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Re: Quantitative assessment of bladder tissue properties using magnetic resonance fingerprinting: a pilot feasibility study in healthy volunteers

Dear Editor,

We read with interest the Correia et al. paper on magnetic resonance fingerprinting (MRF) of healthy human bladder wall by T_1 and T_2 relaxation times at 3-T scanner[1]. However, Table 1 values on bladder wall thickness ≤ 2 mm for three female subjects even when pre-void urine volume is 56 mL symbolizes errors in their technique, likely stemming from the use of T_2 weighted scans for measuring bladder wall thickness[2], contrary to the recommendations of Vesical Imaging Reporting and Data System (VI-RADS)[3]. The gender-neutral thickness of human bladder wall is authenticated to be ≥ 3 mm at the distension of ≥ 200–300 mL of urine or instilled agents[2], which informs the recommended depth of 2 mm for intradetrusor injection of onabotulinumtoxinA. If the Table 1 values are correct, then intradetrusor injections would be causing bladder perforation in majority of patients. Authors could have avoided these missteps if they had chosen to read our extensive work on voxel-wise mapping of T_1 relaxation times in rodent and human bladder[2] which is freely available on the PubMed central. We achieved sub-millimeter resolution for variable flip angle T_1 mapping by fast low angle shot in volume interpolated breath hold examination over a 17s breath hold at each flip angle. While authors speculated on the differences in T_1 relaxation times of normal and diseased bladder wall, we[2] were the first to measure T_1 relaxation time in the bladder wall of interstitial cystitis/bladder pain syndrome at 3-T and others have reported higher T_1 relaxation time in bladder wall of overactive bladder patients at 1.5-T scanner[4]. Despite numerous errors in reported values and lack of clarity on imaging sequence used for T_1 mapping, authors certainly deserve applause for drawing attention to the potential use of MRF in urology.

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Reply

Dear Correspondent

We appreciate the interest in our bladder magnetic resonance fingerprinting (MRF) study[1] but must correct several misstatements. As noted, the bladder wall thickness values reported in Table 1 were measured on sagittal and axial T2-weighted images primarily to provide anatomical context, not to establish normative thickness values, which was beyond the scope of our study. Although the correspondent referenced the VI-RADS, it should be noted that our work was not designed or performed according to VI-RADS recommendations. The reported values of ≤ 2 mm occurred in pre-void bladders of young adult females, in whom thinner walls are physiologically expected. Previous ultrasonographic studies have demonstrated normal bladder wall thickness in healthy adult women and men to be approximately 3.0 ± 1 mm and 3.3 ± 1 mm, respectively[2], and that thickness appears to increase with age[3]. Because bladder wall thickness varies substantially with bladder distension, the observed values represent physiological variation rather than a technical "error".

Our methodology section clearly specifies the MRF acquisition parameters and reconstruction approach used for T1 and T2 estimation. The MRF technique was applied here to explore its feasibility for quantitative bladder wall mapping in a single, efficient acquisition. We concur that MRF and conventional quantitative MRI techniques both contribute to advancing the understanding of bladder physiology and pathology, and we welcome continued dialogue and research in this evolving field.

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