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# Triathlon Training for Mortals

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**N**ot all triathlons are extreme endurance events, such as the famous Hawaii Ironman World Championships. In fact, it is possible for the average person to successfully train for and compete in a short-course road triathlon with several months of consistent training. The primary road triathlon race distances can be seen below in Table 1, though other formats of triathlon competition do exist. Examples of other triathlon-related events include off-road triathlons (swim, mountain bike, trail run), duathlons (run, bike, run), aquathlons (swim, run), and winter triathlons (run, mountain bike, cross-country ski). Ideally, an individual training for their first triathlon should select one of the shorter distance road triathlons such as a sprint or international distance race. The international distance, also known as Olympic distance, is the race distance that has been contested at the Olympic Games by elite athletes since the 2000 Games in Sydney, Australia.

Race Type	Swim Distance	Bike Distance	Run Distance	Typical Race Time	Minimum Recommended Weekly Training
Sprint	400-800 meters	15-30 km	3-7 km	1-2 hrs	4-6 hrs/week
International	1500 meters	40 km	10 km	2-4 hrs	5-8 hrs/week
70.3 (Half-Ironman)	1900 meters	90 km	21.1 km	4-8 hrs	8-10 hrs/week
Ultra-distance (Ironman)	3800 meters	180 km	42.2 km	8-17.5 hrs	10-14 hrs/week

References (2,4,6,10 )

Training for a triathlon is the ultimate exercise in cross-training. The initial training components necessary to address in training for a triathlon are: developing proper mechanics; improving aerobic endurance, and balancing training stress and recovery. Individuals with an endurance training background will have an advantage over non-endurance trained athletes. Keep in mind, though, that several athletes known for their

strength, power, and skills such as former NFL lineman Darryl Halley and NHL great Mike Richter have worked up to competing in Ironman events after retiring from their competitive careers.

The following sections will break down the training requirements for each sport, addressing the key components for successful training. Beginning with swimming, it is important to use proper technique and stroke mechanics. Typically, most competitors use the front crawl stroke as it is the fastest and most efficient swimming stroke. It is legal for competitors to use any stroke, though, and some athletes might find backstroke or breaststroke to be easier to use than crawl in the beginning. While most triathlon competitions occur in open water (ocean, lake, river, etc.), most triathletes train in standard lap swimming pools. Most lap swim pools are 25 or 50 meters or yards in length. In terms of technical demand, swimming is by far the most challenging of the three sports in triathlon. Proper mechanics are extremely important, and researcher Wendy Khort found economy of motion in the water is more important than aerobic fitness in swimming performance (5).

For optimal swimming performance, it is most important to focus on development of proper mechanics before stressing physical and physiological training stresses. Researchers in the Netherlands found that there is a dramatic difference in the swimming economy of triathletes compared to swimmers (11). They concluded that triathletes should spend more time developing better swim technique rather than focusing on conditioning in their swim training. The advantage of swim training, as opposed to cycling and especially running, is that the time needed to recover from training sessions is very short. Since swimming stresses less muscle mass and is primarily composed of concentric muscle activation, there is less overall mechanical stress placed on the active tissues. It is worthwhile mentioning that having a stable shoulder joint is important for front crawl swimming – and again that stroke mechanics can reduce the strain placed on the shoulder joint. Once appropriate

stroke mechanics have been attained, typical conditioning for swimming consists of increasing distance-distance steady pace swims and addition of interval training. Local master's swimming programs and United States Swimming Association certified coaches are excellent resources for swimming training and coaching.

For cycling, safe equipment, proper fit and positioning on the bike are critical aspects of mechanics. Since most cycling motion occurs within a constrained range of motion, it is imperative to be properly positioned to avoid overuse injuries. In "Andy Pruitt's Complete Medical Guide for Cyclists" he states that "bike fit is a marriage between rider and bike" and suggests that it is important to adapt the bike to fit your body – don't



attempt to make your body adapt to the bike (8). Once properly positioned, training for cycling is the easiest of the three sports in triathlon. Of course, it should be stressed that wearing appropriate clothing such as cycling-specific padded shorts, cycling jerseys, protective eye-wear, and an ASTM or Snell certified helmet

is a must. Training on safe roads where traffic is limited or using bike paths and cycling-friendly routes is also important. In terms of training demand, it is possible to use different pieces of technology, such as heart rate monitors, power-meters, and GPS units to monitor your training intensity.

In general, building your fitness to be able to complete up to twice the distance of your goal triathlon bike-leg distance is recommended to ensure that you have adequate endurance to complete the run portion of the triathlon without excessive fatigue. This recommendation only applies to races with a cycling-leg distance of up to 50 to 60 miles. Specific interval training should also include workouts performed up to 50% of race distance just above and just below goal race intensity. Cycling training is more time-intensive than swimming and running. A general training recommendation is to perform about ½ of all your weekly training time as cycling, and to incorporate terrain similar to the event that you are preparing for. It is possible to

perform physiology testing such as lactate profile and  $VO_2$  max tests to help identify appropriate training intensities. In my practice, this type of testing helps athletes of all ability levels train more effectively.

A simple and non-invasive technique to ensure that steady-state aerobic training is performed at the appropriate intensity is to use the “talk test”, as championed by Dr. Carl Foster. The “talk test” has been shown to correlate well with the ventilatory threshold according to researchers at the University of Wisconsin-LaCrosse (7). Simply put, true aerobic endurance training should be performed at an intensity where you can comfortably talk while training.

Running is the final event in triathlon, and in some ways the easiest. It relies on very little equipment and technical activity, though proper mechanics are important for reducing injury potential and maximizing performance. Running accounts for most of the over-use injuries that triathletes incur according to research of British triathletes by Pirkko Korkia and supported by Shaw’s work with triathletes in Australia (6,10). “Contrary to old held misconceptions, it is possible to identify and modify gait strategies for athletes to reduce their risk of injury” according to physical therapist Tim Hilden, MS, PT, AT.C. of the Boulder Center for Sports Medicine (3). One thing about running in a triathlon that is unique is the fact that there is significant cumulative fatigue prior to the start of the run portion of the race. Efficiency of movement, pacing strategies, and attention to nutritional needs prior to the run will impact the ability to perform the run leg in a triathlon.

An aspect of training for the run portion of a triathlon that needs specific attention is the combination workout. In general, combination workouts consist of back-to-back cycling and running. These are often referred to as brick workouts by triathletes. The basic steps of building aerobic endurance for running are similar to cycling. Physiology testing and using the “talk test” are also effective in encouraging use of appropriate training intensity. Increasing training stress to include a long steady-state run of approximately 1.5 to 2 times the goal race distance will ensure that adequate endurance has been achieved prior to competing. Performing interval workouts consisting of up to 50% of the goal race distance at just above and below race pace is also effective in

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proving specific training adaptations.

The amount of time needed to recover from run training is much greater than either swimming or cycling. This is in part due to the eccentric muscle contractions that occur with each and every stride taken while running. Researchers throughout the world including those at the German Sports University in Cologne found that eccentric muscle contractions result in structural damage to muscle fibers that are likely associated with Delayed Onset Muscle Soreness (DOMS), also known as Exercise Induced Muscle Injury (EIMI) (14). Research conducted at Boston University indicates that severe eccentric loading can reduce peak force production for greater than 30-days. (9).

Tying together the individual sports of swimming, cycling, and running make triathlon the sport that it is. Balancing the need to increase training stress, while ensuring that adequate recovery takes place, is a paramount concern for novice triathletes. Models of periodization exist for the progression of training stress. Interestingly, though, there are no published studies regarding the effectiveness of periodization in training for triathlon. For that matter, no published research has been conducted to identify optimal strategies for periodization of endurance training in any endurance sport. Most models that are currently used have been adapted from Tudor Bompa's writings on periodization. Current day endurance coaches and authors, such as Joe Friel and Chris Carmichael, rely heavily on the established models and theory of periodization in prescribing training to improve aerobic endurance. To simplify, periodization is a planned progression of training interspersed with planned recovery periods to lead to optimal fitness over time. The key concepts are planned training, planned rest and recovery. Without sufficient recovery, training will lead to plateaus in fitness and even decreases over time. An example weekly training schedule is shown below in Table 2.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Rest Day	Swim	Bike & Run Combo	Swim	Run	Bike	Run
Rest Day	Drills & Intervals	Bike Intervals followed by short run	Long Distance	Intervals	Long Distance	Long Distance

Other considerations for successful triathlon training include paying attention to nutritional needs, hydration, heat acclimatization, and heat tolerance. The nutritional challenges of triathlon training and competition can be extreme. During short-course events, the role of substrate availability and hydration will be the primary concerns. Most triathlon competitions occur during the summer months so thermoregulation is also a concern. It is important to perform some training in conditions similar to what you will expect on race day. Practicing your nutrition and hydration goals in training will also help reduce problems on race day. The final, and often most over-looked, area of training for a triathlon includes preparation for the transitions – or changes from one sport to the next. It is important to have an organized lay-out of your equipment and to be practiced in rapidly changing from one set of equipment to the next in the least amount of time. Typically, elite athletes spend 10-30 seconds in transition from one sport to the next...while novice athletes may take minutes if they are not prepared. In triathlon, once you begin the swim the clock does not stop until you cross the finish line after the run. Any time wasted in slow transitions add to your overall performance time.

In summary, triathlon training is the ultimate cross training experience. Proper preparation for a short-course triathlon will typically take several months of dedicated training. The amount of training necessary to complete a race depends on the goal race distance. Balancing the demands of developing proper mechanics within each of the three sports; improving fitness and endurance; and balancing training stress and recovery are critical for success in triathlon.

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**Online references for triathlon related information:**

International Triathlon Union – [www.triathlon.org](http://www.triathlon.org)

USA Triathlon – [www.usatriathlon.org](http://www.usatriathlon.org)

Inside Triathlon – [www.insidetri.com](http://www.insidetri.com)

Triathlete Magazine – [www.triathletemag.com](http://www.triathletemag.com)

**REFERENCES**

1. Appell HJ, Soares JM, Duarte JA. Exercise, muscle damage and fatigue. *Sports Med.* 1992 Feb;13(2):108-15. Review.
2. Gulbin JP, Gaffney PT. Ultraendurance triathlon participation: typical race preparation of lower level triathletes. *J Sports Med Phys Fitness.* 1999 Mar 39(1):12-5.
3. Hilden, T. Personal Interview. Boulder Center for Sports Medicine. January 2007
4. Holly RG, Barnard RJ, Rosenthal M, Applegate E, Pritikin N. Triathlete characterization and response to prolonged strenuous competition. *Med Sci Sports Exerc.* 1986 Feb;18(1):123-7
5. Kohrt WM, Morgan DW, Bates B, Skinner JS. Physiological responses of triathletes to maximal swimming, cycling, and running. *Med Sci Sports Exerc.* 1987 Feb;19(1):51-5
6. Korkia PK, Tunstall-Pedoe DS, Maffulli N. An epidemiological investigation of training and injury patterns in British triathletes. *Br J Sports Med.* 1994 Sep 28(3):191-6.
7. Persinger, R; Foster, C; Gibson, M; Fater, D; Porcari, J “Consistency of the Talk Test for Exercise Prescription.” *Med Sci Sports Exerc.* Sept 2004 36(9). 1632-1636
8. Pruitt A. Andy Pruitt’s Complete Medical Guide to Cycling. 2006. *VeloPress:* 5-6.
9. Sayers SP, Clarkson PM. Force recovery after eccentric exercise in males and females. *Eur J Appl Physiol.* 2001 Jan-Feb;84(1-2):122-6.
10. Shaw T, Howat P, Trainor M, Maycock B. Training patterns and sports injuries in triathletes. *J Sci Med*

*Sport.* 2004 Dec;7(4):446-50.

11. Toussaint. “Differences in propelling efficiency between competitive and triathlon swimmers” *Med Sci Sports Exerc.* 1990 Jun;22(3):409-15.

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