Comparing a computer with humans when scoring MRI images of ankylosing spondylitis patients

Full abstract title: Machine learning based Berlin scoring of magnetic resonance images of the spine in patients with ankylosing spondylitis from the MEASURE 1 study


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Please note that this summary only contains information from the full EULAR 2020 scientific abstract and selected supporting references. The results of this study may not reflect those of other studies. This summary is not intended to provide medical advice.

Why was this study done?

To find out whether computers would score images of people with ankylosing spondylitis (AS) more reliably than human experts.

AS is part of a group of long-term diseases affecting the back called axial spondyloarthritis (axSpA). The axSpA spectrum includes AS, in which joint damage is generally visible on X-ray, and non-radiographic axial spondyloarthritis (nr-axSpA), in which joint damage is not visible on X-ray.

Why does this matter?

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In diseases such as AS, magnetic resonance imaging (MRI) is a painless way to help diagnose and monitor the disease that is more sensitive than X-ray. Measuring changes in the images produced by MRI scans is an important way to find out if a treatment is working. Doctors can also track how severe the disease is using a scoring system. However, these images are difficult to interpret and can be affected by personal opinion. The same doctor examining the same image may give it a different score each time they examine it. The process is also time-consuming and therefore costly.

The study compared the scores a computer gave to MRI images of AS patients with those given by two separate human doctors.

The computer and doctors were asked to score MRI images of AS patients with bone marrow edema, a condition where fluids in the bone marrow build up and cause swelling. The computer and doctors were shown each image 10 times to see how variable their scoring was and to allow the computer to get better at scoring each image with experience (machine learning).

This study provides early data suggesting that computers may be able to score MRI images of AS patients correctly, but that there is some room for improvement. Scoring of images by computers could save time for doctors and money for healthcare systems, as well as improving the consistency of results. Computers may also spot extra information in the images that cannot be seen with the human eye.

What did this study look at?

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What did this study find?

Images from 108 patients

STEP 1
Assessed by 1 computer and by 2 different human doctors

STEP 2
Images given a score of 1 or 0 by the computer and each of the doctors

STEP 3
Process was repeated 10 times per image. Overall, 10,988 scores were produced

STEP 4
Scores given to each image were compared

The study found the computer’s scores showed ‘moderate’ agreement with the scores given by the two doctors.

The computer scored approximately 7 out of 10 images the same as the doctors

The human doctors scored approximately 7 out of 10 images the same each time they saw them

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Glossary

Ankylosing (an-kih-low-sing): abnormal stiffening and immobility of a joint due to fusion of the bone.

Axial spondyloarthritis (axSpA): a painless inflammatory disease that primarily affects the spine and sacroiliac joints (long-term). The seek pain that may affect the pelvis.

Machine learning: the study of computer programs that improve automatically through experience (a type of artificial intelligence).

Spondylitis (spon-dill-eye-tiss): inflammation of the spine or vertebrae.

Who sponsored this study?

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References