

Cardiovascular Fitness

The human body is designed to be active. When a person takes part in regular aerobic exercises, he/she derives significant health benefits from the activity. Research shows that attaining a high level of aerobic fitness will yield: 1) Reduced risk of heart disease; 2) reduced risk of stroke; 3) reduced risk of high blood pressure; 4) increased levels of HDL (good cholesterol); 5) reduced risk of Type II diabetes; and 5) increased life expectancy. In order to obtain maximal benefits from aerobic training, it is important that the heart be stressed correctly so that its development is efficient and effective.

Incorporating the principles of **Overload, Progression, Frequency and Duration** will help develop an effective training program. Like other muscles of the body, the heart needs to be stressed order to adapt to a more efficient level. Too high a level can be dangerous; too low a level causes changes to be slow and minimal. The level of stress is referred to as *Overload*. *Progression* is the small step increases of the intensity level. One way of finding a safe and effective overload level is by using **Target Heart Rate**. The *Target* is actually a zone in which you will maintain your heart rate for an extended period of time (minimum 20 minutes). For the normally fit student the zone is 70-85% of maximal heart rate (220-age). Individuals who are unfit or overweight may find this zone too rigorous and may want to start at 60-70% of maximum.

Target Heart Rate Estimate

$$\text{Maximal Heart Rate (MHR): } 220 - \frac{\quad}{(\text{age})} = \frac{\quad}{(\text{MHR})} \text{ beats/minute}$$

$$70\% \text{ (low level)} = \frac{\quad}{(\text{MHR})} \times 0.70 = \frac{\quad}{(70\% \text{ level})} \text{ beats/minute}$$

$$85\% \text{ (high level)} = \frac{\quad}{(\text{MHR})} \times 0.85 = \frac{\quad}{(85\% \text{ level})} \text{ beats/minute}$$

$$60\% \text{ (lower fitness level)} = \frac{\quad}{(\text{MHR})} \times 0.60 = \frac{\quad}{(60\% \text{ \{low fit\} level})} \text{ beats/minute}$$

An alternate method of evaluating the Overload is to use the *Karvonen Method* that incorporates *Heart Rate Reserve* (HRR) which is the difference between resting heart rate and maximum heart rate. One of the problems with the 220-age equation is that it makes no allowances for individual differences in resting heart rate. By incorporating the heart rate reserve into the equation, in theory a more accurate training zone can be determined. This method is sometimes best for fit individuals with low resting heart rates. (This is due to the fact that estimating maximal heart rate can be off 10 to 12 beats per minute.)

Heart Rate Reserve (HRR)

$$\text{Resting Heart Rate (RHR): } = \frac{\quad}{\quad} \text{ beats/minute}$$

$$\text{Maximal Heart Rate (MHR): } = \frac{\quad}{\quad} \text{ beats/minute}$$

$$\frac{\quad}{\text{MHR}} - \frac{\quad}{\text{RHR}} = \frac{\quad}{\text{HRR}}$$

$$\text{Low Level Heart Rate} = .70 \times \frac{\quad}{(\text{HRR})} = \frac{\quad}{(\text{Low reserve})} + \frac{\quad}{(\text{RHR})} = \frac{\quad}{(\text{Low Level Rate})} \text{ beats/minute}$$

$$\text{High Level Heart Rate} = .85 \times \frac{\quad}{(\text{HRR})} = \frac{\quad}{(\text{High reserve})} + \frac{\quad}{(\text{RHR})} = \frac{\quad}{(\text{High Level Rate})} \text{ beats/minute}$$

A third method is the Rating of Perceived Exertion (RPE) developed by Gunnar Borg. This method is based on our ability to subjectively rate how hard we are working.

Number	Perceived Exertion	Approx. Kcal/hour
6		
7	Very, very light	
8		
9	Very light	<100
10		
11	Fairly light	111
12		
13	Somewhat hard	300
14		
15	Hard	401
16		
17	Very hard	600
18		
19	Very, very hard	>700
20		

For college students, adding a zero to the RPE number yields the approximate heart rate you would expect. This puts the RPE range of 12 to 16 as the recommended Overload level for most healthy adults. The duration of cardiovascular exercise should be approximately 20-30 minutes. Individuals just starting may want to begin at 10-20 minutes and increase time as fitness improves. Keep in mind that the optimum duration is dependent upon the level of intensity of the exercise. The duration should be long enough to expend approximately 300 kcal. Frequency of cardiovascular work should be 3 to 5 times per week.