



# A TRANSIENT ISCHAEMIC BLOCK DOES NOT PRODUCE SYSTEMATIC CHANGES IN FORCE OR EMG ASSOCIATED WITH SELECTIVE SINGLE DIGIT MOVEMENTS



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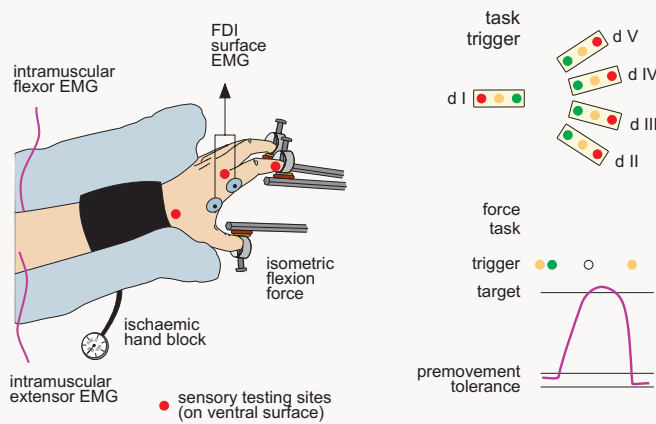
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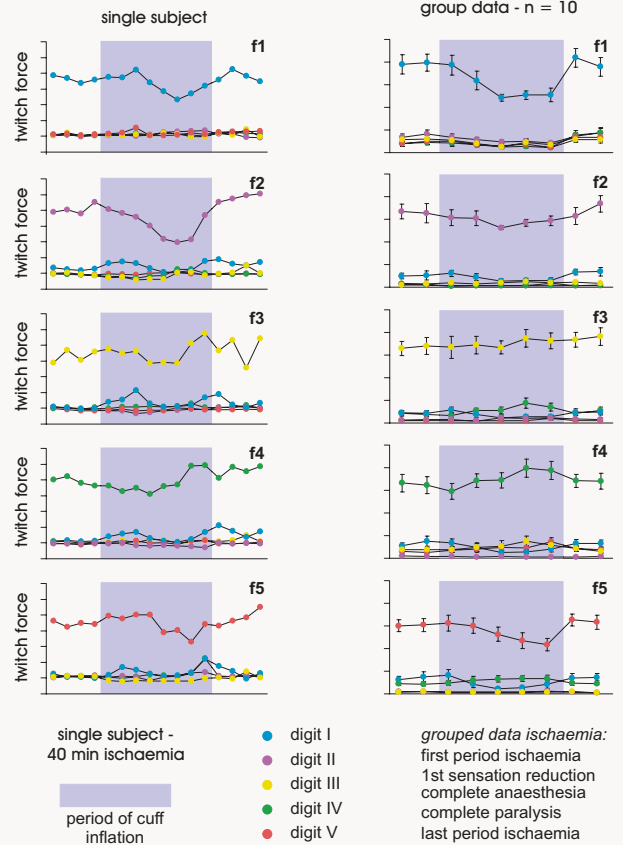
## introduction

Motor cortical reorganisation has been shown to occur following lesions such as spinal cord injury or amputation. The consequent expansion of the cortical representation of muscles proximal to the lesion was thought to be an "invasion" of the motor cortex representing muscles distal to the lesion. The increased cortical excitability results from a down-regulation of the GABA mediated inhibition and has recently been shown to be more generalised, also involving cortical outflow to paralysed and deafferented muscles below the lesion. We used an ischaemic block of the forearm, which mimics a temporary lesion, to investigate whether these changes resulted in functional consequences for voluntary motor control.

## experiment set-up



## force data



## methods

Twisted pairs of fine wire intramuscular EMG electrodes were inserted into the long finger flexor and extensor muscles (3-7, equally distributed) of the left forearm in 10 subjects. Isometric flexion force was recorded at the distal phalanx of each digit during simple brief voluntary flexion efforts. EMG and force were recorded for each contraction during control, ischaemia and recovery periods. Ischaemia was produced by a sphygmomanometer cuff inflated around the wrist to 200 mmHg and maintained until first dorsal interosseus (FDI) muscle became completely paralysed. Thus during ischaemia the muscle was proximal to the block and therefore not directly affected, while the hand became deafferented and paralysed. Subjects performed 10 voluntary flexions of each digit, occurring in blocks of 50 trials beginning every 5 minutes. Movement triggers for each trial were presented by a light array in random order.

## results & conclusions

There was no significant difference in the ability of subjects to selectively produce force primarily at a single digit before, during or after an ischaemic block of the hand. Likewise there was no systematic variation in the selectivity of intramuscular EMG recorded simultaneously at various sites in either the long finger flexor or extensor muscles. These data suggest that the generalised increase in cortical excitability that is seen following a neural lesion such as spinal cord injury or amputation, or temporarily with an ischaemic block, does not produce changes in motor output. Thus, the cortical reorganisation that follows acute paralysis and deafferentation does not appear to have functional consequences for voluntary fine motor control of the hand in human subjects.

## results - ischaemia block 2



## selectivity index

