IN VIVO IMAGING OF TISSUE PHYSIOLOGICAL FUNCTION USING EPR SPECTROSCOPY

SUMMARY

Electron paramagnetic resonance (EPR) is a technique for studying chemical species that have one or more unpaired electrons. The current invention describes Echo-based Single Point Imaging (ESPI), a novel EPR image formation strategy that allows in vivo imaging of physiological function. The National Cancer Institute's Radiation Biology Branch is seeking statements of capability or interest from parties interested in in-licensing an in vivo imaging using Electron paramagnetic resonance (EPR) to measure active oxygen species.

REFERENCE NUMBER

E-250-2008

PRODUCT TYPE

- Devices

KEYWORDS

- Echo-based Single Point Imaging, ESPI
- EPR Imaging
- electron paramagnetic resonance
- Spin Echo Fourier, SEF, Single Point Imaging, SPI

COLLABORATION OPPORTUNITY

This invention is available for licensing.

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DESCRIPTION OF TECHNOLOGY

Electron paramagnetic resonance (EPR) is a technique for studying chemical species that have one or more unpaired electrons. The current invention describes Echo-based Single Point Imaging (ESPI), a novel EPR image formation strategy that allows in vivo imaging of physiological function. The strategy emphasizes image resolution and quantification of in vivo tissue oxygen, parameters that are important in planning radiation and chemotherapeutic treatments for patients with cancer. The two most important existing methods are Spin Echo Fourier (SEF) and Single Point Imaging (SPI). ESPI combines the quantitative contrast of SEF with the super high resolution of the SPI methodology, leading to reliable

EPR imaging for tissue physiological function in vivo.

Further R&D is needed by developing array resonators or surface coils for large animal human topical applications

POTENTIAL COMMERCIAL APPLICATIONS

- Developing chemotherapy strategies

COMPETITIVE ADVANTAGES

- Ability to quantify tissue oxygen and conduct in vivo EPR imaging of tissue physiological function
- Combines advantages of Spin Echo Fourier (SEF) and Single Point Imaging (SPI)
- Sub-mm tissue image resolution without distortion
- Oxymetry resolution better than 2 mm of Hg without distortion
- Does not require resonator and gradient dependent calibration

INVENTOR(S)

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DEVELOPMENT STAGE

- Prototype

PUBLICATIONS

Saito K, Matsumoto S, Takakusagi Y, Matsuo M, Morris HD, Lizak MJ, Munasinghe JP, Devasahayam N, Subramanian S, Mitchell JB, Krishna MC. Clin Cancer Res. 2015 Nov 15;21(22):5073-81.

Subramanian S, Devasahayam N, Matsumoto S, Saito K, Mitchell JB, Krishna MC. J Magn Reson. 2012 May;218:105-14.

PATENT STATUS

- **U.S. Issued:** US 8,712,499 (29Apr2014)
- **Foreign Issued:** EP 2369987

THERAPEUTIC AREA

- Cancer/Neoplasm