Physiological Effects of Acute Bouts of Aquatic and Land Based Sprinting

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Aquatic Training

- Can be used for rehabilitation from injury or as an alternative form of training

- Aquatic training relies on principles of buoyancy and water density (Di Prampero, P.E.; IJSM; 1986)

- Resisted sprinting has shown improvements in speed and acceleration
  - Weighted sleds, bungee cords, parachutes (Corn, R.; JSCR; 2003 & Paulson, S.; JSCR; 2011)
Research Questions

Does an acute bout of aquatic sprinting result in similar physiological effects as an acute bout of land based sprinting?

Are heart rate, blood lactate levels, ratings of perceived exertion (RPE), flexibility and delayed onset muscle soreness (DOMS) similar between land and aquatic sprinting?
Hypotheses

• Heart rate, lactate and RPE would have the greatest increases following aquatic sprinting

• DOMS would be lowest following aquatic sprinting

• Flexibility of the hamstrings and lower back would not change
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<th>n</th>
<th>Age (yr)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
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<tbody>
<tr>
<td>20 males</td>
<td>20.7 ± 1.0</td>
<td>180.2 ± 5.6</td>
<td>79.6 ± 10.5</td>
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Protocol

• Familiarization Session

• 2 Randomized Exercise Sessions
  – Ten 10-yard sprints on land
  – Ten 10-yard sprints in water
    • AQX Shoes
HR and Lactate Measurements

- Continuously measured
- Polar Heart Rate Monitor

- Finger stick
-Measured in duplicate
- Lactate Pro
Flexibility and RPE Measurements

- Three trials
- Pre and post exercise
- Sit-and-Reach box

- Borg Scale
- Post exercise
DOMS Measurements

- 24 hours post
- 48 hours post

Visual Analog Scale (VAS)^2

No pain | Pain as bad as it could possibly be
Statistics

- Within subjects repeated measures analysis of variance (ANOVA)
  - Time (pre and post)
  - Condition (aquatic and land)
- Independent and dependent T-tests
- SPSS 17.0
- P<0.05
Results: Heart Rate

Time main effect: P<0.01
Results: Ratings of Perceived Exertion

- Land 11.2 ± 2.3
- Aquatic 14.5 ± 2.2
  - P = 0.02
- Subjects rated their perceived exertion higher during aquatic sprinting than land sprinting
Results: Blood Lactate

ψTime x Condition Interaction: P<0.01; * Time main effect: P<0.05
Results: Sit and Reach

Flexibility (cm)

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<td>Post</td>
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Time main effect: P=0.001
Results: DOMS

* Condition main effect: P=0.001
Summary of Results

• Heart rate and flexibility increased similarly following aquatic and land sprinting

• Lactate and RPE increased more after aquatic exercise when compared to land

• DOMS was lower at 24 hours post-aquatic exercise when compared to land
• Repeated 10-yard aquatic sprints do not result in the same physiological effects as land based sprinting

• It appears that aquatic sprinting may be more challenging without subsequent soreness

• Aquatic training could be a good modality to supplement land based training
Limitations

• Time vs. Distance
  – Average sprint time on land = 1.84s
  – Average sprint time in water = 15.3s
    • P < 0.05

• Limited to males

• Depth of pool
Acknowledgements

- Undergraduate Research Award – Hamel Center
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- Subjects