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# *Reply:*

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## REPLY:

We appreciate Dr. Nabavizadeh's interest and comments on our article, "Application of 3D Fast Spin-Echo T1 Black-Blood Imaging in the Diagnosis and Prognostic Prediction of Patients with Leptomeningeal Carcinomatosis."[1] We agree that poorly suppressed blood vessels often mimic leptomeningeal enhancement on the black-blood imaging; in particular, slow-flowing blood in leptomeningeal veins, dilated arteries, or leptomeningeal collaterals can be incompletely suppressed using a variable flip angle refocusing pulse sequence.[2] However, we evaluated the consecutive sections of the images rather than the 1 image section, allowing anatomic differentiation between leptomeningeal vessels and leptomeningeal enhancement because the floating curvilinear enhancement pattern of leptomeningeal vessels is somewhat different from that in leptomeningeal carcinomatosis. The use of multiplanar reconstruction images may also be helpful in avoiding this kind of misinterpretation.

As Dr. Nabavizadeh has mentioned, among the various techniques for blood suppression on T1-weighted imaging, other methods such as the double inversion recovery technique may be an alternative to avoid this pitfall. However, the double inversion recovery technique requires longer acquisition times because of the time needed for spins to reach the null point.[3,4] This disadvantage becomes more problematic as spatial coverage increases, and it can be difficult to use routinely in clinical practice. However, we agree that further investigation is warranted to determine the best technique for blood suppression to avoid the above-mentioned pitfall.

Our alternative suggestion is that 3D gradient-echo T1-weighted MPRAGE images can be used with black-blood imaging for better differentiation between leptomeningeal vessels and leptomeningeal enhancement than with a single application of black-blood imaging, which also needs further study.

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