2026 NMD4C Basic Research Summer School Schedule

Day 1: Monday June 8, 2026

Location: University of Ottawa Roger Guindon (451 Smyth Rd)

*Please see the end of document for descriptions of workshops, demos, tutorials, and interactive computer sessions.

8:00-8:30am	**REGISTRATION / COFFEE & PASTRIES**	
8:30-8:45am	Intro/Opening Remarks – Dr. Mireille Khacho	
8:45-9:55am	Participant Flash Talks	
9:55-10:30am	**COFFEE BREAK**	
10:30-11:00am	Patient Partner presentation – Jenna Keindel	
11:00-11:30am	Lucid Scientific Presentation – *Introduction to the Recipher Platform* – Ghainaa Abousleiman & Silke Grainger	
11:30am-12:00pm	**TUTORIAL 1** – Metabolomics – Dr. Shama Naz	
12:00-1:00pm	**LUNCH**	
1:00-2:00pm	**Demo**: Muscle Organoids – Dr. Vahab Soleiman (3 x 20 min sessions)	
2:00-2:30pm	**COFFEE BREAK**	
2:30-4:30pm	**TUTORIAL 2:** Histopathological Basis of Muscle in NMD: From Normal Structure to Pathological Changes – Dr. Jean-Philippe Leduc-Gaudet	**INTERACTIVE COMPUTER SESSION:** Bioinformatics and Genetic Reference Populations – Dr. Keir Menzies
4:30-5:00pm	Preparatory work with Lucid Scientific for Workshop 3 – Ghainaa Abousleiman & Silke Grainger	
5:00-7:00pm	**DINNER & NETWORKING EVENT** – Career Network Panel • Ghainaa Abousleiman, Sales Application Specialist, Silke Grainger, VP of Product Strategy & Applications, Lucid Scientific • Dr. Jean-Philippe Leduc-Gaudet, Early Career PI • Dr. Samantha Kornfeld, R&D Principal Medical & Technical Writer, Abbott • Dr. Jean-Paul Michalski, Learning and Mentoring, CIHR • Dr. Ryan O'Meara's, Senior Clinical Reviewer, Health Canada	

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25 Stem Cell Network

Lucid Scientific

2026 NMD4C Basic Research Summer School Schedule

Day 2: Tuesday June 9, 2026

Location: University of Ottawa Roger Guindon (RGN), 451 Smyth Rd.

***Exception:** Workshop 2 Muscle Biopsy located at the Faculty of Health Sciences, 200 Lees Avenue.

8:30-9:00am	**COFFEE & PASTRIES**		
9:00-10:00am	**Workshop 1:** 3D Muscle Cultures – Drs. Keir Menzies & Alex Green Presentation on Theory and Lab Tour	**Workshop 2:** Human Muscle Biopsy – Dr. Michael DeLisio **Group I:** Presentation on Theory **Group II:** Observe Biopsy	
10:00-10:30am	**COFFEE BREAK**		
10:30am-12:00pm	**Workshop 1:** 3D Muscle Cultures – Drs. Keir Menzies & Alex Green Split Groups for Hands-on Experience and Discussion	**10:30-11:30**	**Workshop 2:** Human Muscle Biopsy – Michael DeLisio **Group I:** Observe Biopsy **Group II:** Presentation on Theory
		11:30-12:00	Shuttle to RGN
12:00-1:00pm	**LUNCH**		
1:00-2:30pm	**Workshop 3:** Muscle Function **Group I: 3A** *Ex vivo* Muscle Function – Dr. Junio Dort **Group II: 3B** Resipher Team – Ghainaa Abousleiman & Silke Grainger	**Workshop 4:** Immuno / Histo Labelling of Muscle Sections **Group I:** Ricardo Carmona **Group II:** Dr. Jean-Philippe Leduc-Gaudet	
2:30-3:00pm	**COFFEE BREAK**		
3:00-4:30pm	**Workshop 3:** Muscle Function **Group I: 3B** Resipher Team – Ghainaa Abousleiman & Silke Grainger **Group II: 3A** *Ex vivo* Muscle Function – Dr. Junio Dort	**Workshop 4:** Immuno / Histo Labelling of Muscle Sections **Group I:** Ricardo Carmona **Group II:** Dr. Jean-Philippe Leduc-Gaudet	
6:00-8:00pm	**DINNER & NETWORKING EVENT**		

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2026 NMD4C Basic Research Summer School Schedule

Day 3: Wednesday June 10, 2026
Location: University of Ottawa Roger Guindon (RGN) (451 Smyth Rd)
*All sessions (9am-11am)

TIME	TOPICS
9:00-10:00am	**TUTORIAL 3:** Single cell transcriptomics – Dr. Vahab Soleimani
10:00-11:00am	**TUTORIAL 4:** Analysis of muscle stem cell function and muscle regeneration – Dr. Mireille Khacho
11:00am-12:00pm	**3D Muscle Cultures Workshop Follow-up:** Students view their 3D myobundles from the previous day – Drs. Keir Menzies & Alex Green
12:00pm	END

Description of workshops, demos, tutorials, and interactive computer sessions.

Day 1

Industry Talk: Lucid Scientific – Led by Ghainaa Abousleiman & Silke Grainger

This talk will be grounded in scientific literature and its context in muscle research. How the Resipher works, and what students will be doing during the Resipher workshop will be demonstrated. Live baseline data will be displayed.

Tutorial 1: Metabolomics – Led by Dr. Shama Naz

This tutorial will introduce key metabolomics approaches, from experimental design and sample preparation to data acquisition and interpretation. Participants will gain practical insight into how metabolic profiling can illuminate cellular states and biological mechanisms.

Demo: Muscle Organoids – Led by Dr. Vahab Soleimani

Muscle organoids, different from conventional 3D cultures, are 3D, lab-grown mini-tissues that self-organize and mimic the structure and function of real human skeletal muscle. These miniature models are used to study muscle development, disease, and regeneration, and can be engineered to include functional neuromuscular junctions for more complex disease modeling.

In this demo trainees will:

- Understand what muscle organoids are.
- Learn how muscle organoids are generated. Observe the organoid setup, how the spinner flasks are arranged and the best methods for changing the media and collecting the organoids for sectioning. Best practices will be discussed on maintaining sterility and handling the organoids.
- Observe key structural and functional features. Example slides of how organoids look during culture will be provided.
- Discuss the potential application of organoids in neuromuscular disease research.

2026 NMD4C Basic Research Summer School Schedule

Tutorial 2: Histopathological Basis of Muscle in NMD: From Normal Structure to Pathological Changes – Led by Dr. Jean-Philippe Leduc-Gaudet (*Trainees to bring laptops)

This presentation will cover histopathological procedures, best practices, troubleshooting, etc. The trainees will be shown how to properly collect and preserve tissues for histology/IHC, TEM, etc. Potentially show in real time, how to dissect and process mice tissue.

Interactive Computer Session: Bioinformatics and Genetic Reference Populations – Led by Dr. Keir Menzies (*Trainees to bring laptops)

This interactive computer-based workshop will introduce participants to GeneNetworks (genenetworks.org, an open-access bioinformatics platform integrating genetic, genomic, and phenotypic data from a variety of model organisms and human studies. The course will focus on how to investigate gene–phenotype relationships in the BXD mouse reference population using gene expression databases, and interactive visual tools available through GeneNetwork.

Students will learn how to:

- Navigate the GeneNetwork interface and datasets (e.g., BXD mouse reference population).
- Perform gene correlation analyses and interpret genetic linkage results.
- Explore tissue-specific gene expression data to identify candidate genes for traits of interest.
- Generate visual outputs such as correlation matrices, correlation tables and gene set analyses using webgestalt.
- Integrate findings with biological context and literature.

The workshop emphasizes hands-on exploration, allowing trainees to work directly with their own gene or phenotype of interest with guided exercises to perform their own mini-analysis by the end of the session.

Day 2

Workshop 1: 3D Muscle Cultures – Led by Dr. Keir Menzies

This interactive, laboratory-based workshop introduces participants to the fundamentals of three-dimensional (3D) muscle cell culture, an emerging model for studying muscle function. The course focuses on how to establish, maintain, and analyze 3D myogenic cultures derived from muscle stem cells (satellite cells) or myoblasts. Trainees will gain practical experience with matrix-assisted approaches that recapitulate native muscle architecture and function.

Students will learn how to:

- Prepare/store/sterilize reagents.
- Seed and differentiate cells into 3D myofiber bundles.
- Assess 3D myofiber bundles using microscopy.

Workshop 2: Human Muscle Biopsy – Led by Dr. Michael DeLisio

Students will observe the muscle biopsy and then learn how to preserve the collected skeletal muscle for downstream immunohistochemistry/immunofluorescence analysis, by mounting the muscle and storing in liquid nitrogen.

Workshop 3: Muscle Function

2026 NMD4C Basic Research Summer School Schedule

Workshop 3A: Ex vivo Muscle Function – Led by Dr. Junio Dort

This hands-on workshop will introduce trainees to the foundational principles and practical techniques of *ex vivo* skeletal muscle physiology. Participants will learn how isolated muscles, such as the extensor digitorum longus (EDL), are dissected, mounted, and assessed to measure contractile properties, fatigue resistance, and force production. Emphasis will be placed on optimizing experimental design, understanding sources of variability, selecting appropriate stimulation paradigms, and using the Aurora Scientific dual-mode lever system to generate high-quality data.

Trainees will:

- Develop familiarity with core *ex vivo* muscle measurements, including twitch responses, force-frequency relationships, and fatigue assays using the Aurora Dual-Mode Lever system.
- Learn how to analyze and interpret output data.

Workshop 3B: Resipher – Led by Lucid Scientific – Led by Ghainaa Abousleiman & Silke Grainger

This workshop, presented by Lucid Scientific, will introduce Resipher's platform for real-time measurement of cellular oxygen consumption and continuous metabolic monitoring. Attendees will learn how continuous metabolic readouts can deepen insights into cell function.

Workshop 4: Immuno/Histo Labelling of Muscle Sections – Led by Ricardo Carmona and Dr. Jean-Philippe Leduc-Gaudet

This hands-on workshop will introduce trainees to the fundamentals of histological and immunohistochemical labelling in skeletal muscle. Participants will also learn how to properly collect and preserve tissues for histology/IHC, TEM, and related approaches. Trainees will gain practical experience labeling skeletal muscle sections using H&E, MHC immunostaining, and COX/SDH enzymatic staining. They will also learn how to design, optimize, and troubleshoot an effective IHC protocol.

Day 3

Tutorial 3: Single cell transcriptomics – Led by Dr. Vahab Soleimani

Single-cell transcriptomics is a technique that isolates individual cells and sequences the RNA inside each one. It reveals the unique molecular identity, state, and function of each cell. This allows researchers to map cellular diversity by identifying cell types in a tissue, discovering unknown cell populations, studying disease at a cell-specific level, and understanding how cells respond to treatments.

In this tutorial trainees will learn:

- What single-cell transcriptomics is used for
- How data are generated
- The structure of single-cell data
- How to analyze and interpret single-cell data

Tutorial 4: Analysis of muscle stem cell function and muscle regeneration – Led by Dr. Mireille Khacho

This tutorial will provide an in-depth overview of experimental approaches to assess muscle stem cell function, including proliferation, differentiation, and self-renewal, and their impact on muscle regeneration. Participants will learn practical frameworks for designing and interpreting regeneration studies *in vivo* and *ex vivo*.