Hamstring Injury Research
Stephanie Lazarczuk

Covered today…

- Risk Factors
- Exercise Selection
- HSR
- Rehab protocols
Risk Factors

- Non-modifiable
  - PMH
  - Age

- Modifiable
  - Strength
  - Architecture
  - Prolonged neurological deficits
  - Exposure to HSR

The hamstring quadrant of doom!!!

significantly increased the risk of a HSI. Multivariate logistic regression revealed significant effects when combinations of age, history of HSI, eccentric knee flexor strength and BF fascicle length were explored. From these analyses the likelihood of a future HSI in older athletes or those with a HSI history was reduced if high levels of eccentric knee flexor strength and longer BF fascicles were present.

Timmins et al., 2016b
Risk Factors

- Prolonged deficits in previously injured participants:
  - ↓ torque and sEMG prev inj’d – up to 18 months (Opar et al., 2013)

- Centralised effects of peripheral injury (Buhmann et al., under preparation)

Exercise Selection

- Askling L Protocol
- The Extender, Diver, Glider

Askling et al., 2013
Exercise Selection

- 10 exercises
- Hip vs. knee dominant

Bourne et al., 2017
**Exercise Selection**

- Glider ~60%
- Diver ~40%

**Exercise Volume**

- High vol versus low vol group
- Completed NHE
- OM: BF1h architecture, strength
- No diff between high and low load groups

<table>
<thead>
<tr>
<th>Week</th>
<th>High volume (reps)</th>
<th>Low volume (reps)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>2</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>64</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>80</td>
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<tr>
<td>5</td>
<td>100</td>
<td>8</td>
</tr>
<tr>
<td>6</td>
<td>100</td>
<td>8</td>
</tr>
</tbody>
</table>
Incorporating exercise - Timing

- NHE pre vs. post training
- Both groups increased eccentric strength and voluntary activation
- Only pre-training group → ↑ FL

- IPPs with eccentrics can be delivered early in micro-cycle (match day + 1)
- Mid-week → soreness day before match in 6 day cycle

Lovell et al., 2017, 2018

HSI & Running

- Consistent theme
  - AFL and soccer (Duhig et al., 2016; Ruddy et al., 2018; Colby et al., 2018; Malone et al., 2016)

- Too much exposure = bad
- Too little exposure = worse

- Avoid sharp spikes or declines
- Progressive exposure
  
  Goldilocks
Running exposure in rehab

TABLE 2. Nine stage progressive running protocol.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Acceleration phase (Intensity/distance)</th>
<th>Hold phase (Intensity/distance)</th>
<th>Deceleration phase (Intensity/distance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Walk/20m</td>
<td>Jog/10m</td>
<td>Walk/20m</td>
</tr>
<tr>
<td>2</td>
<td>Walk/15m</td>
<td>Jog/20m</td>
<td>Walk/15m</td>
</tr>
<tr>
<td>3</td>
<td>Walk/10m</td>
<td>Jog/30m</td>
<td>Walk/10m</td>
</tr>
<tr>
<td>4</td>
<td>Jog/20m</td>
<td>Run/10m</td>
<td>Jog/20m</td>
</tr>
<tr>
<td>5</td>
<td>Jog/15m</td>
<td>Run/20m</td>
<td>Jog/15m</td>
</tr>
<tr>
<td>6</td>
<td>Jog/10m</td>
<td>Run/30m</td>
<td>Jog/10m</td>
</tr>
<tr>
<td>7</td>
<td>Run/20m</td>
<td>Sprint/10m</td>
<td>Run/20m</td>
</tr>
<tr>
<td>8</td>
<td>Run/15m</td>
<td>Sprint/20m</td>
<td>Run/15m</td>
</tr>
<tr>
<td>9</td>
<td>Run/10m</td>
<td>Sprint/30m</td>
<td>Run/10m</td>
</tr>
</tbody>
</table>

Walk = regular gait; Jog <50% of perceived maximal running speed; Run <70% perceived maximal running speed; Sprint >90% of perceived maximal running speed.

Rehab

- Criteria/time based vs symptom based
- Aspetar Protocol, Mendiguchia algorithm
Hamstring strain injury

CON/ECC long length

ECC biased

Isometrics at varying lengths

3 x 10 - 12

3 x 8 - 10

3 x 6 - 8

Progress once repetition range completed through full ROM

3 x 8 - 10

3 x 6 - 8

3 x 4 - 6

Return to play clearance

I’m not here to sell you Nordics but…

51% reduction in risk
RR = 0.49

Effect of Injury Prevention Programs that Include the Nordic Hamstring Exercise on Hamstring Injury Rates in Soccer Players: A Systematic Review and Meta-Analysis

Wesam Saleh A, Al Attar1,2, Najeebullah Soomro1,4, Peter J. Sinclair1, Evangelos Pappas2, Ross H. Sanders1

Including the Nordic hamstring exercise in injury prevention programmes halves the rate of hamstring injuries: a systematic review and meta-analysis of 8459 athletes

Nicol van Dyk, Fearghal P Behan, Rod Whiteley

Summary

- Consider modifiable risk factors
- In prev inj, need to consider prolonged effects
- Exercise selection – muscle bias?
- Low volume effective in supramax ex
- HSR – Goldilocks approach
- Rehab – early loading, early adaptation

Final note: exposure is great, adherence is key.