

Workshop Report: Standardizing the Imaging MS Workflow: Current Progress

ASMS Evening Workshop on Imaging Mass Spectrometry held on June 4 12pm-1:30pm Central Daylight Time (CDT); 19h-20h30 Eastern European Time.

Moderators:

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Introduction:

Progress continues to be made in standardizing imaging mass spectrometry workflows and the current imaging MS work has advanced to include studies of large inter laboratory comparisons for clinically applied workflows. From these investigations, a number of new tools and strategies have emerged for reproducibly transferring workflows between laboratories. In this workshop, we will discuss the state of the art for reproducibly transferring Imaging MS workflows between laboratories. Preliminary topics to be addressed include: 1) Challenges and solutions for instrument specific method transfer; 2) Standardization tools from reference tissues to applied internal standards; 3) Tools & strategies for sharing and comparing data; 4) Minimum requirement and documentation of guidelines for successful method transfer.

The workshop will entail short presentations by students, postdoctoral fellows, investigators from industry and academia. A goal is to disseminate further information on challenges and solutions for method transfer between laboratories. This workshop is addressing everyone in the field, from beginners to experts and also those who are just interested in the method.

Agenda:

Due to the exceptional circumstances this year and the workshop being held online via Zoom, we have decided to organize the workshop as follow: one hour of presentations by our invited speakers, followed by 30 min of Q&A session where the speakers answered the questions from the attendees.

Our invited lectures were:

Standardizing Imaging MS in Pharma and Beyond

Reid Groseclose, PhD, Director, MALDI MS Bioimaging, GSK

How To Achieve Comparable and Robust Results When Doing Multi-Center DESI-MSI Studies For Cancer Diagnosis

Andreia Porcari, PhD, Assistant Professor, Health Sciences Postgraduate Program at Universidade São Francisco – SP – Brazil

Kyana Garza (PhD candidate, group of Dr. Livia Eberlin)

Example and Limits of Standardization in Pharmaceutical Industry

Dr. Jonathan Stauber, Imabiotech

Peptide and Protein Mapping via Liquid Microjunction Surface Sampling and MALDI Mass Spectrometry: The Road Ahead

Dylan Tabang (PhD student, group of Dr. Lingjun Li)

Multi-Site Round Robin Study Of Rapid Evaporative Ionization Mass Spectrometry For The Classification Of Biological Tissues

Pierre-Maxence Vaysse (PhD student, group of Dr. Tiffany Porta) M4I, Maastricht University

Handling Multiple Pretreatment FFPE Biopsies To Analyze With MSI For Biomarker Screening For Therapy Decision

Eline Berghmans (PhD student, Health Unit, VITO, University of Antwerp)

Lessons From the Multi-Lab N-Glycan Imaging Ring Trials

Professor Richard Drake, PhD, Medical University of South Carolina

Discussion – 30 minutes

Opening. Tiffany welcomed the attendees and reported upcoming events involving Mass Spec Imaging in the coming months. This included the MSACL Connect lecture series and the OurCon series and workshops for the coming years. Peggi introduced the session.

Discussion. Dr Reid Groseclose started with an overview of the state-of-the-art of Imaging MS in the pharmaceutical industry. He discussed the benefit of standardization, to increase level of trust and confidence in the results. He also highlighted the importance of monitoring variability at different steps with QCs, such as during sample preparation, instrument QC, and/or during data analysis. He also acknowledged the effort made by the community to work towards this standardization; namely: reporting standards, quality check (MALDISTAR); communities: IMSS, MSIS, JAAMS; multicenter studies.

These thoughts were completed by the presentation of Dr Stauber who also gave an overview of standardization and its challenges, discussed whether even we do need standardization and why it is important to produce accurate, precise and reproducible results. He highlighted that so far there are no clear guidelines about criteria of acceptance. QCs were developed in his company for monitoring instrument variability but also the variability for a targeted molecule. Prof Drake presented multi-sites study focusing on N-Glycans in TMAs / FFPE and reproducibility between sites. Student participants and Postdocs presented their own work in multi-center studies, employing different techniques such as liquid microjunction surface sampling or MALDI for targeted peptides and proteins analysis, DESI or REIMS for cancer diagnosis, which was quite interesting.

Discussion followed about what type of standards are being using for instrument performance check (standard compound spotted, mimetic tissues...), which instrumental parameters are

being monitored (TIC, which molecules), how to monitor matrix suppression effect, which calibration standard is the best. However, conclusion was that there is no “best” way/parameters to monitor established yet. It is also strongly depending on which mass analyzer is used ([Q]TOD, Orbitrap...). The conclusion was that standardization of Imaging MS workflow is challenging due to the lack of (even general) guidelines, and each lab has its own strategy. More and more studies involving multi-center studies between different laboratories are being setup and seem to be a critical step towards standardization and establishment of more specific guidelines.

One remark on the Zoom setup: It overall worked quite well but we still had questions to answer so it would have been nice if we could have continue without interruption at the end, as speakers were quite enthusiastic to continue.

Participants: Number of participants reached 131 at one time on Zoom.

Next Co-leader: Peggi and Tiffany nominated Gus Grey, University of Auckland, New Zealand, to be next co-leader.

Acknowledgements: The workshop leaders gratefully acknowledge the ASMS organization for allowing us to present this workshop.