

Abstract title: A 25 mT Preclinical Electron Paramagnetic Resonance Oxygen Imager, JIVA-25™, And Its Applications to Small Animal Image-Guided Radiotherapy

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### Abstract

**Introduction:** Tumors have a highly heterogeneous oxygen environment which affects the outcome of chemo- and radiation treatment. Oxygen-guided radiation therapy (OGRT) can reduce the overall treatment dose by targeting hypoxic area. Pulse electron paramagnetic resonance oxygen imaging (EPROI) is an accurate and quantitative tool to assist with OGRT in small animals (Epel et al., IJROBP, 2019). We (O2M Technologies, LLC) report here, the development of a dedicated preclinical 25 mT pulse EPROI instrument, JIVA-25™. JIVA-25™ provides three-dimensional oxygen maps in small animals with high spatial (1 mm), temporal (2-10 min), and partial oxygen pressure (pO<sub>2</sub>) resolution (~1 torr for hypoxic environment).

**Materials & Methods:** Two separate oxygen imaging modalities pulse inversion recovery electron spin echo (IRESE) and pulse single point imaging (SPI) have been implemented and optimized for small animal oxygen imaging in JIVA-25™. The IRESE was tested for OGRT on mouse SCVII tumor model at the University of Chicago and for tumor treatment with a radiosensitizer using primary sarcoma and E0771 tumor models at Duke University.

**Results:** We will present the results of the studies and discuss the JIVA-25™ instrument capabilities.

**Conclusion:** JIVA-25™ oxygen imager can be successfully applied for OGRT and other radiotherapy studies in preclinical mouse models.

**Preference:** Oral