

## TRAINEE SECTION

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# Scientific Overview: CSCI-CITAC Annual General Meeting and Young Investigators' Forum 2015

## Abstract

The 2015 Annual General Meeting of The Canadian Society of Clinician Investigators (CSCI) and Clinician Investigator Trainee Association of Canada/Association des Cliniciens-Chercheurs en Formation du Canada (CITAC/ACCFC) was held in Toronto November 23-25, 2015, in conjunction with The University of Toronto Clinician Investigator Program Research Day. The theme for this year's meeting was "It takes a village" and the focus was the various support systems necessary to train a successful clinician scientist. The meeting featured an opening presentation by Dr. Vincent Dumez and workshops by Dr. Peter Nickerson, Dr. Jane Aubin, Dr. Kelly Warmington and Dr. Norman Rosenblum, and MD/PhD trainees Nardin Samuel, Kevin Wang and Kirill Zaslavsky. The keynote speakers were Dr. David Malkin (Hospital for Sick Children) who received the CSCI-RCPSC Henry Friesen Award, Dr. Brent Richards (McGill University) who received the Joe Doupe Award and Ernesto Shiffrin (Lady Davis Institute) who received the Distinguished Scientist Award.

As always, the conference showcased outstanding scientific presentations from clinician investigator trainees from across the country at the Young Investigators' Forum. The research topics, which ranged from basic sciences to clinical medicine and translational work, are summarized in this review. Over 90 abstracts were presented at this year's meeting during two poster sessions, with several of the outstanding abstracts selected for oral presentations.

*CSCI-CITAC Annual General Meeting and Young Investigators' Forum 2015, November 21-24, 2015*

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## 1 President's Forum Oral Presentations

2 Each year, six outstanding abstracts are selected for oral  
3 presentation during the President's Forum session. This year,  
4 the selected individuals were

- 5 • Xin (Kevin) Wang (University of Toronto) (UofT)
- 6 • Shari Manga (University of Calgary) (UofC)
- 7 • Nayan Madhur (University of Toronto)
- 8 • Adam Ramzay (University of British Columbia) (UBC)
- 9 • Christopher Wallis (University of Toronto) and
- 10 • Kanda Pushpinder (University of Ottawa) (UOttawa).

11 Xin (Kevin) Wang (UofT) aimed to study medulloblastoma  
12 pathogenesis by generating transgenic mice using transposon  
13 systems. Model validation using *in vitro* overexpression and  
14 knockdown studies is on-going. Establishing this model would  
15 allow scientists to discriminate driver events and passenger  
16 events of medulloblastoma. Shari Manga (UofC) presented  
17 work on the augmentation of pulse pressure with exercise as a  
18 reliable prediction for remodelling post-cardiac  
19 resynchronization. Manga found that patients with left  
20 ventricle remodelling were more likely to have a > 5mmHg  
21 increase in pulse pressure, and that a 5mmHg or higher  
22 augmentation of pulse pressure post-exercise predicted  
23 favourable left ventricular remodeling with 74% accuracy.  
24 Nayan Madhur (UofT) presented epidemiological data  
25 evaluating the association between medication exposure  
26 (metformin, statins and NSAIDs) and all-cause mortality and  
27 kidney cancer-specific mortality among type 2 diabetic  
28 patients. Interestingly, he reported that current statin exposure  
29 was associated with significantly reduced risk of all-cause  
30 mortality and kidney cancer-specific mortality. Neither  
31 metformin nor NSAIDs were associated with survival  
32 outcomes. Adam Ramzy (UBC) presented work from the  
33 Kieffer Lab at UBC that investigated the role of insulin in  
34 pancreatic development. Using mice lacking the insulin gene,  
35 he showed that insulin is an important signal for alpha-cell  
36 maturation, and highlighted the developmental plasticity of  
37 the pancreas. Christopher Wallis (UofT) gave a presentation on  
38 the incidence of treatment-related complications from  
39 contemporary treatments of prostate cancer. Complications  
40 requiring urological procedures and hospital admissions were  
41 common, may occur many years after treatment and are  
42 depend on the type of treatment used. This information should  
43 be considered when determining a course of treatment. Kanda  
44 Pushpinder (UOttawa) explored the mechanism underlying  
45 encapsulated cardiac stem cell-enhanced cardiac repair beyond  
46 acute retention of transplanted cells. Pushpinder found that  
47 encapsulation forces these cells to adopt an invasive migratory  
48

phenotype, promoting invasion, engraftment and therapeutic  
repair.

## 4 Basic Science

5 Given their training trajectory, clinician investigators are well  
6 positioned to carry out basic science research in conjunction  
7 with the study or practice of medicine. As always, basic science  
8 research was well represented at the 2016 CSCI-CITAC  
9 Annual General Meeting, and drew from diverse fields.

### 11 *Microbiology and Immunology*

12 Connie Le (University of Alberta; UofA) presented work  
13 investigating the role of chemokines (CKs) in asthma relapse  
14 in a mouse model of asthma. Age-matched naïve mice,  
15 recovered primed mice, and recovered mice that were  
16 re-challenged with allergen were compared with respect to  
17 gene expression of 18 CKs and protein levels of three CKs.  
18 While naïve and recovered mice demonstrated similar CK  
19 gene expression, re-challenged mice had 13 upregulated CK  
20 genes. Richard F. Xiang (UofC) studied the role of Rac, Src  
21 family kinases (SFK) and integrins in toxicity against  
22 cryptococcal fungi. Using various molecular biology  
23 techniques, Xiang found that natural killer cell mediated  
24 anti-fungal killing initiated by integrin and NKp30 activation  
25 of Rac and SFK pathways, respectively. Iiya Mukovozov  
26 (UofT) presented work on the role of the Slit family of  
27 secreted proteins in influencing clearance of oxidized  
28 low-density lipoproteins (oxLDL). The binding and uptake of  
29 oxLDL was investigated using fluorescently (DiI)-labeled  
30 oxLDL, and quantified by microscopy and flow cytometry.  
31 Mukovozov found that both human and murine macrophages  
32 express the Slit2 receptor, Robo-1. He also found that  
33 treatment with Slit2 inhibited foam cell formation and  
34 blocked macrophage binding and uptake of oxLDL ( $P < 0.01$ ).  
35

36 Robyn Elphinstone (UofT) presented work exploring the  
37 role of S-nitrosothiol in improving survival in mice infected  
38 with cerebral malaria. She found that T-cells in  
39 S-nitroglutathione reductase (GSNOR) knockout mice appear  
40 to mediate the protective mechanism by which S-nitrosothiol  
41 increases nitric oxide bioavailability. This work suggests that  
42 interventions that target GSNOR function may help improve  
43 outcomes from severe malaria. Alison Michels (Queen's  
44 University; Queen's) presented work aimed at examining the  
45 influence of damage-associated molecular patterns (DAMPs;  
46 such as histones) on the release of Weibel-Palade bodies  
47 (WPBs) and characterizing the association between DAMPs  
48 and WPB exocytosis in models of inflammation. She

1 concluded DAMPs can regulate von Willebrand factor levels  
 2 and function by inducing its release from WPBs. Jason Bau  
 3 (UofC) presented work exploring the role of Keratinocyte  
 4 growth factor (KGF) in protecting against *C. difficile*  
 5 toxin-mediated cell-death. He found that KGF protected  
 6 against TxnA and TxnB-induced cell death both in vitro and  
 7 in vivo and prevented disruption of barrier function as  
 8 measured by ZO-1 tight junction staining. These data suggest  
 9 that modulation of KGF activity may hold promise for  
 10 preventing/treating *C. difficile* infection.

### 12 *Cardiology*

13 Jessica Blom (University of Western Ontario; Western)  
 14 presented a validated adapted surgical model of mammalian  
 15 cardiac regeneration in a neonatal mouse. This 10-15 minute  
 16 procedure allows for visualization of the left anterior  
 17 descending coronary artery and can be used to elucidate  
 18 mechanisms of mammalian cardiac regeneration after  
 19 myocardial infarction. Frank M. H. Lee (UBC) studied the  
 20 role of biochemical cascade to exhibit clot-busting capabilities  
 21 and found that Xa-K, a modified version of activated clotting  
 22 factor X, is a viable target for developing novel clot-busting  
 23 agents.

### 25 *Neuroscience and Psychiatry*

27 Enoch Ng (UofT) presented studies showing that deletion of a  
 28 neuronal calcium concentration sensory decreased motivation  
 29 in mice and dopamine release in structures underlying  
 30 motivation-related behaviour. Jennie Pouget (UofT)  
 31 investigated whether autoimmunity and schizophrenia shared  
 32 genetic risk factors. Preliminary findings suggest a shared  
 33 genetic risk but also suggest that they are likely not major  
 34 factors to either morbidity. Siddharth Nath (McMaster  
 35 University) examined the role of ataxin-7 in spinocerebellar  
 36 ataxia and how mutations to ataxin-7 may alter protein  
 37 function producing the disease symptoms.

38 Raphael Schneider (UofT) presented studies on the use of  
 39 exosomal microRNAs in the cerebrospinal fluid as diagnostic  
 40 biomarkers in ALS. Several microRNAs were found with  
 41 different expression levels in ALS patients compared to  
 42 controls. His work could yield new diagnostic markers. Devon  
 43 L. Johnstone (UOttawa) presented work on the genetic  
 44 mechanism and therapies for a novel epileptic encephalopathy.  
 45 Johnstone found that a patient who died with intractable  
 46 epilepsy at 1 month of age had a rare homozygous frameshift  
 47 deletion in PROSC; a highly conserved gene with unknown  
 48 function. They will now knockout this gene in zebrafish and

produce iPS-derived neurons to characterize the gene's  
 functions and identify potential treatments.

Tianwei (Ellen) Zhou (McGill) investigated inflammatory  
 changes present in retinopathy of prematurity; a serious  
 complication in premature infants. She investigated the visual  
 functions of animal models with oxygen-induced retinopathy  
 in order to study the functional impacts of inflammation  
 mediated changes in the retina. Kirill Zaslavsky (UofT)  
 investigated a method to produce more consistent cultures of  
 induced pluripotent stem cell-derived neurons. This method  
 may help to address the issue of heterogeneity and impact the  
 application of this potential therapeutic avenue in autism  
 spectrum disorder. Alexander Levit (Western) developed an  
 animal model that overexpressed mutant human  
 amyloid-precursor protein to test the hypothesis that a genetic  
 predisposition for Alzheimer's disease can be triggered by  
 hypertension.

Nabeela Nathoo (UofC) presented high resolution MRI  
 of a multiple-sclerosis mouse model and detected previously  
 unseen neuroanatomical changes within the brains of these  
 mice. This work demonstrated the utility of advanced imaging  
 tools to understand disease and structural changes in animal  
 models of neurological diseases. Michael Richards (UofT) used  
 maximum likelihood estimation (MLE) to study the process of  
 multisensory integration. He examined adults with amblyopia  
 and his findings suggested that normal visual experience may  
 be required for proper development of multisensory  
 integration and can, thus, have a lifelong influence on  
 neurological function. Allan R. Martin (UofT) used  
 multimodal MRI to study patients with degenerative cervical  
 myelopathy. He found various advanced MRI metrics that  
 correlate well with white matter injury and disease-related  
 impairment. These methods may help to identify novel  
 imaging biomarkers and improve diagnostics for this disease.

Jonathan Keow (UOttawa) investigated the neurotoxic  
 effects of rotenone, a commonly used pesticide, on zebrafish.  
 They found that zebrafish embryos treated with rotenone  
 displayed a 50% reduction in dopamine neurons in the ventral  
 diencephalon, and a logarithmic increase in markers of  
 oxidative damage. Dopamine neuron loss in zebrafish treated  
 with rotenone may provide a useful tool for studying  
 environmental causes of Parkinson's disease. Jeremiah Hadwen  
 (UOttawa) presented on establishing a database for  
 repurposing clinic-ready small molecules for rare neurological  
 disorders. Hadwen treated mouse cortical neurons with over  
 200 drugs at therapeutic dose and harvested neuronal RNA,  
 which was converted to mRNA sequencing libraries for  
 drug-gene interaction analysis. Heather Leduc-Pessah (UofC)

1 explored the role of microglial P2X7 receptors in morphine  
2 tolerance in mice. Leduc-Pessah reported a causal involvement  
3 of P2X7 receptors in the development of morphine analgesic  
4 tolerance, with repeated morphine leading to increased total  
5 microglial expression that, in turn, induced a potentiation of  
6 P2X7 receptor function. She concluded that these receptors  
7 represent a potential therapeutic target in the management of  
8 morphine tolerance.

9 Mark Chandy (UofT) presented work on microRNA  
10 biomarkers of vascular cognitive impairment in mice. They  
11 hypothesized that in a mouse model of type-2 diabetes, which  
12 results in the development of vascular cognitive impairment,  
13 anti-inflammatory microRNA in circulating microvesicles is  
14 reduced and vascular cognitive impairment pathogenesis is  
15 promoted.

### 17 *Cancer*

18 Paul Savage (McGill) probed single-cells from breast cancer  
19 patients to identify cell subpopulations. Savage found multiple  
20 subtypes and is working to strengthen these preliminary  
21 findings. Allen W. Zhang (UBC) studied the genomic  
22 heterogeneity present in high-grade serous ovarian carcinomas  
23 in order to investigate treatment resistance and therapeutic  
24 options. In particular, his work focused on the spatial  
25 variability in tumour infiltrating lymphocyte composition with  
26 the aim of elucidating the role of immune response to cancer.

27 Eric Zhao (UBC) presented on the merits of genomic  
28 mutational signature of BRCA1/2 deficiency in breast cancer  
29 as a potential predictive marker of platinum-based therapy  
30 response. He found that the signature is associated with  
31 improved radiological responses and time to treatment failure  
32 of platinum-based chemotherapies. Ashton Connor (UofT)  
33 presented on metachronous pancreatic ductal adenocarcinoma  
34 tumour evolution examined with whole genome sequencing.  
35 Connor found that metachronous lesions share a common  
36 ancestor, and that low allele frequency mutations drive  
37 metastases. David Twa (UBC) studied the link between  
38 programmed death ligand 1 (PDL1) and genomic structural  
39 rearrangements in non-Hodgkin's B-cell lymphomas. Through  
40 DNA sequencing, Twa identified a number of rearrangement  
41 partners, allowing the comprehensively characterization of the  
42 landscape of PDL rearrangement mechanisms.

43 Amanda Dancsok (UBC) performed  
44 immunohistochemical assays on 57 human synovial sarcomas,  
45 an aggressive cancer of young adults. She found that expression  
46 of KDM2B was associated with improved overall survival at 15  
47 years. Rola Saleeb (UofT) presented data on expression of  
48 miR-200 family of microRNAs in Clear Cell Renal Cell

Carcinoma. Saleeb found that when these microRNAs are over  
1 expressed, patients have a worse survival and that this  
2 overexpression could be used as a prognostic marker. Jack  
3 Brzezinski (UofT) investigated the loss of imprinting (LOI) at  
4 five imprinting centers in Wilms Tumour, adjacent renal tissue  
5 and cells sloughed into urine. Brzezinski described, for the first  
6 time, a prevalent LOI at 14q32 and its association with 11p15  
7 LOI in the somatic tissue of Wilms Tumour and the detection  
8 of 11p15 LOI in urine from sloughed somatic tissue.

9 Matthew G.K. Benesch (UofA) presented data on the role  
10 of autotaxin, a secreted enzyme that produces  
11 lysophosphatidate (LPA) from lysophosphatidylcholine.  
12 Benesch found that malignant thyroid tumours had higher  
13 levels of tumour autotaxin and LPA, and that LPA increased  
14 thyroid cancer cell inflammatory mediator and autotaxin  
15 secretion. Xenograft thyroid tumour mice treated with  
16 autotaxin inhibitor showed reduced tumour volume,  
17 angiogenesis and inflammation. Alexandra Kuzyk (UofM)  
18 presented work examining telomere organization in  
19 neuroblastoma. Using 3D quantitative fluorescence *in situ*  
20 hybridization, she identified four subgroups, each with a  
21 distinct level of genomic instability based on telomere  
22 organization. Interestingly, subgroups correlated with patient  
23 characteristics such as histology, age of diagnosis, MYCN  
24 amplification and MYCN expression. Moreover, the number  
25 of short and long telomeres increased with MYCN  
26 transfection. These findings suggest that genomic instability in  
27 neuroblastoma may be mediated through changes in telomere  
28 organization due to MYCN overexpression.

29 Laura Forrest (UOttawa) presented studies on the  
30 relationship among estrogen (E2), GREB1 and E2-stimulated  
31 proliferation of ovarian cancer cells. The role of GREB1 in  
32 ovarian cancer progression was validated via proliferation  
33 assays, using Esr1 (estrogen receptor 1) + and - ovarian cancer  
34 cells (+/- E2 treatment). qPCR data supported the hypothesis  
35 that GREB1 may promote ovarian cancer progression via  
36 modulation of ESR1-mediated signalling. Xiao Zhao (UofT)  
37 studied the role of adipose stromal cells in reversing the  
38 formation of radiation fibrosis. Zhao found transplanting these  
39 cells reduced fibrosis, which may be useful in mitigating  
40 sequelae following cancer remission.

### 42 *Other topics*

43 John Soleas (UofT) examined the mechanical forces during  
44 lung development and how they guide the fate of cells during  
45 differentiation. Soleas demonstrated a tissue-engineering  
46 model that examined geometric cues to guide cell  
47 differentiation. Ranita Manocha (Western) worked to  
48 quantify the effect of bracing on elbow stability after elbow

1 lateral collateral ligament injury using cadaveric specimens.  
 2 Manocha reported that when the arm was dependent during  
 3 daily activities, a brace might enhance elbow stability. Chris  
 4 Walsh (UofT) presented data on microRNA and mRNA  
 5 levels in critically ill patients with muscle weakness. Walsh  
 6 found genes with increased expression, which could provide a  
 7 pathway framework for future drug discovery studies.

8 In BTBR mice, which model autism spectrum disorders,  
 9 Chris Newell (UofC) found that a ketogenic diet altered  
 10 mitochondrial function in liver cells. Cynthia Luk (UofT)  
 11 explored the role of focal adhesion kinase (FAK) in adipocytes,  
 12 particularly in the setting of obesity-associated insulin  
 13 resistance. Adipose tissue-specific FAK knockout mice were  
 14 studied in the setting of obesity, which was induced through a  
 15 high fat diet. Luk's findings suggested that FAK is required for  
 16 adipocyte survival and maintenance of insulin sensitivity.

## 18 Clinical Research

19 With dedicated training in study design and research  
 20 methodologies, many clinician investigator trainees are  
 21 carrying out high quality clinical research studies. These studies  
 22 range from case series and epidemiological surveys to  
 23 randomized controlled trials. Grouped by medical topics, this  
 24 section explores the wealth of clinically-focused research  
 25 carried out by Canadian clinician investigator trainees.

### 27 *Population Health and Epidemiology*

28 Amrita Roy (UofC) examined the ability of health service  
 29 systems to meet the needs of pregnant aboriginal women. By  
 30 conducting interviews with multiple stakeholders, Roy  
 31 determined that reducing stigma and barriers to access such as  
 32 transportation, and increasing training and  
 33 culturally-appropriate services are needed. Rebecca Rich  
 34 (UofT) reviewed recommended performance and quality  
 35 indicators for use in circumpolar maternity care systems.  
 36 When completed, this review will highlight the extent and  
 37 nature of research and policy-related activities on the  
 38 performance of maternity care systems.

39 Jonathan Fuller (UofT) presented data showing that  
 40 randomization does not necessarily balance all confounding  
 41 causes in a randomized control trial. His work highlighted the  
 42 reasons why randomized controlled trials often have internal  
 43 validity metrics. Ben Ouyang (UofT) determined the  
 44 incidence of needle stick injuries among medical trainees, and  
 45 the distribution of needle stick injuries across the medical  
 46 specialties. Ouyang reported that needle stick injuries posed a  
 47  
 48

1 common risk to medical trainees at Toronto East General  
 2 Hospital.

3 Mohamad Hussain (UofT) assessed the validity of carotid  
 4 endarterectomy and carotid artery stenting coding in Ontario  
 5 administration databases by comparing them to procedures  
 6 documented in charts through a blinded review. This analysis  
 7 demonstrated that these codes accurately identified patients,  
 8 so researchers can confidently use administrative data to  
 9 conduct population-based studies. Aleksandra Leligdowicz  
 10 (UofT) presented a study on biomarkers of endothelial  
 11 dysfunction and mortality prediction in Ugandan children  
 12 hospitalized for acute febrile illness. Their preliminary results  
 13 suggest that adding biomarkers of endothelial dysfunction can  
 14 independently predict mortality and improve discrimination.

15 Given the recent availability of HPV vaccination, Karla  
 16 Willows (University of Manitoba; UofM) performed a  
 17 meta-analysis to determine whether a 2- or 3-dose schedule was  
 18 more effective in girls aged 9-14. Willows found that two doses  
 19 of HPV vaccination resulted in inferior immunogenicity 24-35  
 20 months post vaccination; however, longitudinal data on these  
 21 cohorts is missing and it is unknown whether booster shots  
 22 may be necessary for those that have received only two shots.  
 23 Julie Lovshin (UofT) presented data on whether inequities in  
 24 retinopathy screening and treatments were present for  
 25 immigrants to Ontario with type 2 diabetes. Immigrants had  
 26 lower screening rates compared with long-term residents;  
 27 however, access to treatment was similar for both groups.  
 28 Nater (UofT) aimed to identify key survival predictive factors  
 29 in surgical metastatic epidural spinal cord compression  
 30 (MESCC) patients. Nater found that slow tumour growth  
 31 rate, absence of visceral metastasis and lower degree of  
 32 preoperative physical disability were predictive factors for  
 33 longer survival in selected surgical MESCC patients.

### 34 *Surgery*

35 Kyle Ricord (UofC) reported the incidence, demographics and  
 36 outcomes of burns treated at the Burn Unit of Foothills  
 37 Medical Complex (FMC) in Calgary, Alberta. The majority of  
 38 patients were young males with facial and neck burns. There  
 39 was a greater severity of burn injuries sustained during the  
 40 illegal manufacturing of hash oil; with these burns affecting a  
 41 greater average body surface area and requiring a longer length  
 42 of admission than in the general population. David  
 43 Berger-Richardson (UofT) presented data on the attitude of  
 44 staff surgeons on changing gloves and instruments during  
 45 cancer surgery. He found that there is little consensus among  
 46 surgeons on how gloves and instruments should be handled  
 47  
 48

1 and surgeons rely on clinical evidence for changing gloves and  
 2 instruments during cancer resections to avoid tumour seeding.  
 3 Andras Fecso (UofT) presented survey data on how  
 4 surgeons distribute “takes” to trainees during a complex  
 5 laparoscopic procedure. The most important steps were not  
 6 performed routinely by trainees, and trainee involvement  
 7 could be improved with defined performance standards.  
 8 Natashia Seemann (UofT) examined surgeon stress in the  
 9 operating room. While great inter-surgeon variability was  
 10 observed, unexpected stressors such as previous complications  
 11 proved very important. Physiological measures of stress were  
 12 only interpretable in the context of subjective stress experience  
 13 and sociocultural aspects (e.g., OR team composition) were an  
 14 important contributor. Together, these findings suggest that  
 15 an individualized approach to stress management is important  
 16 for surgeon wellness.

#### 18 *Internal Medicine*

19 Abdul Elkadri (UofT) discussed a novel form of protein losing  
 20 enteropathy. A patient, who presented at 8 days old with  
 21 hyponatremia and died at 136 days old from sepsis, was found  
 22 to have a plasmalemma vesicle-associated protein mutation,  
 23 which resulted in sieving protein-losing enteropathy and  
 24 death. Van Woudenberg (UofC) described an ongoing study  
 25 to test a relationship between infliximab serum levels and  
 26 clinical outcome in children with ulcerative colitis. Out of 19  
 27 children treated with a standard infliximab regimen, 71% were  
 28 in clinical remission and 59% demonstrated a clinical response  
 29 by week 8. Although the serum infliximab levels of these  
 30 children are monitored, further work is required to  
 31 characterize the relationship between infliximab levels and  
 32 clinical outcomes.

33 Dmitry Rosenberg (UofT) examined elderly and more  
 34 complex patients who were being offered lung transplantation.  
 35 Two fifths of these patients had skeletal muscle dysfunction  
 36 resulting in impairments in daily function, and these patients  
 37 required a longer hospital stay post-transplantation. Ewan  
 38 Goligher (UofT) presented data on an optimal technique to  
 39 evaluate sniff airway pressure and diaphragm function.  
 40 Goligher found that sniff airway with marked airway resistance  
 41 applied was a valid measure of respiratory muscle function, and  
 42 that diaphragm thickening was a more reliable method of  
 43 diaphragm function evaluation than diaphragm excursion.

44 Husam Abdel-Qadir (UofT) reviewed randomized  
 45 controlled trials studying interventions for prevention of  
 46 anthracycline-related cardiotoxicity in adults. Although the  
 47 data was limited, it suggested that dexrazoxane was better than  
 48 placebo for effective cardiotoxicity protection. Daniel Kagedan

(UofT) presented an analysis of overall survival following 1  
 curative-intent resection of pancreatic adenocarcinoma at the 2  
 population level. Following resection, only patients with 3  
 negative lymph nodes demonstrated improved overall survival 4  
 with adjuvant chemotherapy. Helen Cheung (UofT) used 5  
 preoperative gadolinium-enhanced MRI to predict colorectal 6  
 liver metastases prognosis post-hepatectomy. Cheung found 7  
 that patients with weaker MRI enhancement on preoperative 8  
 gadolinium-enhanced MRI are at a higher risk of 9  
 disease-specific mortality following colorectal liver metastases 10  
 resection. Anna Schmidt (UofC) used cardiovascular magnetic 11  
 resonance to examine the relationship between intra-thoracic 12  
 fat volume and myocardial function in remaining healthy 13  
 myocardial tissue patients with known or suspected CAD. 14  
 Intra-thoracic fat volume was negatively correlated with 15  
 myocardial function. No such correlation was found with body 16  
 mass index. 17

18 Reed A. C. Siemieniuk (UofT) performed a meta-analysis 18  
 to examine the impact of corticosteroids on adults hospitalized 19  
 with community-acquired pneumonia (CAP). Adjunctive 20  
 corticosteroids reduced all-cause mortality, the need for 21  
 mechanical ventilation, acute respiratory distress syndrome 22  
 and the length of clinical stay, suggesting that patients with 23  
 CAP would benefit from corticosteroid treatment. Jason 24  
 Elliott (UofT) studied non-invasive genomic analysis of 25  
 human endometrial receptivity in women with polycystic 26  
 ovarian syndrome (PCOS). Elliott proposed that ovulation 27  
 assessment of women with PCOS not actively trying to 28  
 conceive will be conducted, RNA will be isolated and 29  
 sequenced from aspirated endometrial fluid and compared 30  
 with gene-set from women without PCOS to determine gene 31  
 expression differences. 32

#### 34 *Neurology and Psychiatry*

35 Alexander Wright (UBC) asked whether the brains of 35  
 concussed athletes are more vulnerable to rapid blood pressure 36  
 oscillations. By measuring cerebral blood flow using Doppler 37  
 ultrasound and blood pressure using photoplethysmography, 38  
 he observed a trend towards an acute reduction of the ability of 39  
 cerebrovasculature to buffer blood pressure changes. David 40  
 Brandman (Brown University) presented on a study using the 41  
 precentral gyrus to decode common grasps for daily activities 42  
 in two patients with amyotrophic lateral sclerosis (ALS). 43  
 Brandman found that the precentral gyrus in humans can be 44  
 used to accurately predict grasps for daily activities and could 45  
 potentially be used to enhance prosthetic device utility. Ayan 46  
 Dey (UofT) investigated whether functional connectivity 47  
 differed in older adults with cerebral small vessel disease 48

1 (CSVD) who self-reported high versus low levels of executive  
2 dysfunction in their daily lives. Dey reported that relative to  
3 healthy older adults, those with symptomatic CSVD  
4 demonstrated reduced functional connectivity within and  
5 between critical attention neural networks such as the Default  
6 Mode Network and the Dorsal Attention Network.

7 Andrea Jones (UBC) presented data showing that  
8 marginally housed adults were more likely to suffering from  
9 psychosis if they had smaller utilized social networks. Utilized  
10 social network size may be associated with severity of psychotic  
11 illness at presentation. Jiameng Xu (McGill) analyzed the  
12 collective narratives of five patients undergoing mental health  
13 recovery to understand how these patients strive for their own  
14 wellbeing. Fighting and hiding were prevalent narratives,  
15 which may reflect patient beliefs about the appropriateness of  
16 their symptoms and how patients may choose to manage them.

17 Kathleen S. Bingham (UofT) characterized the predictive  
18 value of suicidality on treatment outcome in psychotic  
19 depression (MDpsy). Bingham reported that baseline  
20 suicidality predicts outcome in patients with MDpsy and that  
21 patients with suicidality of any intensity did better with  
22 combination therapy versus monotherapy. Ingunn  
23 Benediktsson (UofC) evaluated standardized anxiety and  
24 stress tools in pregnant and postpartum populations for  
25 evaluation of psychosocial risk against prospective longitudinal  
26 study data collected in Calgary. These generalized tools were  
27 found to be appropriate screening tools for pregnant and  
28 parenting women at risk for mental distress.

## 30 Medical Education

31 With an ever-increasing focus on evidence-based educational  
32 practices in medical schools, there is a growing number of  
33 Canadian trainees engaged in research focused on improving  
34 aspects of medical education.

35 Cynthia Min (UBC) presented work on the malleability  
36 of influences of self-assessment skills of medical students. The  
37 use of a checklist after an OSCE station allowing students to  
38 score their own performance was found more accurately reflect  
39 their performance than students' self-identified strengths.  
40 Malika Sharma (UofT) described an ongoing study to  
41 characterize how health advocacy is taught in the postgraduate  
42 infectious disease curriculum. Because the "Health advocate"  
43 CaRMS role is one of the most difficult to teach and appraise,  
44 it is necessary to gain a greater understanding of the ways in  
45 which advocacy is understood and taught to help health  
46 science centres define their commitments to social  
47 accountability. Victoria McCredie (UofT) presented data on  
48 the effectiveness of a one-day Emergency Neurological Life

Support course by assessing post-course knowledge uptake and  
6-month retention by physicians in Nepal. Overall, knowledge  
had not significantly deteriorated at 6 months compared to the  
immediate post-course scores, suggesting that this education  
technique is effective at disseminating evidence-based practice.

6 Brandon Girardi (UofT) showed that a novel 2-week  
7 intensive simulation skills course for all first year surgical  
8 residents significantly improved structured assessments of basic  
9 surgical skills, enabling residents to begin clinical practice with  
10 much greater technical skills. Peter Szasz (UofT) examined  
11 international perspectives with respect to technical  
12 competence assessments in surgical training. By analyzing  
13 seven responses to an open-ended survey from academic health  
14 centres around the world, he showed that while technical  
15 competence assessments were valued across all aspects of  
16 training, these assessments were rarely implemented during  
17 selection or certification of trainees both because of a lack of  
18 evidence for their use and because of financial limitations. Dale  
19 Podolsky (UofT) presented a proposal for developing a robotic  
20 approach to cleft palate repair using a phantom model created  
21 from an infant CT scan. Both staff surgeons and fellows were  
22 successful in performing a cleft palate repair using the phantom  
23 simulation. Moreover, all steps of the repair protocol were  
24 deemed feasible using the da Vinci Surgical System. Further  
25 modifications to the instruments and methodology to improve  
26 safety and efficiency of the procedure were recommended.  
27 Vivek Bodani (UofT) attempted to improve the training of  
28 neurosurgical residents in endoscopic colloid cyst resection.  
29 Bodani developed a patient-specific colloid cyst simulator and  
30 future work was needed to conduct validation studies.

## 32 Applied Science and Biomedical Engineering

33 Another theme this year was a growing number of trainees  
34 engaged in applied science research with the aim of elucidating  
35 tissue biomechanics or improving therapeutic approaches.

36 Kyle Eastwood (UofT) attempted to increase the use of  
37 minimally invasive neuroendoscope. Eastwood proposed a  
38 method using the established single burr-hole ETV/ETB  
39 procedure. This study established a platform for estimating the  
40 shape of curved dextrous tools, capable of targeting multiple  
41 intraventricular points, to guide future instrument design.  
42 Philip Edgcombe (UBC) introduced the Pico Lantern, a  
43 miniature projector for minimally invasive surgery, with an  
44 intention to improve surgical navigation and reduce surgical  
45 complications. Edgcombe showed that the proof-of-concept  
46 Pico Lantern offers sub-millimeter surface reconstruction  
47 accuracy and detection and display of subsurface pulsatile  
48 vessel motion.

1 Amanda Khan (UofT) investigated the amount of crush  
 2 force a tissue can take before cellular injury occurs. At the  
 3 conclusion of this study, Khan hoped to determine how much  
 4 force can be safely exerted on each gastrointestinal tissue  
 5 without causing damage. Carlyn Figueiredo (UofT) presented  
 6 work investigating the use of gold nanoparticles (GNPs) in the  
 7 detection and treatment of glioblastoma tumours. He  
 8 demonstrated that using an enhanced Raman scattering  
 9 signature to track GNPs allowed for *in vitro* and *in vivo*  
 10 delineation of tumour boundaries. This work highlights the  
 11 potential of GNPs to serve as cancer therapeutics. Cameron  
 12 Kaye (UofM) reported on the use of microwave imaging for  
 13 biomedical applications. Kaye successfully reconstructed  
 14 experimental data collected from simple 2D targets with  
 15 dilutions of magnetic nanoparticles using microwave imaging.  
 16

## 17 Knowledge Translation

18 Very important to patient-oriented research are large scale  
 19 efforts at knowledge translation that can improve the way  
 20 clinicians apply findings from scientific studies to their  
 21 practice. Paul Kudlow (UofT) presented the results of a trial  
 22 studying the effect of a novel, post-publication dissemination  
 23 strategy on article page views at six weeks. Randomly-chosen  
 24 articles distributed across the TrendMD network had 87%  
 25 more views compared with control articles, and no differences  
 26 were observed by article type or medical discipline. Laveena  
 27 Munshi (UofT) investigated strategies for mechanical  
 28 ventilation in acute respiratory failure (ARF). Using the  
 29 Premier Database, she looked at findings from 514,809  
 30 patients for the use of various ventilation strategies and  
 31 correlated actual practices against findings from landmark  
 32 trials. She found that strategies used did not always reflect  
 33 published evidence, and concluded that research such as this  
 34 may help to improve knowledge translation.  
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## Concluding Remarks

The landscape of clinician investigator training in Canada is continually shifting; however, two facts are clear: (1) trainees are engaged in a wide variety of high quality research endeavours; and, (2) the community is experiencing gradual but consistent growth. The work presented at the CSCI-CITAC Annual General Meeting provides an exciting glimpse at a set of research questions at the interface of health and science – a set of questions that clinician investigators are especially well positioned to tackle. As such, we are grateful that the Young Investigator’s Forum continues to provide a forum for the exchange of ideas and the mentorship and career development of these promising young scientists.

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