

# Physiological Assessment: Summary Report

## Assessment Details

### Personal Details:

Name: James Harvey  
Event: Ride Across America  
Date of Birth: 31/10/1974  
Height: 170.5cm  
Weight: 62kg  
Sex: Male

### Assessment Details:

Assessment Venue: Manchester Institute of Health Performance  
Assessment Date: 6<sup>th</sup> March 2019  
Assessment Time: 11:00  
Assessments: 1. Incremental Maximal VO<sub>2</sub> Assessment;  
Lactate Threshold Test and respiratory assessment.  
Assessor(s): Malcolm MacAllister– Performance lab Technician  
Ross Mizen– Performance lab Technician

### Assessment Protocol

A VO<sub>2</sub> max test is used to assess an individual's capabilities and is defined as the highest rate at which oxygen is delivered and utilised during severe exercise and an important parameter for performance. Other important parameters include the lactate threshold (**LT**), lactate turn point (**LTP**) and economy of movement which can alter performance or compensate for a lower VO<sub>2</sub> max.

The protocol carried out was an incremental cycling test performed using a SRM Ergometer, breath by breath analysis using the Vyntus CPX and the Lactate Scout for blood lactate concentration analysis (**[La]**).

The test involved a 5 minute self-selected cycling warm up followed by a protocol consisting of 3 minute stages starting at 120W with an increment of 30W at the end of each stage until above lactate turn point (**LTP**). A finger prick blood sample was taken during the final 30 seconds of each stage to determine blood lactate concentration **[La]**.

A blood sample was taken at the end of the protocol and 5 minutes post termination of the test as well as continuous breath by breath analysis throughout the protocol.

### Assessment measurements and Test profile

Stage	Watts	RPE	Lactate (mmol/L)	Heart Rate (bpm)	VO2 (l/min)	VO2 (ml/min/kg)
Rest	-	-	1.30	70	-	-
1	120	11	1.60	118	2.1	33
2	150	11	1.50	128	2.3	37
3	180	13	1.90	140	2.7	44
4	210	14	3.40	154	3.1	50
5	240	15	5.90	164	3.4	55
6	270	17	11.00	173	3.7	60
7	300	20	17.70	181	3.9	62

At rest and under steady-state exercise conditions (e.g. an easy cycle), the balance between blood lactate production and removal are generally equal, meaning that lactate concentration (**[La]**) does not change by much. As intensity of exercise increases, the rate of lactate production exceeds the rate of removal, resulting in an increased **[La]**. The Lactate Threshold (LT) refers to the intensity of exercise at which **[La]** increases above baseline levels and also useful to determine 'easy and steady' cycling. Once you've reached your LT, if the exercise intensity increases, **[La]** will also increase and if exercise intensity is increased further, a second abrupt increase in **[La]** will occur, known as the Lactate Turning Point (LTP). This marker generally occurs between 2-4 mmol/l **[La]**. These can be used to distinguish between the transition of 'steady' and 'threshold' training.

The lactate Threshold (**LT**) corresponds to a steady increase in [La] above baseline, typically at 2 mmol/L.

From your results your LT occurs at 180 watts where your blood [La] was 1.9 **mmol/L**.

As the intensity (watts) continues to build the production of lactate further increases, with an abrupt increase in [La] signifying the Lactate Turn point (**LTP**). This marker generally occurs between 2-4 mmol/l [La].

In your case, the LTP occurs at 210 watts with and blood lactate [La] of 3.9 **mmol/L**.

### Maximal Oxygen Uptake Response to Exercise

**VO<sub>2</sub> max:** Maximal oxygen uptake was calculated as 62 ml.kg<sup>-1</sup>.min<sup>-1</sup> during the last 30 seconds where your heart rate reported was 181 bpm.

#### What is VO<sub>2</sub> max:

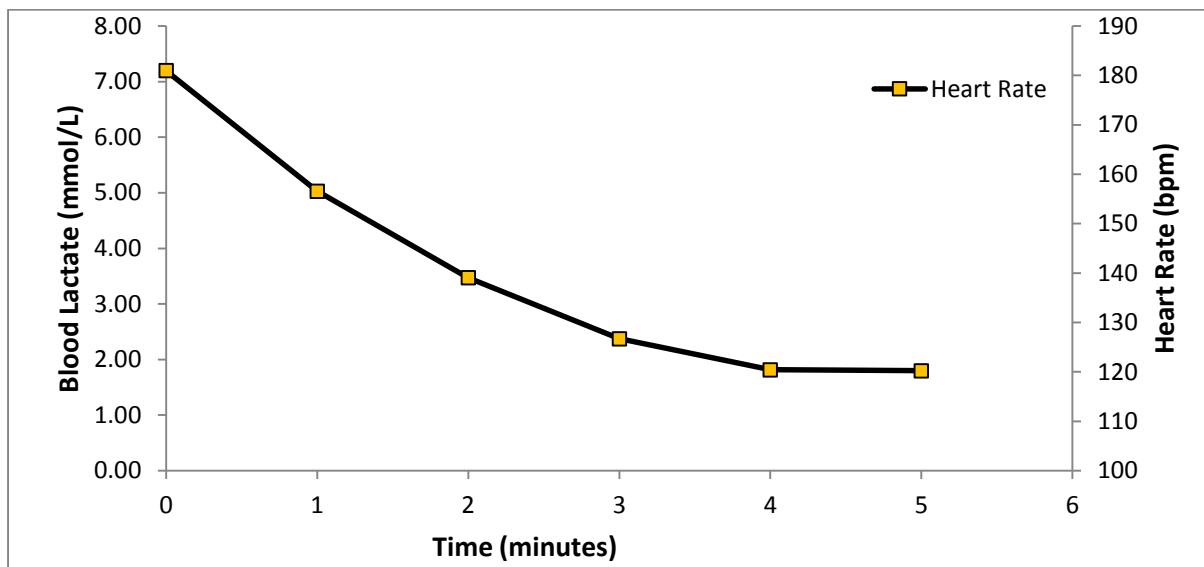
This is expressed as the highest rate at which oxygen is taken up and utilised during exercise. VO<sub>2</sub> max is a good indicator of oxygen delivery and utilisation. However, other factors such as lactate threshold, lactate turning point and cycling economy can partially compensate for a poor VO<sub>2</sub> max. VO<sub>2</sub> max is expressed as a rate, either in absolute terms (L/min), or relative to body weight (ml/kg/min).

#### How did I do in comparison to normative values?:

Using the normative ACSM's guidelines for exercise testing and prescription values to categorise your physical fitness places you into the **Superior** score classification for a male aged between **40-49 years old**. This is a great representation of your maximal capacity.

### Recovery profile

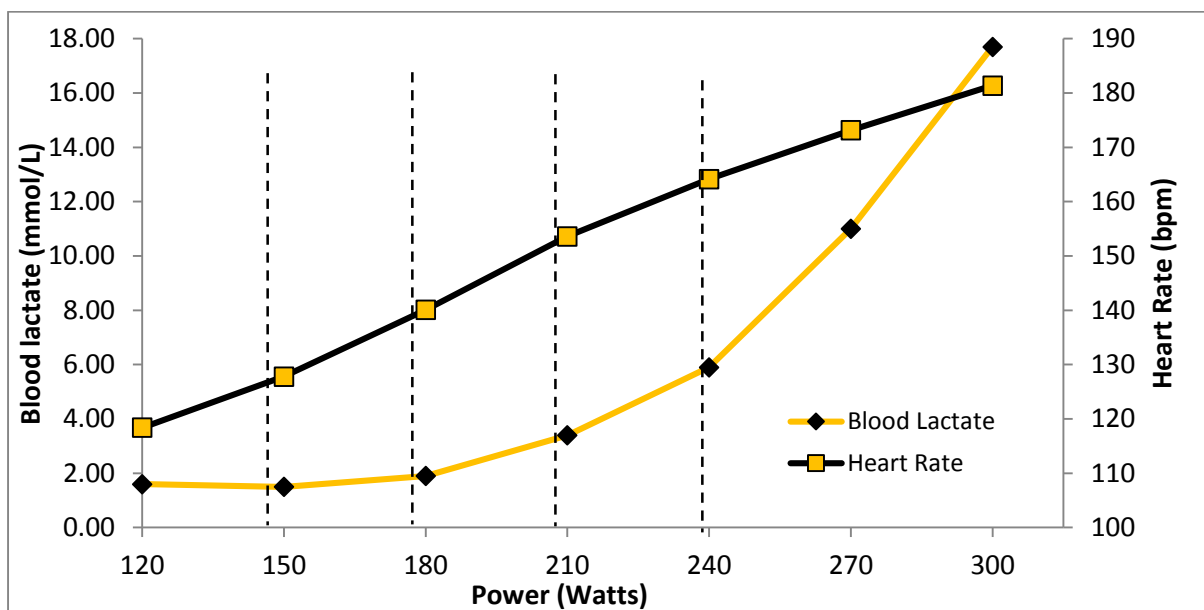
Recovery is an important component of performance with the below tables and figures providing details of your recovery profile for the 5 minutes post the maximal testing. Recovery was monitored whilst cycling at approximately 60 watts for 4minutes, followed by a seated recovery for a further 1 minutes. Post 5 min lactate was documented as 9.0 mmol/l with a recorded heart rate of 120bpm. Monitoring recovery is a useful tool for evaluating increases and decreases in health and fitness. These heart rate values can be used as part of the training guidelines and heart rate zones below.



Recovery (30 second Average)					
Time (min)	Heart Rate (bpm)	VO2 (ml/min)	VCO2 (ml/min)	VO2 (ml/kg/min)	Lactate (mmol/L)
1	157	2052	2657	33.1	17.7
2	139	2323	2303	37.5	
3	127	2001	1942	32.3	
4	120	1937	1829	31.2	
5	120	1922	1634	31.0	9.0

### Heart Rate Training Zones

James, your heart rate training zones are constructed around Lactate Thresholds and Turn points as well as maximal efforts, they are categorised into the points as follows: Recovery, Easy, Steady, Tempo and intervals.



	HR (bpm)		Watts	
	Low	High	Low	High
<b>Recovery</b>	-	127		150
<b>Easy</b>	128	139	150	180
<b>Steady</b>	140	154	180	210
<b>Tempo</b>	155	164	210	240
<b>Intervals</b>	165	181	240+	

**Recovery**

Low intensity cycling at a speed somewhat lower than Lactate threshold and is slower than easy rides (see below). This is used primarily to aid recovery by promoting blood flow to muscles, without stressing the system.

**Easy:**

Is low intensity and is a workload up to your Lactate threshold. This means it is an intensity which you can sustain over long periods of time, repeated long rides, for warm-ups/cool-downs and during active recovery between higher intensity intervals.

**Steady:**

Is a moderate intensity which is at a constant pace that is above your watts at Lactate threshold(LT), but is below your watts at Lactate Turning Point(LTP). It involves medium to long duration rides (20 – 60 minutes) with workloads closest to the workloads at LT being longer than those nearer LTP.

**Tempo/Longer Duration Intervals:**

Tempo based work generally occurs at the lower end of this zone. They are moderate-high intensity rides which occur for sustained periods. Tempo rides can be completed in a number of ways.

1. Constant pace rides at a load (watts) that is just above your workload at LTP,
2. Longer duration ride where the watts are just below your LTP
3. A ride, which gradually increases the intensity until reaching your watts at LTP.

All of these have the purpose of increasing the sustainable power for a set duration, or increasing the duration at a set power. At the upper end of this zone, intervals can be performed. There will be large variations in the duration of the reps and the number of reps and sets.

### **High aerobic intensity intervals:**

This is a high intensity workout where the power would be unsustainable for long durations. The duration of the reps will depend upon the pace of the interval and the intended outcome of the session. At the lower end of this zone, longer intervals are required to allow a sufficient time to reach  $VO_{2max}$  (will often take 2-3 minutes to reach  $VO_{2max}$ ). At higher intensities, shorter duration intervals will be used; however, if the purpose is to challenge the aerobic system, then short recoveries are required to maintain  $VO_2$  at high levels.

For your interval session, longer intervals should be utilised between 240 watts and 270 watts with harder, shorter intervals above 270 watts. For the demands of your race it would be recommended for longer intervals in training to be between 240 and 270 watts.

### **Considerations**

For your training leading up to the event, continuing to improve your steady state cycling which is typically signified at your lactate threshold. This is currently done by working for prolonged period at and above this intensity which is currently 180 watts.

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Many thanks for choosing the Manchester Institute of Health and Performance.

If you have any queries about the information contained within this report please do not hesitate to contact:

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