A lack of spinal hyperexcitability revealed in patients with Restless Legs Syndrome

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Restless Legs Syndrome (RLS)

- Urge to move due to unpleasant sensations
- Relieved by movement
- Exacerbated by inactivity or rest
- Worse in the evening

DOPAMINE

Spontaneous sensations

Hyperexcitability?

Worse in the evening
Objectives

To assess spinal reflex responses in RLS patients & compare properties of these reflexes:

• with control participants without RLS
• at different times of the day
Screening questionnaire

RLS
Evening
5 - 8 pm
Patellar reflex
Hoffmann reflex

Control
Morning
7 - 9 am
Patellar reflex
Hoffmann reflex

Visual Analogue Scale

No pain __________________________ Most severe pain
Patellar reflex

Electromyography
Patellar reflex

Camera 1
Camera 2
Camera 3
Camera 4

Subject

Biomechanics
Biomechanical analysis

Knee angular displacement
Knee angular velocity
Hoffmann reflex (H-reflex)

- Muscle spindle
- Afferent impulse
- H-reflex
- Stimulating electrode
- M wave

Adapted from EP Zehr
Electromyography

Muscle spindle

Afferent impulse
H-reflex

Stimulating electrode

M wave

Latency
Amplitude
H/M ratio

Adapted from EP Zehr

M-wave
Control subjects
• n = 9

RLS patients
• n = 11
• RLS severity: moderate (20.9 ± 4.33)
• RLS duration: 18.5 ± 10.7 years

Statistics:
• Median & interquartile range
• Wilcoxon signed rank test
• Mann Whitney test
Knee angular displacement

* $P = 0.0391$
Knee angular velocity

Knee angular velocity (degrees/second)

CONT am  CONT pm  RLS am  RLS pm
Patellar amplitude

![Bar chart showing patellar amplitude comparisons between CONT am, CONT pm, RLS am, and RLS pm. The x-axis represents different groups, and the y-axis represents amplitude in mV. The chart illustrates that RLS pm has a significantly lower amplitude compared to the other groups, with an asterisk indicating statistical significance (* P = 0.0399).]
## H-reflex

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Group</th>
<th>am</th>
<th>pm</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latency (ms)</td>
<td>CONT</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td></td>
<td>RLS</td>
<td>X</td>
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<td>X</td>
</tr>
<tr>
<td>Amplitude (mV)</td>
<td>CONT</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td></td>
<td>RLS</td>
<td>X</td>
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<tr>
<td>H/M ratio</td>
<td>CONT</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>RLS</td>
<td>X</td>
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</tr>
</tbody>
</table>
H-reflex VAS pain

* P = 0.0451
Conclusion

Patellar reflex

RLS = attenuated response at night indicating ↓ excitability

H-reflex

No differences compared to controls

Altered pain perception
Is there a state of spinal hyperexcitability in RLS patients?

**FOR:**
- • ↑ H/M ratio
  (Wecskeres et al. 1986)
- • Impaired H-reflex excitability curves & vibratory inhibition depression (Martinelli et al. 1987; Rijssman et al. 2005)
- • ↓ inhibition of 1b interneuron (Scaglione et al. 2008)
- • lower threshold and greater spatial spread of the flexor reflex (Bara-Jimenez et al. 2000)

**AGAINST:**
- • Normal H-latency (Bucher et al. 1996; Akyol et al. 2003; Scaglione et al. 2008)
- • Normal H-amplitude (Scaglione et al. 2008)
- • Normal H/M ratio (Bucher et al. 1996; Akyol et al. 2003; Rijssman et al. 2005; Scaglione et al. 2008)
- • Normal flexor reflex (Wechsler et al. 1986)
- • ↓ excitability of the patellar reflex
- • Normal H-latency, H-amplitude & H/M ratio
Conclusion

NOT as simple as a global spinal hyperexcitability in patients with RLS
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