Creative Strength Training

Ben Sheath
Strength in Rowing

Determinant of Erg performance

Glue!
**Strength**

1. Specificity
   - Training for the test (e.g., 1RM vs. dynamometry)
2. Load
   - >85% 1RM
3. Volume
   - <15 sets/muscle/wk
4. Daily protein intake
   - ≥1.6 g/kg of body mass/day
5. Inter-set rest
   - ≥5 minutes

**Hypertrophy**

1. Intensity of Effort
   - Volitional fatigue and internal focus
2. Volume
   - ≥10 repetitions/muscle/wk but <15 sets/muscle/wk
3. Training Frequency
   - ≥3 sessions/wk
4. Daily protein intake
   - ≥1.6 g/kg of body mass/day
5. Inter-set rest
   - >60 seconds

Morten et al., 2019
USE IT OR LOSE IT!
<table>
<thead>
<tr>
<th>Fitness Component</th>
<th>Residual Effect (days)</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed (maximal)</td>
<td>5 ±3</td>
<td>Neuromuscular and motor control, creatine phosphate recovery</td>
</tr>
<tr>
<td>Strength Endurance</td>
<td>15 ±5</td>
<td>Slow twitch fiber hypertrophy, aerobic/anaerobic enzyme activity, local blood circulation, lactate tolerance</td>
</tr>
<tr>
<td>Anaerobic Glycolytic Endurance</td>
<td>18 ±4</td>
<td>Anaerobic enzyme activity, lactate accumulation rate, buffering capacity, glycogen storage</td>
</tr>
<tr>
<td>Aerobic endurance</td>
<td>30 ±5</td>
<td>Aerobic enzymes activity, mitochondria number, glycogen storage, muscle capillaries, fat oxidation rate</td>
</tr>
<tr>
<td>Strength (maximal)</td>
<td>30 ±5</td>
<td>Neural control, muscular hypertrophy</td>
</tr>
</tbody>
</table>

Issurin, 2008
Fig. 2. Dose–response curve for the effect of the duration of training cessation on maximal force. (a) Different from standardized differences computed for ≤112 days of training cessation.
‘8-13% loss in EMG activation after 2 weeks of cessation’
(Mujika & Padilla, 2003)
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KEEP CALM AND STAY SAFE
APPLYING THE SCIENCE
Minimal Dose

Garcia-Palleres et al., 2009
- 5WK Training Cessation vs Reduced Training in World-Class Kayak
- 1xPW @ >85% (BP -3.9% vs -8.9%; PBP -3.4% vs -7.8%)
- Still require specific power training

Ronnestad et al., 2010
- 1 x PW for 13 weeks preserved Strength and CSA
- Highly specific sporting action

Androulakis-Korakakis et al., 2019
- Meta-Analysis
- Single set possible if intensity is high
  → Frequency through week important
- ‘Effort’ is key
<table>
<thead>
<tr>
<th></th>
<th>Body mass</th>
<th>LP5</th>
<th>IP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rowing and weight training (%)</td>
<td>0.5 ± 2.8</td>
<td>9.1 ± 8.5†</td>
<td>12.3 ± 8.6</td>
</tr>
<tr>
<td>Rowing only (%)</td>
<td>−0.6 ± 4.8</td>
<td>−1.0 ± 5.3</td>
<td>5.3 ± 13.4</td>
</tr>
<tr>
<td>% Adjusted difference in performance outcomes</td>
<td>−1.1</td>
<td>−9.3</td>
<td>−6.2</td>
</tr>
<tr>
<td>90% CL</td>
<td>−5.2 to 3.0</td>
<td>−15.1 to −3.0</td>
<td>−22.9 to 14.1</td>
</tr>
<tr>
<td>p value</td>
<td>0.61</td>
<td>0.03</td>
<td>0.52</td>
</tr>
</tbody>
</table>

*LP5 = 5-repetition leg press; IP = isometric pull; CL = confidence limit.
†p = 0.01.
Intended rather than actual movement velocity determines velocity-specific training response

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Towel Isometrics
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Elevator Isometrics
Myo Reps
‘Resistance training does not affect endurance as much as endurance affects resistance training’ (Hickson, 1980)

Interference Effect
Recap

- Unilateral Loading
- Isometrics
- Intent
- Specificity
- Low Load, High Volume
- Manipulation of training programme
### Worst Case Scenario

<table>
<thead>
<tr>
<th></th>
<th>Vo$_2$peak (L.min$^{-1}$)</th>
<th>pVo$_2$peak (watts)</th>
<th>Vo$_2$ at LT (L.min$^{-1}$)</th>
<th>LT % Vo$_2$ peak</th>
<th>Vo$_2$ at 330 watts (L.min$^{-1}$)</th>
<th>p2mM (watts)</th>
<th>p4mM (watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre OG</td>
<td>6.76</td>
<td>546</td>
<td>5.34</td>
<td>79</td>
<td>4.95</td>
<td>399</td>
<td>441</td>
</tr>
<tr>
<td>Post IA</td>
<td>6.19</td>
<td>435</td>
<td>5.26</td>
<td>81</td>
<td>5.26</td>
<td>290</td>
<td>343</td>
</tr>
<tr>
<td>Post 8</td>
<td>6.42</td>
<td>501</td>
<td>4.98</td>
<td>77</td>
<td>4.98</td>
<td>375</td>
<td>408</td>
</tr>
<tr>
<td>Post 20</td>
<td>6.46</td>
<td>552</td>
<td>4.82</td>
<td>79</td>
<td>4.82</td>
<td>385</td>
<td>452</td>
</tr>
</tbody>
</table>

Key: peak - peak oxygen uptake, ppeak - power at peak, LT % peak - lactate threshold as a percentage of peak, at 330 watts is a measure of oxygen economy, p2mM - power at 2mM [iBl]$_a$, p4mM - power at 4 mM [iBl]$_a$. Pre OG is the test point before the Olympic Games. Post IA is the test point after 8 weeks of inactivity. Post 8 is the test point after 8 weeks of retraining. Post 20 is the test point after 20 weeks of retraining.

Table 1: Physiologic data across time.

Godfrey, 2005
KEEP CALM AND STAY SAFE
Q&A

Thank you!!

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