|  |  |
| --- | --- |
| $$ {\text{MEPamp}}\, = \,a \times S + b \times {\text{PreEMG + }}c $$ | (1) |

|  |  |
| --- | --- |
| $$ {\text{MEPamp}}\,{\text{ = }}\,{\text{MEP}}_{{{\text{max}}}} /(1 + \exp (S_{{{\text{50}}}} {\text{ - }}S{\text{)}}/K)\, + b \times {\text{PreEMG}}\,{\text{ + }}\,c $$ | (2) |

Dependent variable: MEPamp = normalized single trial peak-to-peak MEP amplitude

Independent variables: *S* = stimulus intensity, PreEMG = average rectified EMG amplitude over 95 ms prior to TMS stimulus

Variables estimated by fitting the model: MEPmax = maximum MEP amplitude, S50 = stimulus intensity that produces a half maximum MEP, *K* = slope parameter, *a* = coefficient for S in linear equation, *b* = coefficient for PreEMG in linear and non-linear equations, *c* = constant

We assessed the relationship between average MEP amplitude (dependent variable) and stimulus intensity (independent variable) at each contraction level using the Boltzmann equation (Devanne et al. [*1997*](http://www.springerlink.com/content/61408478k926t4j0/fulltext.html#CR11)), except in a few cases where linear fits between these variables were better. We also assessed the dependence of single trial MEP amplitudes (dependent variable) on stimulus intensity and average muscle activity levels over the 95 ms prior to the stimulus (independent variables) using multiple linear regression and nonlinear regression. For multiple linear regression, we tested whether a linear combination of stimulus intensity and muscle activation level accurately predicted single trial MEP amplitudes (eq. 1) for the entire range of stimulus intensities and for the range from 0.9 to 1.4 × RMT, over which the relationship is nearly linear (Lewis et al. [*2004*](http://www.springerlink.com/content/61408478k926t4j0/fulltext.html#CR17)). For non-linear regression, we examined whether single trial MEP amplitudes over the entire range of stimulus intensities could be accurately predicted using the Boltzmann equation to assess the effects of stimulus intensity on MEP amplitude and included a linear dependence on muscle activation level (eq. 2).

**Research Article**

Variability of motor potentials evoked by transcranial magnetic stimulation depends on muscle activation

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