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AQUA: The future for biomarker research

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Abstract

Personalized and molecular-based cancer treatment depends on biomarkers. Biomarker research and assay development is becoming increasingly important because it drives drug discovery, clinical diagnostics, prognostics and treatment decisions.

Immunohistochemistry (IHC), which examines protein localization with preserved tissue morphology, is one of the most important assays to detect protein biomarkers. This technique has been applied in many facets of biological science, especially in assays required using archival formalin-fixed, paraffin embedded (FFPE) tissues. The major challenges for IHC are sensitivity and quantification. AQUA (Automatic Quantitative Analysis) is a fluorescence IHC imaging analysis technology that could automatically quantify protein expression in tissues with high sensitivity and accuracy.

We have applied AQUA technology for both basic and clinical research. Using this technology, we identified biomarkers that related to cetuximab treatment in a mouse xenograft model. We determined the expression of certain proteins in cancer patient cohorts and correlated the protein expression levels with pathologic and clinical outcomes. We found several proteins that could serve as prognostic or predictive biomarkers.

With the emergence of new biomarkers from recent genetic discoveries, numerous novel targeted therapies for cancer are already in clinical trials, with many more to be developed in the coming decades. Personalized medicine is about the identification of patients that are most likely to benefit from treatment and assess treatment response. AQUA technology can dramatically speed up the progress of such challenges and therefore represents the future for biomarker research.

Biography

Yang is an Assistant Professor at Fox Chase Cancer Center, where she takes charge of the Tissue Research Service at the Biosample Repository Core Facility. She is a leading expert in the field of immunohistochemistry (IHC) and quantitative analysis. She has applied IHC to study the molecular alterations of known and novel signaling pathways that regulate embryogenesis, organ morphogenesis and tumorigenesis. Her research results can be found in prestigious journals such as Development, Am. J. Path., JBC et. al. Recently Dr. Yang extended the automatic quantitative analysis (AQUA) IHC assay system for tumor biomarker research.

Dr. Yang serves in the editorial board of the Journal of Cancer Research Updates and the Journal of Analytical Oncology. She is ad hoc reviewers in a number of journals including Biomarkers, Biochemical Pharmacology, Current Pharmaceutical Biotechnology, Current Proteomics, Experimental Neurology et.al.