Editorial

Introduction to the special issue Collaboration between US and Japan for the Early Detection of Cancer

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Early detection is important for reducing mortality from cancer. Use of the fecal occult blood test in colorectal cancer screening and mammography for breast cancer are examples of success in this regard. State-of-the-art technologies that employ ultra-sensitive analyses, including mass spectrometry, next-generation sequencing technology, and single cell analysis, are revolutionizing the horizon of early cancer diagnosis. Radiomics based on machine learning or artificial intelligence has also gained much attention for the early detection of cancer because of its potential to support the identification of extremely small cancer lesions.

To accelerate research into the prevention and early detection of cancer, the National Cancer Institute (NCI) Early Detection Research Network (EDRN) and the Japan Agency for Medical Research and Development (AMED) conduct an annual USA–Japan Workshop on Biomarkers for Cancer Early Detection. At the 7th USA–Japan Workshop which was held at Ito International Research Center (The University of Tokyo) on 26–27 January 2020, participants from the US and Japan gathered to discuss early detection and cancer prevention using advanced biomarkers and radiomics.

Dr. Ohtsuki presented rapid validation methods for protein biomarkers using targeted proteomics and mass spectrometry. As targeted proteomics enable construction of a measurement system without antibodies a quantitative protein assay can be developed more easily than with existing methods such as ELISA.

Dr. Shimizu presented a novel exploration method using capillary microsampling-based single-cell metabolomics with high-resolution mass spectrometry, which can identify the metabolomic profile of a single circulating tumor cell.

Dr. Massion presented the role of the Clinical Validation Center (CVC) of EDRN and described the impact of the Vanderbilt University EDRN Lung CVC in phase-1, -2 and -3 biomarker validation studies.

Dr. Permuth presented the importance of implementing quality control procedures when designing multi-center evaluations of miRNA abundance.

Dr. Crichton presented the collaboration of the National Aeronautics and Space Administration (NASA) Jet Propulsion Laboratory (JPL), NCI EDRN and the Molecular and Cellular Characterization of Screen-Detected Lesions (MCL), which is enabling data-driven discovery in cancer biomarker research using artificial intelligence and machine learning with automated annotation and data science.

Dr. Pérez-Morales presented that peritumoral and intratumoral radiomics and volume doubling time (VDT) were used to identify high-risk subsets of lung patients diagnosed in lung cancer screening that are associated with poor survival outcomes. They utilized peritumoral and intratumoral radiomic features and VDT to generate a model that identifies the high-risk group of screen-detected lung cancers that is associated with poor survival outcomes.
I presented the clinical usefulness of apolipoprotein A2-isofoms (apoA2-i) which are formed by posttranslational modification via enzymatic activity in pancreatic lesions, for the early detection and risk stratification of pancreatic cancer. The results of a large-scale prospective screening study for pancreatic cancer that used the apoA2-i blood test were also presented.

In this special issue of *Cancer Biomarkers*, we provide the seven presentations discussed in this workshop.

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