

Control/Tracking Number: 10-ISC-A-2996-AHA

Activity: Abstract

Current Date/Time: 10/12/2009 5:43:00 PM

Multiparametric MRI ISODATA Analysis In The Assessment Of Acute Ischemic Stroke

Author Block: Panayiotis Mitsias, Mei Lu, Hassan Bagher-Ebadian, James R Ewing, Hamid Soltanian-Zadeh, Alissa Kapke, Michael Chopp, Henry Ford Hosp, Detroit, MI

Abstract: OBJECTIVES: The purpose of this study was to show that the computer segmentation algorithm Iterative Self-Organizing Data Analysis Technique (ISODATA), which integrates multiple MRI parameters (diffusion-weighted imaging [DWI], T2-weighted imaging [T2WI], and T1-weighted imaging [T1WI]) into a single composite image, is capable of defining the ischemic lesion in a time-independent manner equally as well as the MRI techniques considered the best for each phase after stroke onset (ie, DWI for the acute phase and T2WI for the outcome phase). METHODS: We measured MRI parameters of perfusion-weighted imaging (PWI), DWI and T2WI from patients at the acute phase (<24 hours), and T2WI at the outcome phase (3 months) of ischemic stroke. The clinical neurological deficit was graded with the National Institutes of Health Stroke Scale (NIHSS). The final functional outcome was graded with modified Rankin Score (mRS). We compared the ISODATA (and PWI and T2WI) lesion size with the acute DWI, and outcome T2WI lesion size, measured within the same slice at each phase. RESULTS: We studied 81 patients; 44 (56%) were women. The mean \pm -SD age was 64 \pm -14 years. The baseline NIHSS score was 9.7(\pm 8.0). The baseline DWI lesion size (one slice only) was 886(\pm 1019) mm². The time interval from stroke symptom onset to the acute MRI study was 12.3(\pm 5.3) hours. In the acute phase, the ISODATA lesion size had higher correlation with the DWI lesion size ($r=0.95$; $P<0.0001$) than the PWI lesion size ($r=0.81$; $P<0.0001$) or T2WI lesion size ($r=0.56$; $P<0.001$). In the outcome phase, the ISODATA lesion size was highly correlated with the T2WI lesion size ($r=0.92$; $P<0.0001$). ISODATA lesion size correlated better with 24 hour NIHSS score ($r:0.51$; $p=0.0001$) than DWI ($r:0.45$; $p=0.0006$) or PWI ($r:0.26$; $p=0.0025$) and better predicted outcome mRS ($r:0.37$; $p=0.01$ vs. $r:0.35$; $p=0.01$ for DWI, and $r:0.26$; $p=0.11$ for PWI). CONCLUSIONS: The integrated ISODATA method can identify and characterize the ischemic lesion independently of time elapsed since stroke onset. The ISODATA lesion size highly correlates with the acute DWI ischemic lesion size and the final T2WI infarct size, correlates with the acute neurological deficit and predicts the functional outcome. ISODATA lesion analysis can be useful in clinical stroke trials with extended therapeutic windows.

:

Author Disclosure Information: P. Mitsias, None; M. Lu, None; H. Bagher-Ebadian, None; J.R. Ewing, None; H. Soltanian-Zadeh, None; A. Kapke, None; M. Chopp, None.

Category (Complete): Diagnosis

Keyword (Complete): Acute Ischemic Stroke ; Diffusion-Weighted Image(DWI) ; Magnetic resonance imaging

Presentation Preference (Complete): Oral or Poster

Additional Information (Complete):

Yes or No: No

***Segment of Science:** Clinical Science

***Disclosure:** There are no unlabeled/unapproved uses of drugs or products.

ASA Awards (Complete):

: No, I will not apply for any award.

Marketing Survey Question (Complete):

: C. E-mail Invitation

Review Group : 7B