PH-biosensor based on hyperpolarized zymonic acid for non-invasive imaging and spectroscopy

Reference No: B73167

CHALLENGE
Natural pH regulatory mechanisms can be overruled during several pathologies such as cancer, inflammation and ischaemia, leading to local pH changes in the human body. Because of this potentially broad impact, non-invasive imaging of local pH changes has been a major goal in biomedical research, even though so far no technique to measure extracellular pH has been applicable in the clinic.

INNOVATION
This technology introduces hyperpolarized [1,5-\textsuperscript{13}C\textsubscript{2}]zymonic acid (ZA) as a novel probe for MRI and MRS of pH. Using the ZA can non-invasively image extracellular pH both in vitro and in vivo, shows no toxicity and is independent of concentration, temperature, ionic strength and protein concentrations. Importantly, ZA’s pH sensitivity arises from protonation and deprotonation in proximity to its \textsuperscript{13}C-labelled sites, which is fast on the NMR timescale (103–104 Hz under physiological conditions) and allows an assessment of pH whenever the agent reaches its target. Furthermore the long lifetime of the hyperpolarization enhancement and the strong sensitivity to pH changes render this new technique valuable for further preclinical and clinical studies using extracellular pH as an imaging biomarker to characterize pathologies with aberrant acid-base balance.

COMMERCIAL OPPORTUNITIES
• Reliable and non-invasive extracellular imaging sensor to localize and quantify pH
• Potential for diagnosis and therapy of diseases characterized by aberrant acid-base balances

DEVELOPMENT STATUS
Proof of concept in vitro & in vivo

REFERENCES: