MedicalXpress

High-tech 'whole body' scan could improve treatment of bone marrow cancer

January 28 2014

The new type of magnetic resonance imaging (MRI) scan could improve care for a type of cancer called myeloma and reduce reliance on bone marrow biopsies, which can be painful for patients and often fail to show doctors how far the disease has spread.

The research is published today (Tuesday) in the journal *Radiology* and was carried out by researchers at The Institute of Cancer Research, London, and The Royal Marsden NHS Foundation Trust.

It received funding from Cancer Research UK and the National Institute for Health Research Clinical Research Facility in Imaging, with additional funding from the EPSRC.

The new whole-body, diffusion-weighted MRI scans showed the spread of cancer throughout the bone marrow of patients with myeloma - one of the most common forms of blood cancer - more accurately than standard tests. The scans also showed whether the patients were responding to cancer treatments.

In the study 26 patients had whole-body, diffusion-weighted MRI scans before and after treatment. In 86% of cases, experienced doctors trained in imaging were able to correctly identify whether patients responded to treatment. The doctors also correctly identified those patients who weren't responding to treatment 80% of the time.

Using the scanning technique, doctors could pinpoint exactly where the

cancer was in the bones, with the results available immediately. Conventional tests include bone marrow biopsies and blood tests but neither shows accurately where the cancer is present in the bones.

The researchers also assessed the visible changes on the MRI scans, using a measurement called the Apparent Diffusion Coefficient (ADC), which records how restricted water movement is within tissues. Changes in this measurement correctly identified treatment response for 24 of 25 myeloma patients.

The new scan was able to visualise cancer in almost all bones in the body, with only the skull remaining difficult to image partly because of the frequency of metal dental implants and fillings. The researchers also found the new methods were suitable for more patients than conventional tests; for example, seven patients had bone marrow biopsies but their samples were found to be inadequate for analysis. Performing another biopsy could be traumatic and painful, and may not provide any new information.

Professor Nandita deSouza, Professor of Translational Imaging at The Institute of Cancer Research and Honorary Consultant at The Royal Marsden, said: "This is the first time we've been able to obtain information from all the bones in the entire body for myeloma in one scan without having to rely on individual bone X-rays. It enables us to measure the involvement of individual bones and follow their response to treatment.

"The results can be visualised immediately; we can look on the screen and see straight away where the cancer is and measure how severe it is. The scan is better than blood tests, which don't tell us in which bones the cancer is located. It also reduces the need for uncomfortable biopsies, which don't reveal the extent or severity of the disease."

Dr Faith Davies, member of the Myeloma Targeted Treatment Team at The Institute of Cancer Research and Honorary Consultant at The Royal Marsden, said: "Myeloma can affect bones anywhere in the body, which is why this study is so important. We've shown that whole body MRI scans can accurately monitor how myeloma patients are responding to treatment, allowing doctors to make more informed decisions. With this new scan, if a treatment isn't working the patient can be moved onto new therapies that might be more effective much more quickly.

"This is a small study, so our next step will be to try out the technology in more patients and refine it. In the future we hope this new tool will help doctors extend the life of more myeloma patients. "

Julia Frater, Cancer Research UK's Senior Cancer Information Nurse, said: "Finding kinder ways to monitor how patients respond to treatment is really important, particularly in the case of myeloma where taking bone marrow samples can be painful. This research demonstrates how an advanced imaging technique could provide a whole-skeleton 'snapshot' to track the response of tumours in individual bones. Finding ways to make treatments gentler and improve the experience for patients is an important focus for Cancer Research UK and the research we fund."

Provided by Institute of Cancer Research

Citation: High-tech 'whole body' scan could improve treatment of bone marrow cancer (2014, January 28) retrieved 23 April 2024 from https://medicalxpress.com/news/2014-01-high-tech-body-scan-treatment-bone.html

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