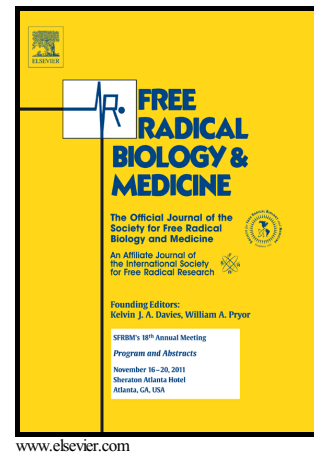


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# Clinical Imaging of Hypoxia: Current Status and Future Directions

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## Abstract

Tissue hypoxia is a key feature of many important causes of morbidity and mortality. In pathologies such as stroke, peripheral vascular disease and ischaemic heart disease, hypoxia is largely a consequence of low blood flow induced ischaemia, hence perfusion imaging is often used as a surrogate for hypoxia to guide clinical diagnosis and treatment. Importantly, ischaemia and hypoxia are not synonymous conditions as it is not universally true that well perfused tissues are normoxic or that poorly perfused tissues are hypoxic. In pathologies such as cancer, for instance, perfusion imaging and oxygen concentration are less well correlated, and oxygen concentration is independently correlated to radiotherapy response and overall treatment outcomes. In addition, the progression of many diseases is intricately related to maladaptive responses to the hypoxia itself. Thus there is potentially great clinical and scientific utility in direct measurements of tissue oxygenation. Despite this, imaging assessment of hypoxia in patients is rarely performed in clinical settings. This review summarises some of the current methods used to clinically evaluate hypoxia, the barriers to the routine use of these methods and the newer agents and techniques being explored for the assessment of hypoxia in pathological processes.

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