The article “Deep brain stimulation for dystonia confirming a somatotopic organization in the globus pallidus internus” by Vayssiere and colleagues from the University Hospital in Montpellier, France, provides further evidence of the widening array of procedures that constitute the current practice of surgery for the treatment of movement disorders. That deep brain neurostimulation enjoys such a widespread application is a testament to the appeal of a testable, nondestructive surgical approach to what are fundamentally chronic, nonmalignant, but frequently degenerative conditions. The current uses of deep brain stimulation (DBS), for example, to reverse the symptoms of Parkinson disease, essential tremor, and tremor in multiple sclerosis, are now joined by its use for congenital dystonia. In my estimation, its relevance to the treatment of epilepsy and obsessive–compulsive disorder, although nascent, will become apparent in the near future. Within the past decade, we have witnessed a neurosurgical era in which the treatment of movement disorders has been reinvigorated from a period of quiescence that lasted nearly two decades. It is the charge of specialists in functional neurosurgery that we continue to build an evidence base to support the further development and expansion of this field.

In this regard, the contribution of Vayssiere, et al., is a worthy effort. They have conducted a careful study of 19 of 70 patients with generalized dystonia who were treated with bilateral DBS of the posteroventral globus pallidus internus (GPI) and obtained a minimum of 80% improvement. The patients’ dystonic symptoms were rigorously evaluated pre- and postoperatively by using a battery of validated clinical assessment instruments. The authors separated outcomes into the principal effects on three body areas (cervicoaxial region, superior limb, and inferior limb). They carefully analyzed the position of the active contact of the DBS that produced the maximal clinical benefit. Based on this analysis, the authors concluded that within the GPI, there is a somatotopy, in the sense that sites of stimulation that resulted in maximal improvement for each area of the body seemed to have a statistically significant and discrete locus. Curiously, significant proof of somatotopy was present only within the right and not the left GPI. The authors offer some comments about why this might be.

Based on the relatively small number of patients in this study, the statistical methods used, and our remaining confusion about the physiological mechanism of DBS, I am not convinced that the apparent asymmetry between the right and the left GPI will be a durable finding. A glance at Table 4 shows that a similar, but not statistically significant trend occurred in the left GPI in an anteroposterior direction, and in the same relative “homuncular” pattern (superior limb, cervicoaxial, and inferior limb, respectively). The distribution of sites of DBS contact placement were significantly different when the right and left GPI were compared (being significantly more posterior on the right side) and the extension of contact distribution was wider on the right side than on the left. These and other uncontrolled variables in this complex study may have confounded the analysis and the resulting conclusion. The major conclusion may certainly be tested by future studies on GPI DBS, although as the authors point out, the size of DBS electrodes presently in use, the stimulated field, and the resolution provided by current image-based stereotaxy call into question the clinical relevance of this small-scale GPI somatotopic organization, at least at present.

In summary, we are well into the second decade of DBS for movement disorders and there appears to be no dimming of enthusiasm for the method. Until more efficacious procedures, such as trophic factor parenchymal infusion or cell transplantation, come to the fore, DBS will remain center stage. Despite considerable cumulative evidence on DBS for movement disorders, we still have much to learn and to prove. I congratulate the Montpellier group for getting one step closer to that goal.

RESPONSE: We thank Dr. Burchiel for his constructive comments on our manuscript. Deep brain stimulation is an expanding field in which many questions remain to be answered. We think that the development of magnetic resonance imaging–based stereotaxy, including immediate postoperative stereotactic magnetic resonance imaging while the patient is in a state of anesthesia, will contribute to these advances because it provides precision for targeting and at the same time security for the patient.
Dr. Burchiel raises doubts regarding the asymmetry found between the right and left GPi. Indeed, our data provide a somatotopic organization of the GPi only on one side. We agree with Dr. Burchiel that the cluster of electrode positions in the left GPi appears quite similar to that on the right side, although it is not statistically significant. It could be possible that uncontrolled variables have confounded the analysis; however, the influences of all elements that obviously could have an impact on the interpretation of the results were checked and excluded. Until rigorous scientific proof invalidating our conclusion can be provided, we have to consider this asymmetry an important finding. It is probable that there is a genuine asymmetry in motor GPi organization, similar to that described in language representation in the brain. The greater motor skill of the dominant side could be driven by a nonsomatotopic organization of pallidal networks, reflecting a more elaborate level of information processing.

The inclusion of more patients could strengthen the statistical power of our study, confirming or invalidating the results. In addition, it is obvious that new data on the anatomical organization of neurons and their networks in the basal ganglia of humans will help answer the question of asymmetry, providing an end to this debate. The final answer could definitely influence the choice of the target within the GPi boundaries, taking into account the clinical pattern in each individual patient.

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