

# Molecular imaging gets to the root of rheumatoid arthritis

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Rheumatoid arthritis causes chronic pain for almost half of adults by the time they retire, but a new molecular imaging technique can visualize inflammation in the joints, giving doctors a clear read on chronic pain and possible joint destruction, say researchers at the Society of Nuclear Medicine and Molecular Imaging's 2014 Annual Meeting.

In order to image arthritis inside the [joints](#), researchers used multiple [molecular imaging](#) systems, [positron emission tomography](#) (PET) and single photon emission tomography (SPECT), both of which image physiological processes with the help of specialized detectors that pick up signals from injected radionuclide imaging agents. In this case researchers evaluated anti-fibroblast activation protein (FAP) antibodies involved in the inflammation associated with rheumatoid arthritis. This was made possible with radiotracers that combine the molecular compound 28H1, which can bind to FAP in the body, with the radionuclides In-111, used in conjunction with SPECT imaging systems, and Zr-89, used with PET systems.

"This research is novel because radiolabeled anti-FAP antibodies have never been used before in molecular imaging for rheumatoid arthritis," remarked Peter Laverman, PhD, assistant professor of nuclear medicine from the department of radiology and [nuclear medicine](#) at Radboud University Medical Center in Nijmegen, The Netherlands. "These antibodies are used for cancer imaging, but can also be used to image FAP expressed on activated fibroblasts in arthritic joints. We found a high accumulation of radiolabeled anti-FAP antibodies in arthritic joints

using SPECT and PET imaging."

This was a preclinical study using small animal scanners. Results of the research showed that both In-111 28H1 and Zr-89 28H1 showed significantly increased imaging agent uptake, or engagement, in inflamed joints. In fact, that uptake was three to four times higher with these agents than another antibody agent evaluated as a control. Researchers also evaluated a very commonly used imaging agent, FDG, to image the inflammation, but uptake of this agent was not associated with the severity of inflammation. This experimental model proved that 28H1 tagged with either In-111 or Zr-89 is a superior method for imaging arthritis.

"To the best of our knowledge, high-contrast [images](#) of this kind were unheard of until now," said Laverman. He estimated that it may take two or more years to accumulate enough research to get the agents approved for arthritis imaging in mainstream clinical practice.

Rheumatoid arthritis is a disease wherein the body's immune system attacks its own joints and other tissues, causing chronic inflammation. It is not well understood why this autoimmune disorder develops.

An estimated 52.5 million Americans report having some form of arthritis, [rheumatoid arthritis](#), gout, lupus or fibromyalgia. One in five adults and almost 50 percent of those age 65 years or older have been diagnosed with arthritis by a doctor, according to 2013 data from the U.S. Centers for Disease Control and Prevention (CDC).

**More information:** Scientific Paper 329: Peter Laverman, Danny Gerrits, Tessa van der Geest, Marije Koenders, Wim Oyen, Otto Boerman, Radboud University Medical Center, Nijmegen, Netherlands; Tapan Nayak, Hoffmann-La Roche, Basel, Switzerland; Anne Freimoser-Grundschober, Christian Klein, Roche-Glycart AG, Schlieren,

Switzerland, "PET and SPECT imaging of rheumatoid arthritis with radiolabeled anti-FAP antibody correlates with severity of arthritis," SNMMI's 61th Annual Meeting, June 7, 2014, St. Louis, Missouri.

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