Exploring Target Proteins of Bioactive Small Molecules

Abstract

Exploring the interaction of a small molecule with its target protein is pivotal to understand the cellular mechanism by which the small molecule acts. However, discovering the on- or off-target proteins of small molecule is often the most challenging and time-consuming step. Chemical proteomics has played as a key research engine to identify direct interacting proteins and to explore mechanisms of action of small molecules towards functional and translational applications. A number of methodologies including conventional affinity chromatography using labeled small molecules as well as recent target identification methods with label-free small molecules such as Drug Affinity Responsive Target Stability (DARTS), Stability of Proteins from Rates of Oxidation (SPROX), Cellular Thermal Shift Assay (CETSA), and Thermal Proteome Profiling (TPP) have been developed and applied to identify the direct binding proteins of small molecules. This interaction information of small molecule and target protein facilitates structure based better drug development and functional annotation of target protein as well. Furthermore, integration of MALDI-MS imaging technology with chemical proteomics will enable to validate the interaction of label-free small molecule with target protein in tissue that harnesses the preclinical studies of small molecules in respect with their efficacy, toxicity, and pharmacokinetics. In this presentation, recent advances for target identification of small molecules towards functional and translational applications will be presented by introducing our case studies.

About the Speaker

Prof. Dr. Ho Jeong KWON received his BSc from Seoul National University, Korea (80-84) and has completed his MS and Ph.D. from University of Tokyo, Japan (90-95) and postdoctoral study at the Professor Stuart Schreiber lab of Harvard University, USA (95-98). He is a full professor, Dept. of Biotechnology, and an adjunct professor, Department of Internal Medicine, College of Medicine, Yonsei University, Korea and director of chemical genomics Global Research Laboratory. He served as a council member of HUPO (05-08, 15-present), the president of KHUPO (10-11) and has been serving a council member, secretary general and vice president of AOHUPO (10-present). He has been serving as a Scientific Advisory Committee member of Institut Pasteur Korea (IPK: 12-present). He has published over 170 papers in reputed journals and been serving as editor-in-chief of Proteome Science and editor of repute journals. He has also filed over 50 patents and received many awards including Sura Academy Award and Outstanding Research Professor Awards of Yonsei University. His major research interests focus on discovery of natural or synthetic small molecules with phenotypic activities, target identification and validation of bioactive small molecules, integration of omics technologies toward innovation in drug discovery and translational research. Based on this integrated approach with chemistry, biology, and omics technologies, his goal aims to deeply understand the biological systems and to apply these insights towards novel drug discovery and development.

Five Representative Publications in the Past Five Years