Correspondence

(The Editors do not hold themselves responsible for opinions expressed by correspondents)

Laterality of motor control and breathing

The Editor,

As a neurologist with interest in laterality of motor control, I read the recent article by Voyvoda et al [1] on diaphragmatic movements in hemiplegic patients with great interest and would like to offer the following explanation for their "unanticipated" finding, *i.e.* a decrease in diaphragmatic excursion "on the left rather than on the right" diaphragm compared with normal controls. Measuring the excursions of the right and left diaphragms on separate occasions while breathing silently or taking deep breaths, the right and left hemiplegic groups displayed a significant decrease in the amplitude of movements of the left hemidiaphragm (when breathing deeply). Thus, according to a newly discovered circuitry that underpins motor control, this laterality-indexed finding by the authors of the article has the following explanation (assuming that the vast majority of their subjects and controls were right-handed):

It has been shown repeatedly that there is an asynchrony between the two diaphragms as we breathe, with the right diaphragm moving earlier and with wider excursion than the left diaphragm [2–5]. This is because both diaphragms are driven from the same hemisphere (the left, in ~80% of people), and the delay on the non-dominant side of the body, amounting to interhemispheric transfer time, is shared by all effectors located on the non-dominant side including the diaphragms [6–9]. Accordingly, while lesions in the minor hemisphere (right, in the vast majority of people) affect the movements of the left diaphragm alone, those in the major hemisphere affect movements of both diaphragms, hence the unexpected finding that "for both hemiplegic groups, a significant decrease was noted in the movements of left hemi-diaphragm in deep respiration".

There is, however, a finding in Table 1 of their study that is incongruous with the above formulation: the mean amplitude of the right diaphragmatic movement during spontaneous breathing in the control group (1.6 cm) was less than that found for the left diaphragm (2.1 cm). One wonders if this was the result of a clerical error when drawing the table or if the handedness of the

participants played a role in creating the reverse bias (*i.e.* disproportionate inclusion of those who were right-hemispheric in laterality of motor control).

I look forward to hearing from the authors regarding my comments and questions.

Yours etc.,

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