

Appendix: Rigid Registration Evaluation

Semi-automatic rigid registration was performed by first interpolating planar images to the same grid as the DRRs and manually adjusting a region of interest to fit closely to the borders of the skull. Then, the shift needed to optimize the normalized mutual information (NMI) metric was found by calling Elastix (University Medical Center Utrecht, Utrecht, Netherlands)[14] with a preconfigured parameter file. Both orthogonal image sets were registered simultaneously with a shared superior-inferior (S-I) axis, so as to determine the translations that would optimize both the anterior-posterior (A-P) and lateral registrations. While each image was initially registered using 5 degrees of freedom ((DOF) 3 translational and 2 rotational), all recorded angular shifts were <0.01 degrees and thus, only 3 translational DOF were recorded. All registrations were performed using a single grid resolution, 32 histogram bins, and a maximum of 500 iterations.