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AXIAL SPONDYLOARTHRITIS: NEW IMAGING TECHNIQUES IN THE SACROILIAC JOINT

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M Chen, P Bird, L Jans. Emerging imaging techniques in spondyloarthritis: dual-energy computed tomography and new MRI sequences. *Rheum Dis Clin North Am.* 2020. 46(2): 287-296.

M Chen, N Herregods, JL Jaremko, P Carron, D Elewaut, FVd Bosch, L Jans. Bone marrow edema in sacroiliitis: detection with dual-energy CT. *Eur Radiol.* 2020. 30(6):3393-3400.

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L Jans*, **M Chen***, D Elewaut, FVd Bosch, P Carron, P Jacques, R Wittoek, JL Jaremko, N Herregods. MRI-based synthetic CT for the detection of structural lesions in patients with suspected sacroiliitis: comparison with MRI. *Radiology.* 2020 Dec 22;201537 (*Co-first authors)

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Summary

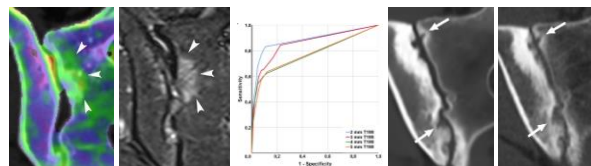
Spondyloarthritis (SpA) is a collective name for a group of inflammatory disease. In Western Europe, 0.5%-1.0% of the population have this disease. Based on clinical features, SpA is divided into two groups: axial SpA and peripheral SpA. Patients with axial SpA have symptoms mainly in the axial skeleton, namely the spine and pelvis. They suffer from a chronic low back pain with stiffness and decrease in mobility. The symptoms typically start in their 20s (no later than 45 years old). The disease can lead to an ankylosed spine and sacroiliac joints in the late stage, especially when not appropriately treated.

The sacroiliac joint is the joint between the sacrum and ilium in the pelvis. The changes in axial SpA usually start in the sacroiliac joint. Imaging of the sacroiliac joint is important for diagnosis of this disease and follow-up during treatment. Modalities that are frequently used in clinical practice are radiography and MRI. Radiography can depict structural lesions of the sacroiliac joint, which appear relatively late in the disease. MRI is good for early diagnosis of axial SpA, active inflammation (the most important change: bone marrow edema (BME)) and structural lesions can both be seen on MRI.

There are challenges in imaging of the sacroiliac joint: 1) Some patients are contraindicated to MRI, but require detection of BME in the sacroiliac joint; 2) The accuracy and reliability for depicting structural lesions on MRI are not so satisfying.

In this thesis, new imaging techniques are studied to overcome these challenges. The purpose of this thesis was to provide an alternative choice for BME detection in patients with axial SpA, and to improve detection of structural lesions on MRI. Three projects were performed in this thesis:

- ① Dual-energy CT (DECT) was evaluated for BME detection in the sacroiliac joint in a group of patients with suspected axial SpA. We found that DECT has a moderate sensitivity and high specificity in BME detection, and can be useful in clinical practice.
- ② Different slice thickness of T1WI MRI for erosion detection was compared. T1WI is the conventional sequence used for erosion evaluation on MRI, but the optimal scanning slice thickness was unknown. We found that a slice thickness of 2 or 3 mm should be used when scanning T1WI of the sacroiliac joint, this can improve the diagnostic accuracy of erosions for the patient.
- ③ The 'CT-like' MRI-based synthetic CT (sCT) was applied for structural lesion detection. We found the sCT can detect these lesions with higher accuracy and reliability than routine T1WI.



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