





Advancing Discovery Research in Nephrology in Canada: A Conference Report From the 2021 Molecules and Mechanisms Mediating Kidney Health and Disease (M3K) Scientific Meeting and Investigator Summit

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Dylan Burger¹ , Amira Abdelrasoul², R. Todd Alexander³ , Barbara Ballermann⁴, Darren Bridgewater⁵, John S. D. Chan⁶, Joanna Cunanan⁷, Andrey V. Cybulsky⁸, Casimiro Gerarduzzi⁹, Lakshman Gunaratnam¹⁰, Sunny Hartwig¹¹ , Andras Kapus¹², Christopher R. J. Kennedy¹, Caroline Lamarche⁹, Robert L. Myette¹, Ifeanyi Kennedy Nmecha¹³, Leanne Stalker¹⁴, Katalin Szaszi¹², Elena Torban¹⁵, Shao Ling Zhang¹⁶, and Tomoko Takano¹⁶

Abstract

Purpose of conference: New discoveries arising from investigations into fundamental aspects of kidney development and function in health and disease are critical to advancing kidney care. Scientific meetings focused specifically on fundamental biology of the kidney can facilitate interactions, support the development of collaborative groups, and accelerate translation of key findings. The Canadian fundamental kidney researcher community has lacked such a forum. On December 3 to 4, 2021, the first Molecules and Mechanisms Mediating Kidney Health and Disease (M3K) Scientific Meeting and Investigator Summit was held to address this gap with the goal of advancing fundamental kidney research nationally. The meeting was held virtually and was supported by a planning and dissemination grant from the Canadian Institutes of Health Research. Attendees included PhD scientists, nephrology clinician scientists, engineers, industry representatives, graduate students, medical residents, and fellows.

Sources of information: This report was prepared from the scientific program, registration numbers, and details obtained from the online platform WHOVA, and summaries written by organizers and participants of the 2021 meeting.

Methods: A 21-person team, consisting of the organizing committee members and participants from the meeting, was assembled. Key highlights of the meeting and future directions were identified and the team jointly assembled this report.

Key findings: Participation in the meeting was strong, with more than 140 attendees across a range of disciplines. The program featured state-of-the-art presentations on diabetic nephropathy, the immune system, kidney development, and fibrosis, and was heavily focused on trainee presentations. The moderated “Investigator Summit” identified key barriers to research advancement and discussed strategies for overcoming them. These included establishment of a pan-Canadian fundamental kidney research network, development of key resources, cross-pollination with clinical nephrology, better reintegration into the Canadian Society of Nephrology, and further establishment of identity and knowledge translation.

Limitations and implications: The 2021 M3K meeting represented a key first step in uniting fundamental kidney researchers in Canada. However, it was universally agreed that regular meetings were necessary to sustain this momentum. The proceedings of this meeting and future actions to sustain the M3K Scientific Meeting and Investigator Summit are presented in this article.



Abrégé

Objectif de la conférence: De nouvelles découvertes découlant des enquêtes sur les aspects fondamentaux du développement et de la fonction des reins en santé ou malades sont essentielles pour faire progresser les soins rénaux. Les réunions scientifiques axées spécifiquement sur la biologie fondamentale du rein peuvent faciliter les interactions, appuyer le développement de groupes de collaboration et accélérer l'application des principaux résultats. La communauté canadienne des chercheurs fondamentaux en néphrologie a manqué d'un tel forum. Les 3 et 4 décembre 2021, le premier Sommet des chercheurs et la réunion scientifique M3K (Molecules and Mechanisms Mediating Kidney Health and Disease) sur les molécules et les médiateurs de la santé et des maladies rénales ont eu lieu pour combler cette lacune; l'objectif était de faire progresser la recherche fondamentale en néphrologie à l'échelle nationale. La réunion s'est tenue virtuellement et était financée par une subvention de planification et de diffusion des Instituts de recherche en santé du Canada. Des doctorants, cliniciens-chercheurs en néphrologie, ingénieurs, représentants de l'industrie, étudiants diplômés, résidents en médecine et en surspécialisation figuraient parmi les participants.

Sources: Ce rapport a été préparé à partir du program scientifique, des informations et des numéros d'inscription tirés de la plateforme en ligne WHOVA, et des résumés rédigés par les organisateurs et les participants à la réunion de 2021.

Méthodologie: Une équipe de 20 personnes composée de membres du comité organisateur et de participants à la réunion a été formée. Les principaux points saillants de la réunion et les orientations futures ont été déterminés, puis l'équipe a rédigé conjointement le présent rapport.

Principaux résultats: La réunion s'est avérée un succès; plus de 140 personnes provenant d'un large éventail de disciplines y ont participé. Le program comprenait des présentations de pointe sur la néphropathie diabétique, le système immunitaire, le développement des reins et la fibrose, et était fortement axé sur des présentations par des stagiaires. Le «Sommet des chercheurs», animé par un modérateur, a permis de déterminer les principaux obstacles à l'avancement de la recherche et de discuter des stratégies pour les surmonter. Ces dernières incluent notamment la création d'un réseau pancanadien de recherche fondamentale en néphrologie, le développement de ressources clés, la pollinisation croisée avec la néphrologie clinique, une «meilleure réintégration dans la Société canadienne de néphrologie» et la poursuite de l'établissement de l'identité et de l'application des connaissances.

Limites et implications: La réunion M3K de 2021 a constitué une première étape clé dans l'unification des chercheurs fondamentaux en néphrologie au Canada. On a cependant universellement convenu que des réunions régulières étaient nécessaires pour maintenir cet élan. Le compte rendu de cette réunion ainsi que les actions futures pour soutenir la réunion scientifique M3K et le Sommet des chercheurs sont présentés dans le présent article.

Keywords

Canadian, kidney, research, fundamental, basic science, discovery

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¹Kidney Research Centre, Ottawa Hospital Research Institute, Department of Cellular and Molecular Medicine, University of Ottawa, ON, Canada

²Division of Biomedical Engineering, Department of Chemical and Biological Engineering, University of Saskatchewan, Saskatoon, Canada

³Departments of Physiology & Pediatrics, University of Alberta, Edmonton, Canada

⁴Department of Medicine, University of Alberta, Edmonton, Canada

⁵Department of Pathology and Molecular Medicine, McMaster University, Hamilton, ON, Canada

⁶Département de Médecine, Centre de recherche du Centre hospitalier de l'Université de Montréal, Université de Montréal, QC, Canada

⁷University Health Network, University of Toronto, ON, Canada

⁸Department of Medicine, McGill University Health Centre, McGill University, Montreal, QC, Canada

⁹Division of Nephrology, Maisonneuve-Rosemont Hospital, Department of Medicine, University of Montreal, QC, Canada

¹⁰Division of Nephrology, Department of Medicine, Schulich School of Medicine and Dentistry, Western University, London, ON, Canada

¹¹Department of Biomedical Sciences, Atlantic Veterinary College, Charlottetown, PEI, Canada

¹²Keenan Research Centre for Biomedical Science of the St. Michael's Hospital, Department of Surgery, University of Toronto, ON, Canada

¹³Medical Sciences, Faculty of Health Sciences, McMaster University, Hamilton, ON, Canada

¹⁴Kidney Foundation of Canada, Montreal, ON, Canada

¹⁵McGill University Health Center Research Institute, Montreal, ON, Canada

¹⁶MeDiC Program, Division of Nephrology, The Research Institute of the McGill University Health Centre, McGill University, Montreal, ON, Canada

Corresponding Authors:

Dylan Burger, Kidney Research Centre, Ottawa Hospital Research Institute, Department of Cellular and Molecular Medicine, University of Ottawa, 2513-451 Smyth Road, Ottawa, ON K1H 8M5, Canada.

Email: dburger@uottawa.ca

Tomoko Takano, MeDiC Program, Division of Nephrology, The Research Institute of the McGill University Health Centre, McGill University, 1001 Decarie EM13244, Montreal, QC H4A 3J1, Canada.

Email: tomoko.takano@mcgill.ca

Canada possesses a vibrant and talented community of researchers who study fundamental aspects of kidney development, health, and disease. Historically, members of this community have lacked a dedicated forum to showcase their discoveries, engage with their colleagues, share perspectives, and establish collaborative groups that would be competitive for large national or international funding opportunities. In August 2019, a group of investigators gathered to identify strategies to address this gap. The outcome of these discussions was the commitment to establish a scientific meeting that would specifically meet the needs of Canadian fundamental kidney researchers. Several planning sessions were held in quick succession to finalize aims and format of the inaugural Molecules and Mechanisms Mediating Kidney Health and Disease (M3K) meeting, planned for 2020. Specifically, M3K would have a trainee-centric scientific program to strongly promote young investigator contributions and encourage social interactions between scientists at different stages of their careers, with a focus on inclusiveness, a diversity of voices, and equitable access. An “Investigator Summit” for principal investigators was also planned, as a platform to discuss strengths and opportunities as well as weaknesses and threats to fundamental kidney research in Canada.

The organizing committee was fortunate to secure financial support through a Canadian Institutes of Health Research (CIHR) Institute of Nutrition Metabolism and Diabetes (INMD) Planning and Dissemination Grant as well as the Kidney Foundation of Canada (KFOC) and the Canadian Society of Nephrology (CSN). An in-person meeting was originally planned for December 2020 in Montreal, QC. Unfortunately, the COVID-19 pandemic necessitated rescheduling for December 2021. In the interim, the M3K committee (Table 1) organized a pan-Canadian planning meeting in February 2021 to engage the community and identify key discussion points for an Investigator Summit to occur during the 2021 meeting. Whereas it was universally agreed that an in-person meeting was preferable, attendees stressed a preference for a virtual meeting over any further delay. As such, a virtual meeting was confirmed for December 2021. Many potential discussion points were identified. The organizing committee subsequently finalized discussion points that could be effectively covered in a 2-hour period during the upcoming 2021 Investigator Summit.

The virtual meeting was held using the WHOVA online platform on December 4 to 5, 2021. The scientific portion of the meeting covered four themes, including kidney development, diabetic nephropathy, transplantation and inflammation, and chronic kidney disease and its progression. A total of 143 scientists, trainees, and stakeholders participated in the meeting with 19 state-of-the-art lectures and more than 50 poster presentations (see Table 2 for a list of speakers and moderators). Among the participants, approximately 20% were clinician scientists (23) or medical residents (7). Leadership from the Kidney Research Scientist Core

Table 1. 2021 M3K Organizing Committee Members.

Tomoko Takano (Montreal, QC) cochair
Dylan Burger (Ottawa, ON) cochair
R. Todd Alexander (Edmonton, AB)
Elena Torban (Montreal, QC)
Casimiro Gerarduzzi (Montreal, QC)
Sunny Hartwig (Charlottetown, PEI)
Andrey Cybulsky (Montreal, QC)
Christopher Kennedy (Ottawa, ON)
Shaoling Zhang (Montreal, QC)
Katalin Szasz (Toronto, ON)
John Chan (Montreal, QC)
Lakshman Gunaratnam (London, ON)
Leanne Stalker (Montreal, QC)

Note. M3K = molecules and mechanisms mediating kidney health and disease.

Table 2. List of Speakers/Moderators.

Speakers

Joan Krepinsky, McMaster University
Pedro Geraldes, Université de Sherbrooke
Shaoling Zhang, University of Montreal
Andrew Advani, Keenan Research Center, St Michael's Hospital and University of Toronto
Christopher Kennedy, University of Ottawa
Ana Konvalinka, University Health Network, University of Toronto
Jeffrey Dickhout, St. Joseph's Healthcare
Marie-Josée Hébert, Université de Montréal
Caroline Lamarche, Université de Montréal
Katalin Szasz, Keenan Research Center, St Michael's Hospital, Toronto
Darren Yuen, Keenan Research Center, St Michael's Hospital, Toronto
Andrey Cybulsky, McGill University
Andras Kapus, Keenan Research Center, St Michael's Hospital, Toronto
Moumita Barua, University Health Network
Darren Bridgewater, McMaster University
Norman Rosenblum, University of Toronto
Justin Chun, University of Calgary
Emmanuelle Cordat, University of Alberta

Moderators

Sunny Hartwig, University of Prince Edward Island
Elena Torban, McGill University
Nina Jones, University of Guelph
Barbara Ballermann, University of Alberta
Branko Braam, University of Alberta
Dan Muruve, University of Calgary
Marie Trudel, Université de Montréal
Casimiro Gerarduzzi, University of Montreal

Education and National Training (KRESCENT) program and the Canadians Seeking Solutions and Innovations to Overcome Chronic Kidney Disease Strategy for Patient Oriented Research (CanSOLVE-CKD SPOR) network were in attendance. Thus, while the focus of this meeting was on discovery-oriented research, engagement by the Canadian nephrology community was strong. Indeed, more than 180

Table 3. List of Award Winners.

Poster blitz winners
Jonatan Barrera Chimal
Erin Deacon
Ann Kuganathan
Claire Martin
José R. Navarro-Betancourt
Yuchao Pang
Poster presentation award winners
Dina Greenberg
Erin Deacon
Harneet Bhullar
Pukhraj Gaheer
Véronique Cheff
Victoria Ki
Ann Kuganathan
Claire Martin
Imane Kaci
José R. Navarro-Betancourt
Michael Hughes
Oraly Sanchez-Ferras
Pedrum Mohammadi-Shemirani
Tho-Alfakar Al-Aubodah
Wenxia Yang
You Chi (Emily) Tang

community discussions took place and question periods often extended into the chat forum well after lectures were complete.

One of the primary goals of the M3K meeting was to provide a platform for trainees to share their research in a supportive and nurturing environment. Given this, significant attention was given to trainee sessions that included a poster blitz session. Select presenters were given the opportunity to provide an overview of their work with 90-second videos that not only showcased their work, but also served as thought-provoking preambles to the formal poster sessions that followed. For each poster blitz and formal poster session, a generous selection of awards recognized outstanding trainees (Table 3).

The M3K Investigator Summit

As part of the M3K meeting, a 2-hour Investigator Summit was held through videoconference in the evening of the first day, December 4, with 39 investigators participating. The goal was to identify actionable plans to advance fundamental kidney research in Canada. There was unanimous agreement at the beginning of this meeting that discussions should be guided by the central goal of advancing kidney health of Canadians.

The session was opened by a recorded message from Dr Norman Rosenblum (Scientific Director, CIHR-INMD) who

provided an overview of the CIHR funding landscape and the strategic planning of the INMD, with particular focus on kidney research. It was acknowledged that there has been a stagnation and progressive decline in tri-council funding for fundamental kidney research over an extended period of time. Breakout sessions followed where the participants discussed what the Canadian kidney research community would need to do to access large funding initiatives and realize transformative research advances. Key elements of these discussions are highlighted in the following.

Establishment of a Pan-Canadian Fundamental Kidney Research Network

The group recognized a fundamental and necessary shift in communal mindset, away from silos and toward the formation of multicenter units that would function more effectively and therefore be more competitive for funding. Indeed, it was felt that the biggest achievement of the M3K meeting was to establish a collective identity that would set the stage for such a shift. It was also clear that collaborations with clinicians caring for those with or at risk for kidney disease needed to be strengthened to inform key research questions, provide links to patients, and strongly enhance bench to bedside knowledge translation. In parallel, many voiced the need for major systemic changes to promote multidisciplinary collaborations connecting biomedical scientists both with each other and with clinicians on a nationwide scale. A national fundamental kidney research network was identified as a key resource to be established and the Canadian Donation and Translation Research Program (CDTRP) and the CanSOLVE CKD SPOR were cited as pan-Canadian clinical network exemplars. Sustained centralized core administrative support was recognized as a key component for the success of CDTRP and SPOR/CanSOLVE-CKD that would be essential for a parallel fundamental science network. In addition to national funding bodies, industry and angel donors were identified as possible sources of support. The importance of increasing visibility of the fundamental science kidney research community to funding agencies and the general public was emphasized, as well as the importance of soliciting patient support for fundraising and visibility.

Development of Key Resources

As a starting point for facilitating community engagement, a centralized registry of personnel and key expertise was proposed (a “resource map”). Ideally, this registry would in time move beyond the Canadian kidney community, and evolve into a pan-Canadian fundamental science registry, catalyzing powerful collaborations across all fundamental science disciplines. Other essential elements of a pan-Canadian repository to make the community more competitive as a whole include access to (1) biobanks, (2) cutting-edge science, (3) uncommon and novel methodologies, (4) unique reagents

and tools, (5) in vivo mouse models, and (6) clinicians who can leverage existing strong relationships with industry partners. An easily accessible national biobank (human tissues and animal models) was identified as an invaluable resource that would greatly expand translational research capacity nationwide. Existing local biobanks (eg, ON, AB, and QC) are available on an ad hoc basis, but could be far better integrated and leveraged to support fundamental kidney researchers throughout Canada.

Cross-Pollination With Clinical Nephrology

Another major discussion point at the summit was how to foster cross talk between clinical and basic science constituents. There was consensus that collaboration between the M3K, clinicians, and clinical researchers would be beneficial for all parties involved, and that it could be best achieved by reintegrating fundamental research into the CSN community. The summit participants agreed that a sizable increase in the number of fundamental scientist attendees at future CSN annual general meetings (AGMs) would be essential to promote mutualism between the M3K and CSN communities, and ensure benefits for both groups. An M3K presence at the CSN AGM showcasing exciting fundamental science talks tailored for a mixed fundamental and clinical audience was thought to be a highly effective way to engage clinicians. Potential strategies could include (1) an M3K poster blitz (visual/graphical abstracts) with an emphasis on knowledge translation to spark interest, (2) an M3K poster session also with an emphasis on knowledge translation and lay friendliness, (3) inviting high-profile international translational researchers who can promote cross-pollination, and (4) a combined clinical, fundamental, and translational science session. Accessible registration fees for fundamental researchers, and availability of awards/travel support for non-MD trainees, would greatly encourage fundamental researchers and their trainees to attend the CSN-AGM.

Further Establishment of Identity and Knowledge Translation

Additional action items to cultivate collaboration between groups included sustained social media presence (ie, Twitter, Facebook) with a strong translational element to engage clinicians and patient champions, partnering with local institutional platforms to promote dissemination (eg, nephrology rounds), and increased KFOC focus on patient and public engagement.

Future Meetings

The final topic of the summit was future M3K meetings. There was unanimous support to sustain the M3K and hold regular meetings with both virtual and in-person platforms having appeal. However, it was felt that in-person meetings

would be more effective in building a strong sense of community, facilitating idea exchange between colleagues and trainees to ultimately establish a strong foundation for the M3K initiative and ensure its continuity. Attendees voiced the need to present fresh ideas at each meeting as a priority item. A boutique M3K satellite symposium coinciding with CSN-AGM was suggested as a forum where new data and cutting-edge research could be discussed. In addition to organizing meetings and helping link Canadian kidney researchers, many were in agreement that the M3K should play a role in mentorship and peer review, particularly for grants. One proposed potential strategy included pairing junior investigators with more established investigators from outside their institution in an effort to improve the quality and competitiveness of the grants coming from the kidney community, compared with other research communities.

Next steps/action plans/future direction. By the end of the M3K meeting, there was strong consensus that *M3K has helped assemble and unite the fundamental kidney research community throughout Canada.* The M3K organizing committee proposes the following steps to build on the first-ever meeting and the ideas that stemmed from it:

1. Meetings. We will aim for an annual M3K meeting. The proposed leadership structure is to model after the Gordon Research Conferences, where a new organizing committee will be formed for each subsequent meeting, with overlapping membership from the previous committee to ensure continuity. In this regard, Drs Katalin Szaszi and Elena Torban have agreed to serve as cochairs for the second M3K meeting. Future meetings may include international speakers; however, the focus will remain on advancing fundamental Canadian kidney research.
2. Maintain a diverse organizing committee. Additional new committee members from a broad range of expertise joined in 2022: Caroline Lamarche (U Montréal), Amira Abdelrasoul (U Saskatchewan), and Andras Kapus (U Toronto). At the same time, some members of the original committee have stepped aside.
3. Reintegration with the CSN. We will approach the CSN leadership to open the discussion as to how best to reintegrate fundamental research/researchers and trainees into the CSN community.
4. Resource map. We will send out a survey to collect information from institutions of the M3K participants and develop a resource map, for which a link will be posted most likely on the KFOC website.
5. Grant writing and mentorship. The M3K organized a grant writing workshop in November 2021 cohosted by Drs Tomoko Takano, Daniel Muruve, and Emmanuelle Cordat. Similar workshops will be envisioned in future. Those who need assistance are encouraged to reach out.

6. Team building/networking. We will identify several leaders from the Canadian kidney research community who can build a network for a given theme, which could be mobilized for future grant opportunities. This was identified as a key topic for exploration at the next M3K Scientific Meeting.
7. Large grant planning. A small group will be formed to discuss strategic areas for future large grant planning. This was identified as a key topic for exploration at the next M3K Scientific Meeting.

Conclusions

In conclusion, the 2021 M3K Scientific Meeting and Investigator Summit achieved its goal of establishing an identity for the Canadian fundamental kidney research community and providing a platform to showcase discoveries, engage with colleagues, and establish new collaborations. Together, the community has identified key steps to growing this emerging community to ultimately set the stage for large research networks and, ultimately, transformative research discoveries and improved patient care.

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Ethics Approval and Consent to Participate

Not applicable.

Consent for Publication

Not applicable.

Availability of Data and Materials

Not applicable.

Declaration of Conflicting Interests

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ORCID iDs

Dylan Burger  <https://orcid.org/0000-0003-3951-2911>

R. Todd Alexander  <https://orcid.org/0000-0001-7396-7894>

Sunny Hartwig  <https://orcid.org/0000-0001-8650-4856>