



Quantitative structural neuroimaging of mild traumatic brain injury in the Chronic Effects of Neurotrauma Consortium (CENC): Comparison of volumetric data within and across scanners

Purpose

Although many studies routinely employ quality assurance (QA) procedures including MR and human phantoms to promote accuracy and monitor site differences, few studies perform rigorous direct comparisons of these data nor report findings that enable inference regarding site-to-site comparability. These gaps in evaluating cross-site differences are concerning, especially given the well-established differences that can occur between data acquired on scanners with different manufacturer, hardware or software.

How was the study conducted?

This study reports findings on (1) a series of studies utilizing two MR phantoms to interrogate machine-based variability using data collected on the same magnet, (2) a human phantom repeatedly imaged on the same scanner to investigate within-subject, within-site variability, and (3) a human phantom imaged on three different scanners to examine within-subject, between-site variability.

Findings

Although variability is relatively minimal for the phantom scanned on the same magnet, significantly more variability is introduced in a human subject, particularly when regions are relatively small or multiple sites used.

Military Impact

Vigilance when combining data from different sites is suggested and future efforts should address these issues. Given that military members and Veterans may receive multiple scans over time from different machines, a clear awareness of these factors above will prove helpful.

Wilde, E.A., Bigler, E.D., Huff, T., Wang, H., Black, G.M., Christensen, Z.P., Goodrich-Hunsaker, N., Petrie, J.A., Abildskov, T., Taylor, B.A. and Stone, J.R., Tustison N.J., Newsome M.R., Levin H.S., Chu Z.D., York G.E., Tate D.F., 2016. Quantitative structural neuroimaging of mild traumatic brain injury in the Chronic Effects of Neurotrauma Consortium (CENC): Comparison of volumetric data within and across scanners. Brain injury, 30(12), pp.1442-1451.