Whole Body MR for Visualizing Metastatic Prostate Cancer

Prostate cancer is the second most common cancer in men worldwide, accounting for 15% of all new cancer cases.¹ Great strides have been made in the detection of prostate cancer and corresponding drop in mortality rates due to the introduction of the prostate specific antigen (PSA) test in the late 1980s. This test has led to a 65% reduction in men being initially diagnosed with metastatic cancer due to early detection of the disease.² But metastatic disease remains a major therapeutic challenge.
A 2012 study published in *European Urology* by Professor Lecouvet and colleagues examined the use of whole body MR with DWI as a potential single-test for detecting metastatic prostate cancer compared to using both scintigraphy and CT as the other visualization tools. The authors concluded that whole body MR outperformed scintigraphy in more clearly allowing the identification of bone metastases and performed as well as CT in helping clinicians with their evaluation of enlarged lymph nodes.

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Professor Frederic Lecouvet

Patients with metastatic disease may benefit from recent advances in therapy e.g., chemotherapy, novel endocrine agents, and immunotherapy, which may allow a significant prolongation of survival but also help to improve quality of life. These modern treatments require optimal metastases detection before their initiation, and monitoring of their efficacy by evaluation of lesion response to help the clinician in the sequencing of these drugs.

While MR is now routinely utilized by clinicians in determining a diagnosis and studying the localized extent of prostate cancer, Frederic Lecouvet, MD, PhD, Professor of Radiology and Head of the MRI Unit in the Radiology Department at the Cliniques Universitaires Saint Luc, Université Catholique de Louvain (UCL), in Brussels, believes that whole body MR is an excellent tool for visualizing metastatic disease and is one of the more promising tools that assists the clinician in determining the global extent of the disease.

“Whole body MR is gaining interest and acceptance as a tool for lesion visualization in metastatic cancer and hematologic malignancies,” says Professor Lecouvet. Metastatic prostate cancer most often manifests in the bones and lymph nodes.

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Frederic Lecouvet, MD, PhD, is a Professor of Radiology and Head of the MRI Unit in the Radiology Department at the Cliniques Universitaires Saint Luc, Université Catholique de Louvain, in Brussels, Belgium.
Whole body MR that includes anatomic, most often T1- and STIR-weighted images, and functional sequences, diffusion-weighted images, offers the opportunity to target all metastases—both bone and lymph nodes—using only one examination,” says Professor Lecouvet. “Whole body MR is an effective tool we use to obtain a clear extent of the metastatic disease in order to determine treatment planning decisions. There are other patient...
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enabled the clinicians to evaluate areas that are typically difficult to study with conventional 2D sequences, such as the ribs, sternum, skull, abdomen/pelvis, and posterior vertebral elements.4

"Scientific evaluation of the value of 3D compared to 2D sequences has shown improvements in terms of signal, thin sections, and multiplanar reconstructions," Professor Lecouvet explains. In addition to detection with 3D T1-weighted, it is possible to accurately delineate the precise benefits as well," he explains. "The patients are provided with optimal information on the metastases in one step.

While Professor Lecouvet is very excited at the potential for utilizing whole body MR with DWI, he also envisions a bright future for the use of 3D (at this time T1-weighted) MR sequences as the primary anatomic imaging component of an MR examination to assist clinicians in their evaluation of metastatic prostate cancer.

As reported by Professor Lecouvet and his colleagues in the April, 2015, issue of Radiology, 3D T1-weighted MR provides significantly better SNR and CNR compared with 2D MR sequences. With 3D T1-weighted, the authors reported it was as good or better for visualizing bone metastases and captured "significantly more node metastases as well as significantly more node-positive patients," compared to whole body 2D sequences. In particular, 3D MR enabled the clinicians to evaluate areas that are typically difficult to study with conventional 2D sequences, such as the ribs, sternum, skull, abdomen/pelvis, and posterior vertebral elements.4

Figure 1 (cont.). Fused T1 and DWI images clearly illustrate the lesions (E, F). Sagittal reformatted slice enables reliable study of the spine showing no metastases in this case (G).
lymphoma, where whole body MR can challenge FDG PET for bone and soft tissue lesion detection, and metastatic breast cancer, which like prostate cancer often metastasizes to the bone. As a result of Professor Lecouvet’s work and others in the field, whole body MR utilizing both functional DWI and morphologic 3D T1-weighted sequences could become an ideal, one-step imaging test for metastases imaging in patients with prostate cancer.

References.

The ability of whole body MR to overcome the challenges that other imaging methods may have, such as bone scintigraphy, is transposable to imaging hematologic cancers, such as multiple myeloma, where whole body MR challenges radiographic skeletal surveys and has been shown to outperform for lesion detection. “The ability of whole body MR to overcome the challenges that other imaging methods may have, such as bone scintigraphy, is transposable to imaging hematologic cancers, such as multiple myeloma, where whole body MR challenges radiographic skeletal surveys and has been shown to outperform for lesion detection,” he adds. Professor Lecouvet also sees potential use of MR in evaluating lymphoma, where whole body MR can challenge FDG PET for bone and soft tissue lesion detection, and metastatic breast cancer, which like prostate cancer often metastasizes to the bone. As a result of Professor Lecouvet’s work and others in the field, whole body MR utilizing both functional DWI and morphologic 3D T1-weighted sequences could become an ideal, one-step imaging test for metastases imaging in patients with prostate cancer.

Frederic Lecouvet, MD, PhD, is a Professor of Radiology and Head of the MRI Unit in the Radiology Department at the Cliniques Universitaires Saint Luc, Université Catholique de Louvain (UCL) in, Brussels, Belgium. He completed both his medical training and PhD at the UCL and has held many specialist teaching appointments focusing on imaging and specifically the use of MRI. Professor Lecouvet’s areas of expertise include imaging of the spine, joint and cartilage, orthopedic, rheumatologic and oncologic conditions, particularly bone tumors and metastases, and assessing response of lesions to modern treatments. Imaging in cancer and metastatic disease is one of the main fields of development for his research projects.