

Report of:

MS Imagery Analysis System for Medical Applications (MIASMA) Workshop

The workshop was held on Friday, June 5, 2015 at Pharmacy Hall in Baltimore. There were 37 participants from academia, FDA, and industry. Attached is the agenda. There were eight speakers as well as parallel discussions sessions in the late afternoon.

The Mass Spectrometry Imagery Analysis System for Medical Applications (MIASMA) concept of a cloud based system, which collects mass spectral imagery data and uses this to assign peaks in existing and future spectra, is a significant undertaking. To be successful, it will need to involve a large proportion of the stakeholder communities. It will cross national boundaries and require the development of specialist software and processes.

The workshop successfully brought the research community to discuss the technical scope of the project and initial strategy, as well as to investigate how such a multinational collaboration could be funded and managed. There was agreement that such as cloud-based data system to crowd-source the assignment of common peaks in mass spectrometry images of biomedical samples. Multiple laboratories will gain efficiency as they will no longer waste time assigning common peaks that have already been assigned many times previously by others. Additionally, the system will statistically analyze the unassigned peaks for the most common unassigned individual peaks or related peaks (commonly seen together) which can then be prioritized for study within the consortium.

Applications will include the analysis of tissue sections or biopsy samples. MSI produces an image of the tissue but, unlike a conventional micrograph where each pixel is split into 3 colors (red, green and blue), a mass spectrometry imager collects a complete mass spectrum at each pixel. This will allow clinicians and biomedical researchers to look for the unexpected, and find biomarkers that correlated with diseases, cancers or injury; to find new or unpredicted metabolites of pharmaceutical drugs in development and to provide key insights into the distribution of pharmaceutical products in vital organs; to provide rapid prognoses to patients suffering from cancer and to provide important information to clinicians regarding the treatment of that individual patient.

Mass spectrometry imagery offers the potential to revolutionize medical research and pharmaceutical development but it produces vast quantities of data, storing huge amounts of currently untapped information. That huge data volume can easily obscure the crucially important subtle spectral changes which will be the key to discovering new biomarkers, tracking low level pharmaceutical metabolites or providing personalized medicine.

Globally, there are a growing number of research laboratories and companies who are using mass spectrometry imaging to try to solve biomedical problems. They spend a significant fraction of their research time and funding trying to find the new or interesting needle in the haystack of information produced by MSI. Many laboratories will be analyzing the same tissue types and will be assigning and reassigning the same common peaks. This is a frustrating inefficiency that the community is aware of and MIASMA is our strategy for helping to overcome this problem.