

DIFFERENCES IN MUSCLE ACTIVATION PATTERNS DURING WALKING BETWEEN CHRONIC LOW BACK PAIN PATIENTS AND CONTROLS

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BACKGROUND

In normal gait, the intrinsic lumbar back muscles (ILBM) show a biphasic activity pattern during both periods of double support of the stride. In chronic low back pain (CLBP), it has been shown that the mean ILBM activity during the periods of swing is higher compared to controls (Arendt-Nielsen et al. 1996; Lamoth et al. 2006). Also, the duration of the biphasic activity is longer in CLBP (Vogt et al. 2003). There is however insufficient knowledge about the changes in activity patterns during the total gait cycle. In particular, more study on the amount of biphasic activity in the periods of double support and on the coordinated activation between the periods of double support- and swing is needed.

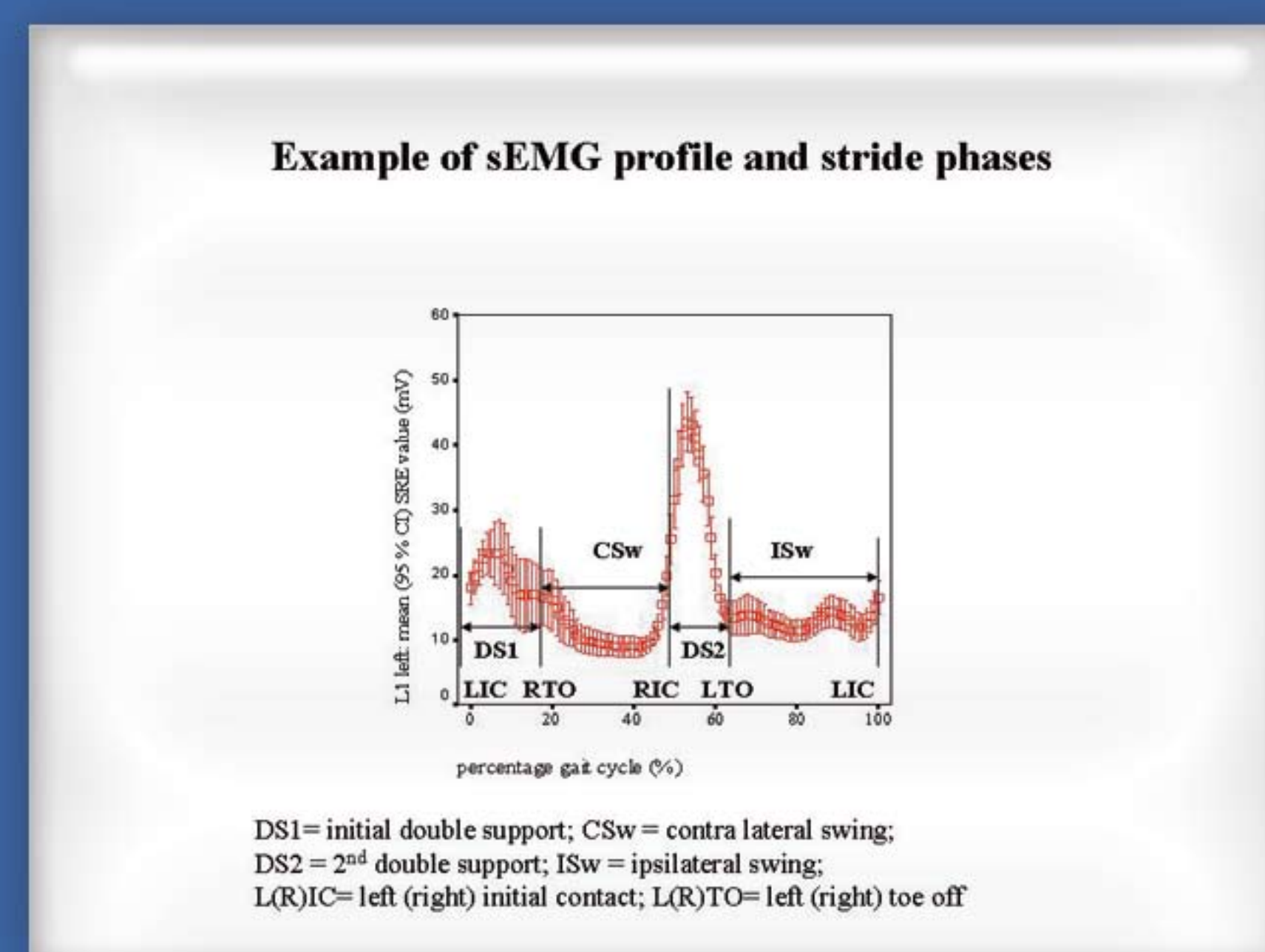
AIM

To determine if CLBP subjects and healthy controls show differences in back muscle activity, as measured by surface electromyography (sEMG), during walking on a treadmill. We hypothesize that CLBP subjects show increased activity during the total gait cycle, thus also during the periods of double support, and less coordinated activity (i.e. higher activity in the period of swing relative to double support), compared to healthy controls.

METHODS

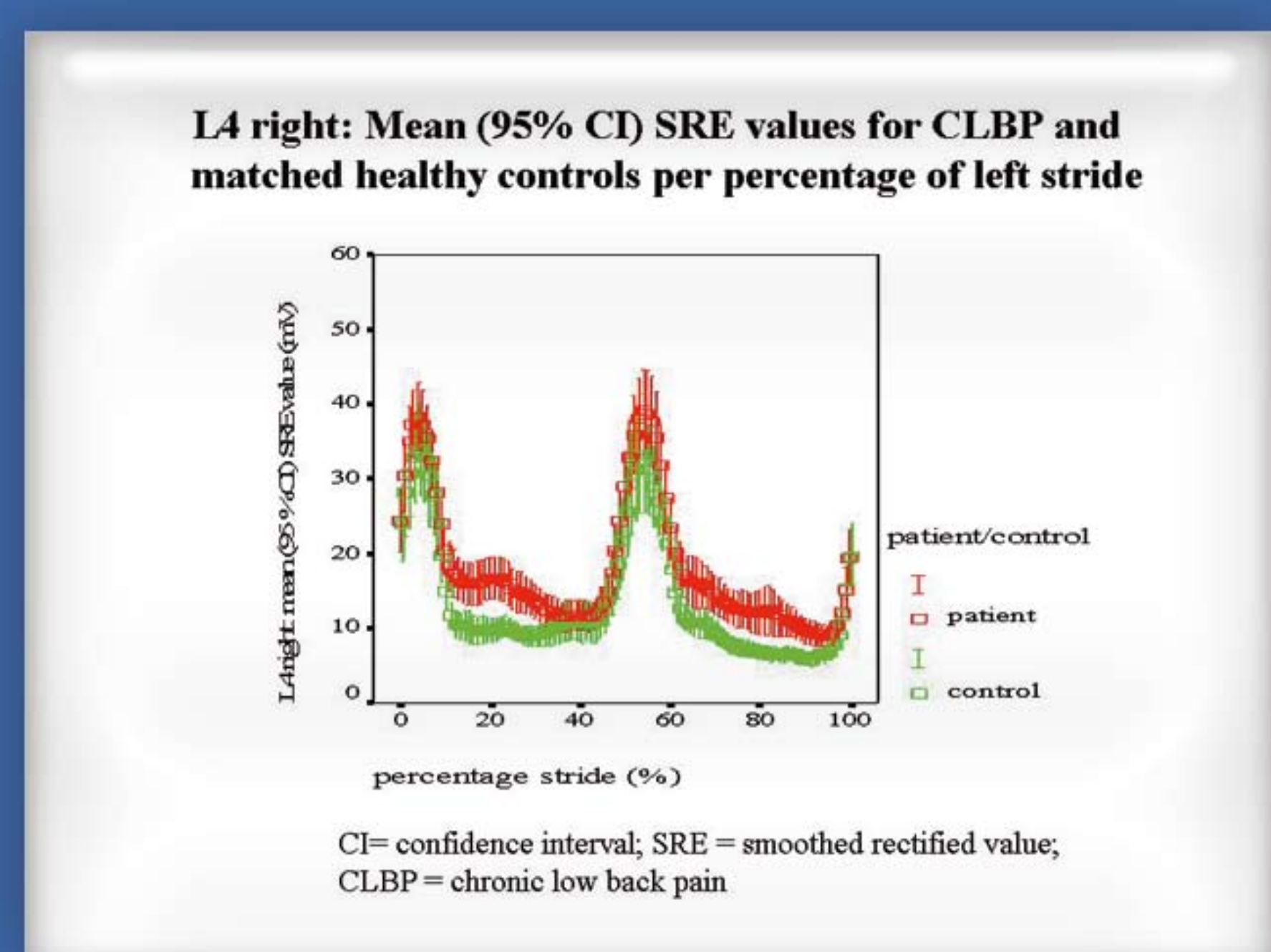
In a cross sectional study sixty-three patients with CLBP and thirty-three healthy controls were studied. Participants walked on a treadmill at 3.8 km/h. Timing parameters were obtained from foot markers, measured with an optical three-dimensional gait analysis system (VICON 370). sEMG data of the ILBM, recorded at L1 and L4 bilaterally, were obtained using a 16 channel sEMG (Glonner) system. Smoothed rectified EMG (SRE) values were calculated for the total gait cycle and the periods of double support and swing separately. The ratio of activity in swing to double support was used as a measure of coordinated activity.

Figure 1



Example of sEMG profile and stride phases

Figure 2



L4 right: Mean (95% CI) SRE values for CLBP and matched healthy controls per percentage of left stride

RESULTS

Mean absolute SRE values of back muscles are significantly higher in patients than in controls, for all muscles during the total gait cycle.

Ratios of SRE values in swing compared to double support are not higher in patients.

CONCLUSION

In walking, CLBP patients show increased activity during the total gait cycle, but do not have less coordinated activity between the periods of double support and swing compared to healthy controls. These findings may support an adaptive response to stabilize the spine. For clinical practice, these results may plead for the use of dynamic exercise training.



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