

Magnetic Resonance Imaging of Neuroendocrine Tumor Hepatic Metastases: Evaluation of Lesion Conspicuity and Interobserver Agreement of Lesion Measurements on Various Sequences

Brian Morse¹; Dalanda Diallo²; Daniel Jeong¹; Kerry Thomas¹;
Jonathan Strosberg¹

¹Moffitt Cancer Center; ²University of South Florida

Background: Prior work by Dromain et al showed that the best MR sequences to evaluate metastatic disease in the liver from NET were T2-weighted and arterial phase dynamic postcontrast (Dromain et al, Am J Roentgenol. 2003 Jan;180:121–8). There are newer MR sequences which may outperform T2-weighted and arterial phase images for evaluation of NETs. The goal of this study was to determine which magnetic resonance sequences provide the highest lesion conspicuity (measured using signal intensity and contrast to noise ratios) and produce lesion measurements with the highest interobserver agreement (measured using concordance correlation coefficient) for hepatic metastases from gastrointestinal neuroendocrine tumors.

Methods: Patients with metastatic NETs who had magnetic resonance imaging exams with both gadoxetate disodium and gadopentetate dimeglumine contrast within a six month span were identified, and 23 metastatic hepatic lesions were selected. Three radiologists and one medical oncologist measured greatest axial diameter of each lesion on the following sequences: T2-weighted (with and without fat suppression), T1-weighted (gradient-recalled echo and fat-suppressed), postcontrast (dynamic, delayed, and hepatobiliary phase) and diffusion-weighted. Signal intensity ratio ($SI_{\text{lesion}} / SI_{\text{liver}}$) and contrast to noise ratio ($[SI_{\text{lesion}} - SI_{\text{liver}}] / \text{noise}$) were calculated for all lesions on each sequence. Interobserver agreement for lesion measurements on each sequence was calculated utilizing concordance correlation coefficient.

Results: Diffusion-weighted sequences had the highest signal intensity ratio with percent change in signal intensity ranging from 147-187% (versus a range of 19.6-130% for other sequences). One hepatobiliary sequence had the highest contrast to noise ratio with a value of 41 (versus a range of 3.2-28.1 for other sequences). All sequences showed high interobserver agreement for lesion measurements, regardless of observer experience.

Conclusion: These results show that diffusion weighted and hepatobiliary phase sequences outperform most other MR sequences with regard to lesion conspicuity, but there is no improvement in interobserver agreement of lesion measurements.