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EPR imaging: A convenient method for *in vivo* monitoring the efficacy of anti-inflamatory drugs

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Introduction: During inflammation, an activated immune system generates free radicals, which act as signaling molecules and help eliminate pathogens. However, the excessive production of free radicals can lead to oxidative stress, further promoting inflammation. One of the methods for *in vivo* temporal-spatial follow-up of inflammation is to use EPR imaging, the gold-standard technique initially meant to detect free radicals.
Materials and methods: A murine inflammation model was employed by injecting uric acid into the mouse´s left leg, using the right one as a control. To visualize and follow-up the redox status, spin-probe 3CP was used in the standard concentration meant for *in vivo* trials.
Results and discussion: The red/blue arrows indicate the inflamed/non-inflamed leg (Fig. 1A). *In vivo* 2D EPR imaging was used to detect the spatial distribution of the exchanged redox status and clearly shows the leg under the inflammation (Fig. 1B). 1D gradient EPR imaging performed along the z-axis was used to compare the 3CP signal intensities from both legs, showing the noticeable difference between the inflamed and the non-inflamed leg (Fig. 1C).

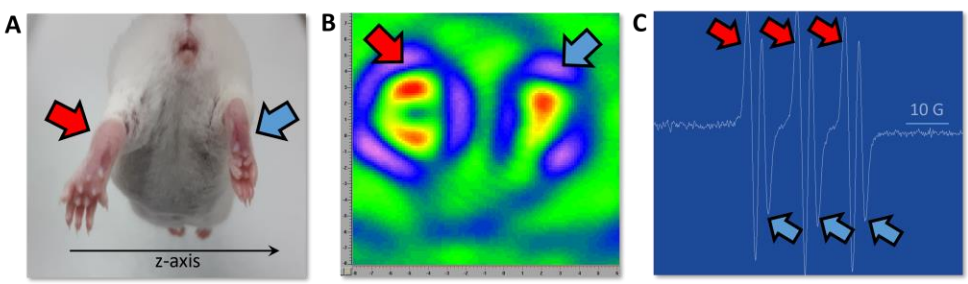

Fig. 1: (A) Mice - 2.5 months old with urate-induced inflammation of the left leg (red arrow), and control leg (blue arrow); (B) *In vivo* 2D EPR image in the x-z plane exposing inflamed (red arrow), and non-inflamed (blue arrow) leg; (C) Typical *in vivo* 1D gradient EPR spectrum along the z-axis, recorded after 10 min (red arrows indicating the 3CP EPR signal of the inflammed, and blue arrows of the control leg).

The kinetics obtained from the EPR signals variations of the 1D gradient image, observed in the course of 90 min, shows efficacy of anti-inflammatory drugs, defining changes in the redox environment in both legs (results not shown).
Conclusions: EPR spectroscopy can be successfully used to follow-up the redox status *in vivo* and evaluate the beneficial effects of anti-inflammatory drugs.

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