

Loma Linda University Mass Spectrometry Core Facility Policy 2014-2015

The state-of-the-art Mass Spectrometry core facility (LLUMSCF), sponsored and maintained by the Loma Linda University School of Medicine (LLUSM), opened in 2007. This facility's primary goal is to serve the needs of investigators at Loma Linda University, including the Loma Linda University Medical Center and the Pettis Veterans Affairs Medical Center, in the analysis of proteins, peptides and other macromolecules by mass spectrometry. While its first priority is to serve the Loma Linda research community, this facility is also available to researchers from outside Loma Linda University.

Personnel, Facilities Location and Contact Information:

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Director's duties and responsibilities

As supported by the Assistant Director and in consultation with the Director of Core Facilities and Infrastructure, the LLUMSCF Director will manage facilities operations, interactions with intramural University administration, media relations, and extramural activities that promote use of the facility. Responsibilities include drafting of policy guidelines, development of training manuals and curricula, counsel on design and implementation of collaborative projects, identification of new technologies and instrumentation, and pursuit of opportunities for support that enhance LLUMSCF capabilities for the benefit of facility users. The Director will manage facilities access, user training, scheduling of usage, and be responsible for equipment maintenance, and monthly reporting of user activities to the Associate Dean's office. As needed, project prioritization of work activities and preparation of budgets will be done in consultation with the Assistant Director and Director of Core Facilities and Infrastructure. Efforts may also involve data collection, analyses, and preparation of reports.

Assistant Director

The Assistant Director will assist the Director in implementing policy and planning, provide input regarding project prioritization and implementation, and consult with regards to scheduling, equipment operations, and management of resources to meet user needs.

Director, Core Facilities and Infrastructure, LLUSM Basic Sciences

The Core Facilities and Infrastructure Director will oversee the work of the LLUMSCF Director and Assistant Director, participate in written and oral communications with users when needed, as well as interface with the Associate Dean and University administration with regards to management, operations, strategic planning, and financial reports of the LLUMSCF. In addition, the Core Facilities and Infrastructure Director will work with the Director to implement recommendations of the Steering committee.

Steering Committee.

This committee will provide recommendations to guide the management and operations of the core facility. The Director will chair and implement oversight by this committee, whose composition is multi-departmental, multidisciplinary, reflective of the diversity of the user group, and includes representation from the LLUSM Dean's office to assist with fiscal issues. The committee will review and possibly make recommendations regarding appropriate core use, training, use charges, and levels of subsidy to maintain resources and operations. This steering committee will also advise regarding academic and educational activities, e.g., workshops, training sessions, use scheduling, equipment (maintenance and upgrades), and provide consultation or assistance to solve major problems. The committee will meet as needs present or biyearly.

Steering Committee members:

Hansel Fletcher, Lubo Zhang, Carlos Casiano, Dave Weldon, Guangyu Zhang, Penny Duerksen-Hughes, Steven Yellon, Alice Wongworawat, Ben Gardner, Yinsheng Wang, and Suzanne Phillips

Major Equipment:

- LTQ-Orbitrap Velos with ETD (Thermo)
- LCQ Deca XP (Thermo)
- QQQ Triple Quadrupole LC/MS (Agilent 6410)
- GC/MS with electron impact ionization (EI), chemical ionization (CI), (Agilent 6890N)
- MALDI (pending acquisition)

LTQ-Orbitrap Velos with ETD

The LTQ-Orbitrap-Velos-ETD represents the latest generation of high resolution mass spectrometers, and possesses different ion fragmentation capabilities including CID, PQD, ETD, and HCD. It can handle a variety of applications including identification and quantification of protein post-translational modifications, identification/quantification of proteins for biomarker identification or protein pathway analysis using iTRAQ or TMT quantitative proteomics approaches, as well as top-down analysis of intact proteins. The instrument is typically operated by a dedicated facility staff member.

LCQ

The LCQ Deca XP is used for protein identification.

QQQ

The Agilent triple quadrupole mass spectrometer is linked with an Agilent 1200 HPLC and PAL autosampler housing six 96-well plates. It has the capability of performing electrospray (ESI in both positive and negative mode) mass analysis and has the features of product-ion scan, precursor-ion scan, selective-ion scan (SIM) and multiple-ion-scan (MRM). The MRM mode is very specific and highly sensitive for quantification of polar small organic molecules or peptides. For small molecules, the sensitivity (LOD) is about 1 pico-gram on a HPLC column).

GC/MS with electron impact ionization (EI), chemical ionization (CI)

The Agilent GC-MSD series is a single quadrupole mass spectrometer with unit resolution. This instrument is dedicated to separation (by GC), identification (by MS) and quantification (by SIM scan mode) of non-polar small organic mixtures. Polar compounds are derivatized with TMS or other types of derivatization reagents before introduction to the GCMS system.

MALDI (pending acquisition)

Core Services and other equipment:

- Protein identity from SDS-PAGE gel bands/spots & complex mixture of proteins in solution
- Differential protein expression analysis (biomarker identification)
- Protein post-translation modification analyses (phosphorylation, glycosylation)
- Qualitative and quantitative analysis of small molecules by LC/MS and GC/MS
- GC-MSD (Hewlett Packard 5890/5970)
- Capillary Electrophoresis (Beckman P/ACE 5510)
- Zeta Potential/Particle Sizer (NICOMP 380ZLS)
- UV-VIS Spectrophotometer (Varian Cary 300 bio)
- FT/IR (Jasco 4100)
- Peptide Synthesizer (Applied Biosystems 433A)
- Spectrofluorometer (PTI Model T)

Policies:

1. The LLUMSCF provides technical service to PIs and for collaborative research projects with investigators within and outside the LLU research community. Principal Investigators (PI) interested in using the services of the facility should first consult with the Director on project needs/design, instrumentation, sample preparation, and estimates of run/personnel time. A Project form must accompany each request for sample analyses. Full disclosure of needs, available funding resources (intramural and extramural), and contribution by collaborators are important for an accurate budget estimate by LLUMSCF. Actual charges and cost-sharing (item 8 below) may require discussions with relevant cost-center administration, Vice Chairs and Chairs of Divisions, as well as the Associate Dean for the Basic Sciences.
2. All submitted samples can be analyzed by facility personnel or by trained investigators or a combination of the two based upon discussions with the Directors. If a PI has extensive analysis needs, such as quantification of small molecules by triple-quadruple or GC/MS, a dedicated person from the PI's group may be trained to use an assigned instrument.
3. Users are required to submit an appropriately-signed Project form with a description for use of core facilities. Users who have funding for their mass spectrometry studies will provide the appropriate cost center number on the use form. Users without funding are required to secure financial support for their studies before permission is granted to use facility resources. Priority for use of available core resources may take into consideration funding, sources, and deadlines.
4. The facility users will be responsible for leaving all work areas and systems clean and in the same condition as found. Users will notify facility staff immediately about any and all equipment problems. Damage or inappropriate use of the instrument may be subject to fine/discipline or denial of privileges to use the facility. Expenses and repairs may be recharged for time and material costs. Remediation may require additional training, supervision, or reconsideration of privileges.
5. Challenging projects such as large scale qualitative protein identification, differential protein expression analysis (biomarker identification) and protein post-translational (PTMs) identification will require a clearly defined collaborative agreement between the PI and the Core Directors that may include time for sample analyses and data interpretation. A Director and/or research associate/staff from LLUMSCF may commit efforts or intellectual contributions that would be sufficient to earn acknowledgement or coauthorship on reports/manuscripts from the project.
6. All presentations, reports, publications, and grants that use the LLUMSCF require the following acknowledgement statement or a variation approved by Administration for posters and publications, and other public displays.
GC-MS or LC-MS was performed in the Mass Spec Core with support of NIH S10 Grant No. 1S10RR027643-01 and the Loma Linda University School of Medicine.
7. Users will provide facility staff with copies of reports, abstracts, and manuscripts from use of the core. Failure to make proper acknowledgements in manuscripts, or failure to submit usage reports, may result in loss of use privileges. Timely reporting and acknowledgement of the Mass Spec Core Facility in publications, including meeting abstracts, posters, manuscripts, and grant applications is encouraged (see incentives for timely annual report in pricelist below).
8. Investigators may apply for a Cost-Sharing Award (see form) to defray LLUMSCF charges.

List of Services and Fees

Please consult with LLUMSCF Director before preparing samples and for Project budget estimation

Full service charges *(performed by facility staff)*

Analysis Type	LLUSOM Academic (subsidized)	Non-LLUSOM Academic	Non-LLU
Orbitrap 1D and 2D Run (LC-MS or LC-MS/MS)	\$150/sample (for 2h/gradient) \$50/additional hr gradient	\$225/sample(for 2h gradient) \$75/additional hr gradient	\$300/sample(for 2h gradient) \$100/additional hr gradient
Orbitrap Molecular weight determination	\$50/sample	\$75/sample	\$100/sample
LCQ Molecular weight determination	\$20/sample	\$30/sample	\$40/sample
QQQ LC-MS/LC-MS/MS	\$50/sample	\$75/sample	\$100/sample
LCQ LC-MS/LC-MS/MS	\$60/sample	\$90/sample	\$120/sample
MALDI-TOF	\$50/sample	\$75/sample	\$100/sample
Agilent GC-MS	\$20/sample	\$30/sample	\$40/sample
Protein_Expression* (LLUMSCF Collaboration)	Inquire	Inquire	Inquire
PTM+ (LLUMSCF Collaboration)	\$200 plus analysis	\$300 plus analysis	\$400 plus analysis
Training, consultation, sample preparation, method development, customized data analysis by staff	\$100/hour	\$150/hour	\$150/hour

Self-serve charges *(by trained expert Users)*

Analysis Type e	LLUSOM Academic (subsidized)	Non-LLUSOM Academic	Non-LLU
Orbitrap	\$50/hour	\$75/hour	\$100/hour
MALDI-TOF	\$20/hour	\$30/hour	\$40/hour
QQQ	\$20/hour	\$30/hour	\$40/hour
LCQ	\$15/hour	\$22.5/hour	\$30/hour
GC/MS	\$20/hour	\$30/hour	\$40/hour

Incentives *(provided when reports are given by User to MSCF staff)*

	LLUSM	LLU Non-SM	Non-LLUSM
Meeting Presentation	\$30	\$40	\$40
Publication	\$50	\$60	\$60
Grant	\$300	\$400	\$400

MALDI recharge values *(pending)*