

## **Oxygen Imaging as A Quality Control Tool in Tissue Manufacturing**

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A key hurdle in tissue manufacturing is insufficient oxygen delivery to metabolic cells in portions of tissue grafts, which results in dysfunctional or dying cells and poor outcomes. The longitudinal monitoring of partial oxygen pressure ( $pO_2$ ) *in vitro* and during early engraftment periods *in vivo* can provide necessary feedback for the creation of functional tissues and organs but is often overlooked because of lack of available techniques that can noninvasively measure oxygen deep in tissues. Oxygen monitoring in developing tissues may avert hypoxia-induced necrosis, control cell differentiation, and overall improve the graft quality.

Electron paramagnetic resonance oxygen imaging (EPROI) is an emerging non-invasive oxygen imaging technique. EPROI provides absolute partial oxygen pressure ( $pO_2$ ) maps with high accuracy ( $\sim 1$  torr) within 1-10 minutes. EPROI uses an injectable water-soluble, non-toxic contrast agent, trityl OX063-D24 that has oxygen-dependent relaxation rates.

In this presentation, I will provide a brief description of O2M's oxygen imager OxyGraft-25 based on EPROI. OxyGraft-25 is designed to provide noninvasive  $pO_2$  assessment of tissue grafts *in vitro* and *in vivo* in mice and rats. Multiple surface and volume resonators/sample holders are available for tissue grafts samples of different sizes upto 28 mm. I will show some example oxygen maps in tissue grafts. Finally, I will outline future possibilities and challenges of involving EPROI widely in tissue manufacturing processes.