MR and the metastatic lymph node

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Involvement of pelvic lymph nodes in patients with gynecological and urological malignancies is a poor prognostic factor correlating with survival and modifying treatment options [1, 2]. Computerized tomography (CT) and conventional Magnetic Resonance Imaging (MRI) are the methods of choice for lymph node staging used in daily practice.

Up to date lymph node staging by cross-sectional imaging is based on size and shape criteria only, however micrometastases can also be present in up to 30% of normal sized lymph nodes in patients with pelvic malignancies as observed on histopathology after extended pelvic lymph node dissection and nodes can also be enlarged due to inflammatory changes [3-7]. Several years ago ultrasmall particles of iron oxide (USPIO) as new MR contrast agent have substantially improved the diagnostic accuracy of lymph node staging compared to conventional MRI with reported accuracies of up to 97.3% [8-10]. Unfortunately, USPIO is not commercially available and therefore new approaches to differentiate benign from malignant lymph nodes are required. Ferumoxytol is used as iron replacement therapy in chronic kidney disease and might be used off label as blood pool agent, however no prospective studies to demonstrate its efficacy for lymph node staging have been reported so far. Diffusion-weighted MRI (DWI) is a noninvasive method that provides microstructural information on the underlying tissue. Up to date several studies mainly in the pelvis have shown promising results to detect lymph nodes and also to allow differentiation between benign and malignant nodes with reported sensitivities of 79-100% and specificities of 74-98.3% based on the underlying apparent diffusion coefficient (ADC) value with lower ADCs reported for malignant nodes compared to benign ones [11-16]. In these studies any size of lymph nodes has been included with the smallest short axis diameter of 5mm. Furthermore, there is an overlap between ADC values of benign and malignant nodes. In contrast to these promising results allowing the detection of metastatic nodes based on the underlying ADC value, other investigations could not confirm these findings [17-19]. This discrepancy might be explained by the following differences of the published studies : inclusion criteria, various lymph node sizes, region of interest delineation, different ADC values (min, median, mean, relative), technical issues, field strength, artifacts, antiperistaltic drugs, etc. Therefore, further studies with histopathological correlation based on extended pelvic lymph node dissection as gold standard and improved imaging quality are needed to especially reduce the high rate of false positive nodes detected on DWI . The reason of false positive nodes is due to the underlying

microstructure of benign alterations such as lipomatosis, sinus histiocytosis and follicular hyperplasia also leading to impeded diffusion and therefore to a decrease in ADC. Meticulous comparison of DWI and morphological findings on conventional MRI might help in overcoming this drawback and minimize the high rate of false positive lymph nodes. Combination of USPIO and DWI might facilitate and improve lymph node staging in the future provided that USPIO will be available [20, 21].

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