Authors' reply

Dear Sir,

We appreciate the interest shown by Sivrioglu *et al.* in our article. Some of the concerns raised by the authors have already been discussed in our article.[1] Nevertheless, we take this opportunity to further clarify the contentious issues.

We have been doing diffusion-weighted MRI (DW-MRI) as part of the protocol for renal lesion evaluation since 2008, employing b-values of 0 and 500 s/mm^2, and have published data from the same.[2,3] The present article was based on a retrospective review of patients who underwent DW-MRI for characterization of focal renal lesions and not primarily for evaluation of renal function. Through this study, we wanted to highlight an additional benefit of renal DW-MRI which we encountered, that apparent diffusion

coefficient (ADC) values may serve as an additional paradigm to identify and estimate the degree of renal dysfunction.

The ADC values in the renal cortex and medulla were not measured separately because as pointed out by previous studies, it is usually difficult to position the region of interest (ROI) cursor accurately in these areas.[4-7] In addition, there is loss of cortico-medullary differentiation in renal parenchymal disease, which makes the precise placement of ROIs separately on cortex and medulla impractical.[6-8]

Low ADC values in renal parenchymal disease can be explained both by reduced perfusion as well as by reduced water diffusion, and ADC values calculated from b-values of 0 and 500 s/mm^2 represent the combined effects of both. Such a monoexponential model using two b-values has been used by majority of previous investigators[4-7,9,10] because it is easy and straightforward to use. To separately evaluate diffusion and perfusion contributions, biexponential fitting model needs to be employed using a large range of b-values.[11] Increased acquisition time and complicated calculation software may, however, pose hindrance for its routine clinical use and such protocols are still in investigational stage.[11,12] Prospective studies based on biexponential model may provide insights into the relative contribution of diffusion and perfusion and whether these two factors separately correlate with the degree of renal dysfunction/parenchymal fibrosis. Our study was not planned with this objective, and as alluded to earlier, DW-MRI was done to evaluate renal mass lesions.

Majority of the studies on DW-MRI in kidney[4,6,7,9,10] have employed two b-values with lower b-value 0 s/mm^2 and higher b-value ranging from 500 to 800 s/mm^2. The maximum b-value of 500 is an optimal compromise between adequate diffusion weighting and image quality on 1.5 T, since higher b-values are associated with decrease in signal-to-noise ratio. Use of more than two b-values in the monoexponential model may not have any beneficial effect; rather, it may decrease the image quality.[10,12]

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