat Easy". And then settle into that feeling for a few minutes. This is where we will start our test. Everyone grab that beat, and pedal at 85rpm (or whatever you set as the cadence).

Just before the next song starts, remind them the following:

So, we are about to start. Remember, you will add just a little bit of resistance at each level, always keeping the same cadence. Pay very close attention to your breath and to how you feel. Ready?

I suggest a few long songs in the background – you won't use the songs to define your levels. It is just background music.

Level 1

Raise the resistance just a little bit, enough to give you about 5-7 more heart beats. It will take from 30-60 seconds before your heart reacts though.

After 1 minute: How do you feel? Starting to approach moderate. Totally in control.

After 90 seconds: *Now say the Pledge. I bet all of you could say it all without taking many breaths. Look at your HR monitor – notice where this very aerobic HR is.*
(If writing down the data, have them record RPE, HR and Power about 10 seconds before the end of the 2 minutes.)

Level 2

Here we go, add a bit more. Let yourself settle into it.

After 1 minute: *how's that feel now? Body warming up, sweating a bit more, still very aerobic, but notice a gradual increase in the depth and rate of your breathing.*

After 90 seconds: *Say the Pledge.*

Everyone should still be doing fine. Right?

Level 3

Time to increase. How's your cadence? You keeping it constant?

After 1 minute: *Notice your body's sensations here. In your legs, in your chest, in your breath. You should be approaching Somewhat Hard (RPE 5).*

After 90 seconds: *Say the Pledge. Some of you may be getting close to that equivocal stage. If so, remember, I want you to go past that exit just to make sure.*

(There may be some sitting up at this point if they started a little high. Acknowledge them and give them a thumbs up.)

Level 4

Increase. Settle into this new level.

After 1 minute: *Body check – what are you feeling? Breathing getting pretty deep isn't it?*

90 seconds: *Pledge. Anyone ready to sit up now? By sitting up, I will know when everyone has reached that point. Remember, don't mind anyone else – you are all only doing this for yourself.*
(More people sitting up)

Level 5

Another increase, getting close, if you're not there yet!

90 seconds: *Say the Pledge. Has anyone gone past his or her exit?*

Additional levels:

Once everyone is sitting up, you end the test and let the students recover a bit. If anyone is still left, you can continue a few levels, but remind them that it doesn't necessarily mean they are more fit, it more likely means they started off too low and/or didn't increase enough each level.

Once everyone has sat up, you can continue the rest of your class with a regular profile. This is a good time to validate the number they got, by doing some short hill repeats and/or some leg speed drills up to that VT HR they arrived at during the test.

Explanation post Talk Test:

So, now you have a number, a heart rate that corresponds roughly to where you transition from being able to talk to not being able to talk. It's an estimation of your Ventilatory Threshold. In reality it's more like a range of heart rates, for example if you recorded 152 as your VT, it's

probably more like 149-154-ish. It's not set in stone, and it's important to remember that it is a moving target. But now you have a target to work around.

I want you to validate that number over the next few weeks. Continue to train with your HR monitor. Every time you feel that sensation of being equivocal about wanting to talk, glance at your monitor. You should see a HR that is somewhere in that range.

If it's consistently higher, then maybe you underestimate it. If this was your first time doing a Talk Test, that's easy to do. There is a learning curve to doing this Talk Test. That is why we validate that number over the next few weeks, and then fine-tune it. You get better and better at pinpointing these physiological responses in your body, you get better at understanding how your body responds, and the best thing about it, is you simply become aware! No more training haphazardly or mindlessly!

You should retest every few months to see if there is an improvement. Make sure you understand that a very fit person might not see an increase in the heart rate at which this happens – obviously there is a limit to how high it can go, right? If we had power meters I could test you to find out if your power at your threshold improves with training, but that is another story for another day.

On the other hand, if you do have some work to do on your fitness, and/or if you are fairly new to cycling, or haven't been as committed as you could, then you may indeed see your VT increase following a good training program. Why? Because your body is more fit; it doesn't rely on anaerobic metabolism until later so that acidosis I talked about earlier, a result of anaerobic metabolism, is delayed. Basically you can go longer, and even harder before you get breathless. And THAT is what we are shooting for, isn't it?

If you don't measure, you have no way of knowing how much you've improved. Now that we've done this test, you have the tools to pay attention to your body, and to know how hard you are working. No more guessing.

So now what do you do with this information? Well, a portion of your training needs to be below this VT – perhaps 70-85% (how much depends on a lot of things, such as your goals, how fit you currently are, and where you are in the year). Below your VT, it will feel Moderate to Somewhat Hard – but still conversational. When you train there, you are using predominantly fat as your fuel source. Please don't misinterpret that to mean you need to be way below your VT, in the so-called "Fat-Burning Zone". Don't listen to those silly charts ever again. An aerobic workout does not need to be "Easy".

Then 10-20% of your training can be right at your VT – this is very effective training and really helps build your aerobic system and can actually raise your lactate threshold. But don't go there all the time – it's too much for the body. Even elite cyclists are smart about how much time they spend at or above their VT/LT. For most of you, 1-2X a week.

And then finally, 5-10% of your training can be above your VT – in that Very Hard range. That's where you cannot talk! Don't be afraid of that zone, anaerobic training is also important. Just

don't do it more than 1X a week for most people, or 2X a week if you're more fit or are training for a specific goal. And always do it in intervals with sufficient recovery in between hard efforts.

Now that's a VERY brief explanation of how you can use this information. There is so much more to teach you, and I'm willing to do so if you are willing to learn. But for now, you are now EMPOWERED to train wisely based on your own body's response to exercise, not some stupid chart telling you where you should be based on your age! You now can train with a purpose, and with total awareness of how your body responds.

In conclusion

What you are reading is really the cutting edge of indoor cycling instruction. Only a few organizations are teaching the Talk Test in indoor cycling classes, including Cycling Fusion. It's time that it becomes the norm in indoor cycling education. Field Tests can be a better tool for the population of your students that are more fit than the average student, especially those who are avid cyclists, but the Talk Test now makes assessment readily available to a much wider range of our students. It is easy to administer, much more relevant and personalized to the students, and best of all, it's free!

Instructors, I would be grateful to hear your stories of how you introduced the Talk Test and/or Field Tests to your students. Please tell us your successes as well as your challenges. Please leave a comment on the content page on ICA where you downloaded this audio and pdf. I am constantly learning from all of you and appreciate your feedback. You may even have a story that will help other instructors in their quest to educate their students.

As usual, I thank you for being an ICA member.

Keeping it real!

Jennifer Sage
Indoor Cycling Association

Rate of Perceived Exertion

1 – 10 RPE Scale		
0	Rest	
1	Extremely Easy	Restful breathing, can sing
2	Very Easy	Can talk in complete sentences
3	Easy	
4	Moderate	Talking first becomes broken
5	Somewhat Hard	Heavier breathing begins
6	Moderately Hard	Deep breaths, talking is avoided (but possible)
7 (LT)	Hard	Deep forceful breathing (but sustainable)
8	Very Hard	Labored, cannot talk
9	Very, very hard	Very labored, breathless
10	Extremely Hard – max!	Gasping for air



The Talk Test

Name: _____

Date of Assessment: _____

Instructor: _____

Level	Heart Rate	RPE	Power
1			
2			
3			
4			
5			
6			
7			