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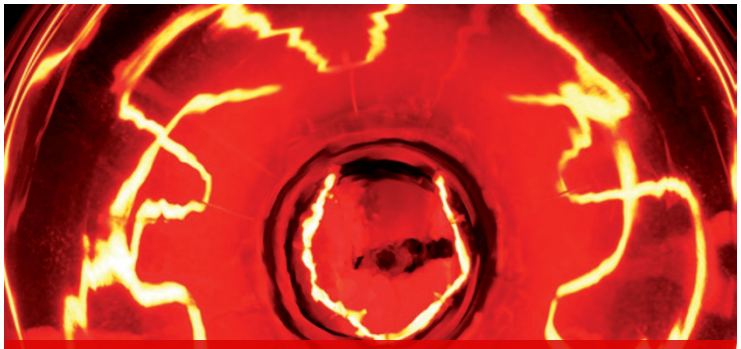

Holger Burmeister/Alamy

EXPERIMENTAL ARTHRITIS

In vivo noninvasive molecular optical imaging of disease

The severity of inflammatory arthritis in mice can now be assessed *in vivo* by noninvasive optical imaging, according to a paper from Marion Chan and colleagues published in *Arthritis Research & Therapy*.

"An *in vivo* imaging assay to assess arthritis noninvasively has always been of interest," explains Chan, as current methods rely on anatomical and histological assessments, which are subjective and require animals to be sacrificed. "This study describes a cost-effective, semiquantitative method for assessing arthritis severity in a mouse model by measuring cell death."

Synovial inflammation leads to tissue damage and cell death resulting in cellular externalization of phosphatidylserine (PS) residues, which are markers of apoptosis. The technique described here involves the use of a small molecule PSVue®794 (Molecular Targeting Technologies, Inc., USA) that fluoresces in the near-infrared region after binding anionic phospholipids such as PS residues.

The authors assessed disease severity in mice with collagen-induced arthritis using X-radiography, histology and by measuring footpad swelling. After disease onset, the mice were injected retro-orbitally with PSVue®794 or a control dye (same fluorophore but no targeting moiety) and after 48 h (to allow clearance of unbound dye) the mice were anesthetized and imaged using the LI-COR Odyssey Image System (v3.0).

As expected, no emission was detected in arthritic mice injected with the control dye. Fluorescence emission of mice injected with PSVue®794 correlated directly with the severity of arthritis in terms of radiographic, histological and anatomical findings.

"This kind of assessment is the way forward for lots of scientific and animal welfare reasons," says Paul Garside, University of Glasgow, who was not involved in this study. "However, the work could be extended to assess additional animal models, more cellular or molecular functions, and the impact of therapeutics."

Chan concludes, "Our future plan is to develop this agent for use in rapid throughput screening of new arthritis drugs in mice or other animal models, and potentially for the nuclear imaging detection of arthritis in patients."

Jenny Buckland

Original article Chan, M. M. *et al*. Non-invasive *in vivo* imaging of arthritis in a collagen-induced murine model with phosphatidylserine-binding near-infrared (NIR) dye. *Arthritis Res. Ther.* doi:10.1186/s13075-015-0565-x