

Effects of warm-up intensity on 5 km performance & blood lactate response

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Purpose

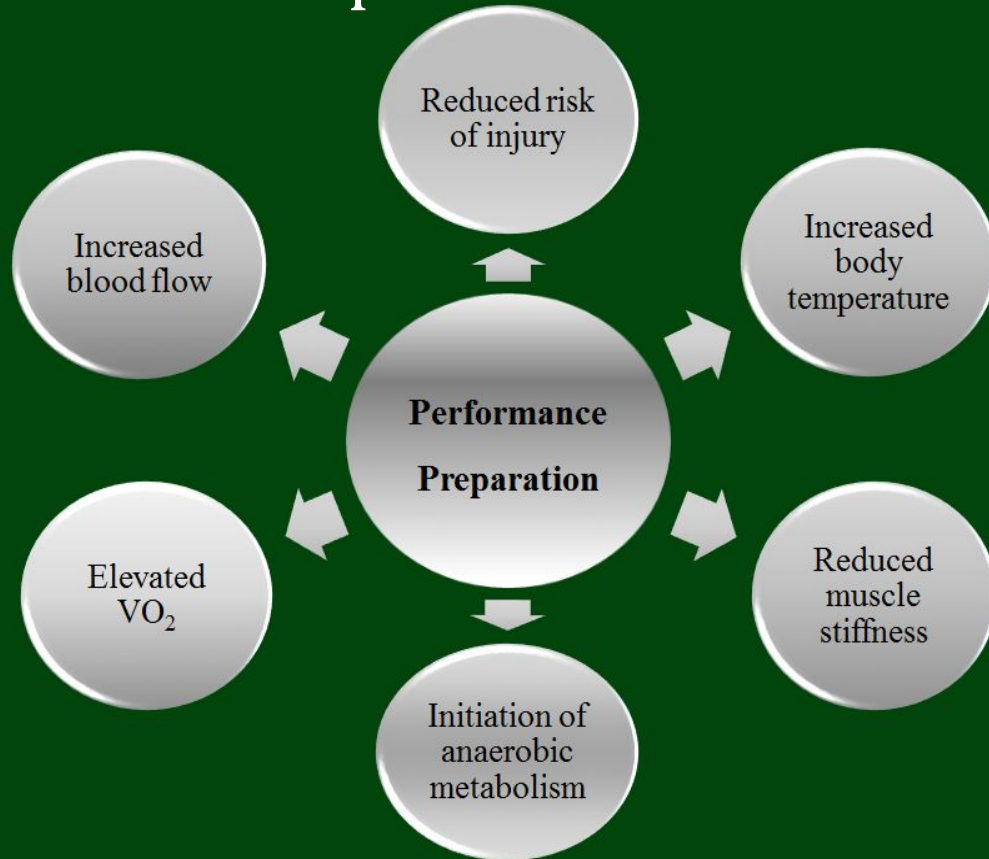
The purpose of this study was to examine the effects of varying dynamic warm-up protocols on performance variables during a 5 km race.

Practical application

- Most popular road race in the USA
- 7.6 million finishers (2015)
- 25 to 44 year old age group accounts for half of the total U.S finishers

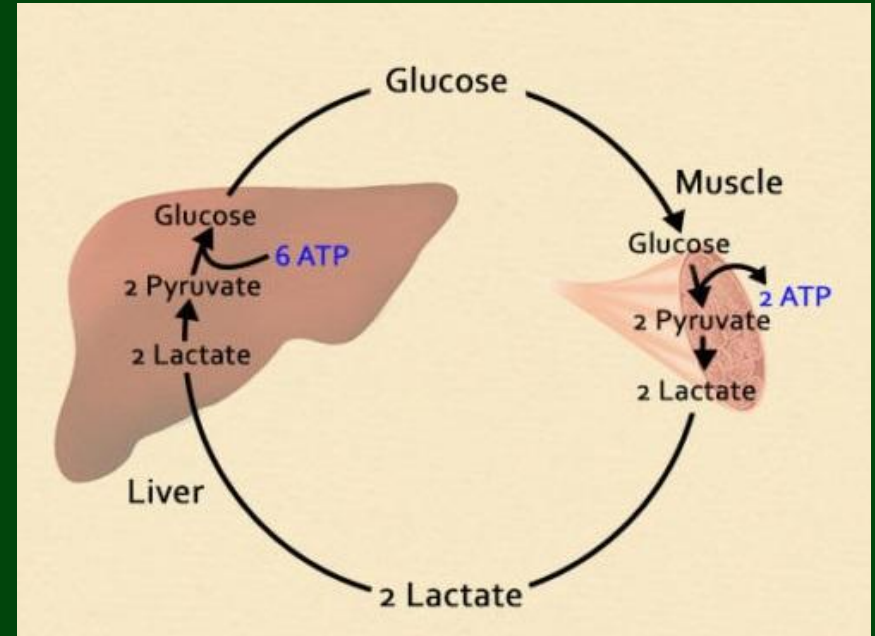


Purpose of a warm-up



Lactic acid

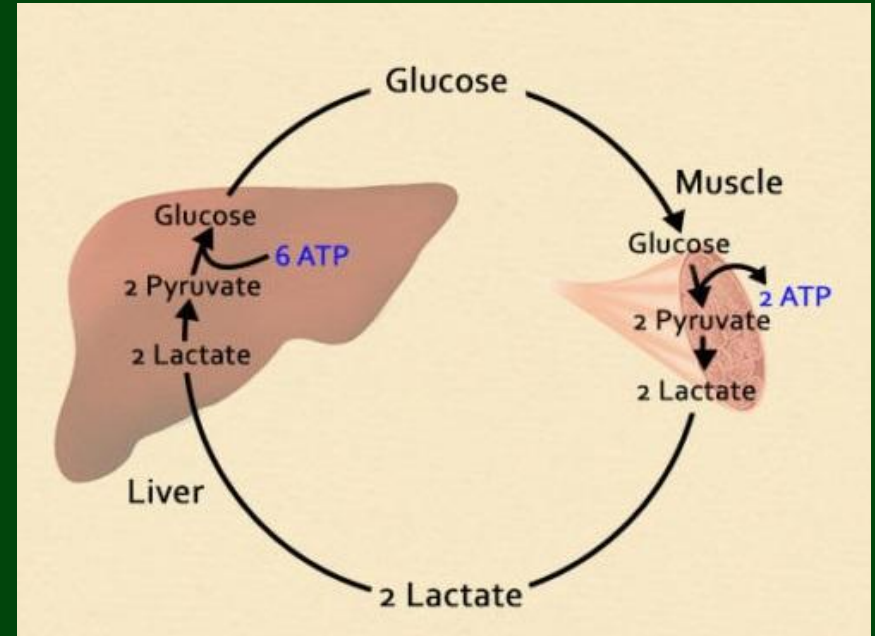
- During anaerobic exercise, lactic acid is produced from glycolysis
- Lactic acid consists of lactate [La^-] and H^+
- Accumulation of H^+ can hinder performance
- [La^-] can be repurposed into ATP for energy
- These processes occur via the lactate shuttle



(Costill et al., 2015)

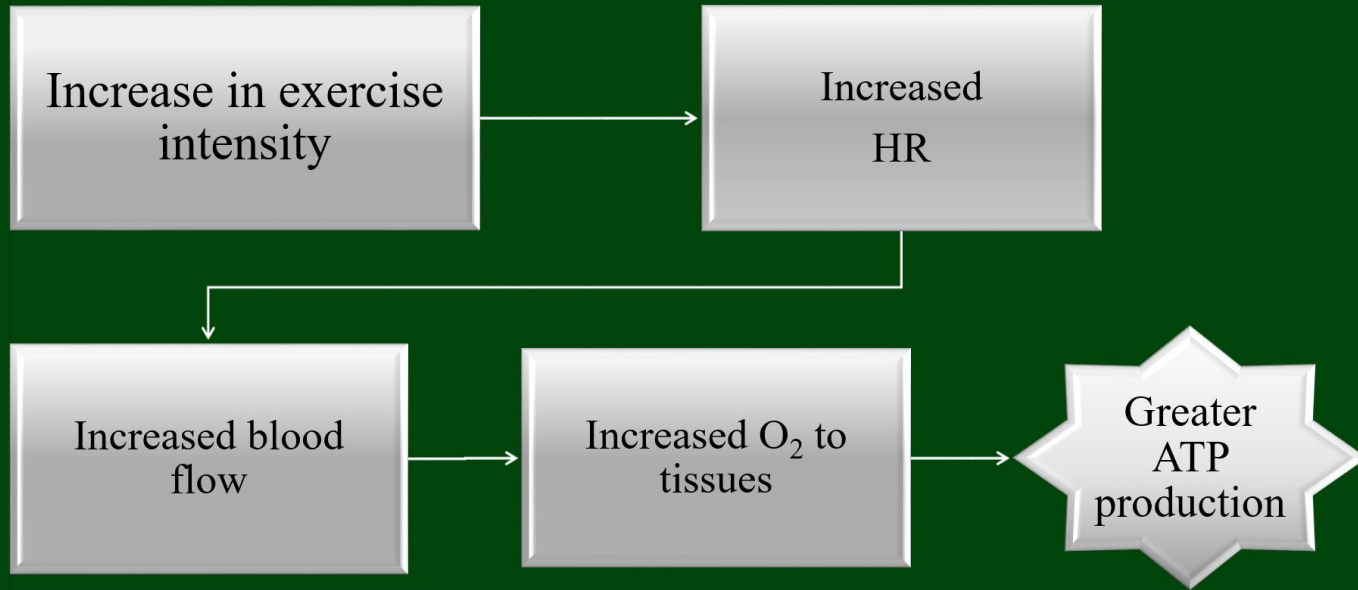
Blood lactate & performance

- High intensity warm-up will increase the efficiency of the lactate shuttle
- Increase in $[La^-]$ results in a greater ATP production
- Theoretically, this will improve performance



(Costill et al., 2015)

Heart rate



Subjects

Descriptive Statistics

Males	<i>M</i>	<i>±SD</i>	<i>n</i>
Height (cm)	181.76	6.60	10
Weight (kg)	82.55	11.22	10
BodyFat (%)	14.88	4.03	10
Age (yrs)	22.70	2.49	10
VO_{2 max} (ml/kg/min)	49.41	6.19	10

Methods

- Each subject participated in a total of three sessions, each about one week apart
 - 1.) Baseline Testing
 - 2.) HIWU or MIWU
 - 3.) HIWU or MIWU
- Following warm-up protocol each subject ran a self-paced 5 km on the treadmill
- HR was monitored throughout and $[La^-]$ was taken at each km

Baseline testing

- Height/weight
 - Detecto Eye Level Beam Scale
- Body composition
 - Tanita Body Composition Scale
- $VO_{2\max}$ via McConnell protocol



$VO_{2\text{ max}}$ test via McConnell Protocol

Time (min)	Speed (mph)	Grade
0:00-0:59	4	0
1:00-3:59	5	0
4:00-6:59	6	0
7:00-9:59	7	0
10:00-12:59	8	0
13:00-15:59	9	0
16:00-18:59	9	2
19:00-21:59	9	4
22:00- 24:59	9	6

High intensity warm-up protocol (HIWU)



- 10 min jog at 50% $v\dot{V}O_{2\max}$
- 5 min intermittent sprints
- Following the protocol subjects began a self-paced 5 km
- HR was monitored throughout
- $[La^-]$ was taken at each km

Moderate intensity warm-up protocol (MIWU)

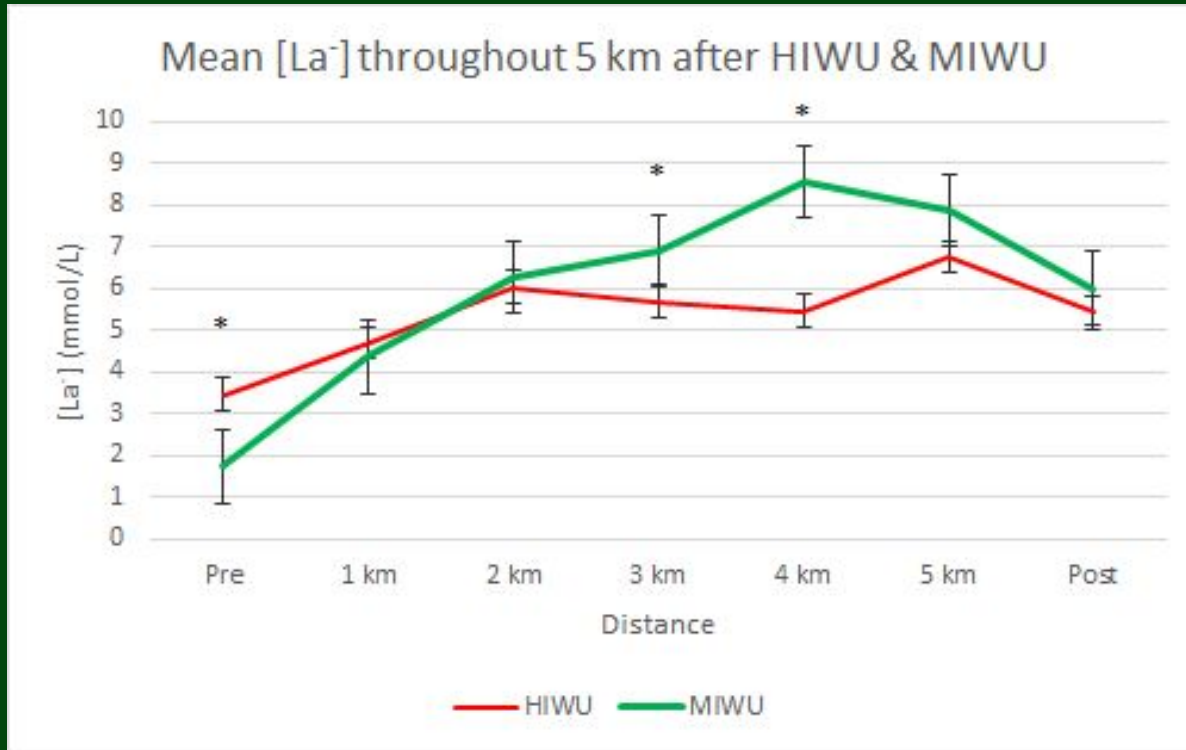
- 15 min jog at 50% $v\dot{V}O_{2\max}$
- Following the protocol subjects began a self-paced 5 km
- HR was monitored throughout
- $[La^-]$ was taken at each km



Results

➤ Overall mean $[La^-]$ throughout the 5 km following the HIWU & MIWU was not significantly different

($p > 0.05$)

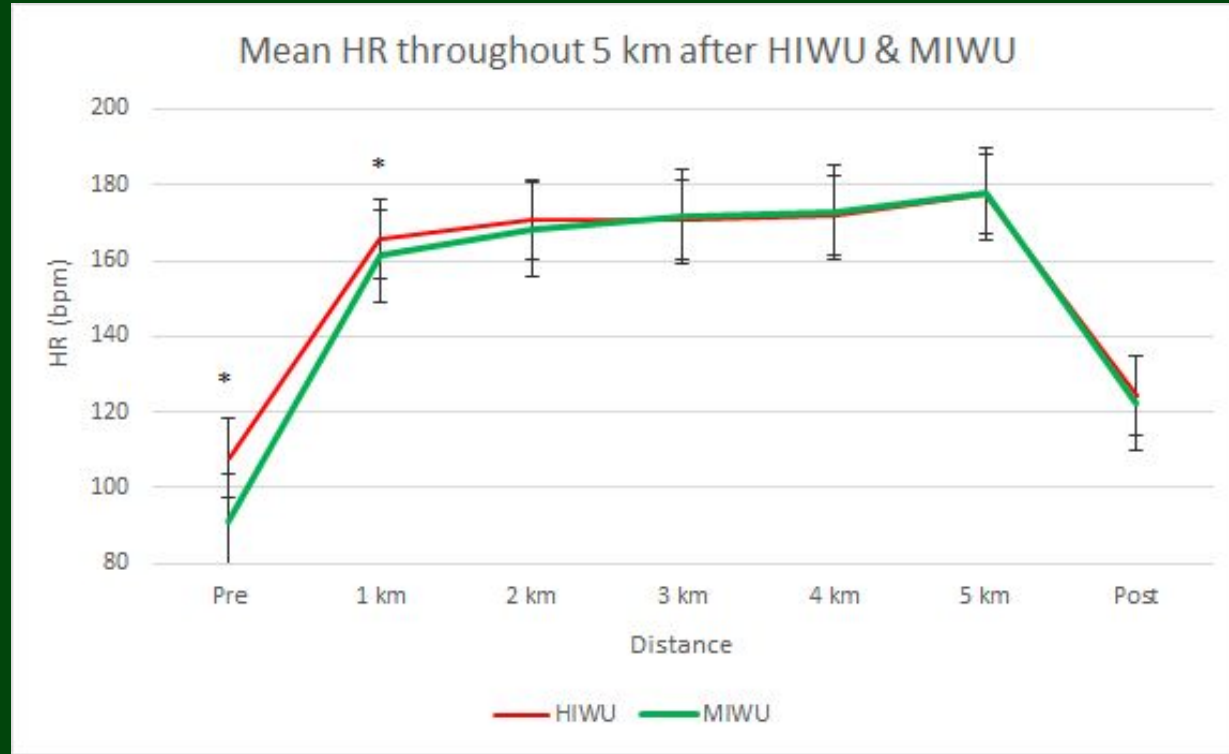


* Indicates significant difference ($p < 0.05$)

Results

- Overall mean HR throughout the 5 km following the HIWU was significantly higher than following the MIWU

($p < 0.05$)



* Indicates significant difference ($p < 0.05$)

Results

- Overall, there was no significant difference in performance time

$(p > 0.05)$

	<i>M</i>	
	HIWU	MIWU
Performance time (min)	24.76	24.52



Discussion

- In this particular study, warm-up did not impact performance time

Future Considerations:

- Increasing the intensity of the HIWU would likely elicit a greater physiological response
- Covering up speed would increase ecological validity

References

Anderson, P., Landers, G., & Wallman, K. (2014). Effect of warm-up on intermittent sprint performance. *Research in Sports Medicine, 22*, 88-99.

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Questions?