

**Imaging MS: Normalization Approaches to Imaging Mass Spectral Data
Workshop Report**

Tuesday 11th June, 5:45 - 7:00, Room 200GF

Timothy Garrett, *University of Florida, Gainesville, FL* and Liam McDonnell, *Leiden University Medical Center, Leiden, the Netherlands*

Introduction

Imaging mass spectrometry continues to grow rapidly owing to its impact in the biological, pharmaceutical and materials sciences. In the last years the imaging workshop has tried to reconcile the very different application areas of imaging MS (pharma, pathology, etc..) by focusing on common aspects; accordingly response normalization and quantitation has been covered a number of times. In order to better address the different application areas there has been discussion about having two imaging workshops (i.e. one for pharmaceutical analysis and the other for biomedical applications). In 2014 only one workshop was organized but it was decided to focus on a specific application area, the medical application of imaging MS. Specifically the topic for discussion was where imaging MS may have an impact in diagnostic and prognostic pathology, and what must be done for it to become a recognized clinical method.

Following the success of the workshop format introduced in 2013, we kept the same format. Specifically, after some short announcements we split the workshop into a number of subtopics, each of which was introduced by an expert in the respective field with a short 5-minute presentation. In order to spur discussion we encouraged the presenters to make deliberately bold, even provocative, statements. The topic agenda was

- I) Imaging MS can replace histology. Dr. Josephine Bunch (National Physical Laboratory, United Kingdom).
- II) Histology & diagnostics – mass spectrometrists underestimate its importance. Dr. Kristina Schwamborn (Pathologist from Technical University of Munich, Germany).
- III) What is the added benefit of imaging MS in diagnostics? Dr. Pierre Chaurand (University of Montreal, Canada).
- IV) In-surgery, in-situ analysis. Zoltan Takats (Imperial College London, United Kingdom).
- V) Open discussion – where can imaging MS make a difference? Professor Richard Drake (Medical University of South Carolina, USA).
- VI) What needs to be done for imaging MS to become a recognized clinical tool? Dr. Liam McDonnell (Leiden University Medical Center, the Netherlands).

Important: It was quickly established that the vast majority of ASMS members, including those registered for the imaging MS interest group, did not receive any information from ASMS concerning the workshop. It was explicitly asked if people had registered for the imaging interest group on their ASMS profile, many confirmed this to be true but they had also not received any information about the workshop prior to the conference.

The workshop led to a lively discussion – the participation of active clinicians, and others highly experienced in clinical MSI, was very helpful. A number of different clinical applications were discussed, but it was agreed and stressed repeatedly that imaging MS must offer additional capabilities for it to have an impact (i.e. do not use imaging MS to differentiate tissues that are routinely and easily assessed in everyday clinical practice, i.e. tumor vs. non-tumor), and that this work can only be performed in close partnership with our clinical colleagues.

The question arose of whether SOP's were necessary for the widespread adoption of imaging MS as a new clinical tool (as performed for the MALDI based biotyper). It was contended that SOP's were not necessary provided people arrived at the correct conclusion. This was countered by the observation that highly variable methods are more prone to error. It was then discussed whether we should instigate a multicentre study concerning classification of clinical tissues.

Jonathan Stauber of Imabiotech (Lille, France) presented the first Imabiotech award for innovation in Imaging MS, which was won by Dr. Shane Ellis of the FOM Institute AMOLF (the Netherlands). Note: Though the award was presented during the workshop there was never any ASMS endorsement of the award – as agreed in previous emails.

Dr. Vilmos Kertesz of Oak Ridge National Labs was voted to be the next co-chair of the interest group, replacing Liam McDonnell. Please note that to date Liam McDonnell's email address and affiliation has been incorrectly advertised in all ASMS announcements (karl mcdonnell @ Pfizer is a different person).

Conference

At ASMS this year there were a total of 213 presentations with a strong focus on imaging MS (cf 157 in 2012 and 120 in 2011). Imaging MS was the focus of 21 oral presentations, 189 poster presentations, 1 tutorial lecture, the distinguished award lecture (Prof. Richard Caprioli) and the recipient of the Biemann medal (Prof. Lingjun Li is also a strong proponent of the technique).

Oral (3 sessions)	Poster (9 sessions)
	Number of posters given in parentheses
MOH: Imaging: Biological Applications	Imaging MS: Disease Markers (26)
TOH: Imaging: Pharmaceuticals and Metabolomics	Imaging MS: Method Development I (18)
TOH: Imaging: Fundamentals, Instrumentation and Method Development.	Imaging MS: Software (12)
+3 talks in different sessions	Imaging MS: Method Development II (13)
	Imaging MS: Small Molecules and Drugs (32)
	Imaging MS: Instrumentation (12)
	Imaging MS: Sample Preparation (24)

The first imaging MS oral session, Monday afternoon, concerning its biological application was very well attended, with an estimated audience of approximately 500-600. The second imaging MS oral session, Tuesday morning, entitled "Imaging: Pharmaceuticals and Metabolomics" was also well attended, with approximately 300-400 attendees. The final imaging MS oral session, Tuesday afternoon, entitled Imaging: Fundamentals, Instrumentation and Method Development, was reasonably well attended (estimated audience of 200-300) considering that a significant number of people were still occupied with the 78 imaging posters. The Imaging MS interest group meeting was well attended, with >90% seats in the room occupied and others sat on the room edges.

The imaging sessions were distributed better in 2014 than they were in 2013, and so we thank the programme organizers for this change.

	2014		2013	
	Oral	Poster	Oral	Poster
Monday	1	2	0	1
Tuesday	2	3	2	4
Wednesday	0	1	0	0
Thursday	0	1	1	4

The session titles for orals and posters worked well this year and so we recommend the same sessions next year, but with one caveat. Several people complained that there was not an oral session suitable for informatics developments for imaging MS. During abstract submission the abbreviated titles of the sessions indicated that the oral session on fundamentals was more concerned with instrumentation. The full title also refers to method development (and thus was suitable for informatics abstracts – however many had not applied there as it was considered out of the remit of the session).

Acknowledgements

We thank ASMS for the opportunity to hold the workshop as part of the conference and all their help and support in doing so. The presenters are gratefully acknowledged for stimulating the discussion and getting everyone involved and excited about the discussion.