

Maintaining sufficient vitamin D levels may help to prevent rheumatoid arthritis

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Vitamin D. Credit: University of Birmingham

Maintaining sufficient vitamin D levels may help to prevent the onset of inflammatory diseases like rheumatoid arthritis, research led by the University of Birmingham has discovered.

The research also found that while Vitamin D can be effective at preventing the onset of inflammation, it is less effective once inflammatory [disease](#) is established because diseases such as [rheumatoid arthritis](#) leads to vitamin D insensitivity.

Another key finding of the research was that the impact of vitamin D on inflammatory disease cannot be predicted using [cells](#) from healthy individuals or even from the [blood](#) of [patients](#) with inflammation as cells from the disease tissue are very different.

The researchers concluded that if vitamin D is to be used in patients with rheumatoid arthritis, clinicians may need to prescribe much higher doses than currently employed or provide a treatment that also corrects the vitamin D insensitivity of immune cells within the joint.

In addition to its well-established actions on the skeleton, vitamin D is a potent modulator of the immune system. In particular, vitamin D can suppress inflammation in autoimmune diseases such as rheumatoid arthritis. Patients with rheumatoid arthritis are frequently vitamin D deficient and may receive vitamin D supplementation.

The study, published in the *Journal of Autoimmunity*, involved using paired peripheral blood and synovial fluid from the inflamed joint of patients with rheumatoid arthritis.

Professor Martin Hewison, of the University of Birmingham's Institute of Metabolism and Systems Research, said: "Our current understanding of vitamin D and rheumatoid arthritis is based on studies of patient blood which may not truly represent the situation at the site of inflammation - the joints.

"We therefore investigated responses to the active form of vitamin D in immune cells from the inflamed joints of patients with rheumatoid arthritis.

"Compared to blood from the same patients, the inflamed joint immune cells were much less sensitive to active vitamin D.

"This appears to be because immune cells from the joints of rheumatoid arthritis patients are more committed to inflammation, and therefore less likely to change, even though they have all the machinery to respond to vitamin D."

Dr Louisa Jeffery, also of the University of Birmingham, said: "Our research indicates that maintaining sufficient vitamin D may help to prevent the onset of [inflammatory diseases](#) like rheumatoid arthritis.

"However, for patients who already have rheumatoid arthritis, simply providing vitamin D

might not be enough. Instead much higher doses of vitamin D may be needed, or possibly a new treatment that bypasses or corrects the vitamin D insensitivity of immune cells within the joint."

Senior author Professor Karim Raza, also of the University of Birmingham, said: "Our findings were unexpected as we initially thought that cells from the inflamed rheumatoid joint would respond just as well to vitamin D as cells from the blood. The fact that they don't has important implications for how we think about using vitamin D to treat [inflammation](#)

"Unlike previous studies we isolated different immune cell types from the actual site of disease to determine whether specific subsets of [immune cells](#) (specific T cell groups) have equal sensitivity to vitamin D."

This is the first research of its kind to characterise the effects of vitamin D in both peripheral blood and inflamed joints of patients with inflammatory disease.

The study, carried out in collaboration with Professor David Sansom at University College London, is part of an ongoing research project which first began in 2011.

The university now hopes to embark on new [research](#) to determine why rheumatoid [arthritis](#) leads to [vitamin](#) D insensitivity, how we can overcome this and whether this effect is seen in other inflammatory diseases.

More information: Jeffery et al (2017).

'Decreased sensitivity to 1,25-dihydroxyvitamin D3 in T cells from the rheumatoid joint'. *Journal of Autoimmunity*.

Provided by University of Birmingham

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