

Mass spectrometry is a highly sensitive approach for the identification, characterization and quantification of biomolecules which include proteins, lipids and other small molecule metabolites with functions in biological systems. In order to facilitate such analyses, BLiSc has set up a mass spectrometry facility in the areas of proteomics, metabolomics and lipidomics. MALDI imaging for lipid metabolites in tissue sections We present the capabilities of these facilities as well as the applications of these in science performed at BLiSc.

Training Program for internal users: MS Facility has user training program for BLiSc students/ Post Docs every quarter for proteomics and targeted metabolomics.

Proteomics

The proteomics unit at mass spectrometry facility provides scientific and technical support to various academic and non-academic institutions across the country. Currently, the facility comprises of Thermo Scientific Orbitrap Fusion Tribrid mass spectrometer coupled with Thermo Easy nLC II at NCBS and Sciex Zeno TOF 7600 coupled with Acuity UPLC at InSTEM.

Technology



Orbitrap Fusion



AP/MALDI (ng)
UHR Ion Source



Zeno TOF 7600



TripleTOF 5600

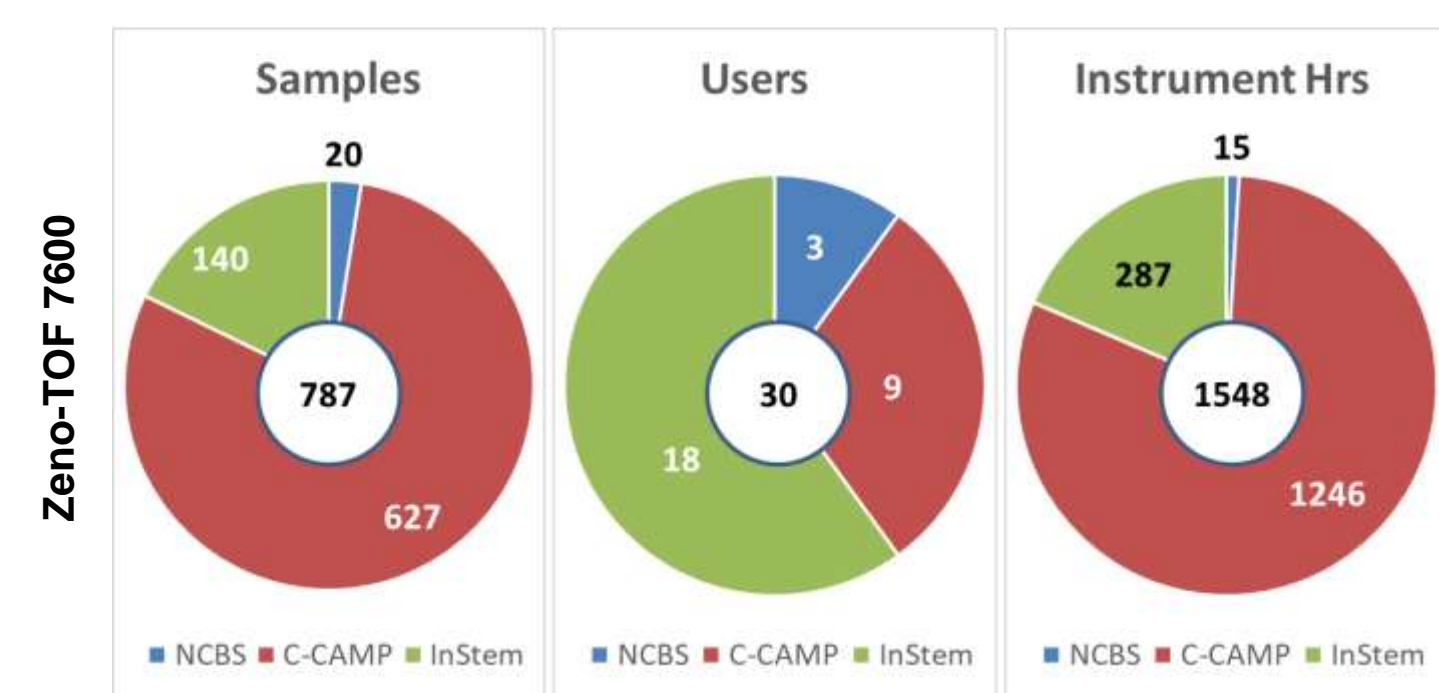
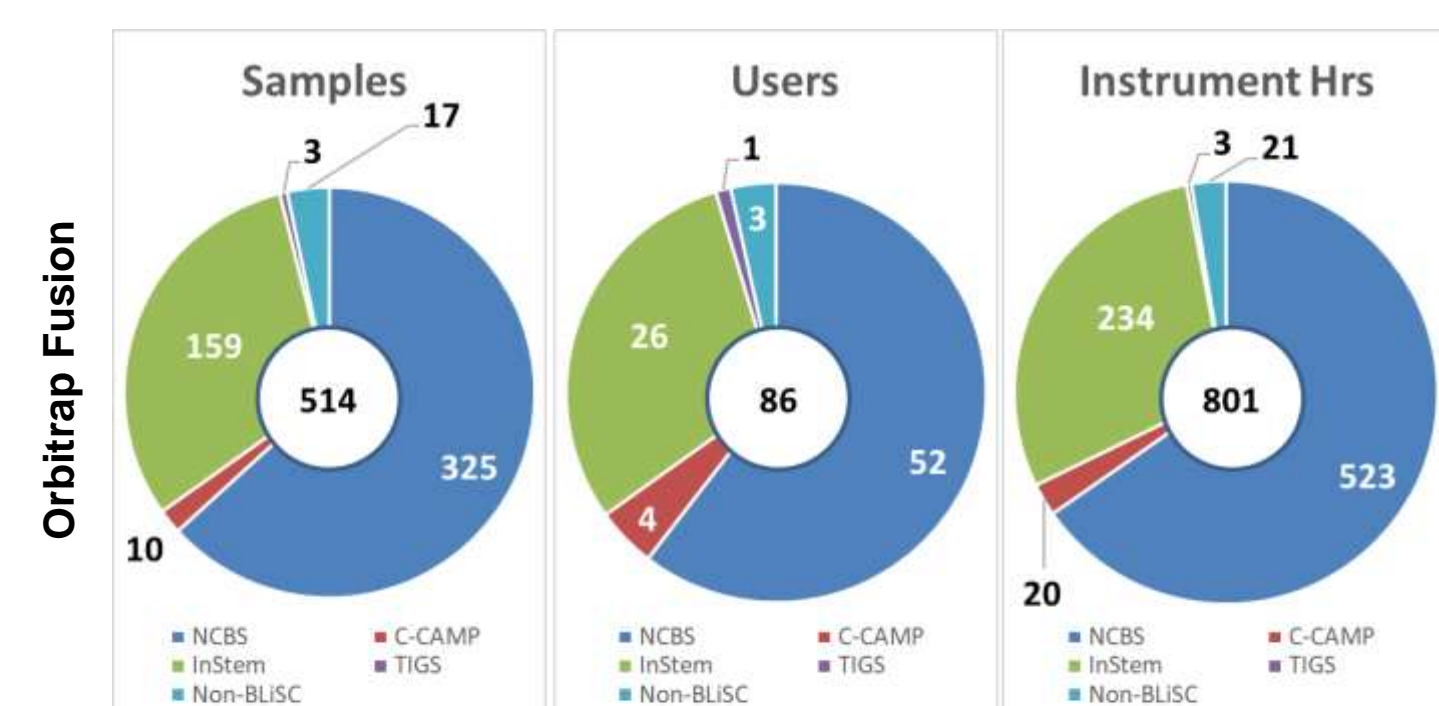


6545XT Advance Bio
Q-TOF

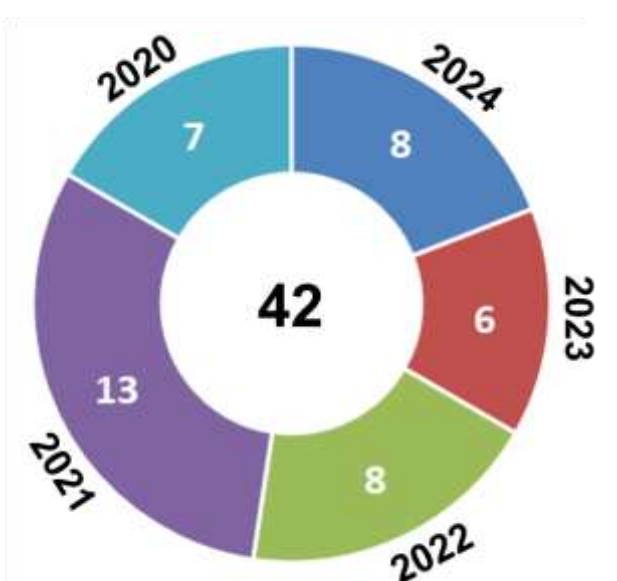


Orbitrap-XL

Facility Usage Statistics



Publication Record

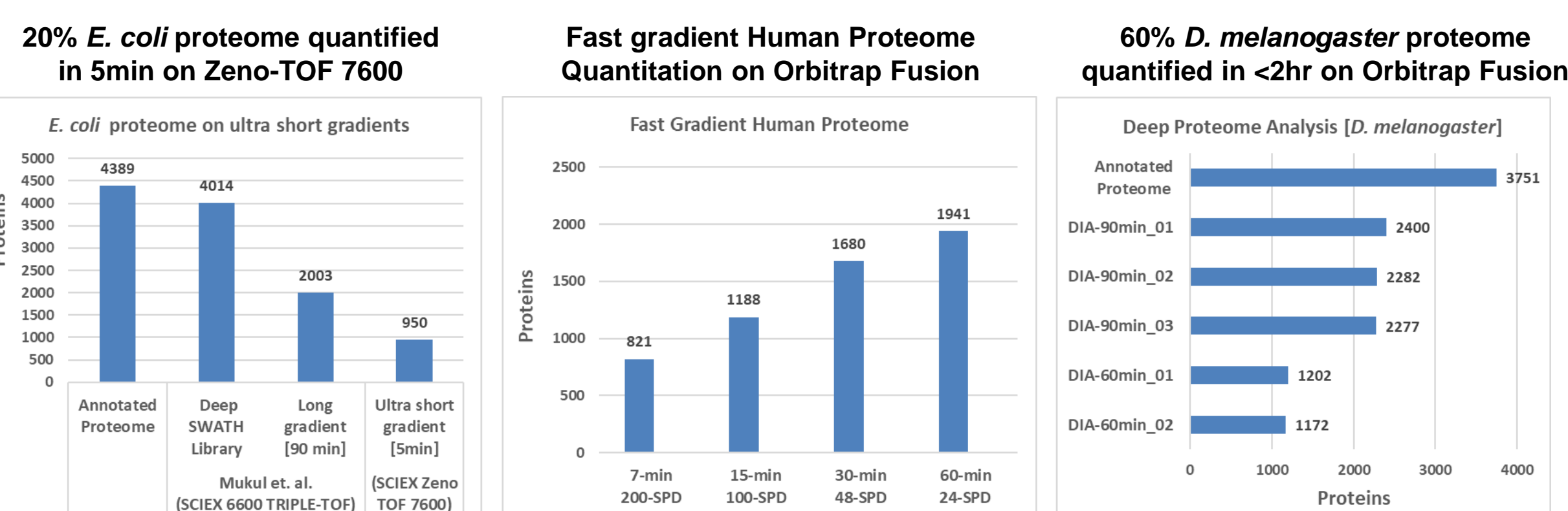


- DOI: [10.1016/j.jfcha.2024.100842](https://doi.org/10.1016/j.jfcha.2024.100842)
- DOI: [10.1186/s12964-024-01576-z](https://doi.org/10.1186/s12964-024-01576-z)
- DOI: [10.1016/j.plaphy.2024.108850](https://doi.org/10.1016/j.plaphy.2024.108850)
- DOI: [10.1016/j.jprot.2024.105176](https://doi.org/10.1016/j.jprot.2024.105176)
- DOI: [10.9734/jabb/2024/v27i81266](https://doi.org/10.9734/jabb/2024/v27i81266)

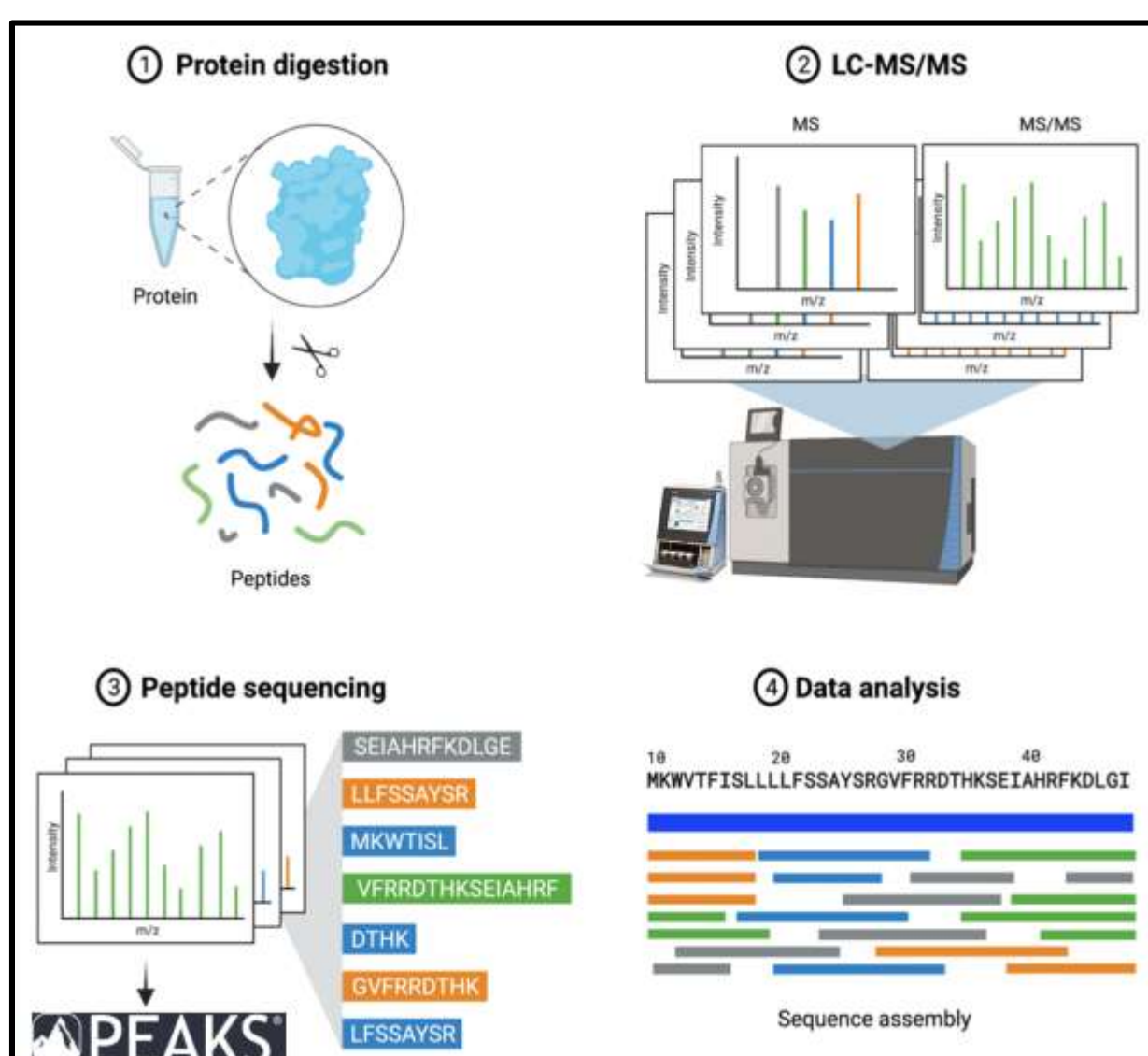
Services offered

- **High-Resolution MALDI-MS-Imaging for fresh frozen tissue sections**
- SWATH/DIA and reporter ion-based workflow for proteome quantitation
- Identification and site-localization of selected post-translational modifications
- Global quantification of (sub) proteomes using DDA
- co-IP analysis using label-free or stable isotope labelling approaches
- Identification of gel-separated and Coomassie-stained proteins
- Determination of molecular mass of intact proteins
- Fast-track validation of antibodies for Co-IP experiments

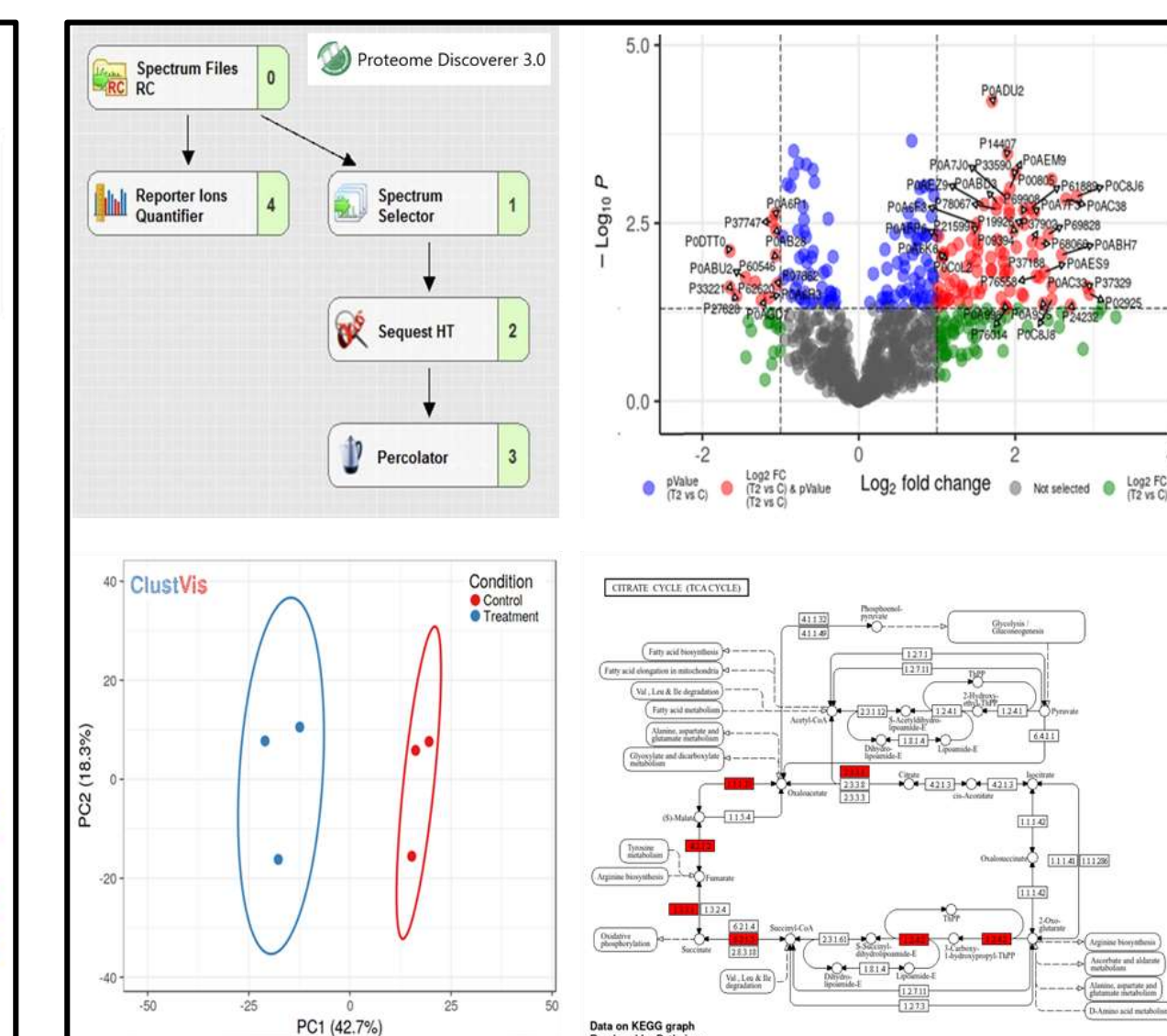
Facility Capabilities & Workflows



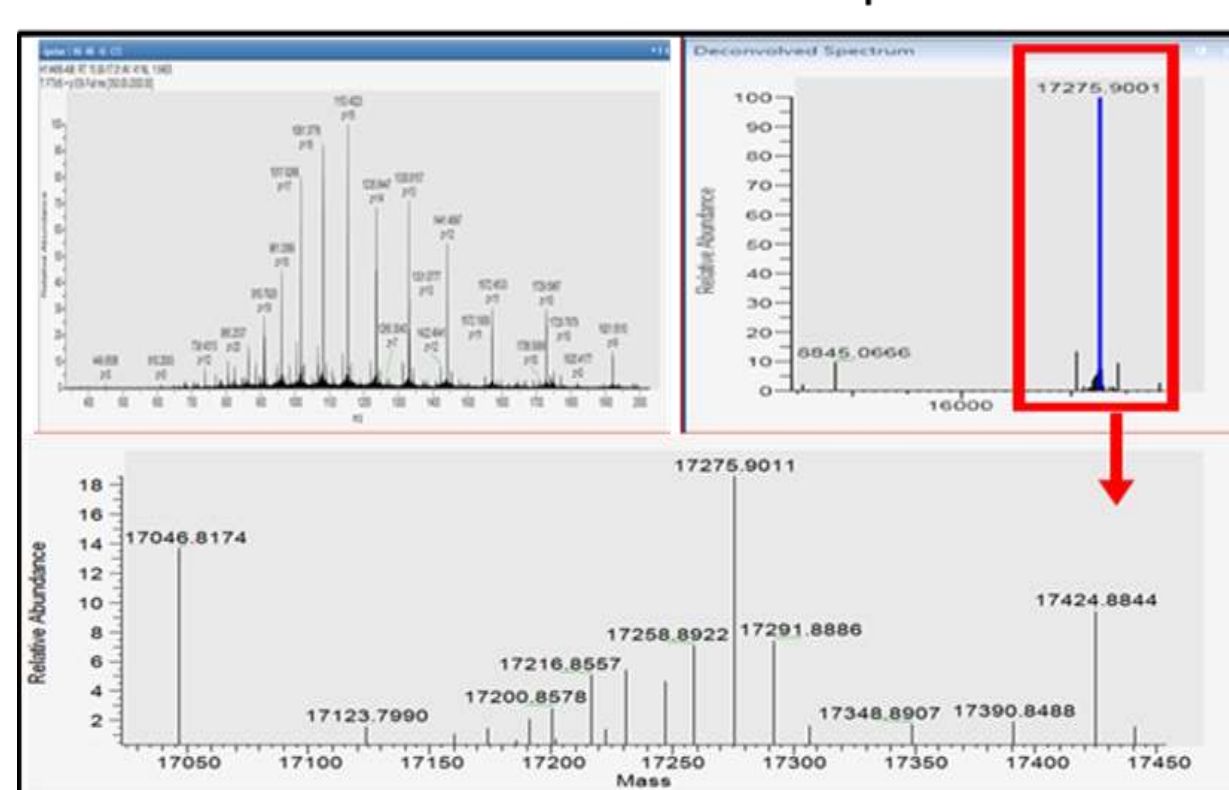
De novo Protein Sequencing with Peaks®



Quantitative Proteomics with Proteome Discoverer™



Proteoform identification at 100K mass resolution on Orbitrap-XL



mAb peptide mapping & sequencing On Agilent 6545XT AdvanceBio LC/Q-TOF



Future plans

- **Development of HR-MALDI imaging facility for spatial multi-omics**
- The facility will develop analytical protocols to measure low-level protein concentrations and will continue its analytical efforts to use targeted proteomics for biomarker analysis.

Lipidomics & Metabolomics

Targeted (Absolute Quantification) and Untargeted (Relative Quantification) metabolomics are the commonly employed strategies for study of metabolites in the biological systems. We now provide high resolution MALDI-MS-Imaging services for lipid metabolites on frozen tissue sections

Available technologies



Qtrap 6500



Qtrap 5500



6495C - QQQ



TSQ Vantage



LCQ Ion trap Fleet



Q Exactive



GC-MS 7000C
Triple Quad

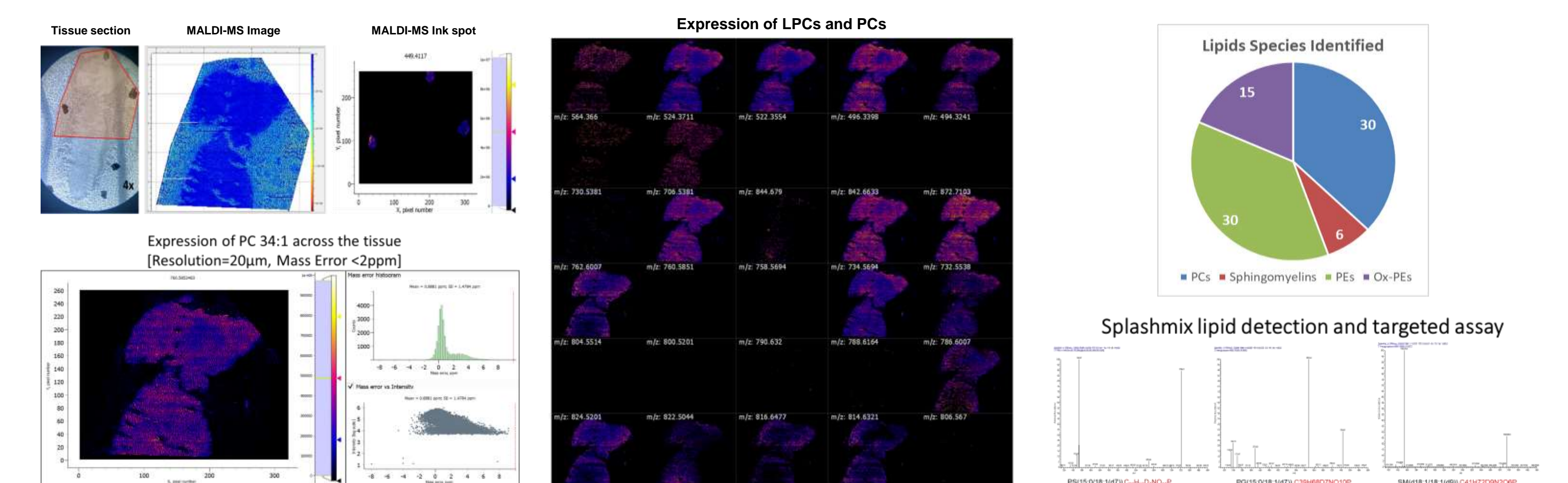


GC-MS 7890B
Single Quad

Services offered & Facility Capabilities

- Capacity building through training and workshops.
- Development of new method and workflow for targeted quantitation of peptides, proteins and small molecules.
- Global non targeted Lipidomics analysis using HRMS
- Pharmacokinetic study and method development for targeted quantitation of small molecule/drugs

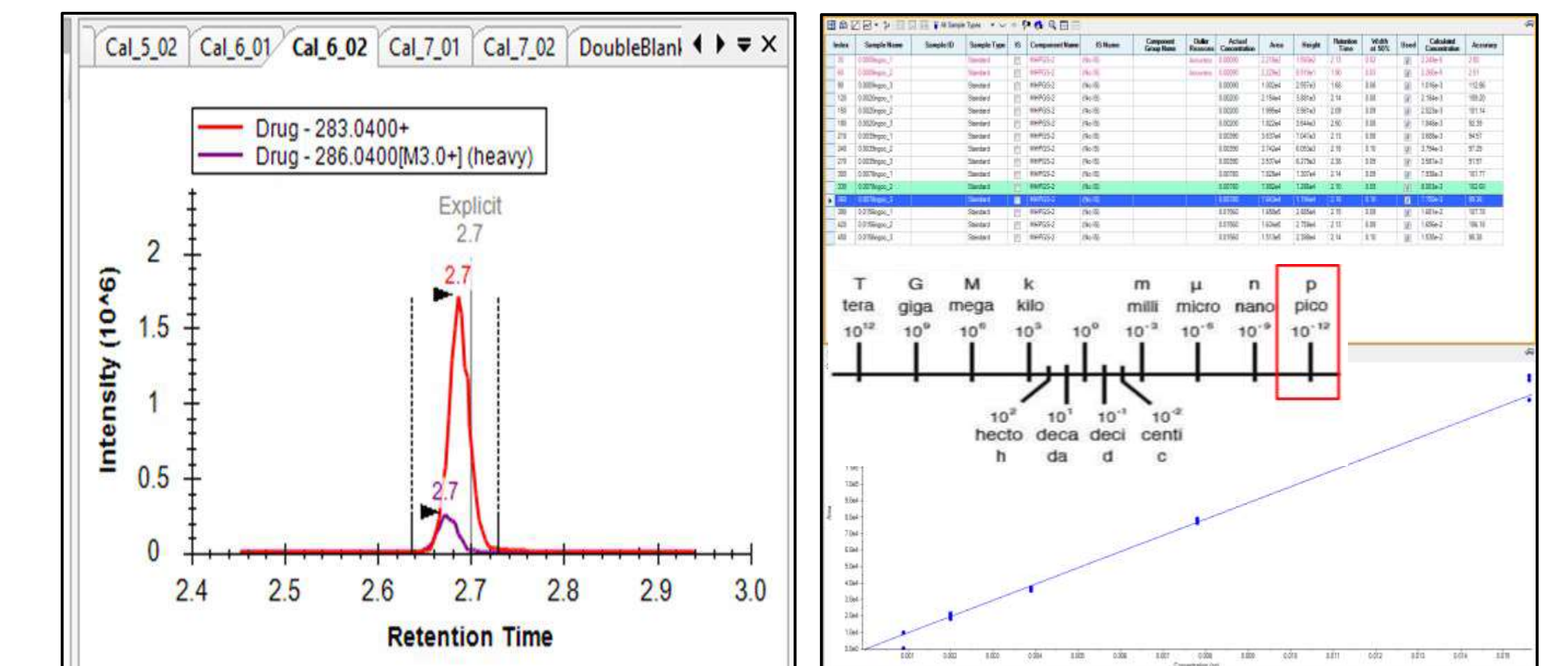
Lipid Imaging in rat brain at 20µm/pixel spatial resolution on AP-MALDI (ng) UHR Ion source



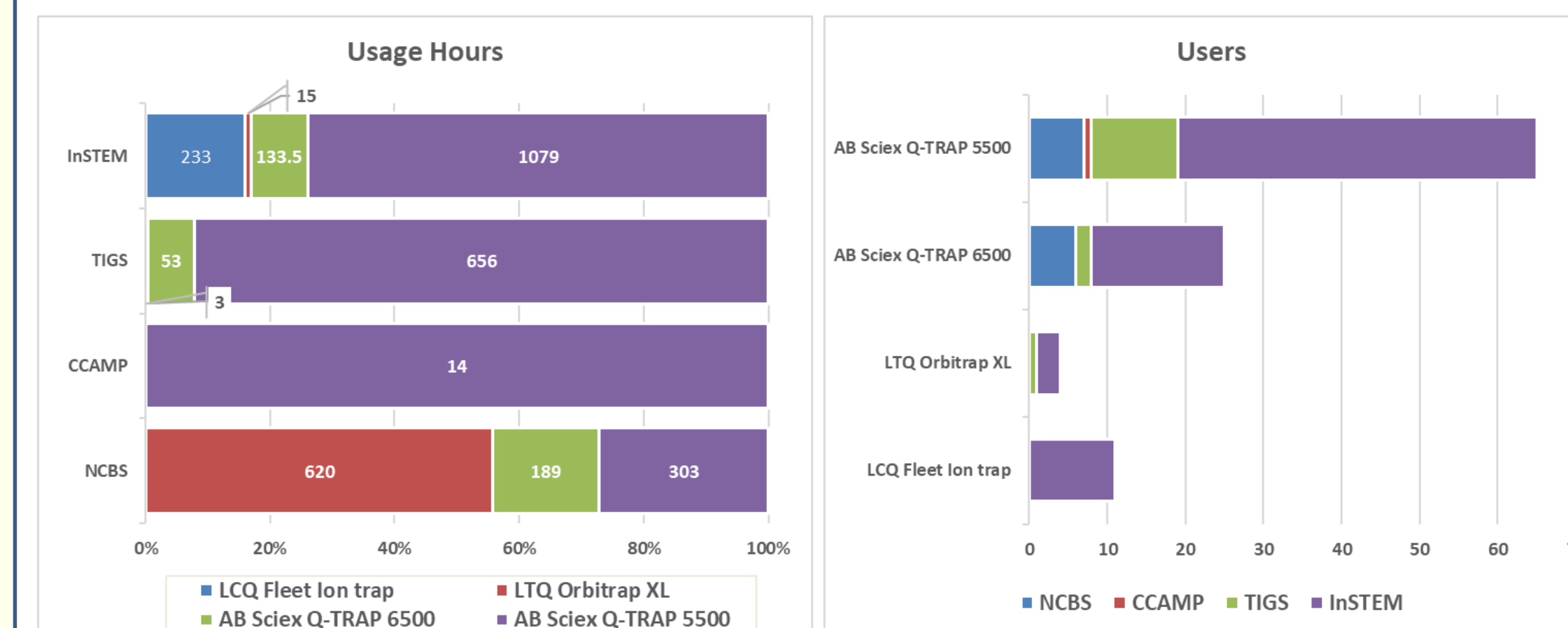
Bio-molecules

- Neurotransmitters
- Nucleotides
- Cholic acids
- Amino acids
- Lipids
- Plant secondary metabolites
- Plant growth hormones
- Peptides

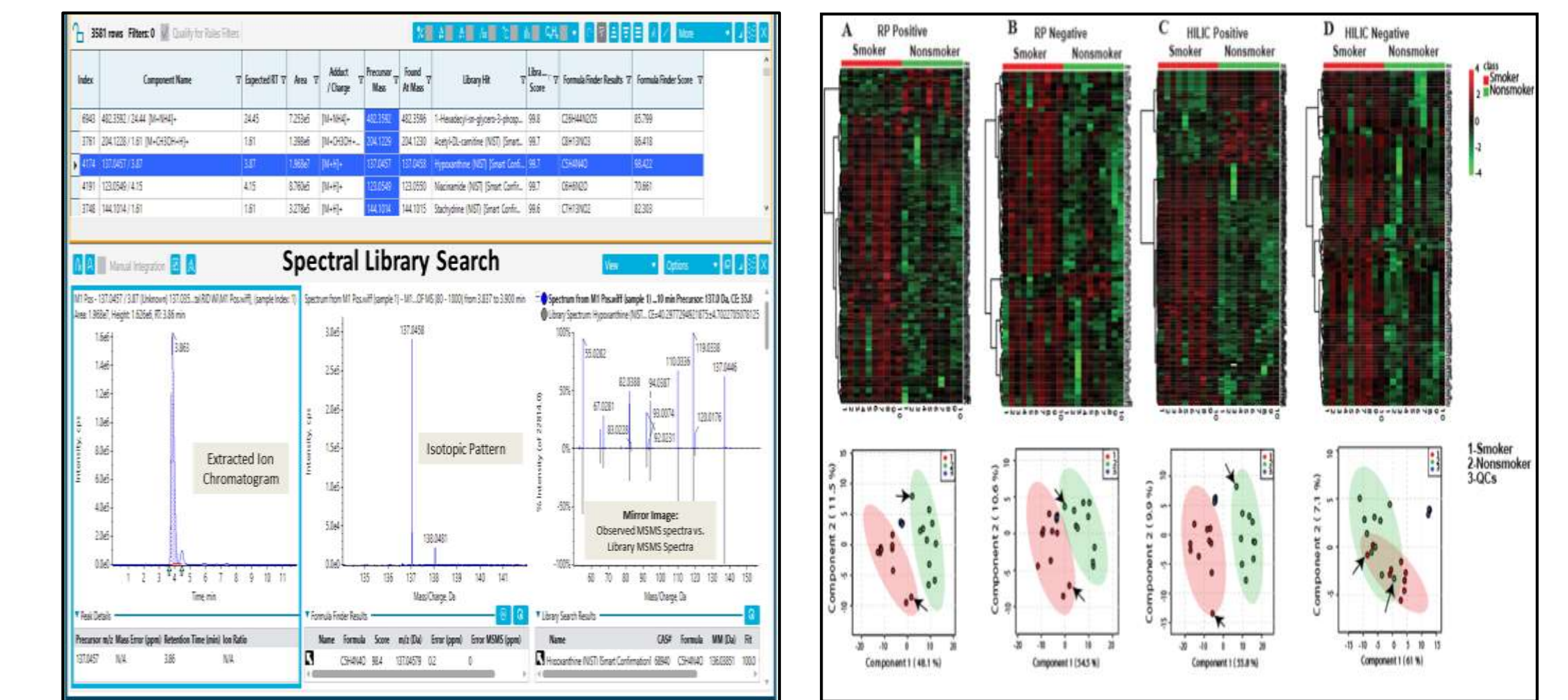
Pico gram level quantitation of metabolites



Facility Usage Statistics



Untargeted metabolomics & Lipidomics



Trainings, Workshops & Resources

Regular training and workshops for both InSTEM students and external students are conducted on a regular basis for capacity building

Mass Spectrometry Facility website showing upcoming events and past events.

National Workshops & Symposia	No. of participants
7 th Hands On workshop on Integrated Omics	25
Workshop & Symposium on Mass Spectrometry Imaging-Based Spatial "Omics"	24
Hands-On training course on MS Data Analysis	18
6 th Hands On workshop on Integrated Omics	25
Hands-On workshop on Proteomics	10
Hands-On training course on Metabolomics-II	30
Hands-On training course on Metabolomics-I	20

BLiSc Training Programme	Students Trained
Proteomics	15
Metabolomics	20
Small Molecule-HRMS	8
Protein Intact Mass Analysis	5
Gas Chromatography-MS	9

Mass Spectrometry Facility website showing training programs and resources.