NMIN
NANOMEDICINES INNOVATION NETWORK
RÉSEAU D'INNOVATION NANOMÉDECINES

Nano NEWS

An update from the NanoMedicines Innovation Network (NMIN) November 12, 2019

NMIN's first round of research investment

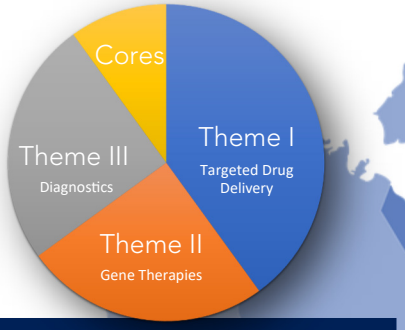
On August 21, 2019, the Board of Directors approved NMIN's initial investments of $4.3M in nanomedicines research. Over a two-year period, NMIN will support 20 innovative projects led by Canadian leaders in nanomedicine drug delivery, gene therapy and diagnostics.

These projects, hosted at six research centres across Canada, span a range of technologies (from neutrophil encapsulation to LNP systems) applied to a range of illnesses (from cancer to diabetes and eye disease).

Targeted Drug Delivery projects in Research Theme I secured 40% of the funding available, with Themes II (Gene Therapies) and III (Diagnostics) securing approximately 25% each. Each of the Network's two core facilities (NanoCore and PharmaCore) received 10% of the Network's initial research investments.

A breakdown by principal investigator (PI), host institution, and project is provided on pages 2-3.

RESEARCH INVESTMENTS & NETWORK MEMBERS



Distribution of research investments (projects) by Theme

The **20 projects** in NMIN's first round of research investment span **6 member institutions** across **5 provinces**

- The University of British Columbia (BC)
- University of Alberta (AB)
- University of Saskatchewan (SK)
- University of Toronto & University Health Network (ON)
- Polytechnique Montréal (QC)

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NMIN's first round of research investment cont.

	PI	Institution	Project
Theme I: Targeted Drug Delivery	Christine Allen	University of Toronto	*Neutrophil encapsulation platform for targeted drug delivery*
	Marcel Bally	UBC	*Development of the Metaplex Immuno-Oncology Platform*
	Pieter Cullis	UBC	*Triggered release of anticancer drugs from LNP systems*
	Robert Hancock	UBC	*Nanoparticle formulations for anti-inflammatory IDR peptides*
	Afsaneh Lavasanifar	University of Alberta	*Nano-delivery of Novel Inhibitors of DNA Repair for Enhanced Therapy in Head and Neck cancer*
	Fabio Rossi	UBC	*Targeting myeloid leukemia with nanomedicines*
	Bruce Verchere	UBC	*Targeting the NLRP3 inflammasome with lipid nanoparticles for the treatment of type 2 diabetes*
	Ellen Wasan	University of Saskatchewan	*Lipidic nanoparticle formulation of a triple adjuvant for intra-nasal vaccines for pertussis and influenza*
Theme II: Gene Therapies	Pieter Cullis	UBC	*GeneCure: Application of Lipid Nanoparticle Technology to Gene Therapies in a Variety of Tissues*
	Kenneth Harder	UBC	*A multiomics screen to identify phagocyte-specific LNPs for immunotherapy*
	Blair Leavitt	UBC	*Development and Optimization of LNP-based Gene Therapy Approaches in the Brain*
	Michel Meunier	Polytechnique Montreal	*Site-specific laser-mediated gene therapy for corneal endothelial diseases*
	Colin Ross	UBC	*Development and utilization of in vivo systems to optimize lipid nanoparticles for therapeutic genome editing: Focus on delivery to muscle for the treatment of LPL Deficiency*

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NMIN's first round of research investment cont.

	PI	Institution	Project
Theme III: Diagnostics	Warren Chan	University of Toronto	*Predicting nanoparticle tumour delivery via serum protein adsorption*
	Shana Kelley	University of Toronto	*Development of an integrated chip for exosome analysis in cancer*
	Keith Pardee	University of Toronto	*Automated Biofunctionalization of Lipid Nanoparticles for CAR T Cell Therapy*
	Gilbert Walker	University of Toronto	*A platform to screen for upregulation of soluble calreticulin as a tool to develop nanomedicines targeting acute myeloid leukemia*
	Gang Zheng	University Health Network	*Customisable metallo-nanotexaphyrins for cancer imaging and therapy*
Cores	Marcel Bally	UBC	*PharmaCore: Preclinical, Scale-up Manufacturing and Project Management Core Facility*
	Pieter Cullis	UBC	*NanoCore: Translational NanoMedicine Formulation and Characterization Core Facility*

This inaugural research program was defined through a rigorous process that began before NMIN was awarded NCE status.

Two workshops in 2018 led to the development of 30 preliminary project concepts that were included in NMIN's NCE application.

Following NCE funding approval in April 2019, NMIN's research leaders invited the teams behind these 30 preliminary concepts to develop them into full project proposals.

NMIN then hosted a workshop in May 2019 to collectively strengthen and network the emerging proposals. Informed by this process, applicants submitted 25 full proposals in June 2019.

Proposals were reviewed in three stages by three sets of reviewers (focusing on the science, training and diversity, and partnership/knowledge translation components of the proposals, respectively).

These reviews, in turn, informed the assessment of the proposals by NMIN's Research Management Committee (RMC). The RMC then provided formative feedback to applicants whose projects remained under consideration; applicants submitted revised proposals in August 2019.

The RMC reviewed final submissions and recommended that the NMIN Board of Directors fund 20 projects, which now comprise NMIN's inaugural research program.

The full disbursement of these inaugural research funds will be provisional upon demonstrated performance against approved milestones and deliverables for each project.

More details about NMIN's Research Themes, Core Facilities, funded projects and research teams will soon be available through NMIN's website.

NMIN is currently planning a targeted call for a second round of research investment, which will complement and enhance NMIN's current research portfolio and the Network's range of research expertise.

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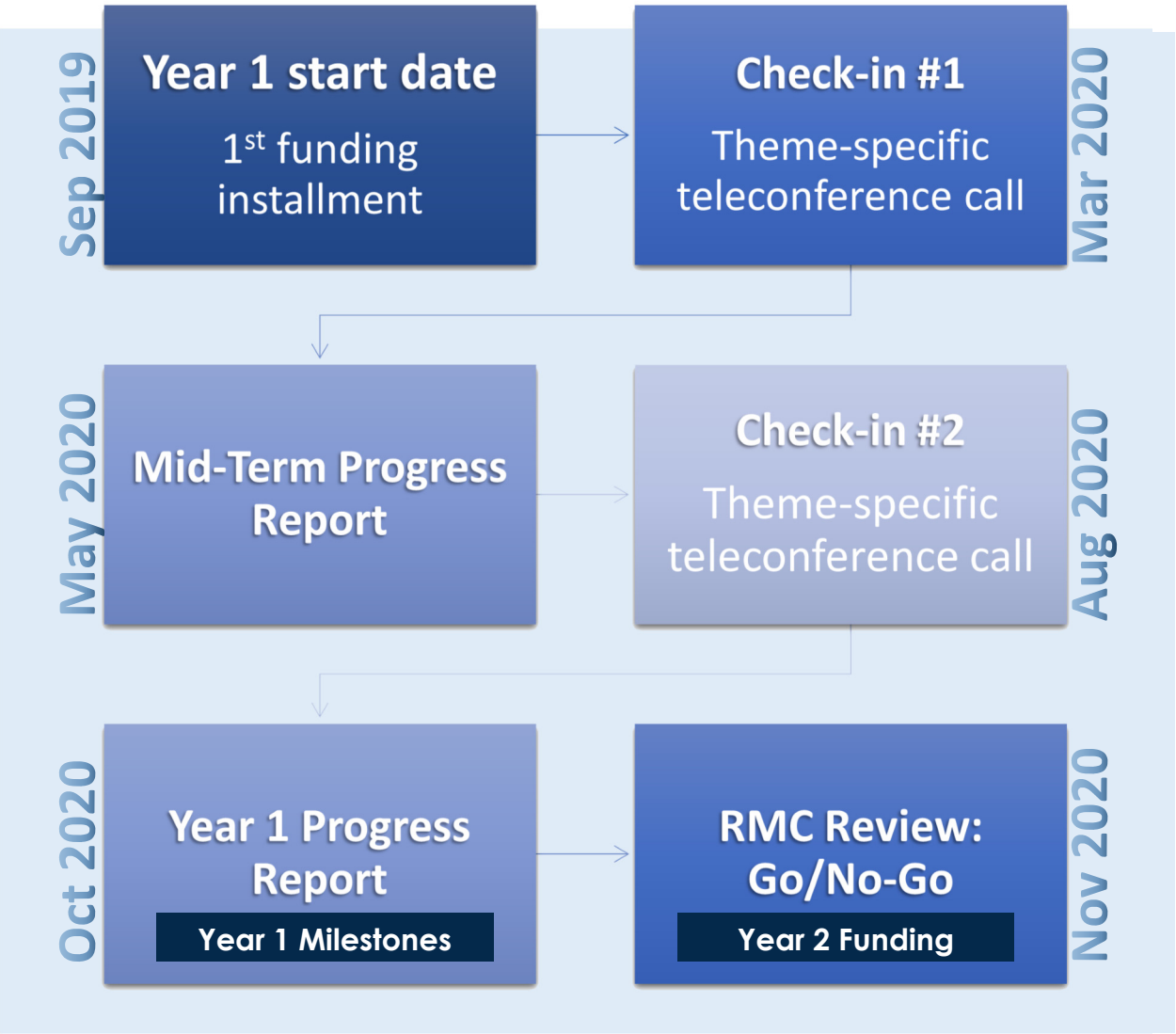
NMIN's first round of research investment cont.

Critical path: progress reports and performance reviews for NMIN's first round of research investment.



During the first year of NMIN's inaugural research investment, the progress of each of the 20 supported projects will be monitored, and feedback provided, at the timepoints outlined above.

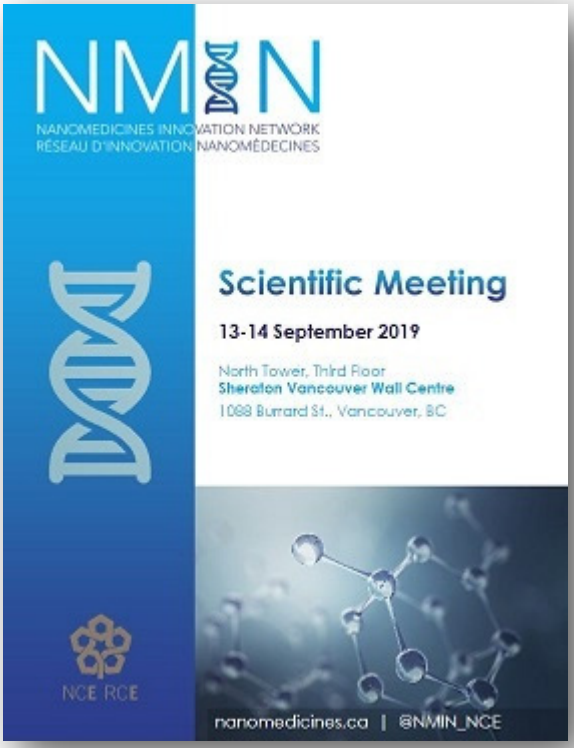
The culminating assessment of project progress will be the Year 1 Progress Report, detailing major accomplishments; impediments to progress or changes in direction; emerging or disclosed Intellectual Property (IP); knowledge translation/ mobilization activities and outputs; and work yet to be completed, including—if altered fundamentally from the original application—new approaches to be taken.

The Year 1 Progress Report will also track progress towards approved milestones, as well as anticipated deliverables, outcomes, and impacts, all within the context of NMIN's mission and its 2019 –2024 Strategic Plan.

NMIN's Research Theme Leaders will lead the discussion of the Year 1 Progress Reports by NMIN's RMC. The RMC will then determine whether or not to recommend to NMIN's Board funding each project for a second year as originally proposed.

Continuation of project funding in Year 2 will be conditional upon performance as assessed during these reviews.

NMIN's first Scientific Meeting



Over 100 delegates–researchers, trainees, partner organization representatives and other stakeholders–gathered at the Sheraton Vancouver Wall Centre in Vancouver, British Columbia, on September 13-14, 2019, to take part in NMIN's first Scientific Meeting.

The event was designed to build connections across Canada's vibrant cross-sectoral nanomedicines community and to showcase nanomedicine-related state-of-the-art science. The delegates collectively strategized ways to further advance Canada's global lead in applying nanotechnologies to advance human health; discussed priorities in the nanomedicine field and strategies to address them; and explored research and capacity-building investment opportunities and commercial strategies.

NMIN's Scientific Director, Dr. Pieter Cullis, spoke of NMIN's vision and goals, and the track record of its key proponents. NMIN's research leaders discussed the current science and future potential of the Network's three areas of research focus: nano-medicine for targeted drug delivery, nanomedicine for gene therapy, and nanomedicine for diagnostics. The leaders of NMIN's two core facilities—NanoCore and PharmaCore—elaborated on the services they anticipate the cores will provide.

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NMIN's first Scientific Meeting cont.

Invited speakers from industry and various research funding agencies spoke about recent developments, current priorities and emerging opportunities in the field, while experts in IP identification, disclosure and protection shared their advice and best practices.

Six veterans of scientific entrepreneurialism—researchers, a venture capital expert, and an industry representative—shared their candid stories from the trenches of IP development and commercialization, in the popular session "Lessons from the School of Hard Knocks." Invited speaker Dr. Neal Boerkoel offered provocative food for thought on how best to approach rare disease care, especially when taking into consideration the perspectives and needs of patients and families. The full event program is available here.

Significant time was given to fruitful, probing discussions of the Network's future direction: how to ensure that it is inclusive and engages with the broader Canadian nanomedicines community; specifically, how to involve more clinicians in the Network; how to best integrate the perspective of patients; how NMIN's emerging research portfolio can be made more coherent and synergistic. The most emphasized topic, however, was how the Network can best engage and benefit trainees.

Over 96% of respondents to the event evaluation survey rated the Scientific Meeting either "excellent" or "above average."

"The opportunity to have the history and prospects of nanomedicine contextualized by many of the field's frontrunners was invaluable," commented one respondent.

"The organization was excellent and the quality of the talks was wonderful. It provided a great opportunity to talk with many of the key people involved in nanomedicine," wrote another.

All sessions of the event were filmed; the videos are intended to serve as resources for current and future Network members not attending. Watch NMIN's website for eventual access to videos of selected sessions.

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NMIN's first Scientific Meeting cont.

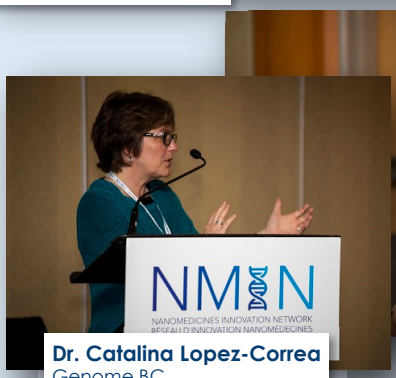
NMIN Trainees

Alex Dhaliwal
University of Toronto

Dr. Euan Ramsey
Precision NanoSystems Inc.

Dr. Dominik Witzigmann
NanoCore Admin Lead

Dr. Kaley Wilson
Quark Venture



Dr. Catalina Lopez-Correa
Genome BC

Dr. Gilbert Walker
Theme III Co-Leader

For more photos, see the event photo gallery.

Visit the Events page on NMIN's website, or sign up to NMIN's mailing list, to keep informed.

"For graduate students and post-docs, often the journey through academia is not empowering. You're under the shadow of your supervisor; you get pointed in directions that maybe you don't want to go in...

"NMIN is all about empowerment. NMIN's all about saying, 'Hey, you can do this: you can start your own company, go in your own direction,' and providing the environments in which these things can happen.

"And you are joining at a pretty good time; we're riding a wave now... We are getting nanomedicines into the clinic; we're enabling gene therapies...

"It's always good to be in at the beginning of any new field, and I'm absolutely sure we're at the beginning of the third generation of pharmaceuticals. It's extremely exciting.

"That's what you'll see in this network: a real sense of empowerment and excitement as we aim for global leadership."

Dr. Pieter Cullis, Scientific Director and CEO of NMIN, at NMIN's 2019 Scientific Meeting

Getting the word out: Promoting & Acknowledging NMIN

The NMIN Administrative Team has developed a portfolio of resources to help you raise awareness about the Network, toward expanding its community of partners, collaborators and trainees. As a new Network, we need to find ways to become known by, and to integrate, those who share our vision of a future in which "smart" medicines detect and cure disease more effectively and efficiently.

The **NMIN Fast Facts** flyer (recently updated and expanded) provides a two-page overview of the Network. The **NanoCore Fast Facts** flyer offers an overview of and price list for that Core Facility's services. An **"Introduction to NMIN" slide deck** is available upon request for presentation at events and can be adapted according to the context.

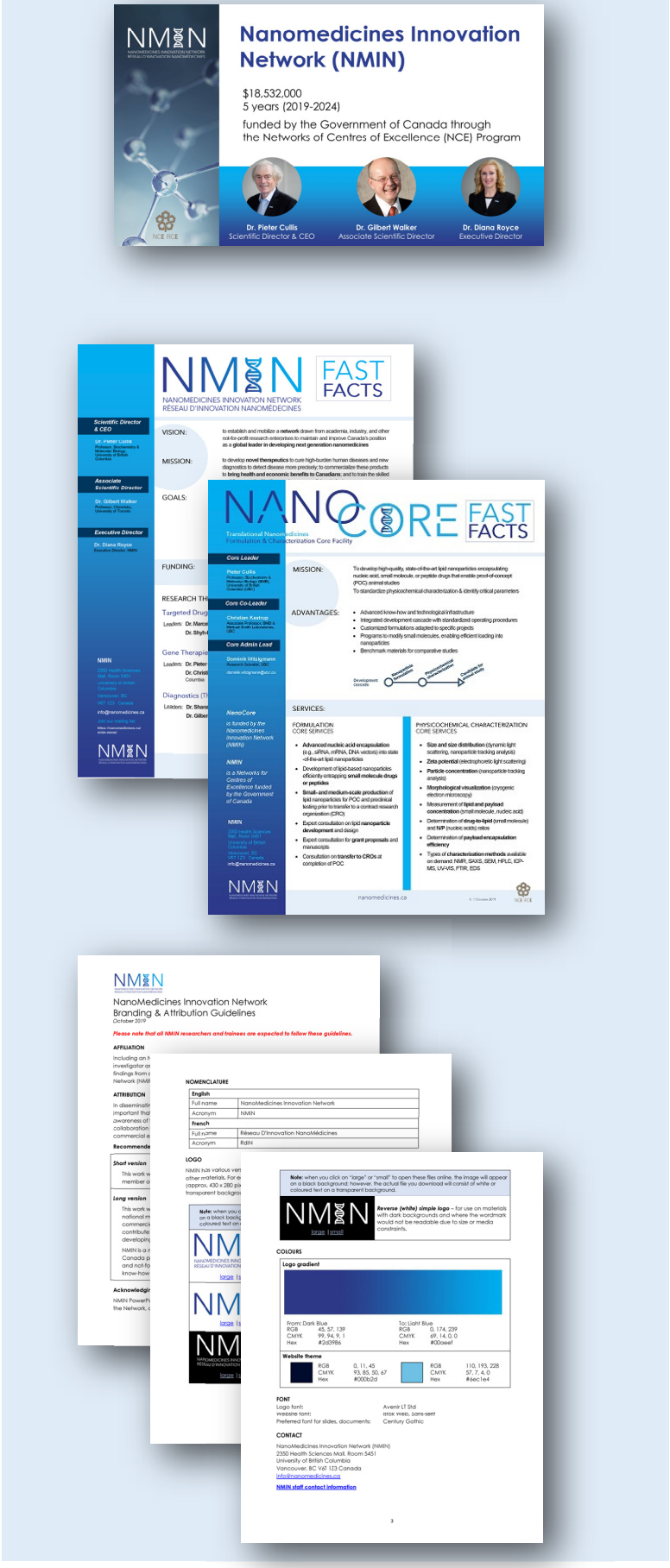
The **NMIN Branding and Attribution Guidelines** offer access to NMIN logos, and provide details regarding NMIN's official colours and fonts. The same document outlines how NMIN members are expected to acknowledge NMIN support and highlight their NMIN affiliation in publications associated with nanomedicines research.

These resources are available from NMIN's website in the "**Resources for Researchers**" section.

Please also promote the NMIN website itself, as well as the Network's social media arms—its **Twitter** and **LinkedIn** accounts in particular. You can help to enliven these social media channels by following/joining them, and/or by contributing content for posting on them; please send your announcements or ideas for content to: info@nanomedicines.ca

Finally, encourage all stakeholders with a potential interest in NMIN's work to sign up to the **NMIN mailing list** via this link.

Additional suggestions for NMIN's promotional and outreach strategy are always welcome at: info@nanomedicines.ca



PEOPLE

U of T's Christine Allen (left) and Shana Kelley at the PRiME symposium (photo by Steve Southon)

Dr. Shana Kelley, Co-Leader for NMIN's Diagnostics research theme, celebrated the launch of her new University of Toronto-based Precision Medicine Initiative (PRiME) with a well-attended inaugural symposium on September 30, 2019.

Read the U of T News story.

Dr. Diana Royce is flanked by CMC Microsystems CEO Gordon Harling (L) and NanoCanada President Marie D'Iorio at the NanoCanada Conference.

Dr. Diana Royce, NMIN's Executive Director, delivered an invited keynote presentation introducing NMIN to the broader industry, academic and policy community attending the Nano-Canada Conference on Nov. 4–5, 2019 in Edmonton, AB.

Dr. Dominik Witzigmann (L) with Dr.Philipp Uhl (R), winners of the 2019 Thudichum Young Scientist Award, presented by Prof. Daan Crommelin (centre).

Dr. Dominik Witzigmann, the Administrative Lead for NMIN's NanoCore Core Facility, was awarded the prestigious "Thudichum Young Scientist Award" from the Phospholipid Research Center (PRC), for his "outstanding publications in pharmaceutical phospholipid research related to the zebrafish model to assess the body distribution of nanoparticles and RNA delivery by means of lipidic particles." The award was presented by Prof. Daan Crommelin (Utrecht University) at the PRC's 2019 Symposium, held in Heidelberg, Germany, on September 9–10, 2019.

Dr. Witzigmann was also appointed for a one-year term as the Trainee Representative for the board of the "Gene Delivery and Gene Editing Focus Group" of the Controlled Release Society (CRS). The Group is currently planning a webinar on gene editing technologies, a young investigator seminar series, and activities for the 2020 CRS conference in Las Vegas.

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PEOPLE cont.

The following NMIN researchers & staff participated in, & represented NMIN at, the following events:

Date	Event	Location	NMIN participant(s)
Apr 8, 2019	**Research Leaders Forum**	Vancouver, Canada	Dr. Pieter Cullis
May 21–24, 2019	**2019 CSPS/CC-CRS Annual Symposium**	Vancouver, Canada	Dr. Marcel Bally Dr. Christine Charette Dr. Pieter Cullis Dr. Dominik Witzigmann
Sep 9–10, 2019	**Phospholipid Symposium 2019**	Heidelberg, Germany	Dr. Dominik Witzigmann
Sep 12, 2019	**Vancouver Nanomedicine Day**	Vancouver, Canada	Dr. Marcel Bally Dr. Pieter Cullis Mr. Don Enns Dr. Christian Kastrup Dr. Norbert Maurer Dr. Diana Royce Dr. D. Witzigmann Dr. M. Coughtrie Ms. N. Dos Santos Dr. Lesley Esford Dr. Shyh-Dar Li Mr. Daniel Rogers Ms. N. Sebestyen
Sep 15-19, 2019	**Liposome Research Days**	Sapporo, Japan	Dr. Pieter Cullis Dr. Shyh-Dar (Star) Li
Sep 24-26, 2019	**Global Summit on Regulatory Science 2019 Nanotechnology and Nanoplastics**	Lago Maggiore, Italy	Dr. Pieter Cullis
Oct 3, 2019	**Life Sciences BD Annual General Meeting**	Vancouver, Canada	Dr. Pieter Cullis Dr. Diana Royce
Oct 17, 2019	**LifeSciences BC's Commercialization workshop**	Vancouver, Canada	Mr. Daniel Rogers
Nov 4–5, 2019	**NanoCanada Conference on Advanced Materials and Nanotechnologies for Health**	Edmonton, Canada	Mr. Daniel Rogers Dr. Diana Royce

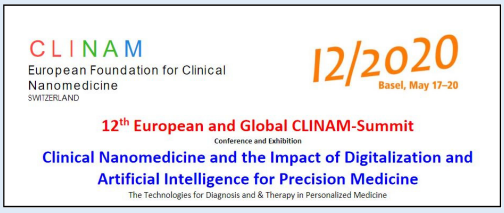
Please keep us updated on your activities, awards, and other professional accomplishments, as well as those of other NMIN members. Send your news to info@nanomedicines.ca

EVENTS

Up-coming events of relevance to the nanomedicines community

Controlled Release Society, Australia
November 18–19, 2019
The University of Queensland, Australia

The American Society of Gene & Cell Therapy Annual Meeting
May 12 –15, 2020 | Boston, MA, USA



CLINAM 2020
May 17–20, 2020 | Basel, Switzerland

CRS Annual Meeting & Exposition
June 27–July 1, 2020 | Las Vegas, NV, USA

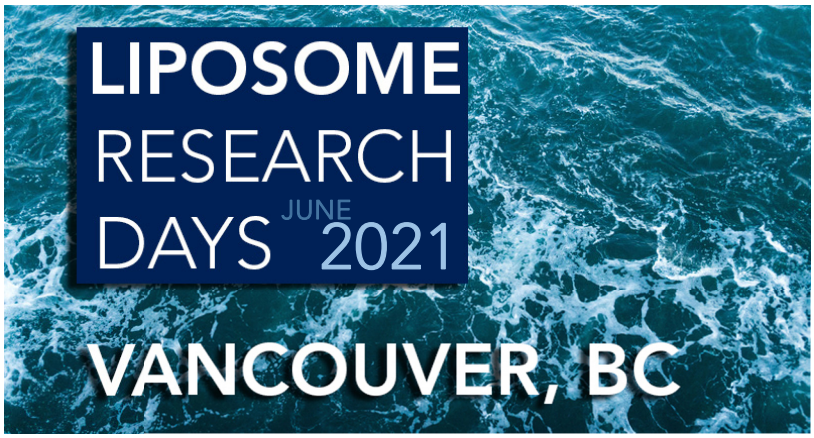
NANOTECH 2020
CONFERENCE & EXPO

Nanotech 2020 Conference & Expo
June 29–July 1, 2020 | Washington DC, USA

Future NMIN events

Trainee Symposium
May 2020
Toronto, ON

Scientific Meeting
January/February, 2021
Toronto, ON



Trainee Symposium
February, 2022
Vancouver, BC

Research Conference
TBD, 2022
Toronto, ON

Trainee Symposium
February, 2023
Toronto, ON

Research Conference
February, 2024
Vancouver, BC

Tell us about other up-coming nanomedicine events:
info@nanomedicines.ca

Please send newsletter enquiries
or comments to the editor:

Marshall Beck, Digital Initiatives Consultant, at ***info@nanomedicines.ca***