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Using machine learning to predict the likelihood of achieving relief from psoriatic arthritis

Full abstract title: Machine learning identifies an association between pre-existing radiographic damage and long-term clinical outcomes with secukinumab therapy in patients with psoriatic arthritis

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Date: November 2020

Please note that this summary only contains information from the full ACR 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 use machine learning (a type of artificial intelligence) to investigate if the amount of joint damage seen on X-ray could predict response to treatment with secukinumab in psoriatic arthritis (PsA) patients.

PsA is a type of inflammatory arthritis that occurs in some patients with psoriasis. It results in swollen and painful joints and tendons, and can happen in any area of the body.[1] Research suggests continued inflammation from PsA can result in joint damage later on.[1] Joint damage in patients with PsA has a substantial impact on physical function, quality of life and survival.[2] Therefore, preventing further damage that is visible on an X-ray is one of the main goals when treating people living with PsA.

Secukinumab is a type of medication called a biologic. It helps reduce inflammation by blocking one of the proteins that activates inflammatory cells.[3]

What did this study look at?

This study looked at data from two previous studies to identify which patients had joint damage on an X-ray at the start of the study and how this related to the number of swollen/tender joints they had, as well as their response to treatment with secukinumab.

Machine learning was used to look back at data from two clinical trials: **FUTURE 1 and FUTURE 5**

1,554 patients* with PsA

STEP 1
Assessed how many patients had joint damage on an X-ray at the start and whether there was a relationship between this damage and how much joint swelling and tenderness patients were experiencing

STEP 2
The effect of secukinumab treatment on these symptoms was then studied

STEP 3
Machine learning looked for a relationship between patients' response to secukinumab treatment and the amount of joint damage at the start of the study

*Patients receiving secukinumab 75 mg, 150 mg or 300 mg were included in this analysis

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What did this study find?

Patients who had experienced symptoms for the longest time before diagnosis had the highest levels of joint damage seen on X-ray.

There was a strong relationship between the amount of joint damage seen on an X-ray and the amount of tenderness and swelling experienced by the patient.

Patients treated with secukinumab had reductions in the number of swollen and tender joints from as early as Week 4 (1 month) with continued reductions through Week 52 (1 year), regardless of how much joint damage was seen on an X-ray at the start of the study.

The amount of joint damage seen on an X-ray before treatment with secukinumab strongly predicted the likelihood of a patient achieving minimal disease activity (almost complete reduction in joint swelling and tenderness) after 1 year.

Week 16

2 out of 10 patients achieved minimal disease activity following treatment with secukinumab, regardless of how much joint damage was seen on X-ray at the start of the study

Week 52

4 out to 10 patients with **low levels** of damage seen on X-ray before the start of the study achieved minimal disease activity on secukinumab

3 out of 10 patients with **high levels** of damage seen on X-ray before the start of the study achieved minimal disease activity on secukinumab

Safety
The safety of secukinumab was consistent with previous studies in psoriasis and PsA.

Why does this matter?

This analysis showed that joint swelling and tenderness was strongly related to joint damage.

Patients with the highest joint damage were less likely to reach almost complete symptom relief (minimal disease activity).

Given the debilitating symptoms patients with PsA experience, it is important that treatments are developed that address all manifestations of the disease. Tools like machine learning can be beneficial by identifying relationships between symptoms and joint damage, as well as showing the effects of treatment options on symptom relief and reducing further joint damage.

Glossary

Biologic medicine:
a treatment made using living organisms, rather than being chemically synthesized.

Inflammation:
the body's immune response to an irritant, which involves a variety of cells that release different substances to help the body fight the infection. In some diseases, the immune cells can attack the body by mistake – this is known as an autoimmune disease.

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

Minimal disease activity:
almost complete resolution of joint symptoms, with one or no swollen or tender joints.

Psoriatic arthritis (PsA)
[saw-ree-at-ik ar-thry-tiss]:
a form of arthritis that affects some people with psoriasis. In PsA, inflammation results in swollen and painful joints and tendons, nail psoriasis, axial symptoms, and swelling of the fingers and toes.

Who sponsored this study?

Novartis Pharma AG, Basel, Switzerland sponsored both this study and the writing of this plain language media summary.

Further information

More on the FUTURE 1 study can be found here: https://clinicaltrials.gov/ct2/show/NCT01392326

More on the FUTURE 5 study can be found here: https://clinicaltrials.gov/ct2/show/NCT02404350

References

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2. Lee S, et al. P T. 2010;35(12):680–689.
3. Blair HA. Drugs. 2019;79(4):433–443.