



To train effectively and achieve fitness progression, it is important to understand and target specific heart rate training zones.

Training zones and thresholds

The graph below illustrates how your heart rate relates to different training zones and thresholds. Training within the appropriate zone is vital for achieving specific fitness outcomes.

- **Aerobic zone (60-80% MHR):** Training in this zone improves cardiovascular fitness. The aerobic threshold is the point at which you enter this zone, essential for making effective training improvements.
- **Anaerobic zone (80-90% MHR):** This zone requires significantly higher intensity. The anaerobic threshold is the point at which you enter this zone. Training here is for shorter durations due to the high effort.
- **Anaerobic systems:** These systems are inefficient, use energy quickly and do not use oxygen. The build-up of lactic acid causes tiredness. After anaerobic exercise, heavy breathing (known as repaying the **oxygen debt**) is needed to replenish oxygen.

Calculating maximum heart rate (MHR)

Your **maximum heart rate (MHR)** is calculated using the formula: **MHR = 220 - Age**

Characteristics of the three energy systems

1. Creatine phosphate (CP) system:

- provides energy very quickly without oxygen
- lasts up to 10 seconds
- produces no waste products.

2. Lactic acid system:

- uses carbohydrates (glycogen) stored in muscles
- produces energy quickly, but creates lactic acid as a waste product due to a lack of oxygen.

3. Aerobic system:

- uses carbohydrates (and fats) for energy
- energy production is slower but can last for a longer duration.

Health and performance benefits

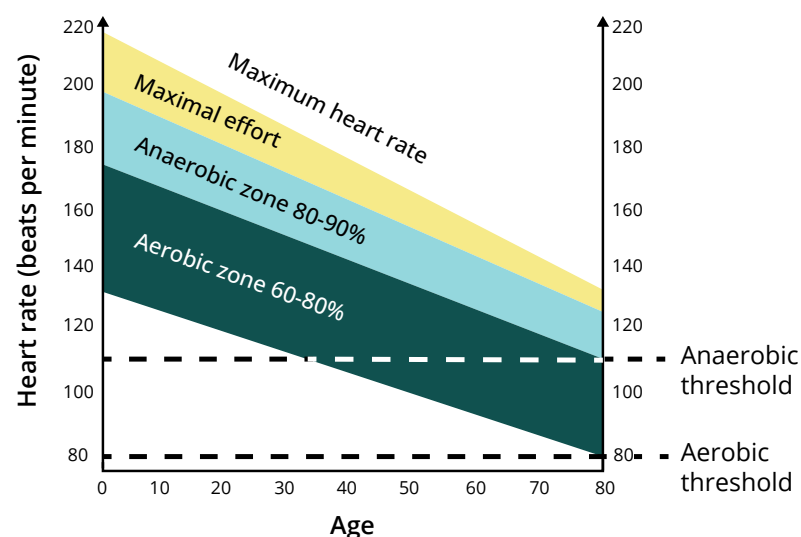
- **Health:** Training below the aerobic threshold, while not optimal for performance gains, offers significant health benefits such as fat burning, weight loss, reduced injury risk, lower stress and improved social well-being.
- **Performance:** Training within specific heart rate zones is crucial for enhancing performance. Choosing the correct zone for your goals prevents overtraining, fatigue or lack of progression.

Predominant energy systems

While all energy systems are always active, one system is usually predominant (most important) depending on the activity:

- **Team sports (such as rugby or football):** Need both anaerobic (for sprints, tackles) and aerobic (for maintaining skill, jogging between plays) systems.
- **100m sprint:** The **creatine phosphate system** is predominant.

Training zones and thresholds



Relationship between training zones and energy systems

	Creatine phosphate system	Lactic acid system	aerobic system
Intensity:	Highest.	High.	Low to moderate.
Duration:	Up to 10 seconds.	10 seconds to approximately 3 minutes.	Long periods.
Activities:	Explosive, high-intensity actions like a 100m sprint or shot put.	High-intensity activities like a 400m run.	Low-intensity, long-duration exercise like jogging or long-distance cycling.
Impact of training:	Improves power and explosive force.	Allows athletes to tolerate lactic acid for longer, delaying fatigue.	Enhances carbohydrate/fat usage and storage, improves oxygen delivery, delays fatigue and removes waste products more efficiently.