

ADAPTATION OF LEG EXTENSOR MUSCLE ACTIVITY TO REPEATED MAXIMAL CONTRACTIONS



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Purpose

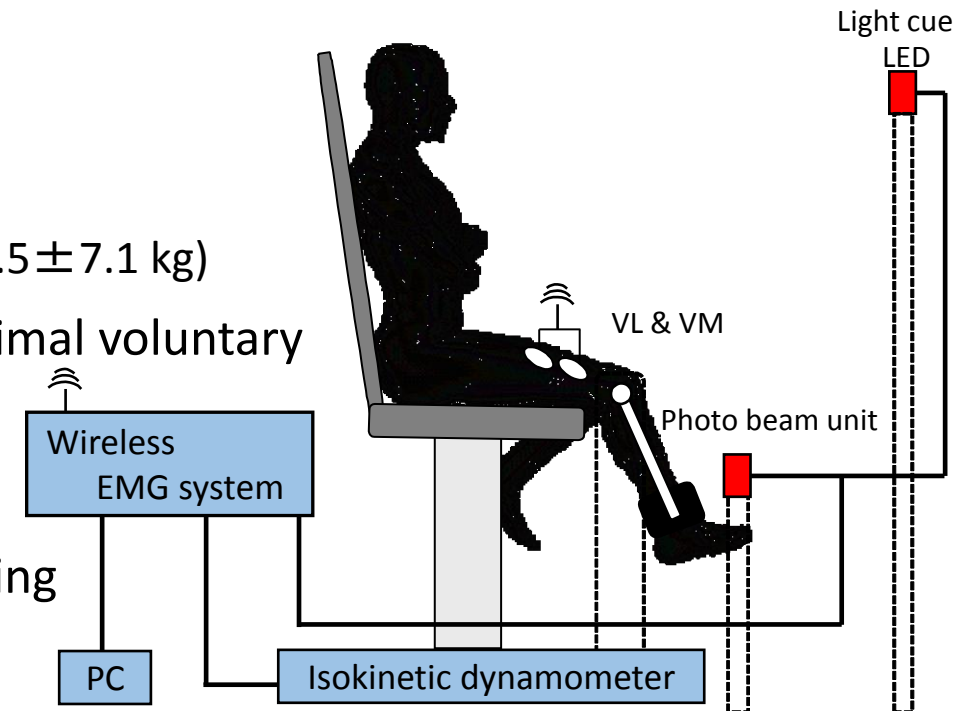
To investigate how the vastus lateralis (VL) and medialis (VM) muscles are activated to prevent the decline in knee extension force during prolonged repetition and whether prediction of the correct timing to exert force influences muscle activation patterns.

Methods

Subjects : 15 males (age 21.2 ± 1.0 years, height 1.720 ± 0.06 m, weight 68.5 ± 7.1 kg)

Procedure: 100 isokinetic extensions ($90^\circ/\text{s}$) with 50 performed at maximal voluntary contraction (MVC) cued by a light at 60° knee angle.

- ◆ Condition 1 (C1): every second trial advance information of the light cue timing
- ◆ Condition 2 (C2): randomly interspersed



Results

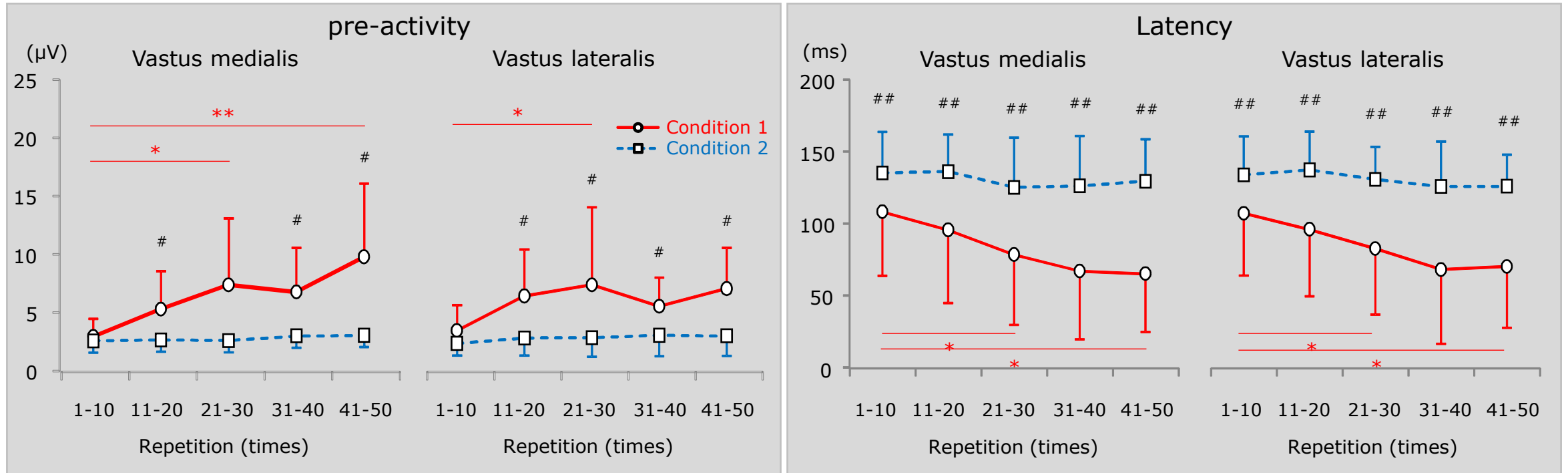


Fig.1 Changes in average EMG with MVCs of pre-activity and latencies repetitions.

◆ condition 1 vs. 2 # p<0.05, ## p<0.01 ◆ among MVC repetitions * p<0.05, ** p<0.01

Condition 1: EMG pre-activity from vastus lateralis and medialis muscles ↑

Latency ↓

Condition 2: EMG pre-activity from vastus lateralis and medialis muscles →

Latency →

with the number of MVC repetitions

Results

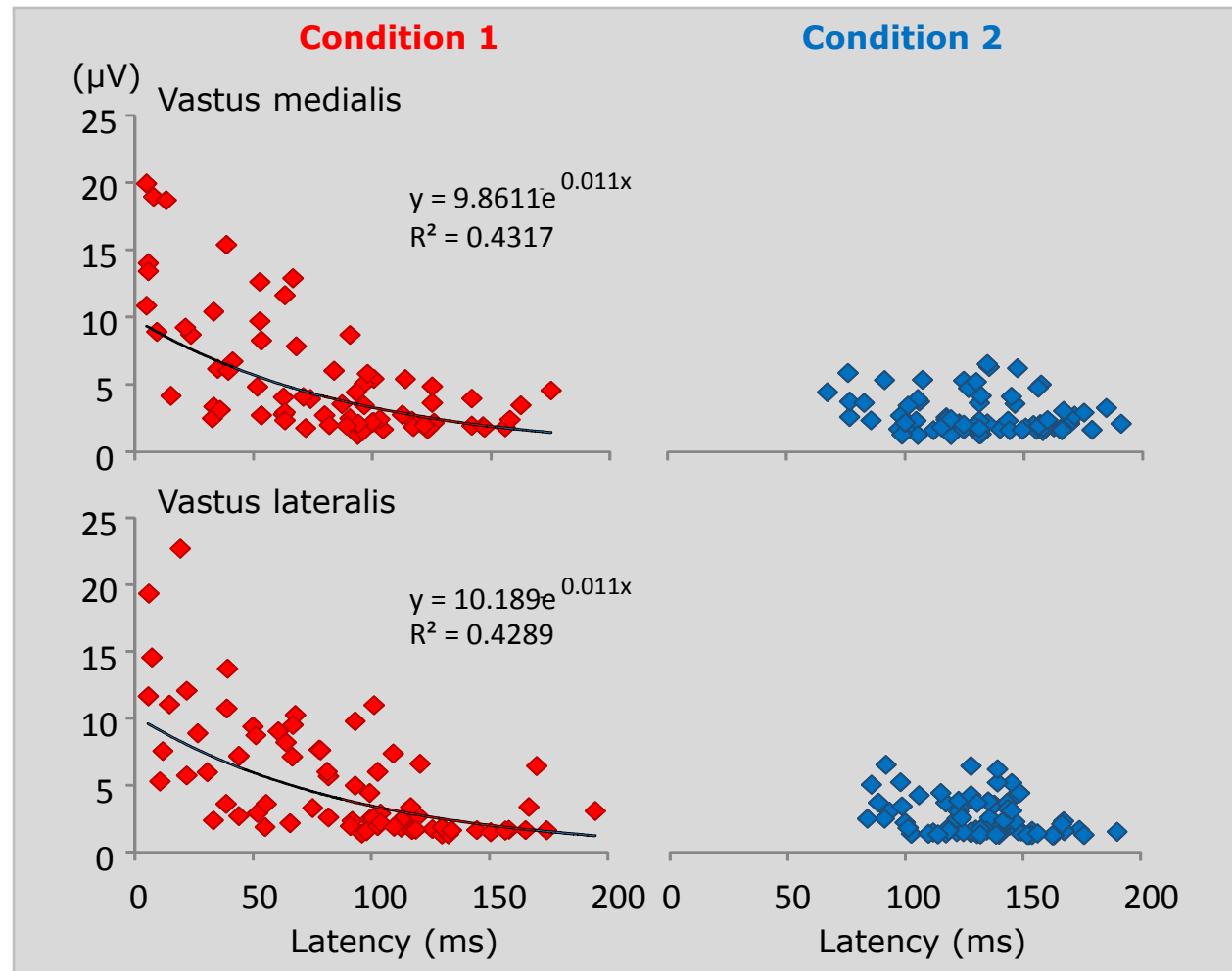


Fig.2 Relationships between average EMGs of pre-activity and latencies.

Condition 1: Negative relationships between pre-activities and latencies.

Condition 2: No relationships between pre-activities and latencies.

Results

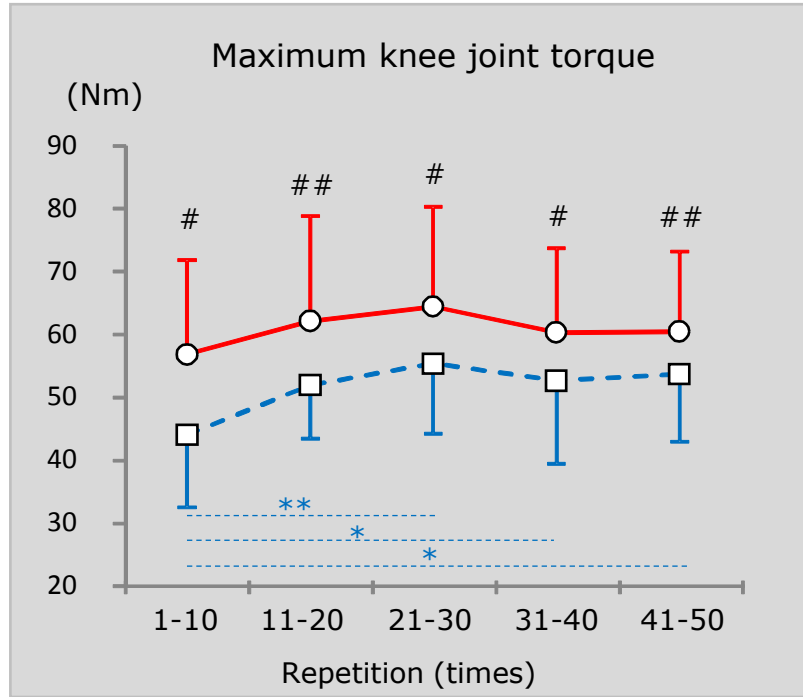


Fig.3 Maximum knee joint torque.

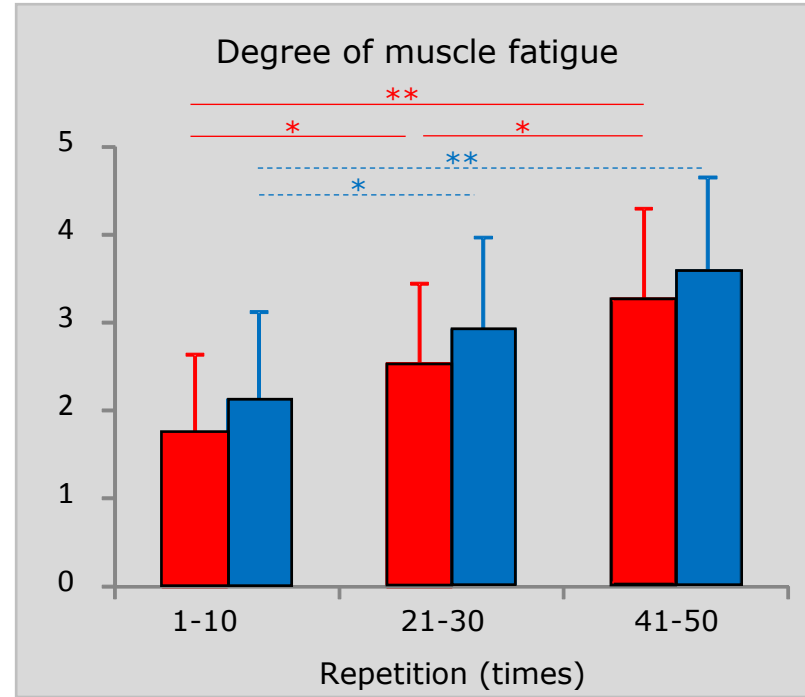


Fig.4 Self-evaluations of degree of muscle fatigue.

- Condition 1 (Red bar)
- Condition 2 (Blue bar)
- ◆ condition 1 vs. 2
$p < 0.05$, ## $p < 0.01$
- ◆ among MVC repetitions
* $p < 0.05$, ** $p < 0.01$

Conclusion

Prediction of the correct MVC timing increased pre-activity and subsequently decreased the latency, although subjects were instructed to relax their muscles fully before the light cue. Decrease in the latency may increase time to exert force and contribute to maintaining large MVC against the fatigue.