INDOOR CYCLING ASSOCIATION

Audio Master Class

BeTwitched!

Exploring Slow- & Fast-Twitch Muscle

Created by Tom Scotto, Cycling Fusion Master Instructor
Training Type: Muscle Fiber Exploration
Working HR Zones: Zones 3–5c
Total Class Length: 60 minutes

Profile Objective and Intensity:
This is a fun ride, particularly if you are a training science geek and you like creative ways to transfer some of that "geekdom" to your riders. We get to explore the slow-twitch (Type I) and fast-twitch (Type II) fibers that are involved in muscle contraction. In one way, you can say this is an "everything included" ride, but we are going to use a specific approach and purpose.

The opening drills are designed to activate and demonstrate the use of the slow-twitch muscle fibers (steady endurance efforts). The ride then transitions toward short, intense efforts to best demonstrate and experience how fast-twitch fibers are used.

Muscle Fiber Types
Muscle fiber types are broken down into Type I (slow-twitch) and Type II (fast-twitch). Each type has the ability to respond to training and contract in a specific way. Type II fibers are further categorized into Type IIa and Type IIb.

The initial composition of slow- and fast-twitch fibers in our body is genetically determined. Your general preference for endurance events versus shorter, faster events is largely dependent on how you chose your parents. On average we possess a 50/50 ratio of slow- and fast-twitch fibers in muscles used for body movement. Research is ongoing to determine how training and use can change our composition of both fiber types and whether fibers can convert from fast- to slow-twitch or vice versa.

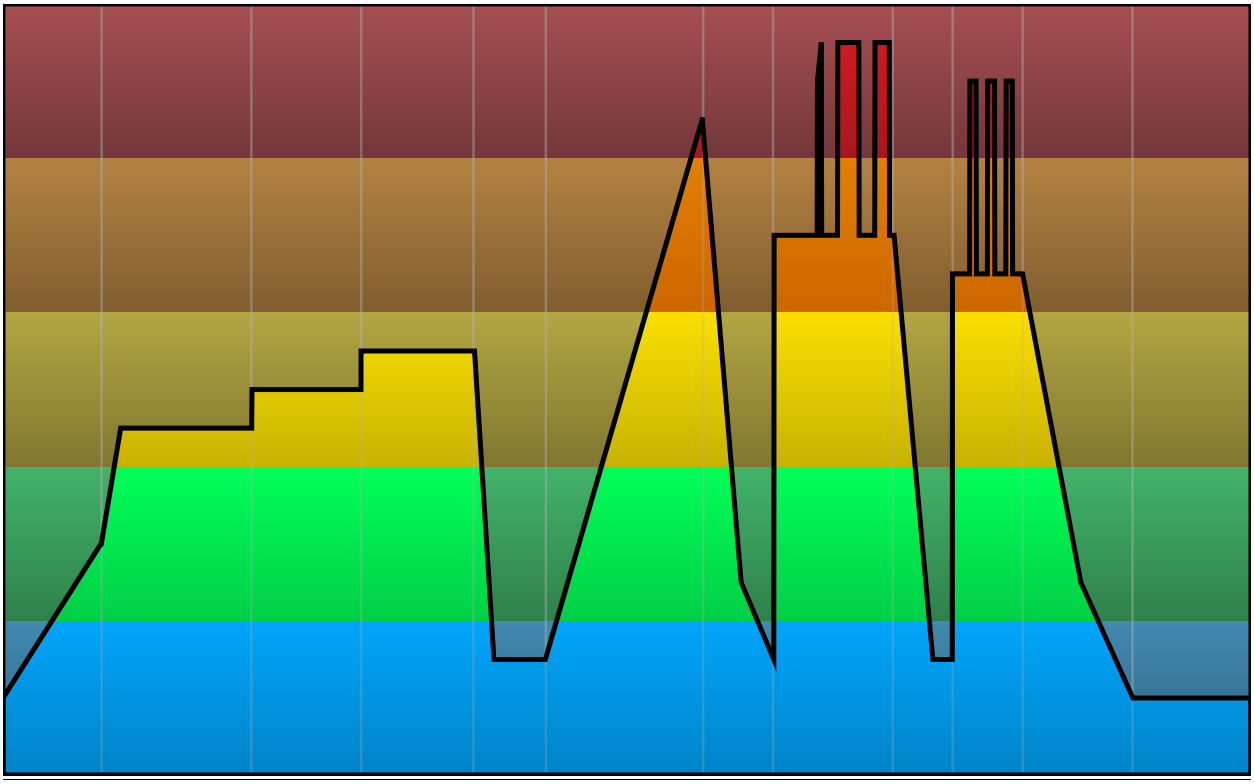
Slow-Twitch (Type I) Muscle Fibers
Slow-twitch muscle fibers, referred to as Type I, are more efficient at using oxygen as a fuel. In general, slow-twitch muscle fibers can work longer amounts of time before fatigue sets in. This is a perfect scenario for long, steady efforts that use continuous, extended muscle contractions over a longer period of time.

Fast-Twitch (Type II) Muscle Fibers
Fast-twitch muscle fibers, referred to as Type II, are best suited for explosive efforts or short bursts of strength and/or speed. As their name applies, these fibers contract faster than their slow-twitch partner, but as a result of the great amount of force fast-twitch fibers can generate, they fatigue more rapidly.

Fast-twitch muscle fibers are further broken down into Type IIa, possessing some of the aerobic qualities (use of oxygen) of slow-twitch fibers, and Type IIb that are more pure to the explosive, short-burst nature of fast-twitch fibers.

Modifications and options
Although it is fun, this can be a very challenging ride for everyone, so it is important that you ONLY deliver this to your class if you feel they are ready for it. What does that mean? This type of ride should be avoided in the early season or during the base-building period. The body (including the cardiovascular and muscular systems) is generally not ready nor has it adapted to this level of stress. The potential for injury can be high if you are not careful to caution riders to REALLY listen to their bodies. Only they will know when they are pushing above their ability and need not be concerned with what others are doing around them. If they need a break or more recovery, they should be encouraged to take it. If they find they can no longer produce the needed intensity, have them focus on form and technique at a moderate effort level.

Graphic Profile
(Provided by Class Builder™)



BeTwitched Coaching

The Warm-up
Road to Benares, Thunderball, 100 bpm, 5:03
East Coast Fusion, Kudos, 84 bpm, 7:45
Write your profile up on your dry erase board, then describe the objectives of the workout:

We are going to learn the dual nature of our muscles during this ride. Part of our muscle enjoys those long steady rides while the other half wants to take off.

Our ride today will explore both sides, with the first half dedicated to slow-twitch muscle fibers (longer endurance efforts) and the second half to short bursts and explosive efforts targeting fast-twitch muscle fibers.

Although it may appear that the second half of our ride is harder, this may vary with the type of rider/athlete you are. If you like endurance, yes, the beginning of the ride may appear easier. However, if you are an explosive rider or athlete accustomed to interval training, the steady endurance efforts may present more of a challenge. Remember, we can be challenged just as well by "duration" as we can by "intensity."

Steady-State Tempo (Zone 3)
The Chamber, Neal Schon, 96 bpm, 5:37
Across the Sands, Neil Zaza, 96 bpm, 5:50
The goal of the next 11 minutes is to maintain a steady-state effort in Zone 3. This is equal to a perceived effort of approximately 70%–80%. The recommended cadence is 80 rpm or greater. I prefer to target a leg speed of 90–100 rpm. This ensures that people will not overload with resistance, plus keeps the stress on the body predominately cardiovascular and not muscular in nature. The first half (~5 minutes), riders should stay in the saddle and settle into their rhythm (tempo). During the last 5 minutes I give riders the option to perform a short 10- to 15-second standing effort each minute. The goal is not to raise the heart rate, but just to offer a change of pace. It is natural for the heart rate to increase a bit, but riders should be able to recover back to Zone 3 shortly after returning to the saddle. As always, standing efforts are optional.

During this effort, the stimulus is going to be "duration." Just because we are only targeting Zone 3 (70%–80% PE), it is sustaining this effort for 10 minutes that may present the challenge.

Efforts like this that target "endurance" and a steady tempo most effectively utilize slow-twitch (Type I) muscle fibers. These efforts rely to a greater extent on energy produced aerobically. For avid and competitive riders, this type of an effort can often be maintained for 2 hours or more. For less avid riders, the goal is to increase the amount of time they can spend at this pace, but this challenge comes from the duration not the intensity.

We stay in the saddle for the first 5 minutes, so try to settle into an intensity and leg speed you can sustain for the entire time.

As you are settling into your target intensity and cadence, ensure you have enough resistance on the bike to safely come out of the saddle. (This means you should have enough resistance on the bike to support your body weight out of the saddle.) If you are not able to do this, you most likely need more resistance to properly perform the drill.

In the last 5 minutes you can join in on some short 10- to 15-second standing efforts. These are optional. We will do one each minute with a goal of being able to return to our Zone 3 steady-state effort after each one. You can do one, none, or all of them. Just remember the focus of "steady state."

If you choose to stand, I recommend keeping your standing cadence the same as your seated cadence. It will be tempting to lower your cadence out of the saddle, but then you will need to re-accelerate once you return to the seat.

Recovery

Can I Get a Witness, Sofa Surfers, Sofa Surfers, 92 bpm, 3:38

Allow riders to slowly return to Zone 1 (50%–60% PE). It is important that riders understand the necessity of recovery during this (and most) rides. The second half of the ride will place great demands on both their cardiovascular and muscular systems. If recovery is not taken, they will limit their ability to ride at the target intensity.

Recovery Litmus Test: If you were able to restore your heart rate/breathing to Zone 1 after our 10-minute steady-state effort in less 1 minute, there is a good chance you were not actually working in Zone 3 and instead riding at too easy an intensity.

Don't let this get you down. It is all about learning our body and what we can do. If you felt you recovered too quickly, just make an adjustment to your effort moving forward. It is all progress.

Climb

Starting Over (Elite Force Mix), The Crystal Method, 66 bpm, 8:05

The overall purpose of this climb is to place additional stress on the leg muscles to prepare them for the more explosive fast-twitch muscle efforts. I would encourage riders not to push too hard on this climb and keep in mind that attacks and bursts of speed and power await them. Allow them to build their intensity into Zone 4. Zone 5 should be strongly avoided.

My favorite approach for a climb like this is to have riders alternate in and out of the saddle each minute. Standing is optional as usual. Discourage riders from "attacking" the top of the climb.

Ahead of us is an 8-minute climb. Before you get all worked up, keep in mind that we have some pretty intense efforts still to conquer after we summit this mountain.

The purpose of this climb is to wake up the legs a bit more and get them accustomed to greater force before we hit them with more intense bursts of power and speed.

We are going to alternate in and out of the saddle each minute. Stand as much or as little as you like and are able.

Just keep the goal of this climb in mind. Its purpose is to transition us, our body and mind, towards higher intensities and more explosive efforts.

And if I haven't warned you enough, let's keep the heroics to a minimum. That means, NO attacking at the summit. There are no KOM/QOM points to be had, so save it for our fast-twitch muscle adventures on the other side.

Feel free to push into Zone 4 by the time you crest the summit, but avoid Zone 5 at all costs (or it will cost ya later).

Recovery
Holographic Universe, Thievery Corporation, 104 bpm, 3:41
Same emphasis as the previous recovery period.

Recovery Litmus Test: If you were able to restore your heart rate/breathing to Zone 1 after our 8-minute climb in less than 2 minutes, there is a good chance you were not actually pushing into Zone 4 by the top of it.

It is important to make this realization now. Sometimes your body has the ability to work harder but your mind is refusing to go there. If you felt you were able to recover very quickly after the climb, really challenge your "discomfort" during the next two sets of fast-twitch fun.

High-Cadence Attacks
Frenzy, Sal Difusco, 102 bpm, 6:10
The first of two sets of fast-twitch muscle fiber engagement. This first set targets a higher cadence (~100 rpm). Encourage riders to find a leg speed close to the cadence of the music with enough resistance to allow them to stand safely. This should give them the sensation that they are riding on a VERY fast flat road. Using this particular piece of music, riders will attack three times during the chorus of the song (12 seconds at 2:14, 60 seconds at 3:17, and 45 seconds at 5:12). It is recommended that the attacks be performed out of the saddle, but seated efforts are fine. Riders should return to their very fast road after each attack.

OK, it is time to say hello to our fast-twitch muscle fibers. We are going to perform three attacks. The first one is only 12 seconds, but the second is 60 seconds, and the third one is 45 seconds.

The goal of the attack is to throw down a burst of power/speed/intensity and then try to pull yourself back without shutting down completely.

Step 1: Find the leg speed
The target cadence is between 90 and 100 rpm. The music is set to 100 rpm. Do what you can, just remember, you need to be able to sustain this cadence for the entire length of

the drill. So whenever you are NOT attacking, you are maintaining this steady effort at your chosen fast leg speed.

Step 2: Now start adding resistance slowly. You need enough resistance to allow yourself to stand safely. This should be enough resistance to support your body weight out of the saddle. If your legs start to slow down, you have added too much.

Each attack is an all-out effort. Go for it as hard as you can. Add more resistance if you want…increase your leg speed. You can perform these seated or standing or a combination of the two. Whatever sets you on fire. After each attack, return to your previous steady fast effort.

Here comes our _____ attack! Get ready. Set it up by adding whatever resistance you need. Prepare your mind for the intensity and get ready to explode in 4…3…2…1…Hit it!!!!!

(After the attack) *Say hello to those fast-twitch muscle fibers! Now let's see what kind of stamina they have. Get ready for the next attack. It will be upon you before you know it…*

Recovery
Wat'cha Like, C.Pro , 93 bpm, 3:00
Same emphasis as the previous recovery period.

Unlike our previous recovery times, if you performed the explosive attacks properly, you may not be able to recover fully during the next 3 minutes. Oftentimes when training on the road, it can take 4–6 minutes to recover from a 30-second sprint, so don't be surprised if you are begging for more time when the next set starts knocking on your door. As a matter of fact that should be the case.

Low-Cadence Attacks
In the End, Linkin Park, 52 bpm, 3:36
This second set targets a slower cadence (~50 rpm). Encourage riders to find a leg speed close to the cadence of the music. They should imagine and feel as if they were riding up the side of a ridiculously steep mountain. Using this particular piece of music, riders will attack three times during the chorus of the song (20 seconds at 0:54, 20 seconds at 1:49, and 20 seconds at 2:46). It is recommended that the attacks be performed out of the saddle, but seated efforts are fine. Riders should return to the grueling steep climb after each attack.

CAUTION: This is a very slow leg speed and can place additional stress on the joints, particularly the knees. Encourage riders to listen to their bodies. Have them either reduce the amount of resistance or increase their cadence if they feel they will be put at risk and/or if they have any knee issues.

OK, it is time to see if there is anything left of our fast-twitch muscle fibers. We are going to perform three 20-second attacks. Since the cadence is so slow, the goal will be to

double-time your leg speed during each attack. If you are doing this right, that will NOT be possible. Yes, you heard me—NOT possible! But I need you to attack it like it is!

The goal of the attack is to throw down a burst of power/speed/intensity and then try to return to the killer climb without shutting down completely.

Step 1: Find the leg speed
The target cadence is between 50 and 60 rpm. The music is set to 50 rpm. Do what you can, just remember, you need to be able to sustain this cadence for the entire length of the drill. So whenever you are NOT attacking, you are maintaining this steady strong climbing effort.

Step 2: Now start adding resistance slowly. Keep adding resistance until your leg speed is FORCED to slow down to the rhythm of the music or what you choose to maintain. If your legs start to slow down below the speed of the music, you have added too much.

Each attack is an all-out effort. Go for it as hard as you can. You can perform these seated or standing or a combination of the two. Whatever sets you on fire. After each attack, return to your previous steady strong climbing effort.

Here comes our _____ attack! Get ready. Show yourself something…even the smallest increase in leg speed is a victory. Prepare your mind for the intensity and get ready to explode in 4…3…2…1…Hit it!!!!!

(After the attack) *Your legs and fast-twitch muscles should be thoroughly wasted by now. Now let's see what we have left. Get ready for the next attack. It will be upon you before you know it. If you can no longer attack, try to stay strong for the remainder of the climb. Fight all the way until the end!*

Cool-down and stretch
Vinyasa, Brent Lewis, DJ Free & Soulfood Slide, Kaya Project, 7:35
During the cool-down ask riders what they experienced during the ride. Did they notice the difference in how the muscles responded between the longer endurance efforts and short bursts of power? What did they consider to be their strength? Which produced the greatest fatigue?

BeTwitched Quick Profile

Time	Length	Cadence	Description
0:00	**5:03**	**100**	**Warm-Up and Introduction:** **Road to Benares, Thunderball** Gradually bring HR to Zone 2
5:03	**7:45**	**84**	**Rolling Hills:** **East Coast Fusion, Kudos** Continue warming up the legs
12:48	**5:37**	**96**	**Steady State Tempo 1:** **The Chamber, Neal Schon** Steady Zone 3 – Tempo riding
18:25	**5:50**	**96**	**Steady State Tempo 2:** **Across the Sands, Neil Zaza** Steady Zone 3 – Tempo riding w/15-sec standing efforts
24:15	**3:38**	**92**	**Recovery:** **Can I Get a Witness, Sofa Surfers**
27:53	**8:05**	**66**	**Climb:** **Starting Over, The Crystal Method** Place force on the legs in preparation for attacks
35:58	**3:41**	**104**	**Recovery:** **Holographic Universe, Thievery Corporation**
39:39	**6:10**	**108**	**High-Cadence Attacks:** **Frenzy, Sal Difusco** 3 attacks (12 sec, 60 sec, and 45 sec)
45:49	**3:00**	**93**	**Recovery:** **Wat'cha, C.Pro**
48:49	**3:36**	**52**	**Low-Cadence Attacks:** **In The End, Linkin Park** 3 x 20-sec attacks
52:25	**7:35**	**~108/92**	**Cool-Down / Stretch** **Vinyasa, Brent Lewis, DJ Free & Soulfood** **Slide, Kaya Project**
60:00			