

RESULTS

For the purposes of this exercise, scores for the wrist and MCP sites were combined to provide total scores for each of erosions, synovitis, and bone edema. The ICC for the change scores for the 3 readers, and for paired readers, are presented in Table 1. Overall, the erosion and synovitis ICC were very good and close to those for high-field technology, whereas the results for bone edema were poor. The findings for erosion and synovitis were comparable with the average-measure ICC from another study using 3 experienced readers evaluating longitudinal 1.5 T images (where the ICC for erosion, synovitis, and bone edema were 0.97, 0.95, and 0.96, respectively)⁵. Table 2 shows the SDD data, and importantly, the SDD presented as a percentage of the actual maximal score achieved. These percentage SDD data demonstrate acceptable measurement error compared to both previous MRI and radiographic scoring data⁶. Again, the bone edema results demonstrated the highest SDD.

DISCUSSION

This multireader, multicenter low-field MRI scoring exercise has demonstrated high agreement for change scores of damage and synovitis, with agreement comparable to that from previous high-field MRI studies. This was despite no calibration of the 3 readers involved, although all 3 were conversant with the European League Against Rheumatism-OMERACT scoring atlas. There was, however, poor agreement on the

Table 1. Intraclass correlation coefficient (ICC) results for the 3 readers. Values are single measure ICC.

| | Bone Erosion | Synovitis | Bone Edema |
|---------------------|--------------|-----------|------------|
| ICC* | 0.91 | 0.89 | 0.24 |
| ICC — readers 1,2,3 | 0.78 | 0.72 | 0.09 |
| ICC — readers 1,2 | 0.85 | 0.72 | 0.04 |
| ICC — readers 1,3 | 0.70 | 0.60 | 0.09 |
| ICC — readers 2,3 | 0.76 | 0.80 | 0.32 |

* Average measure ICC.

Table 2. Smallest detectable difference (SDD) results for change scores for the 3 readers.

| | Readers | Average Difference | SDD | % SDD of Actual Max |
|--------------|---------|--------------------|------|---------------------|
| Bone erosion | 1,2 | 1.2 | 5.4 | 5 |
| | 1,3 | 1.9 | 6.3 | 6 |
| | 2,3 | 0.4 | 7.0 | 7 |
| Synovitis | 1,2 | -2.1 | 5.3 | 27 |
| | 1,3 | -1.2 | 6.9 | 34 |
| | 2,3 | 0.5 | 4.4 | 23 |
| Bone edema | 1,2 | -1.4 | 14.3 | 48 |
| | 1,3 | -1.2 | 16.1 | 54 |
| | 2,3 | 0.2 | 6.3 | 21 |

% SDD of actual max, SDD as a percentage of the actual maximum score obtained.

change scores for bone marrow edema. It is worth noting that caution must be applied in generalizing this information to all E-MRI machines, which differ substantially in their image quality and in their ability to perform adequate STIR sequences that are required to identify bone edema. Our findings support the use of low-field MRI for use in clinical trials with erosion and synovitis as endpoints.

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