Cycling Past 50, 60 and Beyond: Peak Fitness

By John Hughes, 65 years old

Paris-Brest-Paris ’79, ’87, ’91, ’95, ’99;
Furnace Creek 508 ’89 (Course Record), ’93 (1st);
Boston-Montreal-Boston ’92 (Course Record);
Reno-Tucson record ’94 (849 miles in 54:17, still standing),
Oregon North-South record ’95 (292 miles in 14:23, still standing);
Race Across AMerica ’96; Rocky Mountain 1200 ’04

Table of Contents

Introduction

I had dinner last week with a client, Larry, who is 63 years old. We started working together when he was 60. Larry said that he feels much fitter than when I started coaching him. That’s true—he keeps getting faster in his periodic baseline time trials (which he hates). Another client, Joan, age 65, just finished her first century in 10 years. I live in Colorado and last summer climbed Independence Pass, 12,096’ (3,687 m) high and a number of 11,000 ft. passes, climbs that I hadn’t done since my 50s.

How did Larry, Joan and I get fitter as we aged? What does that mean to be very fit?

1. Fit means being in good health and physical condition because of exercise, i.e., scoring high in terms of "athletic maturity."
2. Fit also means being able to complete a specific athletic goal, for example, a century.

This eArticle will help you with both of these kinds of fitness.

This eArticle builds on and complements my prior eArticle in this series, Cycling Past 50, 60 and Beyond: Training with Intensity. In this eArticle, I'm your personal coach, providing specific week-by-week workouts to improve your fitness in one or more of the following ways:

1. Improved Endurance
2. More Power
3. Faster Speed
4. Higher Aerobic Capacity (VO2 max)

These previous articles are also useful background:

Cycling Past 50 series.

1. Healthy Cycling Past 50.
2. Healthy Nutrition Past 50.
3. Off-Season Conditioning Past 50.
4. Performance Cycling Past 50.

Cycling Past 60:

1. Part 1: For Health
2. Part 2: For Recreation

Let's look at the two types of peak fitness:

Athletic Maturity

I introduced the concept of athletic maturity in the Cycling Past 60 series. The more mature that you are as an athlete, the fitter you are overall. The athletic maturity scale includes nine parameters, three of which measure your cycling maturity:

1. **Years riding.** How long you have been riding?

    1.1. 1 to 2 years

    1.2. 3 to 5 years

    1.3. 6 or more years

2. **Annual riding.** How many miles (kilometers) do you ride per year?

   2.1. < 3,000 miles (5,000 km)

   2.2. 3-5,000 miles (5,000-8,000 km)

   2.3. > 5,000 miles (>8,000 km)

3. **Longest annual ride.** What is your longest one-day ride of the year in miles (kilometers) with a speed of at least 12.5 mph (20 km/h)?

   3.1. < 50 miles (80 km)

   3.2. 50-100 miles (80-160 km)

   3.3. > 100 miles (160 km)

This eArticle will help you extend your longest annual ride to 50 miles (80 km). If you already do 50-mile rides, it will help you build to the century mark and beyond. Over eight weeks the Endurance program (below) builds from a long ride of 1:00 – 2:00 up to a long ride of 4:00 – 8:00.

This eArticle will also help you increase your annual riding by increasing your endurance. For example, during the eight weeks of the endurance program, depending on the rides that you select, you will ride approximately 475 – 925 miles (750 – 1,475 km). Although you shouldn't train this much year-round, being able to ride these distances will also help you to increase your annual volume. Increasing your annual volume also will help prepare you for multi-day tours and similar riding if you are interested in these.

In addition to improving on these cycling factors, reaching peak fitness includes realizing your maximum potential in each of the other six areas of athletic maturity:

4. Upper body strength
5. Leg strength
6. Core strength
7. Body weight
8. Flexibility
9. Balance

For details see the Cycling Past 60 series.

Achieving A Goal

Suppose you want to achieve a particular goal in addition to being generally very fit. A prospective client may tell me that he wants to ride with more power. Or she wants to ride faster. I try to get the prospective client to think more specifically. I started working with Dan in May. His goal is to increase his average speed for a century from 14-15 mph

(22-24 km/h) to 16+ mph (26+ km/h) by September. I can help Dan improve because he is working toward a specific goal. His goal is S.M.A.R.T.

- Specific — Riding 100 miles (160 km).
- Measurable — At an average speed of at least 16 mph (26 km/h).
- Attainable — Dan already has a great endurance base, and increasing his speed by 10% over five months is attainable.
- Realistic — He has enough free time to train 4-5 days a week, including one long weekend ride.
- Time-oriented — He wants to achieve his goal by September.

What is your big goal? Your goal could be fitness-oriented, for example, to increase your annual volume by 1,000 miles (1,600 km) next year. Or your goal could be performance-oriented, for example to be able to average 16 mph (26 km/h) on club rides in two months. How can you describe your goal in S.M.A.R.T. terms? Put some thought into it.

After a client and I have agreed on a goal(s), then we talk about the *success factors* necessary to reach the goal, along with the rider's *strengths* and *weaknesses*. We then build a training plan to improve his weaknesses, which are relevant to his goal. Dan lives in relatively flat country, so his climbing isn't slowing him down. He needs more speed. We start with workouts to build his power and continue with workouts to turn that power into speed.

After you have set your goal(s), then write down:

- *Success Factors*—What factors are necessary to achieve that goal? Increased power? Losing weight? Faster cruising speed? Ability to hang with the bunch when someone goes hard? Drinking enough on long rides? Eating the right foods on long rides? Etc.
- *Strengths*—What are you good at compared to the success factors?
- *Weaknesses*—What are your weaknesses compared to the success factors?

To achieve your goal, *work on the relevant weakness(es).* Don't do what you enjoy all the time—you probably enjoy that type of riding because you are good at it!

Because your goal is time-oriented, you know how many months (or weeks) you have to achieve it. Now develop S.M.A.R.T. objectives for each month (or each week). You can control your general preparation, training, equipment, etc., but you can't control the outcomes of events, which depend on conditions and competition. Your objectives should reflect this.

For example, Dan's objectives for the third month of training are to:

- Do one hard power workout a week, increasing from 60 to 90 minutes.
- Do one brisk tempo workout a week, increasing from 1:30 to 2:00 hours.
- Spend at least 2:00 hours in active recovery activities each week.

- Ride one century (160 km) averaging 15+ mph (24+ km/h).
- Ride one 40- to 60-mile (65- to 95-km) ride averaging 16+ mph (26+ km/h).
- Ride two 25- to 50-mile (40- to 80 km) rides at an endurance pace.
- Spend 90 minutes stretching and developing core strength.
- Spend 60 minutes learning mental skills.

His objectives fit the S.M.A.R.T. definition:

- Specific – define exactly which activities.
- Measurable – by amounts of time, distance or speed.
- Attainable – based on his cycling history and current fitness, with proper training he should attain his goal.
- Realistic – given his work and family life, fitting this training into his schedule is realistic.
- Time-oriented – during a specific month (or objectives could be defined for specific week(s).

The four training programs below contain week-by-week S.M.A.R.T objectives.

Effective Training

In order to achieve a goal, you must train with a purpose, not just ride. This applies if you want to finish a specific club ride in a certain amount of time, or increase your cruising speed by X miles (km) per hour or score three points instead of two on a specific parameter of athletic maturity. Effective training depends on *varying the intensity* of different workouts. Learning to train at different levels of exertion, which produce different benefits, is *the most effective way to improve*.

The following training paces are the same as in Cycling Past 50, 60 and Beyond: Training With Intensity as well as in the previous Cycling Past 50 and Cycling Past 60 series.

The first three are all *aerobic paces*; the next five are *anaerobic paces*.

- **Aerobic:** metabolizing fat and glycogen (derived from carbohydrates) with sufficient oxygen. At low intensities you burn mostly fat. As you ride harder the proportion of glycogen metabolized increases.
- **Anaerobic:** metabolizing glycogen without enough oxygen is a different way to produce energy, and lactic acid is the byproduct, which produces that familiar burning sensation in your legs. Lactic acid isn't bad; it's just a by-product of riding very hard. When you ease off the pace it will immediately be burned as fuel.

  Scientists call the area where significant lactate starts to accumulate in the blood the *lactate threshold* (LT). You know you are reaching the threshold when deep

breathing turns to panting. *Functional Threshold Power* (FTP) is the LT intensity that you could maintain for about an hour.

Training paces

1. **Recovery pace.** A recovery pace should feel too easy—so slow you're almost embarrassed to be seen on your bike! Recovery exercise helps to remove waste products from your muscles and to relieve muscle tightness and soreness.
2. **Endurance pace.** This is the classic long, slow distance, conversational pace. Endurance riding trains your body to use more fat for energy, rather than precious glycogen. Even lean riders have enough fat to help fuel a longer ride, so training this system is important. Riding at this pace helps to maintain stroke volume (how much blood your heart pumps per stroke) and lung elasticity (how much air you can inhale) so that you can go a little faster even at an endurance pace. Because of the relatively high volume of endurance riding, this also helps to maintain your economy of pedaling.
3. **Tempo pace.** This is still a conversational pace, although your sentences are much shorter and you can't whistle. This is like riding into a headwind or up a sustained climb. Riding at a tempo pace brings about many of the same benefits as riding at an endurance pace and also helps to increase your cruising speed.
4. **Sweet Spot (Power pace).** You are pushing a little harder. You can get out a few words but definitely feel like you are working. Your energy balance is roughly 50% aerobic and 50% anaerobic. Because you can ride at your power pace much longer than at the following paces, training here is the *Sweet Spot,* the most efficient at building sustained power.
5. **Sub-Lactate Threshold (Anaerobic pace).** You are definitely riding hard and it's hurting! Riding at this pace will increase the amount of power that you can put out at lactate threshold (LT). It will also slow the rate of decline in your LT, as you get older. If you are a strong, fast club rider then training at or below your LT will get you fit to hammer up short hills.
6. **Super-Lactate Threshold.** If you race, then you also need to train above your LT so that you can stay with breaks. If you don't race, I won't fault you if you don't want to ride this hard or harder—most of my clients don't.
7. **VO2 max.** You thought anaerobic was hard? Try going at your max for just a couple of minutes. Riding this hard will slow the rate of decline in your VO2 max as you get older.
8. **Sprinting pace.** Sprinting also helps to maintain economy of movement. When you sprint your nerves are activating as many muscle fibers as possible. Practicing sprinting will improve the coordination of the firing of your muscle fibers. This compensates for slower neural transmission as you age.

Gauging Exertion

How do you know if you are riding at the right pace to get the specific benefits you want? You gauge your exertion in different zones, which correspond to different levels of exertion and yield different training benefits. You can gauge your exertion in zones based on Rate of Perceived Exertion (RPE), heart rate or power.

Rate of Perceived Exertion (RPE)

Perceived exertion is the simplest, requiring no equipment. It means learning to listen to your body, to the signals from your breathing and muscles. Lab studies show that gauging effort by perceived exertion is at least as accurate as gauging exertion by heart rate and may be more accurate than heart rate under certain conditions, since heart rate is determined not only by how hard your muscles are working but also by how well you slept, if you are excited or stressed, how hot it is, what you ate (e.g., sugar, caffeine), if you are dehydrated, and other factors.

Rate of Perceived Exertion (RPE) can be gauged on a 1 to 10 scale. One is barely moving and 10 is a maximum sprint for just a few seconds. I have my own way of gauging intensity specifically for cyclists and give the RPE equivalents. Because power production is a continuum, the different paces and RPEs blend into each other.

- **Digestion pace:** This is how you ride after a big meal, an RPE of 1-2. This is the pace for active recovery rides.
- **Conversation pace:** You can carry on a conversation in full sentences, an RPE of 2-3.
- **Hill climbing and headwind pace:** You're on a long, steady grade or riding into the wind. You're working hard enough that you can't whistle but can still talk in short sentences, an RPE of 3-4.
- **Sweet Spot pace:** The Sweet Spot is the hardest to gauge by RPE. You are riding at the harder end of the hill climbing and headwind pace but not yet sub-barf. You can talk in short phrases but not short sentences, an RPE of 4-5.
- **Sub-barf pace:** Making a hard, sustained effort, an RPE of 5-6. This is the pace for a 10- to 25-mile (20- to 40-km) time trial or racing up a long hill.
- **Barf pace:** This is the classic hammering pace, a hard effort for a few minutes, an RPE of 6-7.
- **Eyeballs out pace:** Max effort for several minutes, longer but not quite as hard as a sprint, an RPE of 7-8.
- **Ouch pace:** Sprinting at an RPE of 8 or more.

How to gauge intensity also depends on who you are. Some people like data and keep extensive training logs. Some people don't care for numbers. If data are useful to you, then you may want to use a heart monitor or power meter.

Heart rate

A heart rate monitor tells how fast your heart is beating. It is an *indirect* way of measuring how hard your muscles are working.

To gauge intensity by heart rate, you use a heart rate monitor (HRM). You wear a strap around your chest that transmits how fast your heart is beating to a monitor, which you wear on your wrist or mount on the handlebars.

Heart rate training zones are set as percentages of lactate threshold (LT). Your lactate threshold is the region where your muscles are working so hard that you can't get enough oxygen to satisfy their demand. You shift from *aerobic* to *anaerobic* metabolism.

Some training systems set the zones based on maximum heart rate; however, max heart rate is just a function of your age and genetics, it doesn't take into account your current fitness. Your LT reflects *how fit you are* at any point in time as well as your age and genetics. Your LT may change as you get fitter. Thus, training zones set on LT more accurately reflect your current fitness.

Power meter

A power meter measures the power output in watts that you are producing at any given instant. It is a *direct* way of measuring how hard your muscles are working and is the most accurate method. Training by power requires a strain gauge attached to a special rear wheel or a crank, which transmits data to a monitor. To get the most out of training with a power meter, you need to learn how to interpret complicated data.

Power training zones are percentages of Functional Threshold Power (FTP). Functional Threshold Power is the maximum average power you could maintain during a one-hour time trial.

You may use RPE for performance cycling; however, gauging your intensity more precisely by using either heart rate or power will yield better results.

Baseline time trial

Whether you use RPE, heart rate or power to gauge exertion, before starting any of the programs below, ride a time trial to establish your baseline. You will use your baseline data to measure your progress and also to establish your training zones.

If you are training by RPE or heart rate use a course that will take you about 30 minutes to ride flat out. If you are training by power, use a course that will take you about 20 minutes. The course can be an out-and-back or a loop or a hill climb. The course should have no stoplights, preferably no stop signs and light traffic so you can safely just concentrate on riding hard.

The week before the TT just do a couple of short, easy rides to keep your legs loose and then ride the TT on the weekend.

Warm-up for the TT:

- Ride for about 20 minutes gradually raising your effort (RPE, HR or power) to the level you think you can sustain for the TT.
- Ride at this effort for about 5 minutes.
- Spin easily for about 5 minutes to recover.

Immediately after the warm-up, start your TT and ride as hard as you can over the course. Try to ride at a consistent effort throughout the TT, rather than starting too hard and then fading. Then cool down.

After cooling down, write down:

- Time of day, temperature and wind speed and direction (if any)
- Length of the course
- Time for the course
- Average speed
- Average heart rate if using a heart rate monitor
- Average power if using a power meter. You may also note average heart rate; however, use your training zones set by power, not heart rate, because heart rate can be affected by factors other than exertion.

After a baseline TT a client often wants to know if the results are good enough. Your results aren't good or bad—they just provide the starting point, or baseline, for your training.

How do you use the results?

- **RPE:** If you train by RPE, the time trial will help you feel what it's like to ride at your lactate threshold, what I call sub-barf. This is the key level of effort. The other levels of perceived exertion are either higher or lower and are listed in the table below.
- **Heart Rate:** Your average HR 30-minute baseline TT is very close to your lactate threshold. Training zones are set as percentages of LT and are listed in the table below.
- **Training zone by power:** The training zones are set based on Functional Threshold Power (FTP). FTP is the maximum average power you could sustain for one hour—longer than you want to ride flat out! Your FTP is 95% of your average power for the 20-minute TT.

Training Zones Using RPE, Heart Rate and Power

Zone	Workout	Hughes RPE	RPE	Heart Rate % LT	Power %FTP
Zone 1	Recovery	Digestion	1-2	<75%	<55%
Zone 2	Endurance	Conversation	2-3	75-87%	56-75%
Zone 3	Tempo	Headwind	3-4	88-94%	76-90%
Sweet Spot	Power	Short hill	4-5	93-97%	88-94%
Zone 4	Sub-Threshold	Sub-barf	5-6	95-100%	91-100%
Zone 5	Super-Threshold	Barf	6-7	101-105%	101-105%
Zone 6	VO2 Max	Eyeballs Out	7-8	106-120%	106-120%
Sprints	Maximum effort	Ouch!	8+	N/a	N/a

If you use RPE, remember the Hughes' descriptive RPE for use in the workouts below. If you use a heart rate monitor or power meter, calculate your training zones in this worksheet.

Your Personal Training Zones

Zone	Heart Rate % LT	Your LT: _____ bpm Your Heart Rate Ranges XXX bpm – YYY bpm	Power %FTP	Your FTP: _____ watts Your Watt Ranges XXX watts – YYY watts
Zone 1	<75%		<55%	
Zone 2	75-87%		56-75%	
Zone 3	88-94%		76-90%	
Sweet Spot	93-97%		88-94%	

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Zone 4	95-100%		91-100%	
Zone 5	101-105%		101-105%	
Zone 6	106-120%		106-120%	
Sprints	N/a	N/a	N/a	N/a

Measuring progress

Whether you use RPE, heart rate or power, you should repeat a baseline time trial after the first four weeks of one of the training programs below to gauge your progress and again after eight weeks. As with your baseline TT, ride the time trial after a relatively easy week. For consistency, ride the same course at the same time on the same day each time. You should see at least a little improvement each time.

- Riding by RPE you should be a little faster than before.
- Riding by heart rate you should be a little faster and your heart rate *may* change as your fitness improves. If your heart rate changes, then recalculate your training zones based on your updated LT. But don't worry if your heart rate doesn't change—the key indicator is riding faster.
- Riding by power you should be a little faster and your average power should increase. Recalculate your training zones based on your new average power.

If your performance is worse, try to figure out why. Was it a lot windier or hotter? Were you not fully recovered? Was there significant other stress in your life so you weren't concentrating well? Or is poor performance a sign of *overtraining?* If the poor result may be the result of too much hard training, rather than just pushing on—no pain, no gain—take an easy week to recover. Nipping overtraining early on is much easier than after you really trash your body by overtraining for an extended period.

Don't Ignore These!

Increasing your training volume and intensity puts a bigger load on your body. To be successful in improving your fitness you need to take care of yourself in the following ways.

Proper Daily Nutrition

When training hard, *consuming proper nutrition* is the most important thing you can do to improve performance. Nutrition is more important than how much your bike weighs, how hard you ride or how many hours you're on the bike.

Proper nutrition starts with hydration. Although it wouldn't be fun, you could ride for days without eating. But only for a few hours without drinking! You should drink enough every day so that when you urinate you have good volume and your urine is pale yellow. (If you take vitamins and other supplements your urine may be darker yellow as you void these; however, you should still have ample volume.)

Your muscles burn both glycogen and fat for energy, and the harder you ride the greater the proportion of glycogen that you burn. The fat can either be fat you eat or fat on your body—even the skinniest pro racer has enough body fat to fuel a day of hard racing. The amount of glycogen your body can store is limited. Through training you can increase how much your body can store, but the supply is still limited—just enough to fuel a few hours of hard riding. The glycogen comes from carbohydrates. Protein provides only about 5% of your energy when riding; however, it is important for rebuilding muscles after the ride.

Because carbohydrates are so important, they should be the mainstay of your diet. Many cyclists don't eat enough carbohydrates and instead eat too much protein and fat. At each meal cover your plate with carbohydrates—think of protein as a condiment.

Note that riding at a fat-burning pace won't help you lose weight. Eating carbs, especially simple sugars, won't cause you to gain weight. Changes in weight are simply a function of how many calories you eat vs. how many calories you burn.

For more on nutrition to support your training see my eArticles Nutrition for 100K and Beyond and Healthy Nutrition Past 50.

Ride Nutrition

Adequate hydration while riding is the first priority. The old advice was "Drink before you're thirsty." However, the medical community now recognizes that's dangerous. If you drink too much you may dilute your blood sodium and develop hyponatremia, which is potentially fatal.

"Drink to satisfy your thirst" is the current recommendation. A sports drink is a good choice because it provides some calories and some electrolytes, although not enough of either. One sports drink isn't better for you than another—drink one that you like. If you prefer plain water, that's fine, too, as long as you eat enough, including salty snacks. For more on ride hydration, see my pair of eArticles on Cycling in the Heat.

Carbs are the second priority. As explained above, you have limited glycogen stores for hard riding. On any hard ride lasting over an hour you should start eating 200 – 300 calories *of carbohydrates* in the first hour and continue that much *every hour*. If you are relatively small (under 150 lbs. / 68 kg) then 200 calories of carbs is sufficient. If you weigh more, eat more!

I prefer real food, partially from habit. When I started riding in the early ’70s sports nutrition products didn’t exist. Real food is just as good for riding as sports products, and professional nutritionists recommend real food. (Clark, 2012). I like fresh fruit, fruit and vegetable juices, bagels and jam sandwiches, low-fat breakfast bars, low-fat cookies, especially newtons, crackers and pretzels (less fat than chips), low-fat chocolate milk (white milk is also good), sweetened coffee or tea, etc. Of course, sports drinks, gels, chews and bars are also okay. They are convenient−just more expensive and often less tasty than real food!

Pro riders also eat a lot of real food. They burn 3-5,000 calories during an average stage of a grand tour, and even more on a climbing day. Eating enough gels and bars to fill their caloric needs can get pretty boring! I’ve researched this with several pro teams and nutritionists and written an eArticle: Eating and Drinking Like the Pros: How to Make Your Own Sports Nutrition — Insights from the Pros. The eArticle contains several recipes for homemade sports and electrolyte replacement drinks, which are quite popular with my clients.

Recovery Nutrition

When you get off the bike, your first priority is to replace lost fluids, followed by replenishing your glycogen stores and, if necessary, your sodium levels.

As soon as you get off the bike, start drinking to satisfy your thirst. You should drink enough to replace all of your body weight lost during a ride, keeping in mind that 1 pound equals approximately 16 fl. oz. or 1 pint (1 kg = 1 liter). Drink what you like. If you drink plain water, then eat a carbohydrate-rich snack and something salty. Again, real food is great! Vegetable juices such as V-8 provide carbohydrates and plenty of sodium. Low-fat or non-fat regular and chocolate milk both provide lots of calories. Fruit juices are a great source of carbohydrates as well as potassium; however, they are also acidic, which could irritate the stomach. Commercial recovery drinks offer no benefits over any of the above and come at a much higher price.

You should start eating as soon as you can digest food after getting off the bike. The most rapid glycogen synthesis takes place 60-90 minutes after getting off the bike. Eating in this window is critical for riders working out twice a day or doing very long rides (for example, a multi-day tour) when there is limited time after a ride to recover for the next ride. For riders with more recovery time between rides, it’s less important to consume carbohydrates immediately as long as you eat enough carbs for the rest of the day.

Nancy Clark and Jenny Hegmann in *The Cyclist’s Food Guide, 2nd ed.* recommend eating 0.5 gm. of carbohydrates / lb. of body weight (1 gm / kg) each hour after getting off bike until you can eat a regular meal. Example, if you weigh 150 lbs. you should consume 75 grams of carbohydrate, which equals 300 calories per hour. (A 75 kg rider would also eat approximately 75 grams of carbohydrate.) Note that you should eat this many calories per

hour of *carbohydrates*, not just this many calories of anything. For example, I like pretzels; however, a serving of pretzels totaling 300 calories has only 240 calories of carbohydrates; many energy bars are similar.

Consuming protein does not increase the rate of glycogen synthesis. You do need some protein for muscle repair; however, most riders get enough protein in their in daily diets. (Clark, 2012) So eating protein post-ride is not vital.

Sodium is the only electrolyte that you lose in significant amounts in sweat. How much sodium you lose in sweat varies depending on your genetics, diet, fitness, heat acclimatization, gender and other factors. How much you sweat varies depending on these factors plus how hard you are riding, and the heat and humidity. Processed foods at the store as well as restaurant meals are generally high in sodium. Unless you shop carefully you are probably getting enough sodium or maybe even too much in your daily diet. If you normally watch your sodium intake very carefully, then eat a salty snack after a sweaty ride. You don't need supplements; which are no better than salty food**.** For more on ride hydration, see my pair of eArticles on Cycling in the Heat.

Preconditioning

Before you start doing harder intensity workouts your muscles and connective tissue need to be strong enough to stand the added workload.

- **Endurance base.** If you've been riding for at least three years and ride at least 3,000 miles (5,000 km) per year, then you're ready to start intensity training. You've built an adequate base to support the harder riding. If you're already riding this much, then including intensity training is the best thing to do to improve riding. It's more beneficial than increasing the volume or buying a lighter bike.
- **Strength training.** Resistance training will also help to prepare you for intensity training. This is the concept of "prehabilitation," preparing your muscles and connective tissue to prevent injury rather than rehabilitation after injury. You don't have to go to the gym to strength train. Both Healthy Cycling Past 50 and Cycling Past 60: For Health contain a basic strength-training program, which provides a good foundation. The program and exercises are illustrated on my website. Former U.S. National Weightlifting Team Coach Harvey Newton has an excellent Strength Training for Cyclists System as well.

Managing training load

For continued improvement you must be overload your body progressively. If you just do the same rides every week and don't stress your body any differently, you don't improve. When adding intensity you should manage these three factors:

- *How much* you ride

- *How often* you ride
- *How hard* you ride.

Before starting one of the training programs below, calculate the hours per week that you've trained for the past couple of months. When you start a program, you are adding harder training than you are used to riding. With the new program your hours per week should be less than or equal to your average weekly volume for the past few months. Fewer training hours are the best because of the lower risk of injury.

Full recovery

As I have emphasized in previous eArticles, *recovery* is the key to improvement, *not* training intensity or volume. The older you are the more recovery you need. The benefits of intensity and the different types of intensity training are the same for riders in their 50s, 60s and beyond; however, older riders generally need more recovery, and the volume of intensity is lower. Also, because riders of different ages are of different athletic maturities (see Cycling Past 60, part 1: For Health) the amount of recovery you need isn't the same as other riders. Listen to your body!

Overload => Stress => Recovery => Adaptation

When you train you *overload* what your body is used to doing. This is a form of *stress.* If you allow sufficient *recovery* then your body *adapts* to the overload and becomes stronger. Note that your body doesn't differentiate among different kinds of stress: training stress, work stress, relationship stress, illness, environmental conditions, etc. The presence of any of these other types of stress will reduce the training stress that you can handle and increase the amount of recovery that you need.

Following this pattern will make you fitter week by week—remember that *increasing fitness, not increasing fatigue* is the goal! In addition to good post-ride nutrition, active recovery rides are important to loosen stiff muscles and help to move waste products from your muscles through the lymph system. Each of the training programs below includes one or two active recovery rides a week. *Don't skip these!*

Although not included specifically in the programs below, I highly recommend stretching after most rides. The most important stretches are illustrated on my website. Alan Bragman recommends a different technique in his eArticle Stretching for Cyclists. In his eArticle Dynamic Flexibility Training for Cyclists, Coach Dan Kehlenbach shows how dynamic stretching emphasizes movement patterns rather than just targeting specific muscles.

Massage also helps to remove waste products from your muscles and to relieve soreness. If you don't have access to a professional massage therapist, my eArticle Optimal Recovery for Improved Performance illustrates two different recovery techniques you can use on yourself, as well as providing other recovery tips.

Adequate sleep

Your body only produces human growth hormone when you sleep. Human growth hormone is necessary for muscle repair and muscle growth. If you short yourself on sleep, then you won't get as strong. If you need an alarm clock to wake up, then you aren't getting enough sleep. Cycling Past 60, Part 1: For Health explains further the importance of good sleep and how to improve the quality of your sleep.

As you add intensity to training, you also need to train more responsibly. It's essential to give your body time to rest, recover and grow stronger.

Training Programs

Here are four programs to help you meet different goals. The programs are progressively harder. Don't immediately start one of the harder programs. Rather, pick the program that is one level higher than the level of intensity at which you currently ride.

Training Programs by Progressive Intensity	
Program	Current Level of Intensity
Better endurance	Use this program if you are comfortable riding in Zones 1 and 2, the Recovery and Endurance zones.
More power	Use this program if your longest ride is at least 50 miles (80 km) and portions of your regular rides are in Zone 3 at the Tempo pace, the Tempo portions of a ride totaling at least 30 minutes.
Faster speed	Use this program if your longest ride is at least 50 miles (80 km) and you can sustain several 5- to 10-minute efforts at the Sweet Spot pace, the efforts totaling at least 15 minutes.
Higher aerobic capacity (VO2 max)	Use this program if your longest ride is at least 50 miles (80 km) and you can do several 3- to 5-minute efforts in Zone 4, Sub-LT, totaling at least 10 minutes of Sub-LT riding, and possibly some Zone 5 Super-LT efforts.

How to do an intensity workout

When following a program, remember the two cardinal rules of intensity training:

1. *After warming up, if you can't ride at the desired intensity, go home.* Don't wear yourself out doing less than quality work. Give yourself another recovery day or two and do the intensity later in the week.
2. *Always finish an intensity workout feeling like you could do more.* The objective is maximum improvement, not maximum fatigue.

The intensity ride always starts with a warmup of at least 15-30 minutes as specified in the workouts. If you are pressed for time, *don't skip the workout, do a shorter main set.* The main set is *mixed-intensity* riding, a combination of harder riding in a specific zone and recovery riding in a lower zone. Always cool down for at least 15 minutes afterward.

The types of intensity rides are similar; however, the intensities and durations of each type of ride are different. The harder the effort, the shorter the duration. The types of rides in increasing order of intensity and descending order of duration are: Tempo, Sweet Spot, Sub-lactate Threshold and Super-lactate Threshold.

For a given program, for example the power program, stay in the prescribed zones—*don't go harder*. If you could go harder, do more or longer repeats at the prescribed level to get the intended benefit.

When doing a workout, start timing the work interval as soon as you start riding hard. RPE and power respond immediately to an increase in effort; however, heart rate may lag by several minutes. Stop timing the interval when you stop riding hard, even though your heart rate may drop slowly.

Unless you are training to race, always recover fully before starting the next hard effort. The times given for recovery are approximations—listen to your body. If you race, you won't have time to recover fully before the next attack, so do your intense efforts with only partial recovery.

Many riders like simplicity and train by perceived exertion. Some like the feedback from a heart rate monitor. Some riders like the precision of training by power. Some riders like structured workouts with timed periods of intensity and recovery. Others prefer unstructured workouts, just mixing up the intense efforts with easy cruising. In each program the workouts are described by minutes of hard riding and minutes of recovery. After each set of workouts examples are given of how to follow the program doing unstructured workouts. Times are given for each type of structured workout. If you prefer unstructured workouts, use these as approximate durations.

How to use the programs

After you have identified which program is right for you, look at Week 1. The week contains three progressively harder intensity workouts, A, B and C. Pick the workout that will challenge you, but you can do without struggling. If you aren't sure which intensity workout to pick, then ride workout B. If intensity workout B is too easy, then follow the harder C workouts in the program. If B is too hard, follow the easier A workouts in the program. If it's about right, follow the B workouts. Once you decide on the right level of intensity workouts, follow that intensity level throughout the program; for example, do the B rides every week.

Each week also contains a range of times for each of the different types of rides. Select the duration that fits *comfortably* with your current fitness level (and your available time). The challenge to your body should come from the intensity rides, not from the other rides. Stay with this duration for all of the different types of rides for the eight weeks. For example, if you start with the shorter Endurance ride, then also do the shorter Tempo ride and shorter Recovery rides and stick with the shorter rides for the rest of the program.

The programs are divided into two 4-week blocks. After each block, you repeat your baseline time trial. If you just have four weeks until a key event, just doing the first four-week block will improve your performance. If you have eight weeks to a key event, then do both blocks. What if the time to your event isn't four or eight weeks, but some other number, for example six weeks? Do the first four-week block and the next week do the first week of block two. Then in week six repeat your baseline time trial to gauge your progress.

What if you have more than eight weeks? For example, you're starting at the beginning of the summer for an early fall event? You have two options:

Repeat weeks seven and eight of the same program several times, and each week add one repetition to the intervals.

Or you could move on to the next program. For example, after completing the Power program start the Speed program in week one.

Improved Endurance Program

This program is for any fitness rider who can ride for a couple of hours averaging at least 12.5 mph (20 km/h) For your mixed intensity workouts, the hard efforts will be in Zone 3 (headwind pace, 88-94% of LT, 76-90% of FTP) and the recovery riding will be in Zone 2 (conversation pace, 75-87% of LT, 56-75% of FTP). You should recover fully between each hard effort—the recovery times are estimates for full recovery.

First four-week block

Week 1

- **Endurance Ride**: 1:00 – 2:00
- **Intensity**: 1:00 – 2:30
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 2 repetitions of 6 minutes in Zone 3 and 3 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B rides:** 2 rides, each with 0:15 warm-up, 0:30 in Zone 3, and 0:15 cool-down.
  - **C rides:** 2 rides, each with 0:15 warm-up, 0:45 in Zone 3, and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 1:30 – 2:30

Total: 3:30 – 7:00

Week 2

- **Endurance Ride**: 2:30 – 5:00
- **Intensity**: 1:10 – 2:00
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 3 repetitions of 6 minutes in zone 3 and 3 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B rides:** 1 ride with 0:15 warm-up, 0:30 in Zone 3, and 0:15 cool-down.
  - **C rides:** 2 rides, each with 0:15 warm-up, 0:30 in Zone 3, and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 1:00 – 2:00

Total: 4:40 – 9:00

Week 3

- **Endurance Ride**: 1:00 – 2:00
- **Intensity**: 1:10 – 3:00
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 2 repetitions of 8 minutes in Zone 3 and 4 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B rides:** 1 ride with 0:15 warm-up, 0:45 in Zone 3, and 0:15 cool-down and 1 ride with 0:15 warm-up, 0:30 in Zone 3, and 0:15.
  - **C rides:** 2 rides, each with 0:15 warm-up, 1:00 in Zone 3, and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 2:00 – 3:00.

Total: 4:10 – 8:00

Week 4

- **Endurance Ride**: 3:00 – 6:00
- **Intensity**: 1:00 – 2:00
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 3 repetitions of 8 minutes in Zone 3 and 4 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B rides:** 1 ride with 0:15 warm-up, 0:30 in Zone 3, and 0:15 cool-down.
  - **C rides:** 2 rides, each with 0:15 warm-up, 0:30 in Zone 3, and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 1:00 – 2:00.

Total: 5:20 – 10:00

Baseline Time Trial: After completing week 4, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline TT to gauge your progress and recalculate your training zones if necessary.

Second four-week block

Week 5

- **Endurance Ride**: 1:30 – 3:00
- **Intensity**: 1:15 – 3:15
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 2 repetitions of 10 minutes in Zone 3 and 5 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B ride:** 2 rides each with 0:15 warm-up, 0:45 in Zone 3 and 0:15 cool-down.
  - **C ride:** 1 ride with 0:15 warm-up, 1:00 in Zone 3 and 0:15 cool-down and one ride with 0:15 warm-up, 1:15 in Zone 3 and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 1:30 – 2:30.

Total: 4:15 – 8:45

Week 6

- **Endurance Ride**: 2:30 – 5:00
- **Intensity**: 1:30 – 3:00
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 3 repetitions of 10 minutes in Zone 3 and 5 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B ride:** 2 rides each with 0:15 warm-up, 0:30 in Zone 3 and 0:15 cool-down.
  - **C ride:** 2 rides each with 0:15 warm-up, 0:45 in Zone 3 and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 2:00 – 3:00.

Total: 6:00 – 11:00

Week 7

- **Endurance Ride**: 1:30 – 3:00
- **Intensity**: 1:20 – 3:30
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 2 repetitions of 12 minutes in Zone 3 and 6 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B ride:** 1 ride with 0:15 warm-up, 0:45 in Zone 3 and 0:15 cool-down and 1 ride with 0:15 warm-up, 1:00 in Zone 3 and 0:15 cool-down.
  - **C ride:** 2 rides each with 0:15 warm-up, 1:15 in Zone 3 and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 1:00 – 2:00.

Total: 3:50 – 8:30

Week 8

- **Endurance Ride**: 4:00 – 8:00
- **Intensity**: 1:30 – 2:00
  - **A ride:** Warm up for at least 0:30 in Zone 2 and then do this mixed intensity workout: 1 repetition of 15 minutes in Zone 3 and 8 minutes recovery in Zone 2 between each rep. Cool down for at least 0:15 afterward.
  - **B ride:** 1 ride with 0:15 warm-up, 0:30 in Zone 3 and 0:15 cool-down.
  - **C ride:** 2 rides each with 0:15 warm-up, 0:30 in Zone 3 and 0:15 cool-down.
- **Active Recovery**: One or two rides totaling 1:00 – 2:00.

Total: 6:10 – 12:00

Baseline Time Trial: After completing week 8, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline TT to gauge your progress and recalculate your training zones if necessary.

Unstructured endurance training

If you prefer not to look at your computer (or don't even ride with one!), here are several alternatives to build better endurance. The times in Zone 3 may vary during a ride, which is fine as long as the total time in Zone 3 on a ride is about the same as the total time in Zone 3 in Intensity Workout A, B, or C for a given week.

- **Rolling hills.** Ride up each hill breathing deeply but still able to talk. Recover on the way down. These work best on big hills or sustained climbs.
- **Headwind.** Ride into the wind early and then enjoy the tailwind home. It's a great workout and good fun.
- **Brisk after-work ride.** Riding home increase your average speed by 1-2 mph (1.5-3 km/h). Remember, you are riding more briskly, not time trialing.
- **Coffee stop.** Ride briskly to coffee and then cruise home at a conversational pace.

- **Hustling.** Up the pace to get home before dark or approaching rain.

More Power Program

To follow this program you should be able to do a 50-mile (100 km) ride including a total of at least 0:30 of Zone 3 (headwind pace, 88-94% of LT, 76-90% of FTP).

For your mixed intensity workouts the hard efforts will be in the Sweet Spot (short hill pace, 93-97% of LT, 88-94% of FTP) and the recovery riding will be in Zone 2 (conversation pace, 75-87% of LT, 56-7% of FTP). You should recover fully between each hard effort—the recovery times are estimates for full recovery.

First four-week block

Week 1

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:15 - 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:00 – 1:20 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 3 repetitions of 4 minutes in the Sweet Spot and 2 minutes recovery in Zone 2 between each rep.
  - **B ride:** 4 repetitions of 5 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.
  - **C ride:** 5 repetitions of 6 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in zones 1 and 2
- **Active Recovery**: Two rides totaling 1:30 – 2:30

Total: 4:00 – 5:50

Week 2

- **Endurance Ride**: 1:30 – 2:30
- **Tempo**: 1 ride with 0:15 warm-up, 0:15 – 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:10 – 1:40 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 4 repetitions of 4 minutes in the Sweet Spot and 2 minutes recovery in Zone 2 between each rep.
  - **B ride:** 5 repetitions of 5 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.
  - **C ride:** 5 repetitions of 7 minutes in the Sweet Spot and 4 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 2:00

Total: 4:25 – 7:10

Week 3

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:15 - 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:15 – 1:45 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 5 repetitions of 4 minutes in the Sweet Spot and 2 minutes recovery in Zone 2 between each rep.
  - **B ride:** 6 repetitions of 5 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.
  - **C ride:** 5 repetitions of 8 minutes in the Sweet Spot and 4 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in zones 1 and 2
- **Active Recovery**: Two rides totaling 2:00 – 3:00

Total: 4:45 – 6:45

Week 4

- **Endurance Ride**: 2:00 – 3:00
- **Tempo**: 1 ride with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:00 – 1:10 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 4 minutes in the Sweet Spot and 2 minutes recovery in Zone 2 between each rep.
  - **B ride:** 3 repetitions of 5 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.
  - **C ride:** 3 repetitions of 6 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 2:00

Total: 5:00 – 7:25

Baseline Time Trial: After completing week 4, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline time trial to gauge your progress and recalculate your training zones if necessary.

Second four-week block

Week 5

- **Endurance Ride**: none

- **Tempo**: 2 rides with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:10 – 1:30 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 3 repetitions of 6 minutes in the Sweet Spot and 6 minutes recovery in Zone 2 between each rep.
  - **B ride:** 4 repetitions of 7 minutes in the Sweet Spot and 4 minutes recovery in Zone 2 between each rep.
  - **C ride:** 3 repetitions of 10 minutes in the Sweet Spot and 5 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:30 – 2:30

Total: 4:40 – 6:30

Week 6

- **Endurance Ride**: 2:30 – 3:30
- **Tempo**: 1 ride with 0:15 warm-up, 0:45 – 1:00 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:20 – 1:40 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 4 repetitions of 6 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.
  - **B ride:** 5 repetitions of 7 minutes in the Sweet Spot and 4 minutes recovery in Zone 2 between each rep.
  - **C ride:** 3 repetitions of 12 minutes in the Sweet Spot and 6 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: Two rides totaling 2:00 – 3:00

Total: 7:05 – 9:40

Week 7

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:40 – 1:55 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 5 repetitions of 6 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.
  - **B ride:** 6 repetitions of 7 minutes in the Sweet Spot and 4 minutes recovery in Zone 2 between each rep.
  - **C ride:** 3 repetitions of 15 minutes in the Sweet Spot and 8 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2

- **Active Recovery**: One or two rides totaling 1:00 – 2:00

Total: 4:40 – 6:25

Week 8

- **Endurance Ride**: 3:00 – 4:00
- **Tempo**: 1 ride with 0:15 warm-up, 1:00 – 1:15 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:00 – 1:20 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 6 minutes in the Sweet Spot and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 3 repetitions of 7 minutes in the Sweet Spot and 4 minutes recovery in Zone 2 between each rep.
  - **C ride:** 4 repetitions of 6 minutes in the Sweet Spot and 3 minutes recovery in Zone 2 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 2:00

Total: 6:30 – 9:05

Baseline Time Trial: After completing week 8, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline time trial to gauge your progress and recalculate your training zones if necessary.

Unstructured power training

If you prefer not to look at your computer (or don't even ride with one!), here are several alternatives to build more power. The times in the Sweet Spot may vary during a ride, which is fine as long as the total time in the Sweet Spot on a ride is about the same as the total time in the Sweet Spot in Intensity Workout A, B, or C for a given week.

- **Fartlek:** Randomly mix harder riding in the Sweet Spot and easier riding.
- **Push up the hills.** Use the same course you used for the Improved Endurance program just go little harder.
- **Use the wind.** This takes discipline. Ride into the wind for a while, turn around and recover for a bit and then turn around and ride into the wind again. Your reward is riding home with a tailwind!
- **Hustling.** Similar to the Improved Endurance program alternate riding at a conversational pace with some sections of harder riding to get home before dark or approaching rain.
- **Paceline.** Take long pulls in a brisk (not racing) paceline.

Faster Speed Program

To follow this program you should be able ride at least 50 miles (100 km). During a shorter ride you should be able to sustain several 5- to 10-minute efforts at the Sweet Spot pace (short hill pace, 93-97% of LT, 88-94% of FTP), the efforts totaling at least 15 minutes.

For your mixed intensity workouts the hard efforts will be in the Zone 4 (sub-barf pace, 95-100% of LT, 91-100% of FTP) and the recovery riding will be in Zone 3 (headwind pace, 88-94% of LT, 76-90% of FTP). You should recover fully between each hard effort—the recovery times are estimates for full recovery.

If you do the level C intensity rides, then in the second four-week block the hard efforts will be in the Zone 5 (barf pace, 101-105% of LT, 101-105% of FTP). You should still recover fully in Zone 3 between each effort.

If you race, in order to simulate racing start the next Zone 4 or Zone 5 interval before you are fully recovered.

First four-week block

Week 1

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:15 - 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:00 – 1:25 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 3 repetitions of 3 minutes in Zone 4 and 2 minutes recovery in Zone 3 between each rep.
  - **B ride:** 4 repetitions of 4 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
  - **C ride:** 5 repetitions of 5 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:30 – 2:00

Total: 4:00 – 5:25

Week 2

- **Endurance Ride**: 1:00 – 2:30
- **Tempo**: 1 ride with 0:15 warm-up, 0:15 – 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:05 – 1:30 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 4 repetitions of 3 minutes in Zone 4 and 2 minutes recovery in Zone 3 between each rep.

- **B ride:** 5 repetitions of 4 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
- **C ride:** 5 repetitions of 6 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.

Cool down for at least 0:15 in Zones 1 and 2

- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 3:50 – 6:30

Week 3

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:15 - 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:10 – 1:40 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 5 repetitions of 3 minutes in Zone 4 and 2 minutes recovery in Zone 3 between each rep.
  - **B ride:** 6 repetitions of 4 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
  - **C ride:** 5 repetitions of 7 minutes in Zone 4 and 4 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 2:00 – 2:30

Total: 4:40 – 6:10

Week 4

- **Endurance Ride**: 1:30 – 3:00
- **Tempo**: 1 ride with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:55 – 1:10 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 3 minutes in Zone 4 and 2 minutes recovery in Zone 3 between each rep.
  - **B ride:** 3 repetitions of 4 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
  - **C ride:** 3 repetitions of 5 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 4:25 – 6:55

Baseline Time Trial: After completing week 4, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline time trial to gauge your progress and recalculate your training zones if necessary.

Second four-week block

For riders who like formal and informal racing note that the intensity increases to Zone 5 in the level C intensity rides.

Week 5

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:55 – 1:20 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 3 repetitions of 5 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 4 repetitions of 6 minutes in Zone 4 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2 or 3 repetitions of 2 minutes in *Zone 5* and 2 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:30 – 2:00

Total: 4:25 – 5:50

Week 6

- **Endurance Ride**: 2:00 – 3:30
- **Tempo**: 1 ride with 0:15 warm-up, 0:45 – 1:00 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:50 – 1:35 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 4 repetitions of 5 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 5 repetitions of 6 minutes in Zone 4 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2-4 repetitions of 3 minutes in *Zone 5* and 2 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 5:05 – 8:05

Week 7

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:55 – 1:45 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 5 repetitions of 5 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 6 repetitions of 6 minutes in Zone 4 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2-4 repetitions of 4 minutes in *Zone 5* and 2 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 2:00 – 2:30

Total: 4:55 – 6:45

Week 8

- **Endurance Ride**: 2:30 – 4:00
- **Tempo**: 1 ride with 0:15 warm-up, 1:00 – 1:15 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:50 – 1:10 Warm up for at least 0:30 in Zones 2 and 3 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 5 minutes in Zone 4 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 2 repetitions of 6 minutes in Zone 4 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2 repetitions of 2 minutes in *Zone 5* and 2 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 5:50 – 8:25

Baseline Time Trial: After completing week 8, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline time trial to gauge your progress and recalculate your training zones if necessary.

Unstructured training

If you prefer not to look at your computer (or don't even ride with one!), here are several alternatives to build better endurance. The times in Zone 4 or 5 may vary during a ride, which is fine as long as the total time in Zone 4 or 5 on a ride is about the same as the total time in Zone 4 in Intensity Workout A, B, or C for a given week.

- **Fartlek:** Randomly mix harder riding in Zone 4 or 5 and easier riding.
- **Hammer the hills.** Use a course with shorter and/or steeper hills than earlier programs.
- **Race to the city.** Start several miles (km) away and race to the city limit sign.
- **Escape and chase.** Send a rider down the road. Let a significant gap open, then chase back into contact. For a tougher workout, escape down the road yourself and let the group chase you.
- **Catch and release.** Catch up to another rider, slow down and let the rider open significant gap, then catch up again.
- **Fast group.** Riding with a group that's faster is a classic way to improve fitness.
- **Paceline.** Take pulls in a fast paceline.

Greater Aerobic Capacity Program

To follow this program you should be able ride at least 50 miles (100 km). During a shorter ride you should be able to sustain several 3- to 5-minute efforts in Zone 4 (sub-barf pace, 101-105% of LT, 101-1055 of FTP), the efforts totaling at least 10 minutes.

For your mixed-intensity workouts the hard efforts will be in the Zone 6 (eyeballs out pace, 106-120% of LT, 106-120% of FTP) and the recovery riding will be in Zone 3 (headwind pace, 88-94% of LT, 76-90% of FTP). You should recover fully between each hard effort—the recovery times are estimates for full recovery.

First four-week block

Week 1

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:15 - 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:50 – 0:55 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 1 minutes in Zone 6 and 2 minutes recovery in Zone 3 between each rep.
  - **B ride:** 2 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:30 – 2:00

Total: 3:50 – 4:55

Week 2

- **Endurance Ride**: 1:00 – 2:30
- **Tempo**: 1 ride with 0:15 warm-up, 0:15 – 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:55 – 1:05 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 3 repetitions of 1 minutes in Zone 6 and 2 minutes recovery in Zone 3 between each rep.
  - **B ride:** 3 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.
  - **C ride:** 3 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 3:40 – 6:05

Week 3

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:15 - 0:30 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:50 – 0:55 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 1 minutes in Zone 6 and 2 minutes recovery in Zone 3 between each rep.
  - **B ride:** 2 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 2:00 - 2:30

Total: 4:20 – 5:25

Week 4

- **Endurance Ride**: 1:30 – 3:00
- **Tempo**: 1 ride with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:55 – 1:10 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 4 repetitions of 1 minutes in Zone 6 and 2 minutes recovery in Zone 3 between each rep.
  - **B ride:** 4 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.

- **C ride:** 4 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 4:25 – 6:55

Baseline Time Trial: After completing week 4, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline TT to gauge your progress and recalculate your training zones if necessary.

Second four-week block

Week 5

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:55 – 1:05 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 2 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2 repetitions of 3 minutes in Zone 6 and 6 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:30 – 2:00

Total: 4:25 – 5:35

Week 6

- **Endurance Ride**: 2:00 – 3:30
- **Tempo**: 1 ride with 0:15 warm-up, 0:45 – 1:00 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:00 – 1:10 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 3 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 3 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 3 repetitions of 3 minutes in Zone 6 and 6 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 5:15 – 7:40

Week 7

- **Endurance Ride**: none
- **Tempo**: 2 rides with 0:15 warm-up, 0:30 – 0:45 in Zone 3 and 0:15 cool-down.
- **Intensity**: 0:55 – 1:05 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 2 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 2 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 2 repetitions of 3 minutes in Zone 6 and 6 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 2:00 – 2:30

Total: 4:55 – 6:05

Week 8

- **Endurance Ride**: 2:30 – 4:00
- **Tempo**: 1 ride with 0:15 warm-up, 1:00 – 1:15 in Zone 3 and 0:15 cool-down.
- **Intensity**: 1:00 – 1:20 Warm up for at least 0:30 in Zones 2 to 4 and then ride one of these *mixed intensity* workouts:
  - **A ride:** 4 repetitions of 90 seconds in Zone 6 and 3 minutes recovery in Zone 3 between each rep.
  - **B ride:** 4 repetitions of 2 minutes in Zone 6 and 4 minutes recovery in Zone 3 between each rep.
  - **C ride:** 4 repetitions of 3 minutes in Zone 6 and 6 minutes recovery in Zone 3 between each rep.

  Cool down for at least 0:15 in Zones 1 and 2
- **Active Recovery**: One or two rides totaling 1:00 – 1:30

Total: 6:00 – 8:35

Baseline Time Trial: After completing week 8, take at least five recovery days riding not more than a total of three hours of active recovery during the five days. Then repeat your baseline time trial to gauge your progress and recalculate your training zones if necessary.

Unstructured training

If you prefer not to look at your computer (or don't even ride with one!), here are several alternatives to build better endurance. The times in Zone 6 may vary during a ride, which

is fine as long as the total time in Zone 6 on a ride is about the same as the total time in Zone 3 in Intensity Workout A, B, or C for a given week.

- **Fartlek:** Randomly mix very hard riding and easier riding.
- **Hammer the hills.** Use a course with very short and/or steep hills.
- **Race to the city.** Start ½ - 1 mile (1 – 1.5 km) away and race to the city limit sign.
- **Chase cars.** Pick a color and every time a car of that color passes sprint after it.

Sprinting

Sprinting isn't just for racers. Increased strength, power and speed come from more coordinated firing of the muscle fibers as well as stronger individual muscle fibers. The above workouts train the individual muscle fibers and will do a little to improve the coordination of the firing. The best way to improve the neuromuscular coordination is to put the maximum demand on your muscles, i.e., sprint! Here's how:

- **In other rides**. Mix a few sprints into one or several of your other training rides. Give yourself plenty of recovery—even an hour—between sprints.
- **Hard gear**. Shift into a hard gear, e.g., 53 x 15.
- **Start small**. Begin with 10- to 15-second sprints and gradually build up to 30-second sprints.
- **Not too many**. Start with just a couple of sprints and build up to a maximum of four to six depending on your fitness and goals.
- **Ignore heart rate**. Changes in heart rate always lag changes in effort, so your heart rate won't peak during the sprint. This doesn't matter. You're working on neuromuscular facilitation, not aerobic capacity.

Sprinting hurts, so make it fun by sprinting against a friend, chasing a car (at a safe distance!) or out-running a dog.

Reach Your Potential!

For seniors, one of the consequences of aging is a feeling of loss of control over your body. This can be as simple as unavoidably poorer vision. Mountain bike legend Ned Overend, now in his 50s, has started carrying glasses so that he can see to fix a mechanical on a ride. Despite this loss of control, Overend can still control his performance and reach his potential for his age through smart training. (Fiske, 2012)

You can also reach your potential even if you are 50, 60 or older. Smart training means following a specific training program to reach a specific goal, whether the goal is increased general fitness and longevity, more power to climb better or to fight the wind, faster speed to set a personal best or to smoke your buddies, or maximizing your aerobic capacity to race.

As you train hard to reach your potential by following one or more of the training programs in this eArticle, remember why the pros train—to win races *and* because they love riding their bikes!

If you aren't having fun, why are you pushing yourself? Not every minute of every workout will be fun. There may be times when you hate Coach Hughes. But if you don't finish most of your rides with a smile on your face, you're doing something wrong—probably doing too much!

Have fun riding and enjoy the great feeling that comes with successfully pushing your limits!

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About the Author

Coach John Hughes earned coaching certifications from USA Cycling and the National Strength and Conditioning Association. He enjoys coaching riders with a variety of goals and fitness backgrounds. For more information, visit www.coach-hughes.com. Follow Coach Hughes https://twitter.com/HughesCoaching, and https://www.facebook.com/john.hughes.5283

Coach Hughes lives in Boulder, Colorado, where he served for 12 years as Managing Director of the UltraMarathon Cycling Association and editor of *UltraCycling* magazine. In 2011 he participated in the International Conference on Cycling and Health in Shanghai, China.

He is the author with Dan Kehlenbach of Distance Cycling: *Your complete guide to long-distance rides,* published by Human Kinetics, Champaign, IL

Coach Hughes's cycling career includes course records in the Boston-Montreal-Boston 1200-km randonnée and the Furnace Creek 508, a Race Across AMerica (RAAM) qualifier. He has ridden solo RAAM twice and is a 5-time finisher of the 1200-km Paris-Brest-Paris. Much of this was accomplished during a 24-year career at Stanford University, where he balanced a professional career, family and cycling. His palmarès include:

Paris-Brest-Paris ’79, ’87, ’91, ’95, ’99;
Furnace Creek 508 ’89 (Course Record), ’93 (1st);
Boston-Montreal-Boston ’92 (Course Record);
Reno-Tucson record ’94 (849 miles in 54:17, still standing),
Oregon North-South record ’95 (292 miles in 14:23, still standing);
Race Across AMerica ’96; Rocky Mountain 1200 ’04

Other Publications by Coach John Hughes

His other publications available from RoadBikeRider include:

Cycling Past 50, 60 and Beyond: Training with Intensity

Intensity: How to Plan & Gauge Your Most Beneficial Training Efforts

Optimal Recovery for Improved Performance.

Cycling Past 50 series: 4-Article Bundle

1. Healthy Cycling Past 50
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