

### Assessment of the Correspondence between Subjects of the Cervical Intervertebral Disk Locations

The correspondence between subjects of the location of the cervical intervertebral disks, used as anatomic reference points to assess the goodness of the overlap among transformed images, was assessed by using the following procedure. First, the positions of cervical intervertebral disks were marked on normalized scans by ROIs, which were then used to create corresponding masks (On-line Fig 1A). Then, the degree of overlap of the disks among subjects was assessed by using SPM8 (1-sample *t* test,  $P < .001$ , family-wise error [FWE] corrected for multiple comparisons).

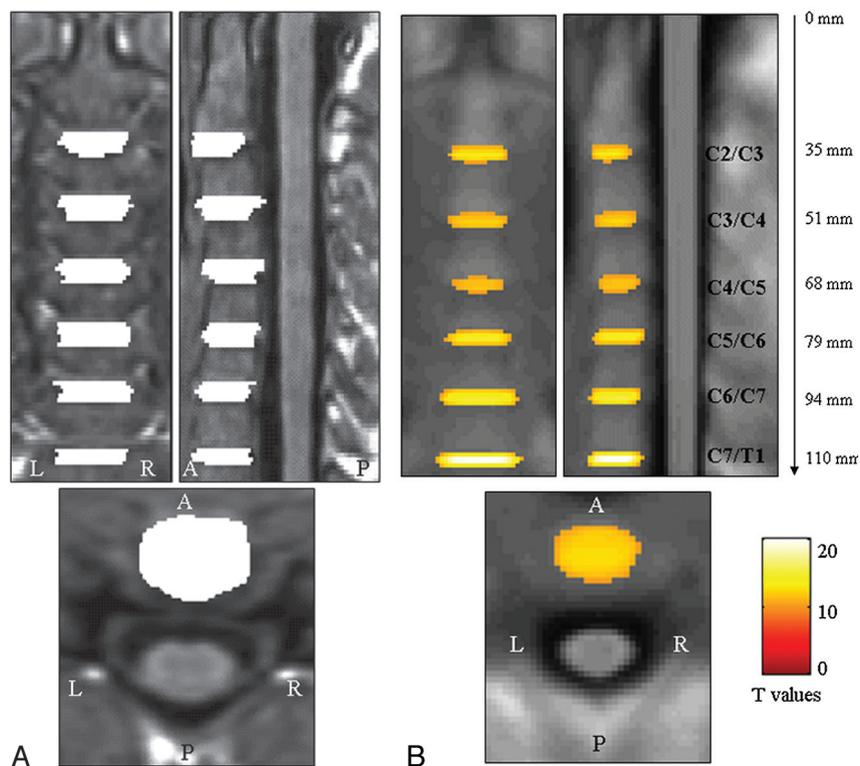
Results showed a significant overlap in the position of all disks in the final images (On-line Fig 1B). With a value of 0 mm set for the most cranial section, the C-C coordinates of the point of maximum disk overlap were the following: 35 mm for the C2–3 disk ( $P < .001$ , *t* value = 13.8), 51 mm for the C3–4 disk ( $P < .001$ , *t* value = 12.3), 68 mm for the C4–5 disk ( $P < .001$ , *t* value = 11.5), 79 mm for the C5–6 disk ( $P < .001$ , *t* value = 13.3), 94 mm for the C6–7 disk ( $P < .001$ , *t* value = 15.3), and 110 mm for the C7–T1 disk ( $P < .001$ , *t* value = 20.2).

### Assessment of the Effect of Subject Height on the Normalization Procedure

To verify that our registration process was able to compensate for different heights of the enrolled participants, we assessed whether there was any correlation between subject height and total cervical cord length in the original images (ie, before normalization) and whether the effect of height was removed in the normalized images. For this purpose, we measured the position (in millimeters) of the cranial border of the C4–5 intervertebral disk along the normalized cord axis of each subject (setting a value of 0 mm for the most cranial section) and we correlated the coordinates of this position with the subject height. Both correlations were measured by means of the Spearman rank correlation coefficient.

Results indicated that in the original images, there was a strong association between these 2 variables ( $r = 0.75$ ,  $P < .001$ ) and that the position of the cervical cord enlargement in the normalized images was, on average, at  $63.0 \pm 3.1$  mm and that there was only a minimal trend toward a correlation between this position and the subject height ( $r = 0.21$ ,  $P = .08$ ).

These results seem to indicate that though the subject height might have the potential to bias the results of the normalization procedure, our postprocessing seems able to compensate for this confounding effect and the final alignment of our coregistered images is only minimally influenced by subject height.



**On-line Fig 1.** A, Marking of the position of the intervertebral disks in the cervical region of the normalized image of 1 study subject (a 36-year-old woman) and creation of the corresponding masks. B, Results of the 1-sample *t* test, overlaid on the cervical cord template, show clusters of significant overlap of the cervical intervertebral disks among subjects ( $P < .001$ , FWE corrected for multiple comparisons). With a value of 0 mm set for the most cranial section, the C-C coordinates of maximum overlap for each disk, as well as the associated *P* and *t* values, are indicated on the image.