Hong Wang, J Chromatogr Sep Tech 2016, 7:7 (Suppl)
http://dx.doi.org/10.4172/2157-7064.C1.022

Quantification of multiplex cancer biomarkers in formalin-fixed, paraffin-embedded (FFPE) tissue using matrix-free mass spectrometry imaging

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A novel method for quantification of cancer biomarkers on formalin-fixed paraffin-embedded (FFPE) tissue was developed using matrix-free on-tissue imaging mass spectrometry. A simple and robust interface was created using stable-isotope-labeled chromogens between the standard immunohistochemistry (IHC) tissue stains and matrix-free laser desorption ionization time-of-flight mass spectrometry (MFLDI-TOF MS). Conventional IHC staining instruments can be used for the FFPE tissue staining without any additional modification of the standard protocols. Quantification was done after standard IHC staining of establish biomarker panels already familiar to pathologists. Two cancer protein biomarkers, estrogen receptor (ER) and progesterone receptor (PgR), were detected simultaneously in FFPE tissue by this stable-isotope-label based mass spectrometry imaging (SILMSI). We applied this technique to the detection of Endocrine receptor (ER) and progesterone receptor (PgR) on FFPE tissue from MCF-7, ZR-75-1, and BT474 nude-mouse xenograft breast cancer cell lines. We showed that this technique has the capability assessing intra-tumor heterogeneity and accurately quantifying relative abundance of ER/PgR by comparing the results from two independent studies using serial sections from the same FFPE tissue block. The quantification of cancer biomarkers *in situ* across a single FFPE tissue section with this SILMSI technique adds an additional dimension in cancer histological evaluation by allowing a visual and statistical assessment of tumor heterogeneity.

Biography

Hong Wang has completed his Post-doctoral fellow training from University of Michigan Medical School in 2004. He is the Scientific Manager of the Proteomics Platform for Moon-shot Program in MD Anderson Cancer Center. He has worked as a Senior Staff Scientist in Fred Hutch Cancer Research Center for 7 years before he joined Roche Company for developing matrix-free MALDI imaging technology which received the US patent in 2012. He has been in the field of Cancer Proteomics for more than 15 years with over 80 publications. He has collaborated with Shimadzu Company for developing on-line 2D-HPLC system for intact protein separation, and Waters Company for developing nano UPLC-HDMSE based technology for high through-put quantitative proteomics based cancer biomarker study.

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