PLYMOUTH MARJON UNIVERSITY

VO_2 Max Report

Maximum Aerobic Power
Incline Method

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CASES
The Chartered Association of Sport and Exercise Sciences

INTRODUCTION

Maximal aerobic power (VO_2 Max) is regarded as the best single indicator of cardio-respiratory performance to monitor training programmes of elite runners. The rate at which aerobic metabolism can supply power is dependent upon 2 factors:

- The chemical ability of the tissues to use oxygen for substrate utilisation.
- The abilities of several mechanisms (pulmonary, cardiac, vascular and cellular) to transport oxygen to active skeletal musculature.

Evaluating aerobic capacity can help determine the following:

- The current readiness/suitability of an athlete to perform a given event.
- The emphasis that should be placed on aerobic or other types of training.
- The type of aerobic training that should be performed.
- The magnitude and rate of change generated by a training program (i.e. effectiveness).

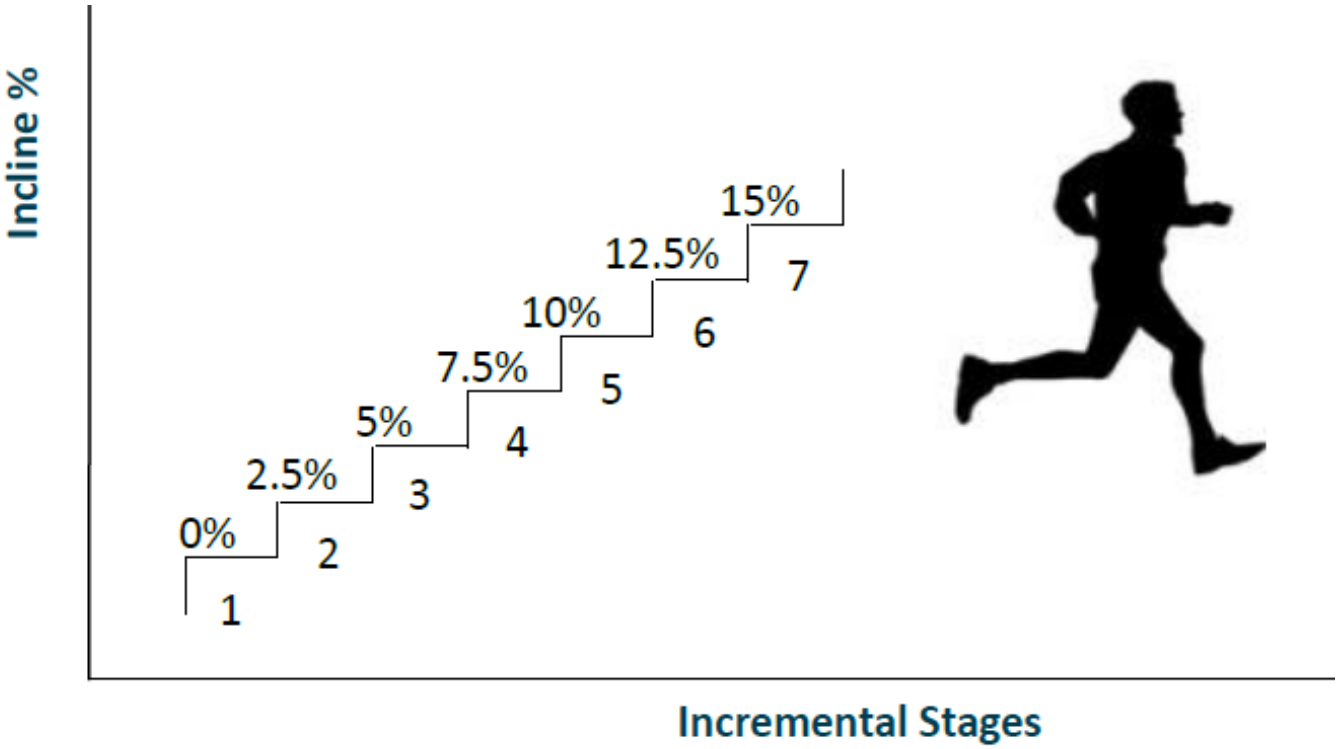
PROTOCOL

- A Direct method of continuous incremental protocol to voluntary exhaustion using Cortex Metalyzer.
- Standardised 5-minute warm up.
- Test to start at 9km/h with 0% gradient.
- The speed is to remain constant throughout the test with the gradient to gradually increase by 2.5% every two minutes.
- The gradient continues to rise until the subject reaches voluntary exhaustion.
- Subject to perform active cool down on the treadmill until HR returned below 120 bpm.

THE TEST

- One of the general recommendations for the assessment of VO2 max is that participants should perform rhythmic exercise that requires a large muscle mass. This ensures that the cardiorespiratory system is taxed and the test is not limited by muscular endurance. The muscle mass engaged explains why simulated cross-country skiing produces the highest VO2max values, followed by graded treadmill running, flat treadmill running and cycle ergometry.
- The specificity of the activity of the participant undergoing assessment should take precedence if the aim is to produce meaningful values for interpretation of aerobic potential or current training status.
- Elite athletes tend to have VO2max values in excess of 60ml·kg-1·min-1.

EXAMPLE DIAGRAM OF THE TEST



TERMINATION CRITERIA

- An increase in VO2 less than 150mL/min (2.1mL/kg/min) with a 2.5 % increase treadmill speed or 3% with an increase in exercise intensity. If this plateau is not achieved, then the term VO2 peak is preferred.
- Heart rate within 10 bpm of the age predicted maximum (220-age) or levelling off during the latter stages of the test.
- Subject showing signs of intense physical effort (unsteady gait, facial flushing, profuse sweating).
- A final respiratory exchange ratio of >1.15.
- Subjective fatigue and volitional exhaustion.
- A rating of perceived exertion (RPE) of 19 or 20 on the Borg scale.
- Blood lactate exceeding 8 mmoL/L.

RECORDED DATA

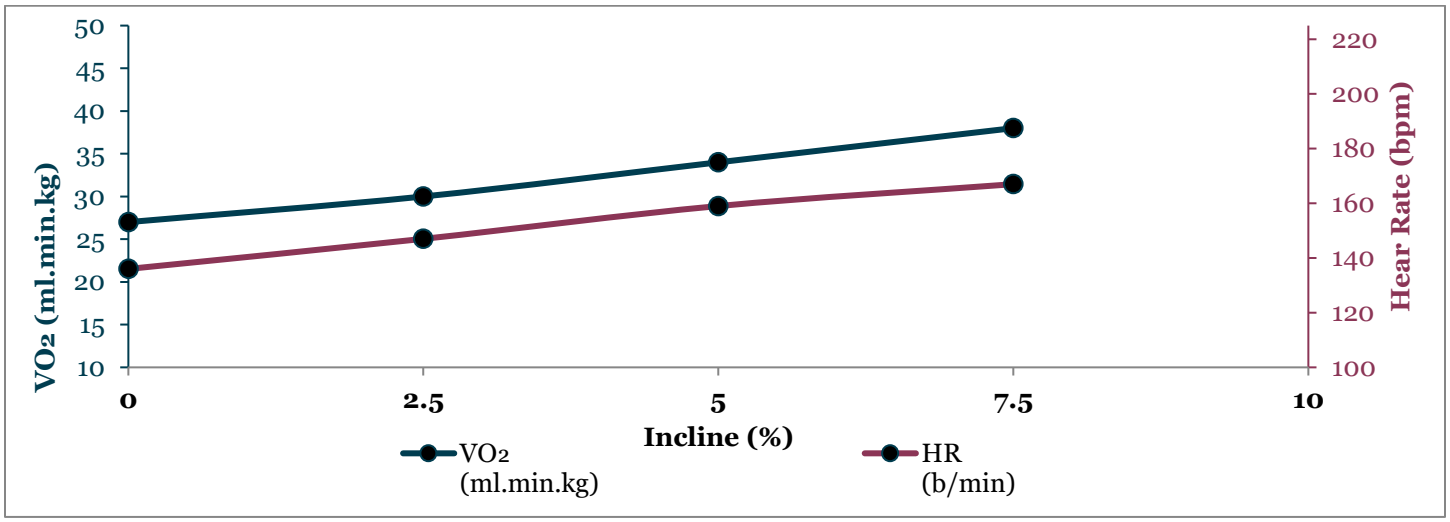
Informed Consent:	Yes	**Time:**	14:00
Body mass (kg):	112.95	**Temp (◦C):**	23.2
Stature (cm):	184.6	**Humidity (%):**	30
Blood Pressure:	129/82	**Ambient Pressure (mbar):**	973

Stage	**Speed** (Km/h)	**Gradient (%)**	**HR** (b/min)	**Rate of Perceived Exertion**	**VO_2** (ml.min.kg)	**RER**
Rest			67			
1	8	0	136	11	27	0.94
2	8	2.5	147	11	30	0.96
3	8	5	159	13	34	0.99
4	8	7.5	167	15	38	1.05

RESULTS

Pre-Test Blood Lactate (mmol/L):	0.80
Post Test Blood Lactate (mmol/L):	9.03

Achieved VO_2 Max (ml/kg/min**):**	40
Achieved Peak VO_2 (L/Min**):**	4.52
Achieved Max Heart Rate (beats/min)**:**	173
RER (Respiratory Exchange Ratio):	1.08



TRAINING ZONES

Training Zones	Heart Rate (bpm)	
1	107	125
2	125	142
3	142	160
4	160	169
5	169	178

EQUIPMENT

- Stadiometer, Seca 287 Wireless Ultrasonic Measuring Station, Seca Medical, Birmingham, UK
- Blood Pressure Monitor, Omron 907 Professional Blood Pressure Monitor, Kyoto, Japan
- Cortex Metalyzer 3B R3; Cortex, Leipzig, Germany (Studio)
- Woodway Treadmill, Desmo HP, Woodway GmbH, Weil am Rhein, Germany
- Biosen Glucose and L-Lactate Analyser, Biosen C – Line, EKF Diagnostics, Indiana, USA
- Heart Rate Monitor, Polar H10, Polar Electro, Kempele, Finland
- Seca mBCA 515. Seca Medical, Birmingham, UK

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