



University of Alberta Metabolomics Research Services Group

NANUC has teamed up with Chenomx to offer University of Alberta researchers cost-effective and quality laboratory services to facilitate achievement of metabolomics research project goals. The National High Field Nuclear Magnetic Resonance Centre (NANUC) is the largest multi-user nuclear magnetic resonance (NMR) facility in Canada. Chenomx Inc. is a University of Alberta spin-off biotechnology company with global reach for quality NMR analysis of complex mixtures. Our collaboration offers an experienced team of scientists with specializations in NMR spectroscopy, biochemistry, statistics, pharmacy, nutrition, and bioinformatics. NANUC'S state-of-the-art NMR facility and the Chenomx NMR Suite software and patented metabolite profiling technologies are world standard for robust, reliable, and quantitative NMR analysis of metabolites in mixtures. Together we provide practical solutions to metabolomics research problems every step of the way (Figure 1). Training, workshops, and seminars are available.

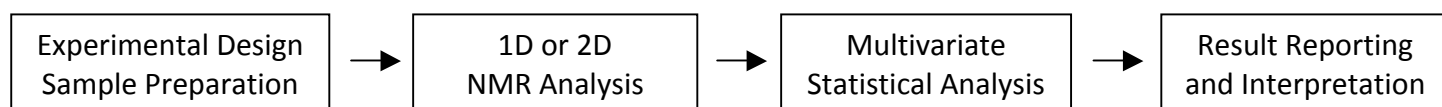


Figure 1 Organized project workflow of NANUC and Chenomx services

Metabolomics Research Services

1. Metabolomics Research Project Consulting

- a. Literature Search
- b. Hypothesis Generation and Testing
- c. Study Design and Technical Writing

2. Sample Preparation and Protocol Development

- a. Biological Fluids – Uring, Serum, Plasma, Saliva, Cerebrospinal Fluid
- b. Stool, Cell Lysates, Tissue Homogenates, and more...

3. NMR Spectral Data Acquisition

- a. Automated High-Throughput 600 MHz or enhanced resolution/sensitivity 800 MHz NMR spectrometers

4. Patented Targeted Profiling Analysis with Chenomx NMR Suite

- a. Optimized NMR Spectra and Identify and Quantify 100s of metabolites in complex mixtures

5. 2D NMR and Correlation Analysis

- a. Personalized small molecule elucidation

6. Multivariate Statistical Analysis and Report Generation

- a. Statistical Consultation and Publication Quality Reports
- b. Biomarker Pattern Discovery

Metabolomics Research Project Design Consulting

We share your excitement in achieving research goals and will take time to review articles in your field to assist you with the development of a hypothesis and experimental design for your project. We understand your busy schedule and the challenges of designing quality research projects that receive funding. We will perform literature searches and help you write research documents such as grants and ethics applications.

There is no charge for research project design consulting.

Sample Preparation

Chenomx research scientists have years of experience working with complex sample mixtures and recognize that sample collection and preparation are essential steps in the analysis process to ensure good quality analytical results. Our laboratory follows universal safety precautions and is well-maintained, organized, and equipped with a bio-safety cabinet, centrifuge, fume hood, and sonicator. Our scientists work with a diversity of sample types including urine, serum, plasma, CSF, saliva, cell lysates, tissue, beverages, and food. By stopping metabolism, removing interfering substances, and concentrating metabolites of interest in solution for high resolution nuclear magnetic resonance (NMR) spectroscopy, Chenomx ensures clean, informative NMR spectra. An internal standard is used when performing analyses with Chenomx software. Chenomx guarantees the concentration of the internal standard solutions which have been carefully and accurately calibrated. Our laboratory continues to develop new sample preparation technologies to meet your needs and provides guidelines to help you collect and prepare samples for metabolite analysis.

Typical pricing for U of A researchers is:

Preparation of NMR-ready samples including internal standard and NMR tube:

\$20/urine sample \$40/serum, plasma, or CSF sample

Call for pricing on others such as cells and tissue samples

NMR Spectral Data Acquisition

Our research scientists and NMR facility (NANUC) have the capacity to handle up to 20,000 samples per year. Depending on project size, result turnaround times vary from 2 - 6 weeks from sample arrival. Following analysis, samples are stored for 30 days after project completion in our -80°C storage freezer. Upon request, samples can be returned after NMR analysis or stored for a longer period of time depending on available storage space. There will be slight modifications to samples such as internal standard addition and removal of large interfering macromolecules (proteins, lipids).

Typical pricing for U of A researchers:

Standard (600 MHz) \$25/sample

Please call for charges for enhanced 800 MHz NMR data (cryoprobe)

Patented Targeted Profiling Analysis with Chenomx NMR Suite 6.0

Using the processor module of Chenomx software, our research scientists convert raw NMR spectra (FID files) into Chenomx format spectrum files (CNX files) and optimize the spectra (zero filling, phasing, baseline correction, reference deconvolution). The metabolites in your sample NMR spectrum are identified and quantified with the profiling module by matching peak frequencies and heights to our pH specific compound library. Each analysis is passed through rigorous peer review of assigned metabolites and fits by a second expert scientist to validate results (check for consistency and outliers).

Standard pricing for U of A researchers for Targeted Profiling Analysis is \$60/sample.

2D NMR and Correlation Analysis

Chenomx 2D NMR spectral analysis resolves ambiguous features (ex. overlapping peaks) in the 1D targeted profiling NMR spectra and is an option available to add new customized library compounds or to confirm metabolite identity. Our novel in-house methods are capable of analyzing 2D 1H-1H COSY (correlation spectroscopy) or TCOZY (total correlation spectroscopy) spectra with the Chenomx metabolite library.

2D NMR or Correlation Analysis is available on a custom quotation per project.

Multivariate Statistical Analysis and Report Generation

We are experienced in multivariate statistical analysis techniques and uses Umetrics software to simplify overwhelming metabolomics data sets of many variables into easy to interpret statistical data displays such as heat maps. Chenomx takes advantage of state-of-the-art chemometric tools such as principal component analysis (PCA), partial least squares difference analysis (PLS-DA), and orthogonal projections to latent structures discriminant analysis (OPLS-DA). All data is gathered into an automated report. Customers receive NMR spectra and metabolite profiles (CNX files), a table displaying metabolite ID's and concentrations, and a targeted profiling report. The targeted profiling report includes univariate summary statistics, and per sample (how sample differs from group average), and per compound (how each compound differs across samples) summary reports. The data displays are publication quality and can be adjusted to meet your needs.

Multivariate Statistics Consulting is available on a custom quotation per project.

Metabolic Pathway Interpretation

Our Metabolomics Application Scientist has a background in pharmacology, nutrition, and clinical biochemistry and can assist you in uncovering the biological relevance of discovered metabolic patterns.

Metabolic Pathway Consulting is available on a custom quotation per project.

Intellectual Property Ownership and Confidentiality

All intellectual property rights, patents, and scientific discoveries are owned by you. NANUC and Chenomx do not request intellectual property ownership. We ask for acknowledgement in papers and posters for our collaborative services. Client data is secure and treated confidentially.

Contact Information

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