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Understanding Heart Rate

Heart rate is the number of beats the heart makes per minute in its job of pumping blood around the body. On average the heart, which is about the size of a clenched fist and about 300g in weight, beats about 100,000 times per day.

Resting Heart Rate (RHR) is the rate at which the heart pulses during periods of inactivity, an average of which is 72 beats per minute. Although RHR is influenced by hereditary factors such as metabolic rate, it is a reasonable indicator of an individual's level of fitness.

A low RHR is usually found in athletic people who have a strong heart; however it may also result from decreased body temperature and certain drugs.

A fast RHR may be caused by fever, medication, anxiety, stress, stimulants or a weakening of the heart muscle. It is usually a sign of poor cardiovascular fitness.

How do I find out my heart rate?

A true resting heart rate should be taken upon awakening over a period of three mornings. However, if resting heart rate is to be taken after this time it is essential to:

- Ensure that you have relaxed for at least 5 minutes in a seated position.
- Find the radial artery situated on the thumb side of the wrist, or place your hand over your heart.
- Remember to count the first pulse as zero.
- Count for 30 seconds and multiply by 2 or for the full minute.

During exercise it is more accurate to count for 10 seconds and multiply by 6, or 15 seconds and multiply by 4.

Be aware that stress, anxiety, prior exertion, food intake, caffeine, smoking, medicine, and temperature will have an immediate effect on heart rate.

Maximum Heart Rate (MHR) is the maximum “medical” pulse that can be achieved without putting the individual at risk.

This can be predicted by using the formula $MHR = (220 - AGE)$, this formula is only a prediction and is said to be accurate (+/- 10 bpm). Therefore a 20 years old male should have a MHR of $220 - 20 = 200$. However, research shows that two thirds of the people in this age group vary from 190-210 bpm and 95% vary from 180-220 bpm. This factor is not important to the average fitness enthusiast but is vital to the elite athlete.

Target Heart Rate (THR) is a desired range of heart rate reached during aerobic exercise which enables one’s heart and lungs to receive the most benefit from a workout.

A common method is to use the Karvonen formula to derive the desired THR range. This formula determines the THR range by taking a percentage of the difference between the maximal heart rate and resting heart rate. This difference is commonly referred to as the heart rate reserve. The Karvonen formula for establishing a THR range is as follows:

$$THR = (MHR - RHR) \times \% \text{ intensity} + RHR$$

E.g. 40 yr. old male with a Resting heart rate of 60 would have a THR of:

$$MHR = 220 - AGE = 220 - 40 = 180 \text{ bpm}$$

If we wanted the person to exercise at between 60 – 90% of heart rate reserve then:

$$60\% \text{ THR} = (180 - 60) \times 60\% + 60 = 120 \times 60\% + 60 = 72 + 60 = 132 \text{ bpm}$$

$$90\% \text{ THR} = (180 - 60) \times 90\% + 60 = 120 \times 90\% + 60 = 108 + 60 = 168 \text{ bpm}$$

In examining the Karvonen formula, how does one know what range of intensity to use?

Low intensity: 60% to 70%

This zone keeps you at comfortable low intensity and is a good choice as a warm-up or for beginners because it helps you develop aerobic fitness for more intense exercise.

Moderate intensity: 70% to 80%

This zone kicks up the intensity, improving your body’s ability to transport oxygen throughout the body and conditioning heart. You will burn more calories in this zone.

High intensity: 90% to 100%

Working in this zone takes you out of your comfort zone. Working at this level means you are working hard, as in all-out sprints or very high intensity interval training. Most of us can only sustain this level of effort for a short period.