IMPACTS AND OUTCOMES OF KIDNEY RESEARCH IN CANADA

A 2017 report by
The Kidney Foundation of Canada

MESSAGE FROM DR. BILL CLARK, RESEARCH COUNCIL CHAIR

Over the past 41 years as a kidney care provider, researcher, educator and administrator I have witnessed major impacts and outcomes of kidney research. Chronic kidney disease is no longer a death sentence with kidney replacement therapies of transplantation and dialysis continuously improving with successive translations of basic and clinical research. The treatment advances to date have relied on the discovery of innovative findings that have been directly integrated into improved patient care. This is the essence of successful fusion of basic and clinical research. The major thrust of The Kidney Foundation of Canada is to support and develop both basic and clinical research investigators and programs that will improve outcomes for patients and lead to a cure for kidney disease. In order to do that, it must rely on the commitment and generosity of donors and volunteers who make it possible to aggressively pursue a cure for kidney disease. Since 1964 The Kidney Foundation of Canada has raised over $119 million for kidney related research.

What are the impacts and outcomes of this investment? Thanks to the hard work of the research community, including the researchers profiled in this publication, the potential 10% of Canadians facing CKD have a better future. In 2017 The Kidney Foundation raised

over $3.4 million and leveraged over 70 projects and programs. It has also directed its support into three national programs designed to dramatically improve our chances of finding a cure by improving our research infrastructure and capacity.
1) The KRESCENT (Kidney Research Scientist Core Education and National Training) program provides direct financial support for young kidney research investigators to upgrade their research training and skills so they will be able to lead the search for a cure.
2) CANN-NET (Canadian Kidney Knowledge Translation and Generation Network) was created to develop a network of experienced Canadian investigators to co-ordinate and execute multi-center randomized control clinical trials that facilitate successful bench to bedside treatments that target improved patient outcomes.
3) The Kidney Foundation of Canada is a proud partner of Can-SOLVE CKD (Canadians Seeking Solutions and Innovations to Overcome Chronic Kidney Disease), a unique and innovative partnership of patients, researchers, health care providers, policy makers, industry and renal agencies that creates a powerful patient-oriented research network to transform the care of patients affected by kidney disease.

Over the next five years they plan
1) to identify and support people with kidney disease at high risk of poor outcomes;
2) test and define the best treatments to improve patient outcomes and quality of life;
3) define the best ways to deliver patient-centered care in the 21st Century.

The photographs and research descriptions of our successful grantees, trainees and National medalists provide a glimpse into the vast array of basic and clinical science directed at improving or curing kidney diseases. You will see that our research community is focused on genes, molecules, cells, animal models and humans to discover and integrate new knowledge necessary to achieve our goal. This publication is intended to celebrate the accomplishments of the kidney research community and report back to those generous donors and volunteers who make the search for a cure for kidney disease possible.

Cover Photo: Dr. Darren Yuen Credit: St. Michael's Hospital, Toronto, ON (Medical Media Centre)

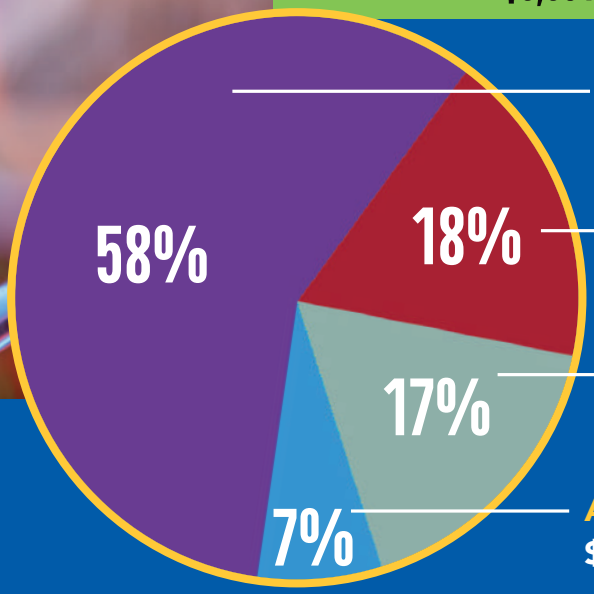
RESEARCH BY THE NUMBERS

The Kidney Foundation of Canada supports research into all aspects of kidney health, disease, and treatment, and has provided Canadian researchers with more than $119 million in grants and awards since the start of the Foundation in 1964.

Over this time period, research has transformed the options and care for people living with kidney disease. However, while advancements have been made, much more needs to be done and we continue to search for a cure and envision a time when people with kidney disease can thrive and live long, full lives.

TOTAL INVESTED IN RESEARCH IN 2017:

$3,351,571



Biomedical Research Grants
$1,945,822

Partnerships
$605,000

KRESCENT Program
$568,000

Allied Health Grants
$232,749

TOTAL
$3,351,571

IN 2017, THE KIDNEY FOUNDATION PROVIDED FUNDING TO:

2 PARTNERSHIPS IN LARGE NETWORKS

5 PROVINCES

35 RESEARCH INSTITUTES

70 PRINCIPAL APPLICANTS

19 KRESCENT AWARDS

59 CO-APPLICANTS

39 BIOMEDICAL RESEARCH GRANTS

106 COLLABORATORS

7 ALLIED HEALTH AWARDS

4 ALPORT SYNDROME AWARDS

Top 10 research disciplines funded in 2017:

- Transplantation
- Kidney Biology
- Renal Failure
- Genetics
- Chronic Kidney Disease
- Dialysis
- Diabetes
- Hypertension
- Alport Syndrome
- Quality of Life

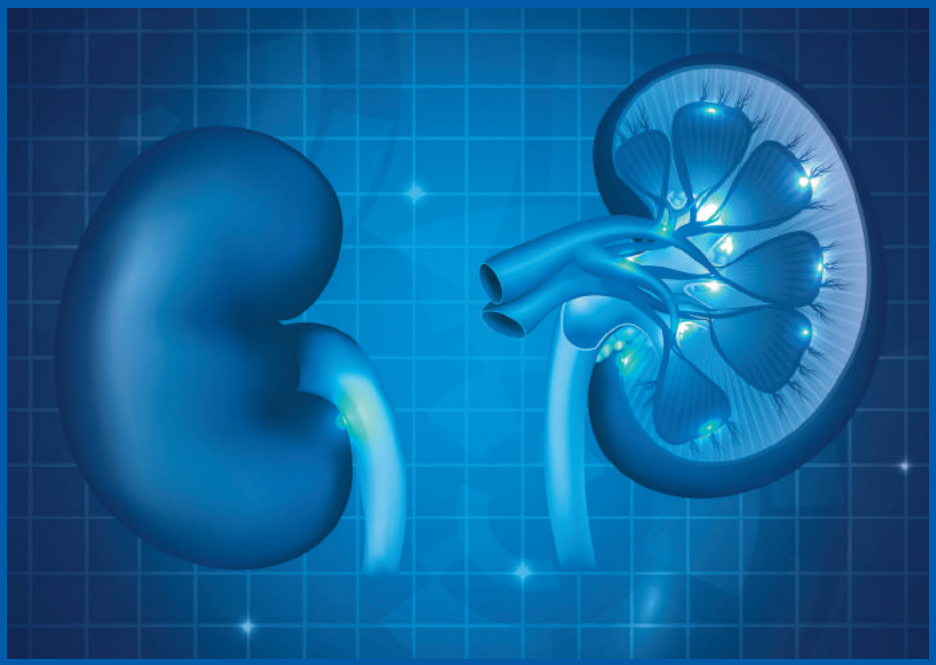
THE KIDNEY FOUNDATION OF CANADA RESEARCH PROGRAMS

The Kidney Foundation of Canada (KFOC) invested over $3.3 million in research in 2017, and leveraged over $10 million from strategic partnerships. The KFOC runs 3 main research programs described below:

Biomedical Research Grant Competition:
The Biomedical Research Grant, KFOC's largest research competition, provides support to researchers to defray the costs of research. In order to be eligible for this competition, the research program must be carried out in Canada, and must be relevant to the mission and vision of The Kidney Foundation of Canada.

Allied Health Competition:
The goal of the Allied Health competition is to encourage research relevant to clinical practice in the areas of nephrology and organ donation. Preference is given to applications that are submitted by allied health professionals (such as nurses, psychologists, social workers, dietitians, etc.) There are 3 different grants and awards given in this competition:

1. **Research Grants:**
   Research grants provide support to researchers to defray the costs of research.
2. **Doctoral Fellowships:**
   These salary awards are designed to provide for full-time academic and research preparation at the doctoral level.
3. **Scholarships:**
   The purpose of these scholarships is to assist students pursuing education at the Masters' level.



KRESCENT Program:
The Kidney Research Scientist Core Education and National Training (KRESCENT) Program was launched in 2005 to enhance kidney research capacity in Canada and to foster knowledge translation across the four themes of health research. If a trainee is successful in applying to the KRESCENT program, they receive a salary award, and must attend a core curriculum which is delivered through 2 workshops each year. There are 3 different awards provided through this competition:

1. **New Investigator Awards:**
   This award is given to individuals who have clearly demonstrated excellence during their pre-doctoral and post-doctoral training in kidney disease.
2. **Post-Doctoral Fellowships:**
   This is an "in-training" award intended for applicants with a PhD, MD, or equivalent degree. The objective is to attract and foster young investigators to initiate and/or continue training in kidney research.
3. **Allied Health Doctoral Award:**
   Each year a limited number of fellowships designed to provide for full-time academic and research preparation at the doctoral level are offered.

In addition to these 3 programs, the KFOC also partners with the Alport Syndrome Foundation and the Pedersen Family to offer the **Alport Syndrome Research Funding Program**. The goal of this program is to find novel treatments to prevent kidney failure and hearing loss in patients with Alport Syndrome.

2017: NEW FUNDED RESEARCHERS BY PROGRAM

BIOMEDICAL RESEARCH GRANTS

DR. ANDREW ADVANI
St. Michael's Hospital, Ontario
2017-2019: $100,000
Project Title:
Epigenetics in focal segmental glomerulosclerosis
Category: *Kidney Biology*

DR. TOM BLYDT-HANSEN
Co-Applicant(s): Colin JD Ross, Bruce C. Carleton, Mara Medeiros, David Wishart, Atul K. Sharma
University of British Columbia, British Columbia
2017-2019: $100,000
Project Title:
Pharmacometabolomics in pediatric transplant recipients and relationship to mycophenolate mofetil pharmacokinetics and pharmacogenomics
Category: *Transplantation*

DR. TODD ALEXANDER
University of Alberta, Alberta
2017-2019: $100,000
Project Title:
Molecular mechanisms mediating paracellular intestinal pi absorption and the development of CVD
Category: *Renal Failure*

DR. KEVIN BURNS
Ottawa Hospital Research Institute, Ontario
2017-2019: $100,000
Project Title:
Exosomal transfer of MicroRNA-486-5p in acute kidney injury repair
Category: *Renal Failure*

DR. AN-WEN CHAN
Co-Applicant(s): Neil Shear, George Tomlinson, Sang Joseph Kim, Nathan Herrmann
Women's College Hospital, Ontario
2017-2019: $99,958
Project Title:
Nicotinamide chemoprevention for keratinocyte carcinoma in kidney transplant recipients: A pilot, randomized, placebo-controlled, internal pilot trial
Category: *Transplantation*

DR. JOHN CHAN
Centre de recherche du CHUM, Québec
2017-2019: $100,000
Project Title:
Oxidative stress and molecular regulation of renal angiotensin-converting enzyme-2 (Ace2) and angiotensin 1-7 receptor (MasR) expression in diabetic nephropathy
Category: *Diabetes*

DR. EMMANUELLE CORDAT
University of Alberta, Alberta
2017-2019: $100,000
Project Title:
Deciphering mechanisms of acid-base balance in collecting duct intercalating cells
Category: *Water, Salt and Calcium handling by the Kidney*

DR. ANNE-MARIE CÔTÉ
Co-Applicant: Michelle Hladunewich
Université de Sherbrooke, Québec
2017-2019: $100,000
Project Title:
Detection of acute glomerular injury in the hypertensive disorders of pregnancy
Category: *Hypertension*

DR. SACHA DE SERRES
Université Laval, Québec
2017-2019: $100,000
Project Title:
The role of dendritic cells and follicular helper T cell in antibody-mediated rejection of the kidney graft
Category: *Transplantation*

DR. NINA JONES
University of Guelph, Ontario
2017-2019: $100,000
Project Title:
Role of Nck adaptor proteins in kidney podocyte morphology
Category: *Kidney Biology*

DR. ANDRAS KAPUS
St. Michael's Hospital, Ontario
2017-2019: $100,000
Project Title:
Mechanotransduction pathways and fibrogenic reprogramming
Category: *Kidney Biology*

DR. MATTHEW LEMAIRE
The Hospital for Sick Children, Ontario
2017-2019: $99,000
Project Title:
Glomerular sialic acid deficiency as a novel cause for hemolytic-uremic syndrome
Category: *Kidney Biology*

DR. CHRISTOPHER MCINTYRE
Lawson Health Research Institute, Ontario
2017-2019: $100,000
Project Title:
Understanding the pathophysiology of uremic symptoms: A pilot mechanistic study of dialysate cooling to protect against hemodialysis induced liver and gut dysfunction
Category: *Dialysis*

PROF. KEIR MENZIES
University of Ottawa, Ontario
2017-2019: $99,990
Project Title:
NAD+ metabolism as a theapeutic target in a mouse model of acute kidney injury
Category: *Renal Failure*

DR. HEATHER REICH
Co-Applicant: Paul Boutros
University Health Network, Ontario
2017-2019: $100,000
Project Title:
Non-invasive markers of outcome and treatment response in the MENTOR study
Category: *Glomerulonephritis*

DR. REJ SOHAM
Co-Applicant(s):
Serge Beaulieu, Tarek Rajji
Lady Davis Institute for Medical Research, Québec
2017-2019: $96,664
Project Title:
Statins in the treatment of lithium-induced nephrogenic diabetes insipidus: a pilot randomized controlled trial
Category: *Water, Salt and Calcium handling by the Kidney*

DR. KATALIN SZASZI
St. Michael's Hospital, Ontario
2017-2019: $100,000
Project Title:
Claudin-2 as a regulator of RhoA and epithelial phenotype in tubular cells
Category: *Kidney Biology, Renal Failure*

DR. KARTHIK TENNANKORE
Co-Applicant(s): Ian Alwayn, Marc Dorval, Nessa Gogan, Tammy Keough-Ryan, Bryce Kiberd, Sean Martin, Amanda Miller, Kenneth Rockwood, Laura Sills, Kenneth West, Seychelle Yohanna
Nova Scotia Health Authority, Nova Scotia
2017-2019: $100,000
Project Title:
Frailty and the kidney transplant wait list
Category: *Transplantation*

DR. ELENA TORBAN
McGill University Health Centre Research Institute, Québec
2017-2019: $100,000
Project Title:
PCP effector Fuzzy in renal development and pathogenesis of CAKUT
Category: *Kidney Development*

DR. MICHAEL ZAPPITELLI
McGill University Health Centre Research Institute, Québec
2017-2019: $100,000
Project Title:
11 year renal outcomes after pediatric intensive care unit admission: acute kidney injury and disease progression
Category:
Screening & Prevention of Renal Disease

ALLIED HEALTH RESEARCH GRANTS

DR. MARISA BATTISTELLA
Co-Investigator(s): Judith Marin, Cali Orsulak, Jo-Anne Wilson
University Health Network, Ontario
2017-2019: $99,500
Project Title:
Targeted deprescribing in patients on hemodialysis to reduce polypharmacy
Category: *Dialysis, Quality of Life*

DR. DAYNA LEE-BAGGLEY
Co-Investigator(s): Michael Vallis, Karthik Tennankore
Nova Scotia Health Authority, Nova Scotia
2017-2019: $100,000
Project Title:
Predicting and reducing non-adherence in kidney disease: Validating a novel clinical tool
Category: *Dialysis*

ALLIED HEALTH DOCTORAL FELLOWSHIPS

MARIE LEBLOND
Supervisor: Dr. Marie Achille
Université de Montréal, Quebec
2017-2019: $58,000
Project Title:
Le développement identitaire des adolescents ayant reçu une transplantation rénale et les rôles parentaux associés dans un contexte de don vivant parental
Category: *Transplantation*

BRENNEN DOBBERTHIEN
Supervisor: Dr. Atiyah Yahya
University of Alberta, Alberta
2017-2019: $58,000
Project Title:
In-Vivo detection of metabolites relevant to kidney cancer with magnetic resonance spectroscopy at 9.4 T
Category: *Cancer*

KRESCENT POST-DOCTORAL FELLOWSHIPS

DR. IOAN-ANDREI ILIUTA
Supervisor(s): Dr. York Pei, Dr. James W. Scholey
University Health Network, Ontario
Can-SOLVE CKD KRESCENT Trainee
Partnership with: Otsuka Pharmaceuticals Canada and the PKD Foundation of Canada
2017-2020: $195,000
Project Title:
Modulating dysfunctional metabolic pathways to slow disease progression autosomal dominant polycystic kidney disease
Category: *Genetics*

DR. THOMAS KITZLER
Supervisor:
Dr. Friedhelm Hildebrandt
Boston Children's Hospital, Boston
2017-2020: $150,000
Project Title:
Identification and characterization of monogenic causes of hereditary kidney disease for the development of novel drug therapies
Category: *Kidney Disease*

DR. CAROLINE LAMARCHE
Supervisor:
Dr. Megan Levings
University of British Columbia, British Columbia
2017-2020: $195,000
Project Title:
Tailoring antigen-specific regulatory T cells for use in transplantation
Category: *Transplantation*

DR. MATTHEW LANKTREE
Supervisor(s): Dr. Andrew D. Paterson, Dr. York Pei
University Health Network, Ontario
Can-SOLVE CKD KRESCENT Trainee
2017-2019: $130,000
Project Title:
Improving polycystic kidney disease prognostication using imaging, next generation sequencing and urinary biomarkers
Category: *Genetics*

KRESCENT is a partnership between The Kidney Foundation of Canada, the Canadian Society of Nephrology and the Canadian Institutes of Health Research (CIHR), Institute of Nutrition, Metabolism and Diabetes.

KRESCENT NEW INVESTIGATOR AWARD

DR. MATHIEU LEMAIRE
The Hospital for Sick Children, Research Institute, Ontario
2017-2020: $210,000
Project Title:
Investigating the pathophysiology of atypical hemolytic-uremic syndrome caused by DGKE deficiency
Category: *Kidney Biology*

KRESCENT INFRASTRUCTURE AWARD

DR. MATHIEU LEMAIRE
The Hospital for Sick Children, Research Institute, Ontario
2017-2020: $25,000
Project Title:
Investigating the pathophysiology of atypical hemolytic-uremic syndrome caused by DGKE deficiency
Category: *Kidney Biology*

KRESCENT ALLIED HEALTH DOCTORAL AWARD

MS. VINUSHA KALATHARAN
Supervisor(s): Dr. Amit Garg, Dr. York Pei
University of Western Ontario, Ontario
2017-2018: $37,000
Project Title:
The epidemiology of urinary tract stone management in autosomal dominant polycystic kidney disease
Category: *Renal Failure*

ALPORT SYNDROME RESEARCH AWARDS

DR. ALESSIA FORNONI
University of Miami, Florida
2017-2018: $100,000
Project Title:
Targeting podocyte lipotoxicity in Alport Syndrome

DR. CONSTANTINOS DELTAS
University of Cyprus, Nicosia, Cyprus
2017-2019: $100,000
Project Title:
Repurposing of FDA approved chemical chaperones to the rescue of a mouse model of Alport Syndrome

Partnership with the Alport Syndrome Foundation, the Pedersen Family and The Kidney Foundation of Canada

MEDAL OF RESEARCH EXCELLENCE RECIPIENTS 2017

2017 was a special year for The Kidney Foundation of Canada Medal of Research Excellence because for the first time in the history of this award, it was given to **two** very special individuals: Drs. Brenda Hemmelgarn and Braden Manns.

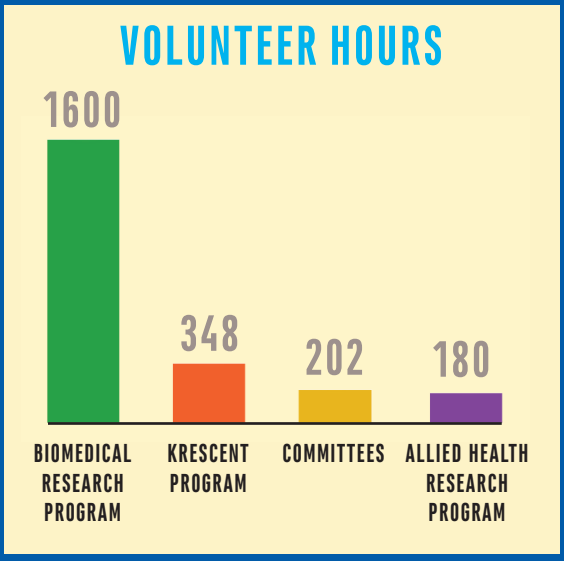
KFOC recognizes that the Canadian renal community is one of the most collaborative research communities in the world, and believes that this collaborative nature is one of the keystones of success. As such, KFOC was delighted to give two medals this year to honour the individual achievements of these excellent researchers, and also to honour the amazing collaborative work that these two people have done, and continue to do together.

DR. BRENDA HEMMELGARN | ELIZABETH MYLES | DR. JULIAN MIDGLEY | DR. BRADEN MANNS

Drs. Brenda Hemmelgarn and Braden Manns have had outstanding careers, underscored by their mutual collaboration, not only in terms of major research grants such as Can-SOLVE CKD and the recent CIHR grant looking at patient centered care in chronic kidney disease, but have also been co-authors on more than 50 publications in the past 10 years that have had a major impact on the translation of health care for patients with chronic kidney disease. As well, they both have been involved in different administrative roles concerned with the optimal delivery of renal services in the province of Alberta. They have been and are the principle organizers and innovators of a major renal epidemiologic centre not only noted in Canada but also throughout the world. The quality and impact of their collaboration in the translation of renal healthcare has been, and remains, outstanding.

THANK YOU TO THE KIDNEY RESEARCH COMMUNITY!

The Kidney Foundation of Canada would like to extend a huge thank you to the 77 kidney researchers who generously volunteered their time to help the Foundation meet its research goals. Researchers collectively volunteered over 2,300 hours of their time to act as peer reviewers, to provide direction to the Foundations' research activities through their role on the Research Council, and this year, to act as Steering Committee members for the HORIZONS 2022 Strategic Planning Workshop in May 2017.



The Kidney Foundation of Canada runs three research competitions: the Biomedical Grants competition, KRESCENT and the Allied Health competition. In order for KFOC to determine which are the best research projects, so that it can be sure it is funding those projects with the best chance of making a positive impact on patients' lives, we organize a peer review meeting so that experts in the field can judge the applications. When a researcher agrees to sit on one of the KFOC peer review committees, it means that they agree to review between 4-8 applications and then to attend a meeting to discuss these applications. Each application is about 100 pages in length and takes about four hours to review. Depending on the competition, the peer review meeting can last anywhere from four hours by teleconference (Allied Health competition), to 2.5 days (Biomedical competition). This is a significant commitment and we are so grateful to all of the researchers who help us out every year, and who take their roles and responsibilities so seriously.

RESEARCHER PROFILE: NGAN LAM FOCUS: TRANSPLANTATION

Ngan Lam is an Assistant Professor in the Division of Nephrology at the University of Alberta. She is a graduate of the KRESCENT Post-Doctoral Fellowship and is a current KRESCENT New Investigator (2015-2018). "I have been a part of the KRESCENT family for the last 6 years. I'm so grateful for the experiences, opportunities, and mentorship that I've had because of this program." Her research focuses on the clinical outcomes of living kidney donors and kidney transplant recipients.

Recently, she has used the databases within the Alberta Kidney Disease Network to assess the follow-up care of living kidney donors. The current guidelines recommend that donors get lifelong follow-up care to monitor their health and promote the prevention, early detection, and management of diseases. Previous donors and their families have identified inadequate follow-up care as a growing concern.

Her program of research will study how often living kidney donors are getting follow-up care after they donate a kidney. Dr. Lam also wants to determine if this follow-up care actually leads to better outcomes for donors, who are otherwise healthy. Her research will help transplant programs better understand what follow-up their donors are receiving and what the possible barriers are to regular follow-up care. Also, understanding the risk factors for complications will lead to better strategies to prevent donors from developing kidney failure and heart disease.

This research aims to improve care provided to living kidney donors who have already done a selfless act to care for someone else. Ensuring timely and adequate follow-up for living kidney donors is an internationally recognized priority aimed at protecting donors and ensuring the integrity, quality, and safety of organ donation. Improving health outcomes and patient satisfaction for living kidney donors and increasing access to living donor kidney transplantation is a top research priority in Canada.

PARTNERSHIPS: OVERVIEW OF THE CNTRP

The Kidney Foundation of Canada has partnered on a number of research Networks that we hope will result in better lives for people living with kidney disease. One of these is the Canadian National Transplant Research Program (CNTRP).

The CNTRP brings together the Canadian donation, solid organ/islet transplant and hematopoietic cell transplant communities, together with patients and families, to improve access to transplantation and increase survival and quality of life of transplant recipients.

Some of the key successes of the network over the past four years include:

- Developing and testing new "ex vivo perfusion machines" for heart, liver, kidney and lung transplantation. An ex vivo perfusion machine is a machine that preserves organs that have been removed from the body. This has allowed the safe use of organs that before now would have been considered unsuitable for transplant. **vimeo.com/210615508**
- The CNTRP has tested a new diagnostic tool that will facilitate safe ABO-incompatible transplantation. This means that more people will be able to safely donate their organs to someone in need, even if their blood types are different.
- Defining and discovering new causes of organ rejection.
- Leading an international multi-site clinical trial, in partnership with Qiagen, to guide treatment of Cytomegalovirus (CMV) infection, a major infectious complication of transplantation.
- Completing a national survey on patients' priorities in transplantation research that led to a new national program investigating long-term complications and quality of life in transplant patients.
- Working with policy-makers across the country, CNTRP legal, social and economic researchers published two national guidelines (public solicitation of anonymous living donors and increased use of infectious risk donors) leading to system and practice change.
- CNTRP researchers worked with Trillium Gift of Life (the Ontario organ donation organization) to develop a toolkit based on these guidelines for improved management of high infectious-risk donors, leading to a substantial increase in the use of high risk organs in Ontario alone.

The CNTRP is now expanding and transforming the Program to focus on solving the 'One-Transplant-For-Life' challenge: Fulfill every donation opportunity and realize the potential of transplantation to become a true, cost-effective cure for chronic diseases and some blood cancers.

PARTNERSHIPS: OVERVIEW OF CAN-SOLVE CKD

The Kidney Foundation of Canada is proud to be an active and engaged partner of the Can-SOLVE CKD Network[1], an exciting kidney research initiative. Can-SOLVE CKD is a patient-oriented research Network, which means that patient voices are at the centre of everything that is done in the Network. The Network addresses top priorities identified by people living with kidney disease, and patient partners support the design, execution, and communication of every one of the network's 18 research projects.

Patient partners across Canada play a central role in guiding all Can-SOLVE CKD activities. These patients are diverse in sex, age, geography, and experience of kidney disease. Their involvement ensures the network addresses and respects the unique needs and perspectives of patients, including Indigenous peoples.

There are 18 research projects within the Can-SOLVE CKD Network, and each project relates to one of the 3 themes identified by patients:

- Identifying kidney disease earlier
- Defining the best treatments that improve quality of life
- Delivering innovative patient-oriented care

Two important Councils form the heart of Can-SOLVE CKD: the Patient Council and the Indigenous People's Engagement and Research Council. "Through the wisdom and guidance of our patient partners and Indigenous Peoples' Engagement and Research Council, we are learning to incorporate Indigenous ways of knowing and being into our work. We recognize and embrace the importance of a "two-eyed seeing" approach that accounts for both Western and Indigenous perspectives."[2]

The goal of Can-SOLVE CKD is to ensure that the right patient receives the right treatment at the right time – regardless of age, sex/gender, location or ethnicity.

Can-SOLVE CKD's aspirational but achievable goals will substantially transform the care of patients with kidney disease in Canada.

1. Canadians Seeking Solutions and Innovations to Overcome Chronic Kidney Disease
2. http://cansolveckd-annualreport.ca/

Krescent

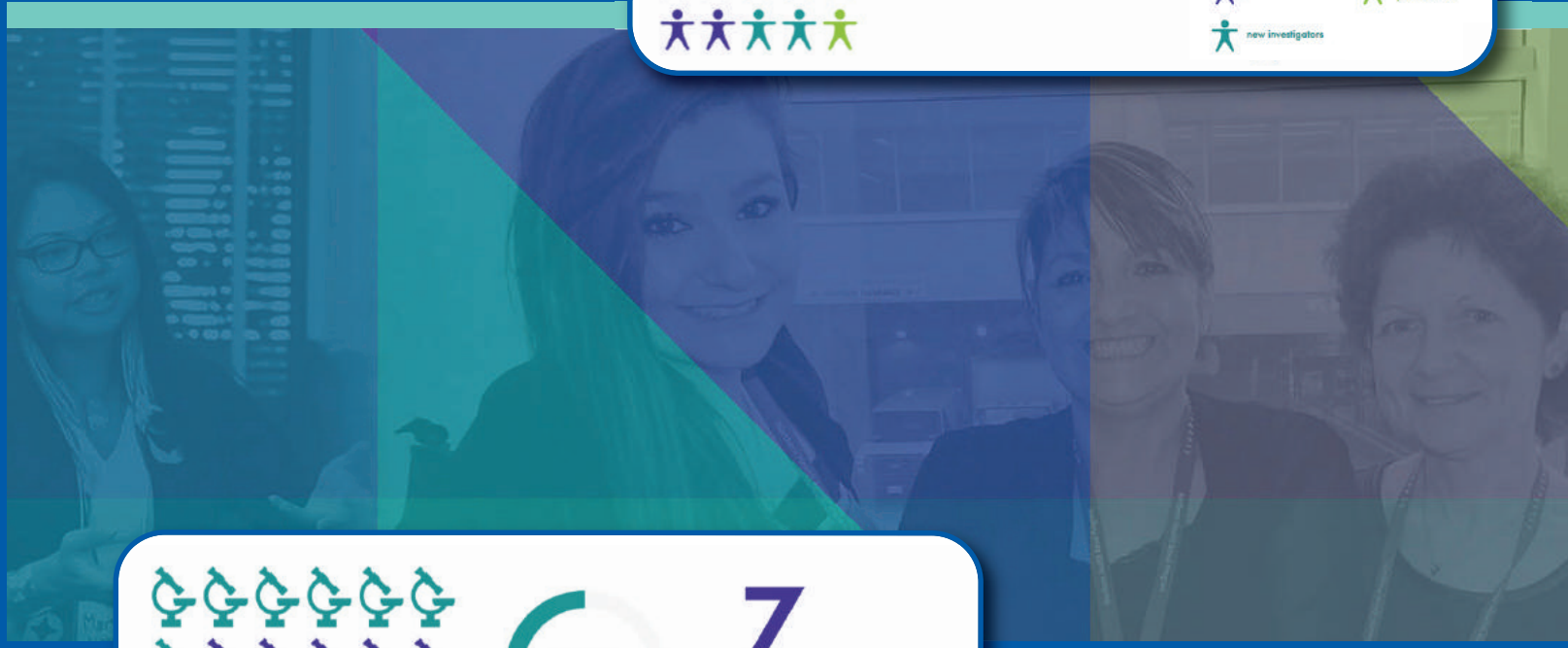
20

trainees received patient-oriented research training through the KRESCENT program

post-docs

allied health professionals

new investigators



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research projects have designated Patient Leads

TRANSPLANTATION TIMELINE

Research takes time and is a global initiative: researchers work with incremental changes that build on each other and add up to amazing success.

1902 First successful kidney transplant, using a dog's kidney was performed in Vienna, Austria. It lasted 5 days.

1912 Nobel Prize was awarded to Dr. Alexis Carrel from France for work on vascular sutures and transplantation.

1933 First real attempt to transplant a human kidney took place in the Soviet Union. Doctors do not know about mismatches in donor and recipient blood groups yet. Therefore, the transplant is rejected and the recipient died not long after the surgery.

1944 First reports that rejection of a transplant is based on immunology factors.

1954

First successful kidney transplant between identical twin brothers. No anti-rejection drugs were used as doctors knew that the immune system would not reject the organ since it came from an identical twin (Boston, U.S., Joseph Murray).

1958 John Dossetor performs Canada's first successful transplant (also with identical twins).

1962 Tissue typing and immuno-suppression with drugs are used for the first time in a kidney transplant.

1963 Canada's first successful transplant between non-identical twins is performed.

1963

First successful lung transplant (Mississippi Medical Center).

MID-1960s

"Fearless surgeons and physicians along with brave patients began to experiment with organ transplantation and immuno-suppression"[1].

1967

First successful heart transplant (Cape Town, South Africa).

1971

Discovery of cyclosporine (a fungal extract that combats organ rejection). Scientists hope that this medication will counteract the effect of the immune system in organ rejection (Basel, Switzerland).

1983

The US Food and Drug Administration (FDA) releases Sandimmune (cyclosporine) for general use heralding a new area for transplantation.

1986

Joel Cooper performs the world's first successful double-lung transplant in Toronto, Canada.

1990

Transplantation is accepted as mainstream medicine. Joseph Murray and Donnall Thomas of the U.S. receive the Nobel Prize for organ transplantation in treatment of human disease.

1995

First laparoscopic live-donor nephrectomy was performed in Baltimore, USA. (This is a surgical removal of the kidney in which a fiber-optic instrument is inserted through the abdominal wall: no need for open abdominal surgery). The patient was back to work two weeks later.

2017 AND ONWARDS

Transplantation was the #1 research theme funded by The Kidney Foundation of Canada. Researchers continue to work towards lessening the side effects of anti-rejection medications, improving surgical methods, improving our understanding of organ rejection and our immune systems, the role of parents in supporting youth through their transplantation, and much more. For more information please visit: **kidney.ca/research-awards**

[1] Klintmalm, GB
The history of organ transplantation in the Baylor Health Care System Proc (Bayl Univ Med Cent), 2004, Jan: 17(1): 23-34