Use it or Lose it: Basic Cardio Training for the Swiftwater Rescue Professional

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The phrase "use it or lose it" is never more appropriate then in January when it comes to cardiovascular conditioning after taking time off of training for the Christmas/New Year holidays. It's also applicable to river folks during the off-season: don't wait until the spring to think about conditioning for spring run-off. Improving fitness through cardiorespiratory training will have a positive impact on overall functional capacity and will have a direct impact on improved maximal oxygen uptake as well as decreased myocardial oxygen cost and rate-pressure product at a given submaximal intensity. This means any physical act performed will become easier, and the cumulative effects of physical activity throughout a long day on the river becomes easier when cardiorespiratory fitness improves. On the other hand, the effects of detraining begins within only a few days of your last exercises session, and cardio training must be continue on a regular basis to maintain the training effects.

Basic Training Guidelines

The American College of Sports Medicine (ACSM) has established guidelines for promoting cardiorespiratory and musculoskeletal components of fitness (2006). For cardiorespiratory fitness, the ACSM recommends activities that can be sustained for a prolonged period of time, including walking, jogging, stationary cycling, rope-jumping, rowing or similar activities. Rescue professionals should participate in these activities 3-5 days per week for anywhere from 20-60 minutes per session. Intensity of exercise is monitored by heart rate and, according to ACSM, exercise intensity could be anywhere between 40% to 85% of heart rate reserve (HRR) to improve cardiorespiratory fitness depending on your physical fitness. Heart rate reserve is the difference between maximum heart rate (HRmax) and resting heart rate (RHR). An easy way to estimate maximum heart rate HRmax is by using the formula 206.3 – (.711 x Age). Subtract RHR from the predicted HRmax and the result will be the HRR. Calculate an appropriate percentage range of the HRR and add it back to the RHR to determine target heart rate range:

- Predicted HRmax = 206.3 – (.711 x Age)
- HRR = HRmax - RHR
- HRR intensity = HRR X 40% - 85%
- Target Heart Rate Range = HRR intensities + RHR

See Table 1 for an example of how to calculate target heart rate range for a 50 year old river rat who has a resting heart rate of 71 beats/min. An individual who is deconditioned

or is in poor physical condition may need to start with a lower intensity, and 40-60% of HRR may be a realistic starting point for anyone who has not exercised in over one year.

Table 1: Calculating Target Heart Rate Range
206.3 – (.711 x 50)= 170.7
171-71 = 100
100 X .4 + 71 = 111
100 X .6 + 71 = 131

The goal of exercise is to expose the body to an overload stimulus in a safe manner. The body, given appropriate rest and recovery, will respond by becoming stronger, improving endurance or enhancing efficiency in the activity that caused the stimulus. As you improve physical fitness, the intensity may be increased to continue improving cardiorespiratory function. Increasing the intensity to 60-70% of HRR for the same river rat would change the target heart rate range to 131-141, assuming the RHR remained unchanged.

Warm-up and Cool-Down

To prevent injury it's important to pay attention to the warm-up and cool-down. The warm-up increases the body's temperature and prepares the body for the more intense training to follow. An effective warm-up is to perform the activity you have chosen as your fitness activity, but at an easier intensity. So, if mountain biking is what you've chosen to improve cardiorespiratory fitness, then biking a slower pace on a gentle grade (or lower intensity) for 5-10 minutes will be a good warm-up. The cool-down gently guides the body back toward a resting state by lowering the intensity of exercise for 5-10 minutes. During the warm-up you can palpate your pulse to ensure that your heart rate is increasing toward the target range, and decreasing toward resting levels during the cool-down. It is during the cool-down that stretching exercises can be done to improve flexibility and reduce soreness from exercise.

RPE

If monitoring heart rate during the exercise session is difficult, the rate of perceived exertion (RPE) scale could be used as an adjunct to adjusting exercise intensity. An RPE scale is a measure of perceived exertion, and is defined as the degree of heaviness and strain according to a specific rating method. One scale that is often used is a 15 – grade scale ranging from 6-20 (Borg, 1998, pg. 31):

6	No exertion at all
7	Extremely light
8	
9	Very light
10	

11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	Extremely hard
20	Maximal exertion

To use the scale the individual simply assigns a number to how hard they feel the exercise work rate is. The average RPE range associated with improvements in cardiorespiratory fitness is 12-16.

Progress at a logical pace. As your fitness improves the same level of exercise intensity may no longer be enough to increase your heart rate to within your target heart rate range. This means that you are adapting to the exercise training by improving cardiorespiratory fitness – that's the whole point! These improvements will be more pronounced in lower fit individuals. Updating your program by gently increasing the intensity of your exercise and/or the duration will allow improvements to continue. When you've reached your optimum fitness level you can continue that program to maintain the cardiorespiratory fitness changes you achieved.

Try This

If you have been exercising on a regular basis and would like to challenge yourself by increasing the intensity of your cardio training, try interval training. Interval training combines higher intensity work segments with lower intensity active recovery/rest segments. The work to rest ratio can vary depending on individual preference. For example a 2:1 ratio may involve 20 second, 60 second, or 2-minute second sprint followed by 10 seconds, 30 seconds or 1-minute at a slower pace, respectively. Developing an interval training program to suit you allows you to be creative with your program. The higher intensity segments of interval training increases metabolic demand, which means you'll be expending more calories during and following the training session.

For example, if you can jog comfortably at a 5 mile/hour pace for an extended period of time, then try this 11-minute interval training session:

- 6 miles/hour for 2-minutes
- 5 miles/hour for 1-minute
- 6.5 miles/hour for 2-minutes
- 4.8 miles/hour for 1-minute

- 6.8 miles/hour for 2-minutes
- 4.8 miles/hour for 1-minute
- 7.0 miles/hour for 1-minute
- 4.8 miles/hour for 1-minute

The objective of interval training is to increase intensity so only add this if you have been exercising on a regular basis for at least four months. Also, the speeds involved in developing an interval training session would be experimental – it's always advisable to be conservative! Don't do too much too soon, but don't be afraid to push yourself a little as you improve your physical fitness. Interval training can be implemented using any mode of exercise: cycling, stairstepping, swimming, rope-jumping or any other aerobic activity.

Conclusion

Improving cardiorespiratory fitness is one step in improving overall health status and can greatly improve the functional ability of rescue professionals and these general guidelines should help any rescue professional improve cardiorespiratory fitness. The key to developing fitness should be safe and logical progression in the methods used. By this we mean that you should not progress too quickly. Listen to your body, and only increase volume and/or intensity if you feel absolutely comfortable in doing so.

The principle of overload states that when demands are made on body systems that the systems are not normally accustomed to, instead of "wearing out" or becoming weaker, the system responds by becoming stronger given appropriate nutrition and recovery time. That's the objective of the guidelines for cardiorespiratory training outlined in this article. On the other hand the principle of reversibility states that physiological gains are lost when the load against which a system is working is reduced. The common term for this situation is, "use it or lose it", and is appropriate to all of us, including rescue professionals.

References

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