Blood Lactate

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What is Blood Lactate?

Blood lactate is a chemical byproduct of glucose which forms during high intensity exercise and is measured in millimoles per litre, or mmol/l. Blood lactate is formed when oxygen is no longer available for the production of energy through a process known as anaerobic respiration. Elevated blood lactate concentration occurs during prolonged or high intensity exercise, and can be used as a quantitative predictor of an individual's endurance capacity. The accumulation of lactate in muscle tissue and blood is strongly associated with muscular fatigue.

Blood lactate is a well known parameter during clinical exercise testing as well as during performance testing of athletes and can therefore be used as an effective management tool for training programmes.

The LifeQ Blood Lactate solution allows for a non-invasive continuous estimation of blood lactate during exercise.

The LifeQ Lactate solution combines:

- **Heart Rate data**
- **Accelerometer data** to provide context regarding the activity state of the user
- **User profile information** including height, age, weight, gender, resting heart rate and HR max.

What HR Outputs are provided by LifeQ?

- **Blood Lactate:** During an exercise session, blood lactate is outputted on the device every 30 seconds.
- **Maximum Blood Lactate:** This is the highest concentration of blood lactate outputted during an exercise session.

Accuracy

The results presented below were from a sample of 116 participants collected during laboratory based VO_2 max tests using A Lactate Pro 2™ electrochemical lactate oxidase biosensor. The participants were split into two groups with treadmill (n = 48) and stationary bicycle (n = 68).

A summary of these results is provided below with a detailed description of the results available in the LifeQ Blood Lactate Validation Document.

Table 1: Analysis of the results obtained from the LifeQ Blood Lactate solution when compared with the Lactate Pro 2™ reference device.

Participant Description	Number of Participants	Correlation (R)	MAD (mmol/L)	MAD (5th Percentile)	MAD (Median)	MAD (95th Percentile)
V02max on treadmill	48	0.86	1.85	0.07	1.11	6.2
V02max on Stationary Bike	68	0.92	1.37	0.05	0.72	5.38

*(5th percentile, median, 95th percentile),
Abbreviations: MAD (mean absolute difference), mmol/L (millimoles per litre)

It is important to note that while the absolute error on the Blood Lactate solution is relatively large, the ability to track this consistently over time and critically see relative changes for an individual enables significant understanding of various key variables such as fitness, recovery and training load.

Constraints in measuring Blood Lactate accurately

Measuring HR from a wrist-based device is complex and the technology has limitations owing to the nature of the available signal.

The accuracy of the LifeQ Blood Lactate is dependent on accurate continuous HR and accurate user profile values.