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The main objective of this research is to apply in vivo optical spectroscopy to measure the diffusion, the uptake and the utilization of oxygen by normal and diseased tissues and cell types in the whole animals. Currently, we are the only ones in the world with such a spectroscopic microscope which operates in vivo and has a large light source with the field of view large enough to allow us to measure the temporal and spatial dynamics of oxygenation in the tissue of a whole living animal with high spatio-temporal resolution. We will measure oxygen uptake, oxygen utilization, and blood flow in specific tissues of a small laboratory animal by the new microscope. In addition, we will measure redox states in the tumor and in the tumor vasculature with high spatio-temporal resolution. The goal of this research is to determine if oxygen consumption is an important factor in the selection of effective cancer therapies. We will measure the time course of oxygen uptake by the tumor during and after radiation therapy. We will compare the time course of oxygen uptake with the time course of the tumor vascular perfusion measured with a contrast-enhanced magnetic resonance imaging technique. In addition, we will monitor the oxygenation of a topical drug solution applied to the tumor using a newly developed instrument which has a small light source with the field of view large enough to allow us to measure the temporal and spatial dynamics of oxygenation in the topical drug solution. The results of the comparison will give us an insight into how effective a topical drug therapy is. We will also use the novel instrument to evaluate the efficacy of various anticancer therapies with an external light source which does not penetrate the skin. The novelty of our approach is to measure redox states in vivo in a tumor and in the tumor vasculature. The uniqueness of our approach is that we can not only measure oxygen levels but we can also measure other important chemical species which are commonly found in biological media, including ferrous and ferric iron, nitric oxide, carbon monoxide and methemoglobin.

Catheter ablation of ventricular tachycardia in long-standing myocardial infarction: risk stratification. Patients with acute

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