

Functional MRI may predict response of hepatocellular carcinoma to chemoembolization

July 8 2010

A research team from United States investigated whether intra-procedural diffusion-weighted magnetic resonance imaging can predict response of hepatocellular carcinoma (HCC) during transcatheter arterial chemoembolization (TACE). Their results indicated that intra-procedural apparent diffusion coefficient changes of > 15 percent predicted 1-mo anatomical HCC response with the greatest accuracy, and can provide valuable feedback at the time of TACE.

Early knowledge of hepatocellular carcinoma (HCC) response to transcatheter arterial chemoembolization (TACE) is crucial for determining treatment success, timing of repeat treatment, and patient prognosis. Currently, magnetic resonance imaging (MRI) is used 1-3 mo after treatment to evaluate anatomical [tumor response](#), based upon changes in tumor size and contrast-agent enhancement. Alternatively, diffusion-weighted imaging (DWI) can be used as a functional imaging technique to depict thermally induced motion of water molecules. The extent of water mobility within biological tissues can be quantified by a parameter called the apparent diffusion coefficient (ADC). Recently, ADC values have been shown to change within days to weeks after therapy, which is earlier than changes seen by conventional HCC anatomical size assessment. However, no studies to date have reported the intra-procedural characteristics of ADC and whether these values can predict future tumor response at the time of chemoembolization.

A research article to be published on July 7, 2010 in the [World Journal of Gastroenterology](#) addresses this question. The research team led by Professor Reed A Omary, from Department of Radiology, Northwestern University, Chicago, used [functional magnetic resonance imaging](#) (MRI) to measure changes in tumor activity at the time of treatment, and compared them to tumor structural changes on conventional MRI at standard 1- and 3-mo follow-up periods.

Their results suggest that patients whose intra-procedural ADC values increase or decrease by $> 15\%$ are more likely to have a favorable anatomical tumor response 1 mo later.

This result is encouraging because early knowledge of HCC response after initial therapy is essential to revise prognosis and guide future therapy. Use of DWI and ADC mapping in conjunction with traditional anatomical imaging evaluation could further improve tumor response interpretation and subsequent treatment planning. At present, MR/Interventional radiology suites permit the acquisition of immediate quantitative functional imaging changes, in both tumor perfusion and now diffusion. Which of these two functional parameters is more effective as an intra-procedural biomarker to tailor HCC therapy awaits verification by future studies.

More information: Chung JC, Naik NK, Lewandowski RJ, Deng J, Mulcahy MF, Kulik LM, Sato KT, Ryu RK, Salem R, Larson AC, Omary RA. Diffusion-weighted magnetic resonance imaging to predict response of hepatocellular carcinoma to chemoembolization. *World J Gastroenterol* 2010; 16(25): 3161-3167.

www.wjgnet.com/1007-9327/full/v16/i25/3161.htm

Provided by World Journal of Gastroenterology

Citation: Functional MRI may predict response of hepatocellular carcinoma to chemoembolization (2010, July 8) retrieved 19 April 2024 from <https://medicalxpress.com/news/2010-07-functional-mri-response-hepatocellular-carcinoma.html>

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