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From immunochemistry to multispectral imaging of tissue biomarkers

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Despite the growing demand for true quantitative biomarker (BM) assays, many pathologists are not yet convinced that there is a need for any tools beyond their eyes. We are interested in developing analytic tools and algorithms to discover in tissue proteins that are of the potential utility as diagnostic and prognostic BMs or therapeutic targets. Specifically, we aim to identify protein BMs that determine the likelihood that precancerous lesions remain contained in situ, as opposed to becoming invasive. Although a variety of quantitative methods exist for assaying biofluid-based BMs, contemporary proteomic technologies remain impractical for application to archived clinical samples that provide a trove of information for BM discovery. We developed monochrome imaging-based method – without use of sophisticated and expensive equipment – to measure protein expression in formalin-fixed paraffin-embedded (FFPE) tissue. The measurements are performed on a continuous biologically relevant scale and the quantification of relative (rather than absolute) intensity of staining takes into account fluctuations of background staining. Using this approach, we found that increased expression of the insulin-like growth factor type I receptor (IGF-IR) and its target, Ras-related protein 1 (Rap1) was associated with risk of progression in patients diagnosed with breast carcinoma in situ. To streamline development of novel tissue BMs, we have been taking advantage of multispectral imaging (MSI) technology. MSI, previously successfully applied to space and military applications, now offers promise of both extending the power and value of tissue examination. The pros and cons of imaging technologies enabling BM identification in tissue will be presented.

Biography

Marina Guvakova received Ph.D. in cell biology from the Russian Academy of Sciences and post-doctoral training from Columbia and Thomas Jefferson University, USA. In 2001, she joined Faculty at the University of Pennsylvania, where she is now an Assistant Professor and a Senior Research Investigator at the Department of Surgery, Perelman School of Medicine. She is an author of 20+ papers, recipient of Gordon Research Conferences awards, the New Investigator Award from the Endocrine Society, Breast Cancer Research Award. She serves as a reviewer for several journals, editorial board member of ISRN Endocrinology, and a CDMRP peer-review panel member.

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