Supplementary data for JN---371-2007

Optimization of tendon stimulation parameters for inhibitory reflex response in gastrocnemius muscle.

Figure 1

Effect of electrode position over the Achilles tendon: The effect of electrode position over the tendon was tested in all subjects. A range of stimulus intensities (20-60 mA) was used at four cathode electrode positions, 10%, 40%, 70% and 90% of the tendon length. At each electrode position, the tendon was stimulated with at least 20 shocks at each of five stimulus intensities ranging from 20-60 mA while subjects maintained a constant contraction of 20% of maximum (MVC). The maximum stimulus strength was reported to be below pain threshold and described as mild discomfort by most subjects. Plots of area of first inhibitory component ($I_1$) against stimulus intensity for each electrode position were used to derive estimates of maximum strength of inhibition and threshold intensity at that site. Maximal inhibition and the lowest threshold intensity occurred close to the musculotendinous junction and it decreased approximately linearly from that site (see figure).
Effect of stimulus intensity on the strength of reflex inhibition at 70% of tendon length in a subject. The strength of inhibition increased approximately linearly over the tested range of stimulus intensities as shown in this subject ($r^2 = 0.9545; p = 0.0042$, linear regression). The inhibition was calculated as a percentage of background contraction. The average area of inhibition at 20 and 60 mA was $704 +/- 990 \mu v.ms$ and $2055 +/- 2430 \mu v.ms$ and the average maximum strength of inhibition was $54.6 +/- 12.5\%$ and $90.2 +/- 11.1\%$ respectively.
The inhibitory response to tendon stimulation was assessed during a normal voluntary contraction of 20% of MVC while GA length was fixed at 25%, 50% 75% and 100% of its range. Again, at least 20 shocks were given at each joint angle at x3 threshold intensity. The order of change in joint angle was randomised. The strength of reflex inhibition increased in an approximately linear manner with increase in muscle length (dorsiflexion) in all subjects. The solid line is the linear regression line and the broken lines are 95% confidence intervals. The stimulus strength was 60mA in all of these trials.