

## **VO2max as a Predictor of Success**

VO2 max, short for maximal oxygen uptake, is a common metric used to assess an athlete's aerobic capacity. It refers to the maximum amount of oxygen that an individual can utilise during intense exercise, measured in millilitres of oxygen consumed per kilogram of body weight per minute (ml/kg/min). While VO2 max is often cited as an indicator of cardiovascular fitness and potential performance in endurance sports like running, it has limitations as a sole predictor of a runner's potential.

VO2 max is influenced by factors such as genetics, age, training status, and altitude acclimatisation. Athletes with higher VO2 max values can theoretically sustain higher levels of oxygen consumption, which would translate to better endurance performance. It improves through structured aerobic training, particularly long-duration, moderate-intensity workouts that enhance the body's ability to transport and utilise oxygen. Training at higher intensities, such as interval sessions, also boosts VO2 max by increasing the efficiency of the heart and lungs and improving oxygen delivery to the muscles. However, despite its importance, VO2 max does not tell the full story of a runner's performance capacity.

One reason VO2 max is not the best predictor of running performance is that it reflects a ceiling of aerobic potential rather than how efficiently the body uses oxygen at submaximal efforts, which is more relevant to actual race conditions. In other words, a high VO2 max does not automatically translate into the ability to sustain fast paces for long periods. Many elite runners do not have the highest VO2 max readings, yet they outperform those with higher values due to other factors, such as running economy, lactate threshold, and mental resilience.

Running economy is a more reliable predictor of performance, as it measures how much oxygen a runner uses at a given pace. A runner with better economy will require less oxygen to maintain the same speed as someone with poorer economy, allowing them to conserve energy and sustain faster paces over long distances. Running economy can be improved through proper biomechanics, strength training, and plyometrics, which help a runner move more efficiently and reduce the energy cost of running.

Lactate threshold is another critical factor in endurance performance. It represents the point at which lactate begins to accumulate in the blood at a faster rate than it can be cleared, leading to fatigue. The ability to sustain

a high percentage of VO2 max before reaching this threshold is a more accurate indicator of how fast a runner can perform over long distances. By training at or just above lactate threshold levels through tempo runs and threshold intervals, athletes can delay the onset of fatigue and maintain higher intensities for longer.

Mental toughness and pacing strategy also play significant roles in determining running performance. Running is as much a psychological challenge as a physical one, especially in races that demand sustained effort over long periods. Runners who can effectively manage their energy distribution, remain focused, and push through discomfort are more likely to reach their full potential, regardless of their VO2 max.

So, while VO2 max offers valuable insights into an athlete's aerobic capacity, it is not the best predictor of a runner's performance. Factors like running economy, lactate threshold, and mental resilience are more relevant when assessing potential in endurance sports. Focusing on improving these areas through targeted training can have a more profound impact on performance than simply increasing VO2 max alone.