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James P Basilion

Case Western Reserve University, USA

Defining the cutting edge: The use of molecular imaging to define tumor margins

A challenge for surgical removal of cancer is to maximize the removal of the cancerous tissue while minimizing removal of normal tissues. This is critical for a number of prevalent cancers. Several investigators have shown the utility of systemically delivered optical imaging probes to image tumors and guide surgical removal in small animal models of cancer and recently first-in-man studies have demonstrated feasibility in Europe. However, to date there are no FDA approved cancer-selective optical imaging probes that can be used to guide surgery. The future direction of this field is to develop and translate into clinical use effective optical imaging probes for real-time assessment of surgical margins during tumor resection. Here we demonstrate a method for imaging tumors margins during surgery that may impact patients in the next few years. Specifically, we show that optical imaging probes topically applied *ex vivo* to resected tumor and surrounding normal tissue can rapidly differentiate between tissues. In contrast to systemic delivery of optical imaging probes which label tumors uniformly over a long period of time (i.e., hours), topical probe application results in rapid and robust probe activation that is detectable as early as 5 minutes following application. Importantly, labeling is primarily associated with peri-tumor spaces, defining tumor margins. This methodology provides a means for rapid visualization of tumor and potentially infiltrating tumor cells and has potential applications for directed surgical excision of tumor tissues. This technology could find use in surgical resections for any tumors having differential regulation of cysteine cathepsin activity.

Biography

James P Basilion has obtained his PhD in Molecular Pharmacology from the University of Texas, USA, Postdoctoral studies at the NIH (NICHD) with Dr. R. Klausner. He had a short stint in industry and then became an Assistant Professor of Radiology at Harvard Medical School and Massachusetts General Hospital. Currently, he is a full tenured Professor at Case Western Reserve University, Vice-Chair for Basic Research at the Department of Radiology, Director of the Case Center of Imaging Research, Director of the NCFR Center for Molecular Imaging at Case and Co-Director of the Cancer Imaging Program for the Case Comprehensive Cancer Center. He is also the President elect for the World Molecular Imaging Society.

james.basilion@case.edu

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