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Ratiometric luminescence 2D in vivo imaging and monitoring of mouse skin oxygenation

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Abstract:

Tissue oxygenation plays a critical role in the pathogenesis of various diseases, but non-invasive, robust and user-friendly methods for its measurement in vivo still need to be established. Here, we are presenting an in vivo oxygen-detection system that uses ratiometric luminescence imaging (RLI) as a readout scheme to determine the skin oxygen tension of mouse hind footpads via side-by-side comparison with more established techniques including luminescence-lifetime imaging using planar sensor films and the polarographic electrode as the gold standard. We also demonstrate that this technology allows the detection of changes in mouse skin tissue oxygenation induced by subjecting mice to systemic hypoxia. The data demonstrate oxygen imaging based on RLI to be a most useful tool for reliably and easily analyzing and monitoring skin tissue oxygenation in vivo. This technology will advance our understanding of local regulation of skin tissue oxygenation in various disease conditions.

Key-words: tissue oxygenation, ratiometric luminescence imaging, luminescence-lifetime imaging, polarographic electrode, systemic hypoxia, skin oxygen tension