

Developing tissue biomarkers in early breast cancer

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We are interested in developing biomarkers (BM) to determine the likelihood that initial breast tumor remains contained in situ, as opposed to becoming invasive. In-tissue testing serves as a gold standard for breast cancer diagnostics, yet the power of high throughput technologies can be realized for diagnostic purposes if emerging technologies can be directly applied to samples obtained by the routine clinical procedure. Although a variety of quantitative methods exist for assaying biofluid-based BM, contemporary proteomic technologies remain impractical for application to archived formalin-fixed paraffin-embedded (FFPE) tissues that (being associated with clinical histories) provide a trove of information for BM discovery. Immunohistochemistry (IHC) remains the tool of choice to examine protein expression in tissue; however, it does not lend itself to the truly continuous measurements needed for BM study. We developed the analytic tools and algorithms – without use of sophisticated and expensive equipment – that allow measurements of protein expression in FFPE tissue on a continuous biologically relevant scale, while quantification of relative (rather than absolute) intensity of staining takes into account fluctuations of background staining. Using this approach, we have revealed that women with invasive breast cancer were 4 times more likely to have increased levels of insulin-like growth factor type I receptor and its target, Ras-related protein 1 than women with non-invasive tumors. To facilitate development of novel in-tissue BMs, we are taking advantage of digital multispectral imaging technology and developing pattern-recognition-based image analysis for the core-needle biopsies containing early form of breast cancer, i.e. carcinoma in situ.

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 School Of Medicine; where she is now an Assistant Professor and a Senior Research Investigator at the Department of Surgery. 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.