Weill Cornell Medicine

Core Laboratories Center / Meyer Cancer Center

Proteomics and Metabolomics Core Facility

ABSTRACT

The WCM CLC/MCC Proteomics and Metabolomics Core Facility is a newly established core facility that will offer state-of-the-art instruments and services, and expertise in their applications, to the Weill Cornell Medicine (WCM) community and to outside investigators. Services will include sample preparation, protein identification, protein characterization, quantitative proteomics, and small molecule profiling and characterization. The facility will also provide consultation on project design and data analysis, and will offer educational workshops, seminars and training.

OVERVIEW

History: The WCM CLC Proteomics and Metabolomics Core Facility is a new core facility that will start offering a full array of services in September 2016.

Location: The core is located on the 16th floor of the Belfer Research Building, Weill Cornell Medicine, 413 East 69th Street, New York, NY.

Services provided: The facility will provide mass spectrometry based analysis of proteins, peptides, metabolites and other biochemical molecules. Training will be available on sample preparation techniques, instrument use, and data analysis and interpretation.

WCM Core Laboratories Center (CLC): The WCM CLC was established in 2015. In addition to proteomics and metabolomics, the CLC includes core facilities that offer resources and services in genomics and epigenomics, synthetic and analytical chemistry, NMR, flow cytometry, imaging (e.g., optical and electron microscopy, high content screening), CBIC (MRI, PET/CT, and ultrasound), biorepository, bioinformatics, and advanced technology assessment.

WCM Myer Cancer Center: The Sandra and Edward Meyer Cancer Center is a collaborative, multidisciplinary research enterprise located at Weill Cornell Medicine. The Meyer Cancer Center engages more than 250 basic scientists, pathologists, bioinformaticians, surgeons, oncologists, radiologists and other clinicians, who collaborate with colleagues at Cornell University's Ithaca campus and other institutions to take fundamental discoveries from bench to bedside and back again.

Administration: The Proteomics and Metabolomics Core Facility is part of the Weill Cornell Medicine (WCM) Core Laboratories Center (CLC) and part of the WCM Myer Cancer Center (MCC).

Open to all: The resources and services of the core facility are open to all investigators at Weill Cornell Medicine, Cornell University and Cornell-affiliated institutions. The facility also provides services to external investigators at both academic institutions and commercial enterprises.

RESOURCES

Mass spectrometry (coming soon): Fusion Orbitrap Lumos (Thermo), Q Exactive Orbitrap (Thermo).

HPLC (coming soon): Easy Nano UPLC (Thermo), Vanquish UPLC (Thermo).

RapidFire system (available now): Triple quadrupole 6400 (Agilent), 1260 Infinity HPLC (Agilent), SPE sample prep robot (Agilent).

Instrument Systems

NanoLC-MS

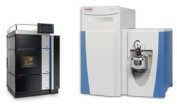
Coming Soon

Easy nanoLC / Fusion Orbitrap Lumos
for proteomics

- High sensitivity
- High resolution
- High mass accuracy
- High scan speed
- High versatility
- Protein identification
- Protein characterization
- Protein quantitation
- PTM characterization
- PTM profiling

LC-MS

Coming Soon



Vanquish UPLC / Q Exactive Orbitrap
for metabolomics

- High resolution LC
- High mass accuracy
- Fast LC separation
- Robust performance
- Untargeted (discovery) metabolomics
- Targeted metabolomics

HPLC

Coming Soon

Agilent 1260 Infinity HPLC
for peptide fractionation

- Wide flow range
- Accurate gradient
- RP, IEX, HILIC
- Peptide fractionation prior to MS to greatly improve coverage

RapidFire

High Throughput MS Screening

Available Now

- Ultra fast analysis (~10 sec per sample)
- High throughput (automated 63 plate handling)
- Combined with LC-MS (QQQ) for high sensitivity/specificity detection
- Reduced cost for high throughput screening

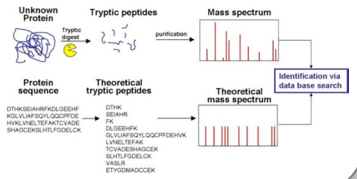
Quantitative analysis for
- metabolites
- drugs
- other small molecules

Applications in
- drug discovery
- clinical analysis
- biochemical analysis
- forensic analysis

The Agilent RapidFire system includes a RapidFire unit, an LC unit, and a triple quadrupole MS unit. The RapidFire unit is a micro-scale solid-phase extraction (SPE) based, front-end instrument that enables detection of native compounds by mass spectrometry. Requiring no labels or surrogates, it enables the screening of intractable or challenging targets that are not amenable to fluorescence or luminescence. Sample throughput is 10x faster than conventional LC/MS screening methods.

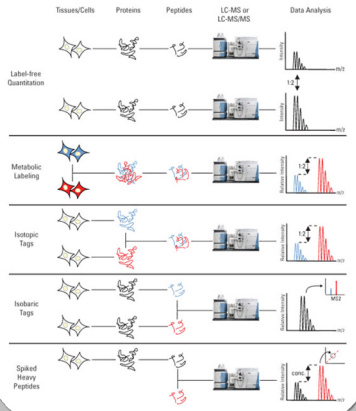
Protein Identification

- Proteins from SDS-PAGE
- Proteins in-solution



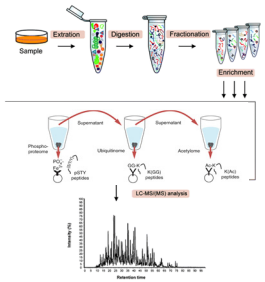
Protein Quantitation

- Label-free (intensity based / spectral counting)
- Stable isotope labeling by amino acids in cell culture (SILAC)
- Tandem mass tags (TMT)
- Other chemical labeling (dimethyl, etc.)
- Spiked standards



Post-Translational Modification Analysis

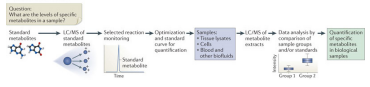
- Phosphorylation
- Ubiquitination
- Acetylation
- N-term / C-term processing
- Other PTMs



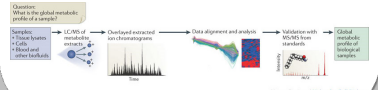
Metabolomics

- Metabolites / drugs / other small molecule
- Global profiling (untargeted or discovery)
- Targeted quantitation
- Pathway analysis

Targeted metabolomics

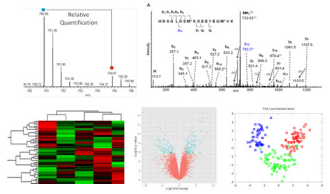


Untargeted metabolomics



MS Data Analysis

- Database searching (protein / metabolite identification)
- Manual inspection of MS and MS/MS spectra
- Statistical analysis for quantitation
- Pathway analysis



Consultation, Workshops and Training

- **Consultation on project evaluation, experimental design, sample preparation and data analysis.**
- **Educational workshops and hands-on training on data analysis.**
- **Seminars on emerging proteomics and metabolomics technologies.**
- **Coordinated project design consultation and data analysis support available with the CLC genomics and epigenomics, synthetic and analytical chemistry, NMR, flow cytometry, imaging (e.g., optical and multiphoton microscopy, high content screening, MRI, PET/CT, and high resolution ultrasound) biorepository, bioinformatics, and advanced technology assessment core facilities.**

Contact Information

Proteomics and Metabolomics Core Facility

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For questions about the WCM Core Laboratories Center, please contact George Grills at gsg2016@med.cornell.edu