IN VIVO IMAGING OF TISSUE PHYSIOLOGICAL FUNCTION

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Technology

- Tumor-hypoxia is a severe problem in Radiation Oncology.
- Poorly oxygenated tumors are highly resistant to radiation and chemotherapy, and re-oxygenation improves results.
- There is no current **non-invasive quantitative** technique available for the monitoring of tissue oxygen profiles.
- **Spin-Echo based Single Point Imaging Technology**, using *non-toxic free radical probes*, developed by NCI can provide **fast, non-invasive quantitative in vivo oxygen profiles with sub mm resolution.**
- Instrumentation and methodologies already developed and tested in small animals.
- U.S. Provisional Patent Application 61/200,579 Filed 29 Nov. 2008.

Technology Applications

- Areas in which the technology can be applied:
  - Cancer treatment by radiation & drugs (Staging and treatment-outcome)
  - Quantitative tissue redox status – efficiency of antioxidants
  - Testing angiogenic and angiostatic drugs
  - The viability of transplant organs (heart / liver, etc.)
- Available procedure with Eppendorf oxygen –electrode is invasive, but the current method is non-invasive.
- Several mouse tumor models were monitored for hypoxia & re-oxygenation with breathing of oxygen-rich gases.
- With MRI/MRSI anatomy/metabolite co-registration it is possible to monitor the effect of oxygen on vivo biochemistry & bioenergetics.

Commercial Applications

- Existing or anticipated market and applications:
  - Small animal tumor models – monitoring oxygenation and radiation therapy as well as efficiency of treatment.
  - Monitoring wound-healing & peripheral vascular deficiency
  - Testing of anti-angiogenic cancer drugs
- When co-registered with MRI or CT this technology can provide anatomy-specific resolved oxygen profiles quantitatively
- Will help monitor quantitatively tissue redox status and anti-oxidant treatment
- Useful for devising chemotherapeutic and radiotherapy strategies in cancer treatment

Collaboration Opportunities

- Licensing opportunities

  Hardware for spectrometer/Imager at 300 MHz working in time-domain (pulsed EPR) with acquisition and image processing software available

- CRADA opportunities
  - Scaling up needed for human/large animal applications. Technical Collaboration for large surface / saddle resonators for topical human applications.

  - **Employs non-toxic trityl-based free radicals as spin probes. Collaboration in the synthesis of narrow-line spin probes based on trityls and perdeuterated nitroxides is also sought.**

Contact Information

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