

Professor Daniel W. Chan from the Johns Hopkins University School of Medicine



We interviewed Professor Daniel W. Chan from the Johns Hopkins University School of Medicine. His research is focused on the development and application of proteomic and immunologic techniques in the diagnosis, management, and understanding of cancer. The relationship with Shimadzu started in 2009 when the Johns Hopkins Center for Biomarker Discovery and Translation began utilizing Shimadzu mass spectrometers (AXIMA QIT and Resonance), primarily for discovery and analysis of cancer related glycoforms.

Professor Chan has edited and written five books on immunoassay, immunoassay automation, diagnostic endocrinology, and tumor markers. He has published about 300 articles including the tumor markers chapters in the Tietz Textbook of Clinical Chemistry and in Tumor Markers: Physiology, Pathobiology, Technology, and Clinical Applications, which he also co-edited. Prof. Chan was one of the founders of the USHUPO (Human Proteomics Organization) society. Currently, Prof. Chan is the Editor-in-Chief of Clinical Proteomics. His research was recently recognized and awarded the inaugural "Translational Proteomics Award" for outstanding achievement in proteomics at HUPO.

Professor Chan, thank you very much for spending some time for this interview. At first, could you outline the research and let us know what discovery and achievement have been made so far?

The focus of my research is cancer proteomics. In 2000, I founded the Center for Biomarker Discovery and Translation. The focus of the Center is to discover and translate proteomics cancer biomarkers using mass spectrometry, protein microarrays and immunoassays. Our team developed the test OVA1 which is based on 5 proteomic biomarkers for ovarian cancer. In 2009, this test became the 1st FDA cleared proteomic in vitro diagnostic multivariate index assay (IVDMIA).

I am the principal investigator (PI) of the Biomarker Reference Laboratory (BRL) for the National Cancer Institute (NCI) Early Detection Research Network (EDRN) and the NCI Clinical Proteomic Tumor Analysis Consortium (CPTAC). We were instrumental in the development of public-private partnerships leading to the clinical study, publication and FDA approval in 2012 of two new prostate cancer tests - proPSA (phi) and PCA3.

Our efforts extend beyond discovery to include the translation of cancer biomarkers. We have constructed a roadmap for the development of cancer diagnostics and with close collaboration between researchers, industry (including Shimadzu), clinicians, and regulatory agencies.



Dr. Daniel Chan in the Johns Hopkins Hospital Clinical Chemistry Laboratory

Why are you interested in this research? What is the goal?

Currently there are many unmet needs, including clinical (benefits to patients, impact on clinical outcomes, etc.) and scientific knowledge for the biology of diseases. There are also unmet technical needs, including analytical performance, automation, and operational issues for clinical laboratory, such as reliability, higher throughput, faster results.

As we address these unmet needs, we have a positive impact on human health. Better disease biomarkers enable earlier detection, which translates into saved lives. Our ultimate goals are early detection (screening) of aggressive cancer, prognosis with clinical outcomes, and development of predictive biomarkers for targeted or immune therapy which are more effective and less toxic (i.e. precision medicine and "companion diagnostics").

Could you tell us why you chose Shimadzu as your partner when you established this new lab?

Shimadzu has provided our labs with exceptional tools for both our discovery efforts as well as new clinical assay development. We are most impressed with the reliability of Shimadzu instrumentation. These state-of-the-art instruments are our laboratory workhorses.

How are our instruments helping you?

Glycans play important roles in the function of glycoproteins in human body. Currently, the detail structure analysis is challenging due to the time-consuming and labor-intensive glycan analysis procedure, which usually includes multi-step sequential treatments, HPLC or electrophoresis purification, and mass spectrometry analysis. We have found the Shimadzu AXIMA-ResonanceTMALDI-QIT-TOF- MSn to be a very powerful platform for the analysis of the glycan sequences without multistep separation or enzymatic treatment. This helps us monitor the oxidization of glycans and better understand their roles as disease biomarkers.

Also, the Shimadzu LCMS-8040 and LCMS-8050 triple quadrupole mass spectrometers in our labs have proven to be extremely reliable instruments for new clinical diagnostic assay development. Shimadzu has engineered mass spectrometers with ultra-fast acquisition and polarity switching speeds, yet exquisite sensitivity at these ultra-fast speeds. This uncompromised solution enables greater assay throughput and drastically reduced assay development times.

What are Shimadzu’s strengths compared to other vendors (not limited to the instruments)?

In addition to the aforementioned performance characteristics, we have found Shimadzu to provide excellent technical and service support. The local support provided by Shimadzu Scientific Instruments individuals like Alan Brasel, Ricky Ciner, Thomas Russell, Chris Gilles, Brian Feild and Scott Kuzdzal have kept our labs operating at peak efficiency.

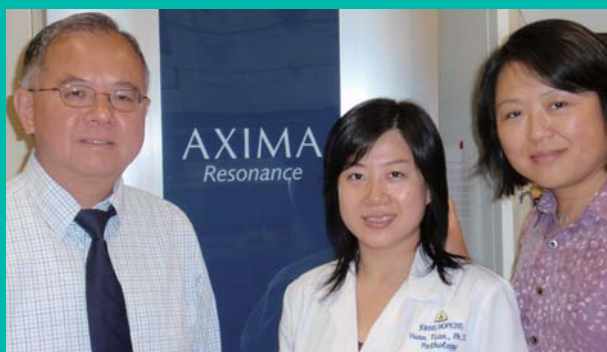
Also, while Shimadzu has always provided innovative solutions, we have recently seen a new focus on innovation within Shimadzu. I was a keynote speaker at the Shimadzu Solution Center Grand Opening in February, 2014, in Columbia, MD. I am excited to see the new Innovation Center that is also being developed at SSI. With a great influx of talented engineers like Hikaru Shibata and Tairo Ogura at SSI, we see a bright future for Shimadzu and new, innovative platforms.

Finally, could you share any requests that you have with respect to analytical and measuring instrument vendors?

Our clinical laboratory relies on automated platforms that operate with high throughput. Shimadzu mass spectrometers have come a long way in terms of ease of use. But these analytical instruments must become even simpler- push-button analyzers with increased multiplexing and assay-specific software.

I recently visited Shimadzu Corporation in Kyoto, Japan, and I was very impressed with your new CLAM-2000 clinical lab automation module. This is exactly the type of liquid handling/sample preparation integration that clinical laboratories need. We hope to play a role as a voice of North American clinical key opinion leaders in the development of these new platforms, as well as continue our fruitful clinical research collaborations.

It was significant to know what you think of us and our collaboration. We will strive to meet your request more than ever. Thank you very much.



Prof. Daniel Chan, Drs Hui Zhang and Yuan Tian in front of their Shimadzu AXIMA Resonance (2009)



Dr. Stefani Thomas, Research Associate at the Johns Hopkins School of Medicine in front of the Shimadzu LCMS-8040 triple quadrupole mass spectrometer (2015)

Here are his recent publications:

1. Füzéry AK, Levin J, Chan MM and Chan DW. Translation of proteomic biomarkers into FDA approved cancer diagnostics: issues and challenges. Clin Proteomics 2013, 10:13.
2. Sartori DA and Chan DW. Biomarkers in prostate cancer: what's new? Curr Opin Oncol 2014, 26(3): 259-64.
3. Li, D and Chan DW. Proteomic cancer biomarkers from discovery to approval: it's worth the effort. Expert Rev Proteomics 2014, 11(2):135-6.
4. Serum fucosylated prostate-specific antigen (PSA) improves the differentiation of aggressive from non-aggressive prostate cancers. Li QK, Chen L, Ao MH, Chiu JH, Zhang Z, Zhang H, Chan DW. Theranostics. 2015 Jan 1;5(3):267-76.
5. Comprehensive analysis of protein glycosylation by solid-phase extraction of N-linked glycans and glycosite-containing peptides. Sun S, Shah P, Eshghi ST, Yang W, Trikanad N, Yang S, Chen L, Aiyetan P, Höti N, Zhang Z, Chan DW, Zhang H. Nat Biotechnol. 2016 Jan;34(1):84-8.