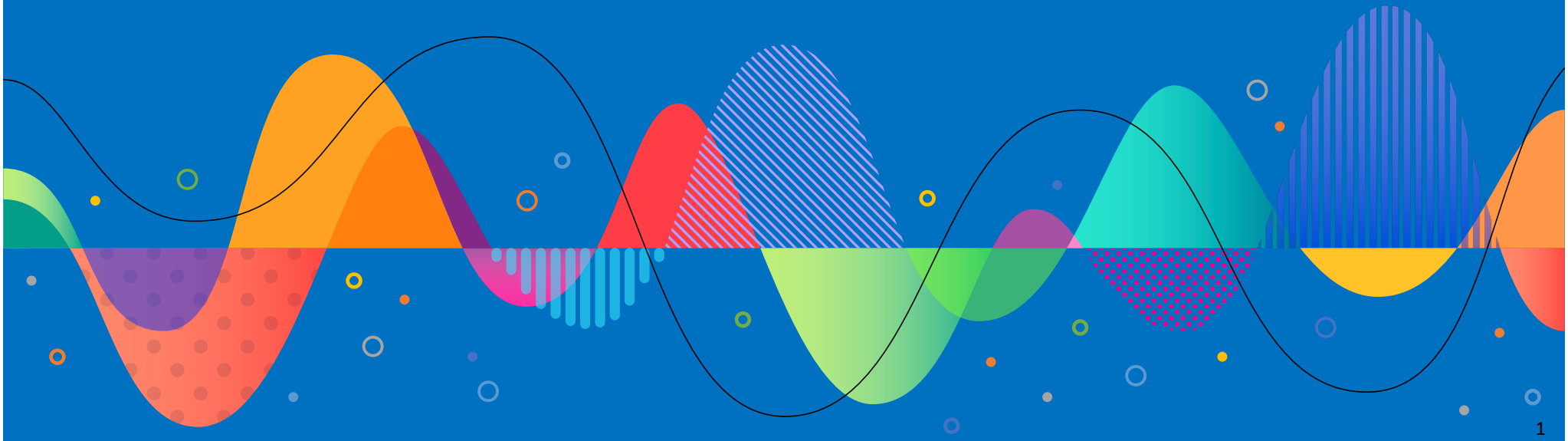
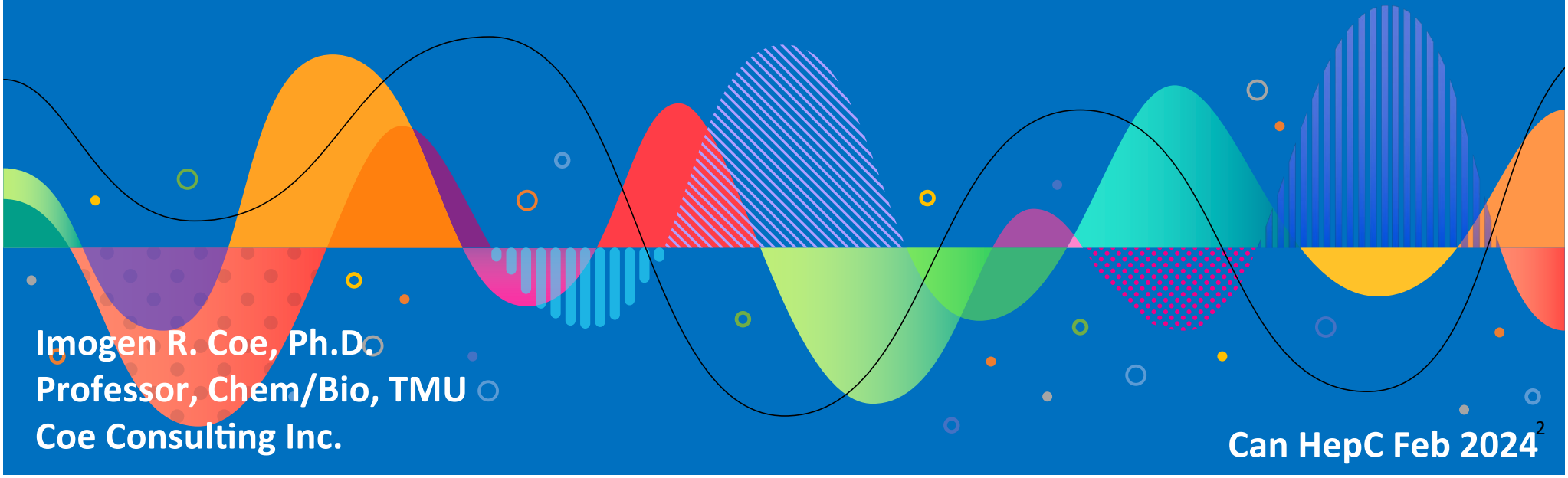
Thank you



Embedding EDI principles into biomedical and health research: who, what, where, when, & why.



Imogen R. Coe, Ph.D.
Professor, Chem/Bio, TMU
Coe Consulting Inc.

Can HepC Feb 2024

- Who?
- What?
- Where?
- When?
- Why?

- You, trainees, leaders, policy-makers, reviewers?
- Actions or good intentions….?
- In the lab, at the bench, in the clinic, in the research design, in evaluations….?
- For the grant, when a trainee starts, in meetings with leaders, with peers…..?

- Who?
- What?
- Where?
- When?

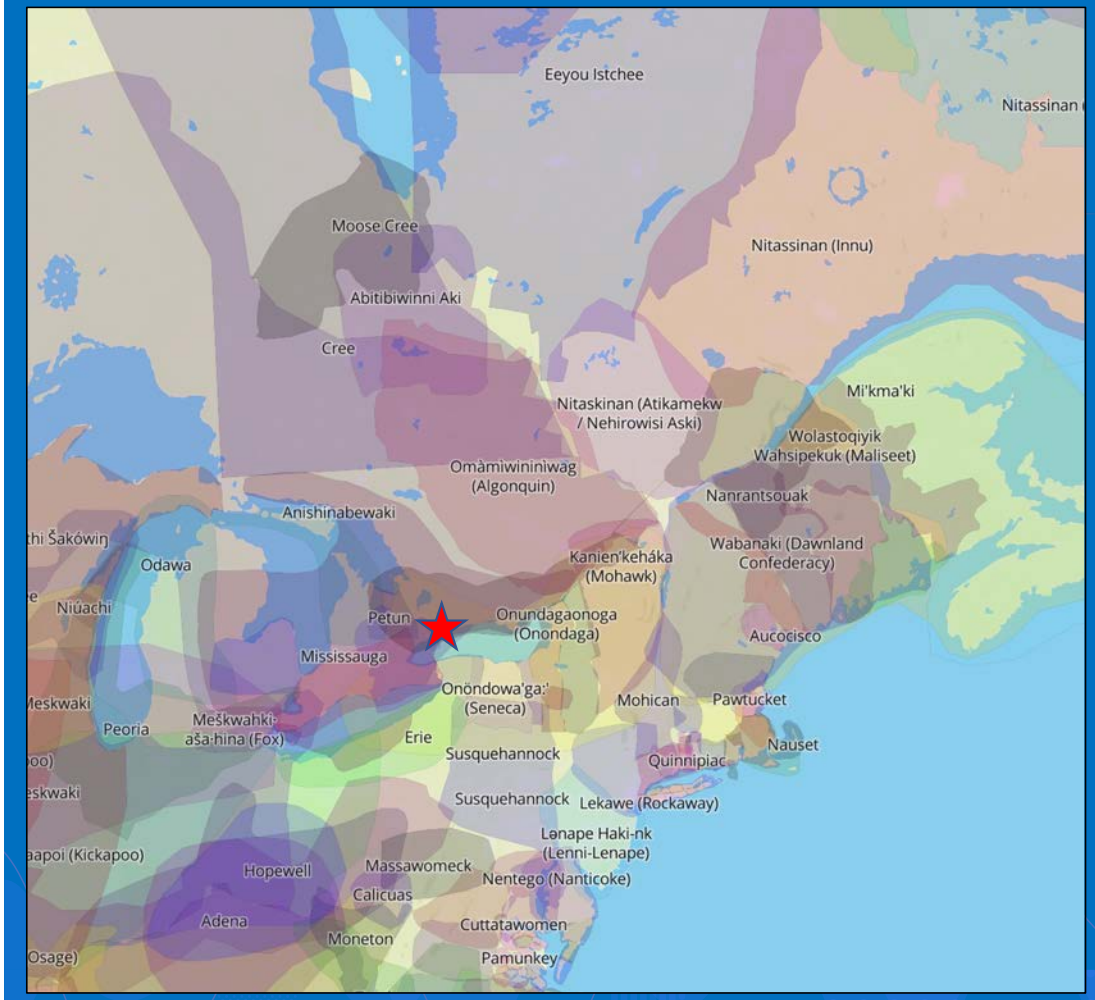
- You, trainees, leaders, policy-makers, reviewers?
- Actions or good intentions….?
- In the lab, at the bench, in the clinic, in the research design, in evaluations….?
- For the grant, when a trainee starts, in meetings with leaders, with peers…..?

- **Why?** ……...because integration of EDI principles into research leads to better research, more rigorous science, more impactful outputs, more creative scientists. Increased rigour.

- Who?
- What?
- Where?
- When?
- Why?
- How?

- You, trainees, leaders, policy-makers, reviewers?
- Actions or good intentions….?
- In the lab, at the bench, in the clinic, in the research design, in evaluations….?
- For the grant, when a trainee starts, in meetings with leaders, with peers…..?

……by using a systems approach

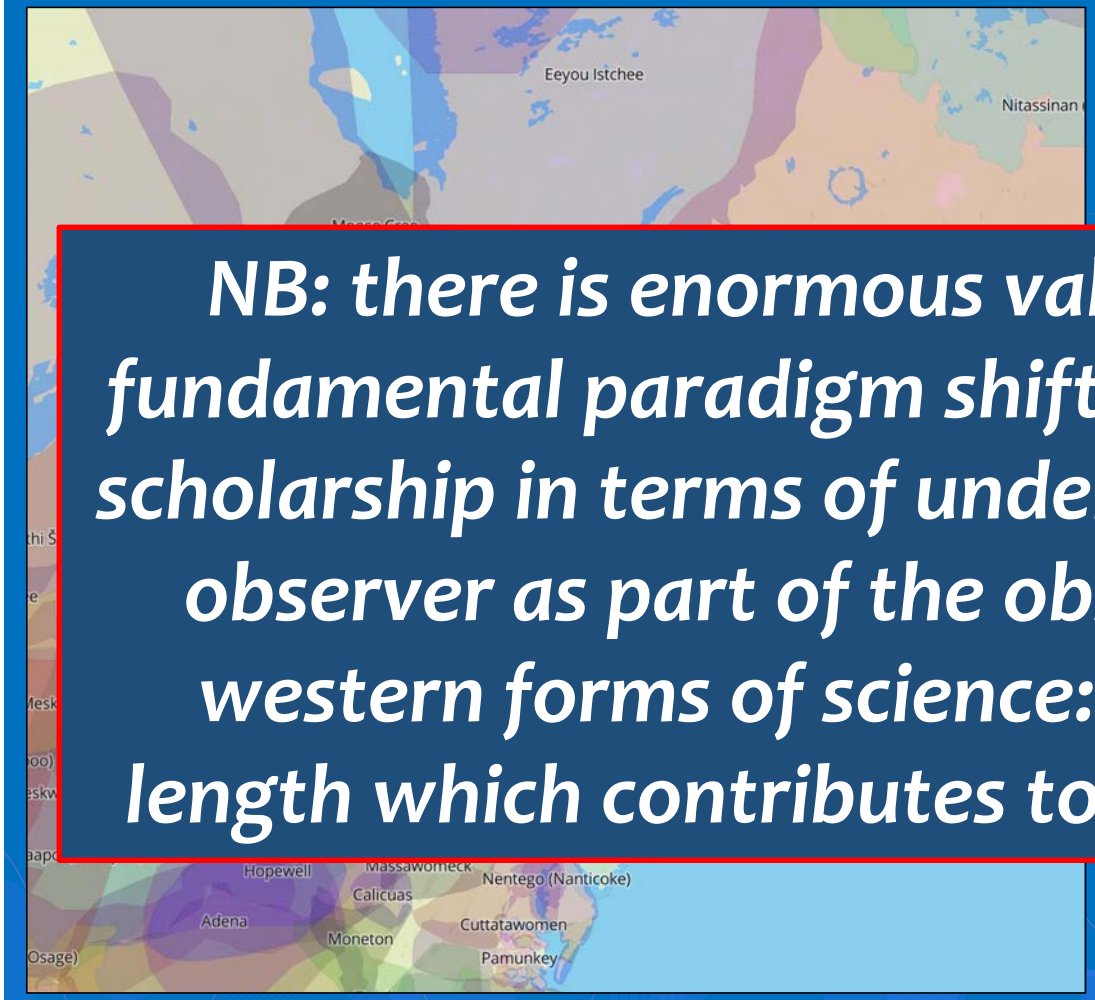


https://native-land.ca/

I do my academic work in the heart of Toronto (Tkaronto) which is in the Dish With One Spoon Wampum Agreement Territory - a sacred treaty between Anishinabek, Mississaugas and Haudenosaunee Peoples that holds all treaty peoples, new and not so new to a spirit of respect for the land and its resources, sharing and peace.

I live on Williams Treaty lands – disputed until 2018

(NB: value of indigenous scholarship in understanding the world vs euro-centric western forms of science, e.g. the myth of objectivity)



https://native-land.ca/

I do my academic work in the heart of Toronto (Tkaronto) which is in the Dish With One Spoon Wampum

NB: there is enormous value in recognizing the fundamental paradigm shift that frames indigenous scholarship in terms of understanding the world: the observer as part of the observed vs euro-centric western forms of science: the observer as arms length which contributes to the myth of objectivity

(NB: value of indigenous scholarship in understanding the world vs euro-centric western forms of science, e.g. the myth of objectivity)

Who?

#distractinglyhonest
(Dr. Eden Hennessey, WLU)

- Professor, Dept. Chemistry & Biology, Faculty of Science, Dimensions Chair
- Toronto Metropolitan University

https://www.linkedin.com/in/imogencoe/

@ImogenRCoePhD

@drimogencoe

- Affiliate Scientist, St. Michael's Hospital, Toronto
- Member, Institute for Biomedical Engineering, Science & Technology (iBEST)
- NSERC Scholar-in-Residence (inaugural)
- Past-President, Canadian Society of Molecular Biosciences (CSMB)
- Imogen Coe Consulting, Inc.
- Shift Health (associate consultant)

“How do cells work?”

THE FASEB JOURNAL • RESEARCH • www.fasebj.org

Oligomerization of equilibrative nucleoside transporters: a novel regulatory and functional mechanism involving PKC and PP1

Natalia Grañe-Boladeras,*,†,‡,1 Declan Williams,§ Zlatina Tarmakova,* Katarina Stevanovic,* Linda A. Villani,¶ Pedram Mehrabi,¶ K. W. Michael Siu,§ Marçal Pastor-Anglada,†,‡ and Imogen R. Coe*

*Department of Chemistry and Biology, Ryerson University, Toronto, Ontario, Canada; †Department of Biochemistry and Molecular Biomedicine, Institute of Biomedicine, University of Barcelona, Barcelona, Spain; ‡National Biomedical Research Institute of Liver and Gastrointestinal Diseases, Barcelona, Spain; and §Department of Chemistry and ¶Department of Biology, York University, Toronto, Ontario, Canada

ABSTRACT: Equilibrative nucleoside transporters (ENTs) translocate nucleosides and nucleobases across plasma membranes, as well as a variety of anti-cancer, -viral, and -parasite nucleoside analogs. They are also key members of the purinome complex and regulate the protective and anti-inflammatory effects of adenosine. Despite their important role, little is known about the mechanisms involved in their regulation. We conducted membrane yeast 2-hybrid and coimmunoprecipitation studies and identified, for the first time to our knowledge, the existence of protein–protein interactions between human ENT1 and ENT2 (hENT1 and hENT2) proteins in human cells and the formation of hetero- and homo-oligomers at the plasma membrane and the submembrane region. The use of NanoLuc Binary Technology allowed us to analyze changes in the oligomeric status of hENT1 and hENT2 and how they rapidly modify the uptake profile for nucleosides and nucleobases and allow cells to respond promptly to external signals or changes in the extracellular environment. These changes in hENTs oligomerization are triggered by PKC activation and subsequent action of protein phosphatase 1.—Grañe-Boladeras, N., Williams, D., Tarmakova, Z., Stevanovic, K., Villani, L. A., Mehrabi, P., Siu, K. W. M., Pastor-Anglada, M., Coe, I. R. Oligomerization of equilibrative nucleoside transporters: a novel regulatory and functional mechanism involving PKC and PP1. FASEB J. 33, 3841–3850 (2019). www.fasebj.org

From the journal: Lab on a Chip

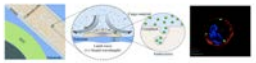
Dosage-controlled intracellular delivery mediated by acoustofluidics for lab on a chip applications†

Alinazhi Salari, Sila Apak-Baskoy, Imogen R. Coe, John Abousawan, Costin N. Antonescu, Scott S. H. Tsai and Michael C. Kolios

Author affiliations

Abstract

Biological research and many cell-based therapies rely on the successful delivery of cargo materials into cells. Intracellular delivery in an *in vitro* setting refers to a variety of physical and biochemical techniques developed for conducting rapid and efficient transport of materials across the plasma membrane. Generally, the techniques that are time-efficient (*e.g.*, electroporation) suffer from heterogeneity and low cellular viability, and those that are precise (*e.g.*, microinjection) suffer from low-throughput and are labor-intensive. Here, we present a novel *in vitro* microfluidic strategy for intracellular delivery, which is based on the acoustic excitation of adherent cells. Strong mechanical oscillations, mediated by Lamb waves, inside a microfluidic channel facilitate the cellular uptake of different size (*e.g.*, 3–500 kDa, plasmid encoding EGFP) cargo materials through endocytic pathways. We demonstrate successful delivery of 500 kDa dextran to various adherent cell lines with unprecedented efficiency in the range of 65–85% above control. We also show that actuation voltage and treatment duration can be tuned to control the dosage of delivered substances. High viability (≥91%), versatility across different cargo materials and various adherent cell lines, scalability to hundreds of thousands of cells per treatment, portability, and ease-of-operation are among the unique features of this acoustofluidic strategy. Potential applications include targeting through endocytosis-dependant pathways in cellular disorders, such as lysosomal storage diseases, which other physical methods are unable to address. This novel acoustofluidic method achieves rapid, uniform, and scalable delivery of material into cells, and may find utility in lab-on-a-chip applications.



JEM Journal of Experimental Medicine Articles Reviews & Opinion

Article | December 05 2005

HIF-1–dependent repression of equilibrative nucleoside transporter (ENT) in hypoxia

Holger K. Eltzschig, Parween Abdulla, Edgar Hoffman, Kathryn E. Hamilton, Dionne Daniels, Caroline Schönfeld, Michaela Löffler, German Reyes, Michael Duszenko, Jorn Karhausen, Andreas Robinson, Karen A. Westerman, Imogen R. Coe, Sean P. Colgan

nature > nature chemistry > articles > article

MENU nature chemistry

Article | Published: 10 December 2018

Rapamycin-inspired macrocycles with new target specificity

Zufeng Guo, Sam Y. Hong, Jingxin Wang, Shahid Rehan, Wukun Liu, Hanjing Peng, Manisha Das, Wei Li, Shridhar Bhat, Brandon Peiffer, Brett R. Ullman, Chung-Ming Tse, Zlatina Tarmakova, Cordelia Schiene-Fischer, Gunter Fischer, Imogen Coe, Ville O. Paavilainen, Zhaoli Sun & Jun O. Liu

Nature Chemistry **11**, 254–263 (2019) | Download Citation

Abstract

Rapamycin and FK506 are macrocyclic natural products with an extraordinary mode of action, in which they form binary complexes with FK506-binding protein (FKBP) through a shared FKBP-binding domain before forming ternary complexes with their respective targets,

Am J Physiol Cell Physiol 310: C808–C820, 2016.
First published March 23, 2016; doi:10.1152/ajpcell.00243.2015.

Novel regulation of equilibrative nucleoside transporter 1 (ENT1) by receptor-stimulated Ca^{2+}-dependent calmodulin binding

Alex Bicket,[1] Pedram Mehrabi,[1,2] Zlatina Naydenova,[3] Victoria Wong,[4] Logan Donaldson,[1] Igor Stagljar,[4] and Imogen R. Coe[1,3]

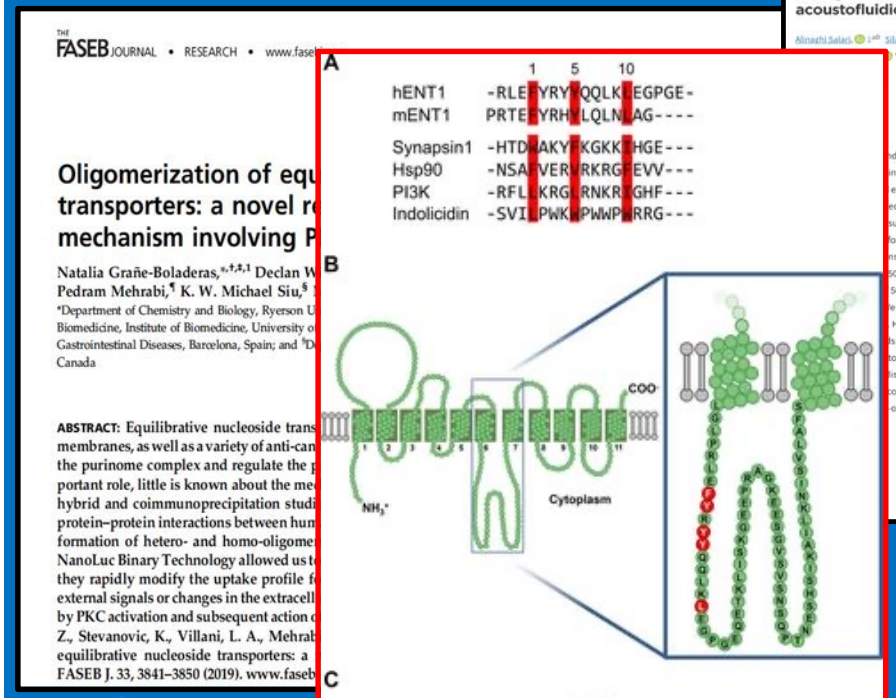
[1]Department of Biology, York University, Toronto, Canada; [2]Department of Medical Biophysics, University of Toronto, Toronto, Canada; [3]Department of Chemistry and Biology, Ryerson University, Toronto, Canada; [4]Donnelly Centre, Department of Biochemistry and Department of Molecular Genetics, University of Toronto, Toronto, Canada

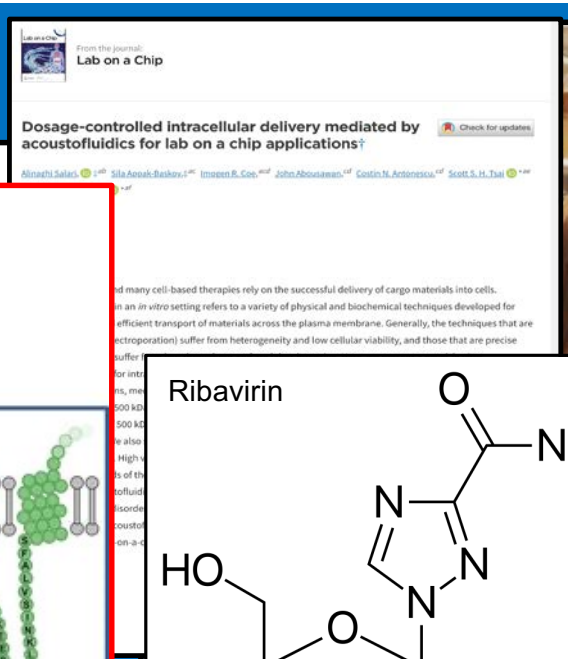
Submitted 25 August 2015; accepted in final form 9 March 2016

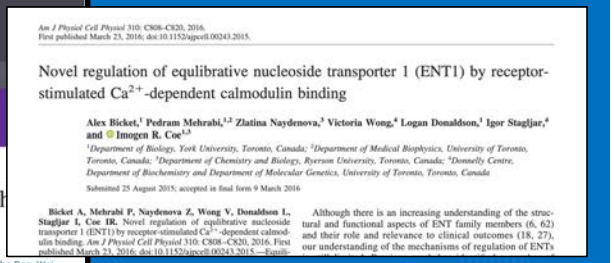
Bicket A, Mehrabi P, Naydenova Z, Wong V, Donaldson L, Stagljar I, Coe IR. Novel regulation of equilibrative nucleoside transporter 1 (ENT1) by receptor-stimulated Ca^{2+}-dependent calmodulin binding. *Am J Physiol Cell Physiol* 310: C808–C820, 2016. First published March 23, 2016; doi:10.1152/ajpcell.00243.2015.—Equili-

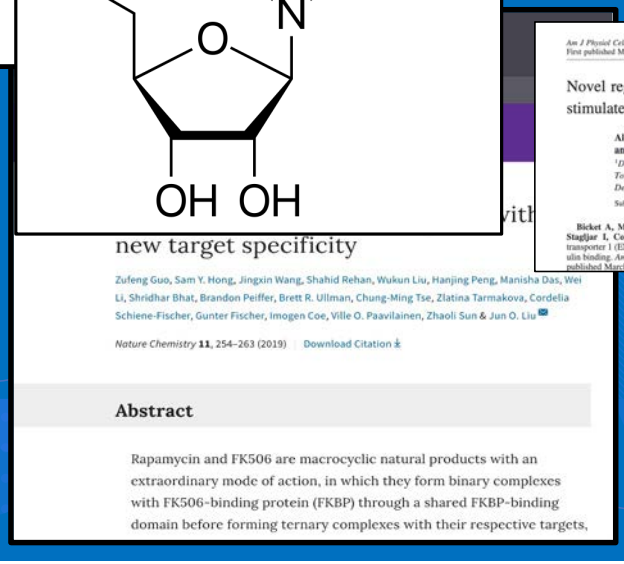
Although there is an increasing understanding of the structural and functional aspects of ENT family members (6, 62) and their role and relevance to clinical outcomes (18, 27), our understanding of the mechanisms of regulation of ENTs

“How do cells work?”









JVI
Journals.ASM.org

Persistent Hepatitis C Virus Infection Impairs Ribavirin Antiviral Activity through Clathrin-Mediated Trafficking of Equilibrative Nucleoside Transporter 1

Rajesh Panigrahi,[a] Partha K. Chandra,[a] Pauline Ferraris,[a] Ramazan Kurt,[a,b] Kyoungsub Song,[a] Robert F. Garry,[c] Krzysztof Reiss,[d] Imogen R. Coe,[e] Tomomi Furihata,[f] Luis A. Balart,[b] Tong Wu,[a] Srikanta Dash[a,b]

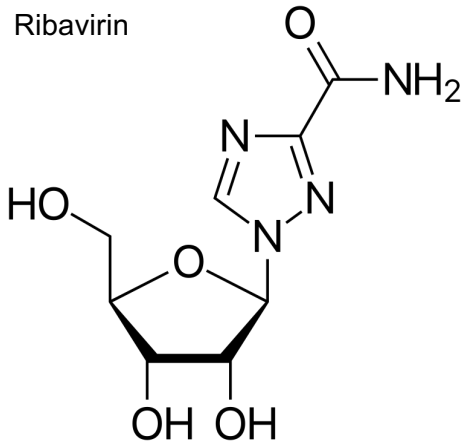
Department of Pathology and Laboratory Medicine,[a] Department of Medicine, Gastroenterology and Hepatology,[b] and Department of Microbiology and Immunology,[c] Tulane University School of Medicine, New Orleans, Louisiana, USA; Neurological Cancer Research, Stanley S. Scott Cancer Center, New Orleans, Louisiana, USA[d]; Department of Chemistry and Biology, Ryerson University, Toronto, ON, Canada[e]; Laboratory of Pharmacology and Toxicology, Graduate School of Pharmaceutical Science, Chiba University, Chiba, Japan[f]

ABSTRACT

Ribavirin (RBV) continues to be an important component of interferon-free hepatitis C treatment regimens, as RBV alone does not inhibit hepatitis C virus (HCV) replication effectively; the reason for this ineffectiveness has not been established. In this study, we investigated the RBV resistance mechanism using a persistently HCV-infected cell culture system. The antiviral activity of RBV against HCV was progressively impaired in the persistently infected culture, whereas interferon lambda 1 (IFN-λ1), a type III IFN, showed a strong antiviral response and induced viral clearance. We found that HCV replication in persistently infected cultures induces an autophagy response that impairs RBV uptake by preventing the expression of equilibrative nucleoside transporter 1 (ENT1). The Huh-7.5 cell line treated with an autophagy inducer, Torin 1, downregulated membrane expression of ENT1 and terminated RBV uptake. In contrast, the autophagy inhibitors hydroxychloroquine (HCQ), 3-methyladenine (3-MA), and bafilomycin A1 (BafA1) prevented ENT1 degradation and enhanced RBV antiviral activity. The HCV-induced autophagy response, as well as treatment with Torin 1, degrades clathrin heavy chain expression in a hepatoma cell line. Reduced expression of the clathrin heavy chain by HCV prevents ENT1 recycling to the plasma membrane and forces ENT1 to the lysosome for degradation. This study provides a potential mechanism for the impairment of RBV antiviral activity in persistently HCV-infected cell cultures and suggests that inhibition of the HCV-induced autophagy response could be used as a strategy for improving RBV antiviral activity against HCV infection.

Journal of Virology 2015
doi:10.1128/JVI.02492-14.

Ribavirin



ENTs are responsible for the uptake of a large class of anti-cancer & anti-viral drugs: nucleoside analogs & endogenous nucleosides.

“How does science work?”

Canadian Science Publishing

653

ARTICLE

The complex chemistry of diversity and inclusion: a 30-year synthesis

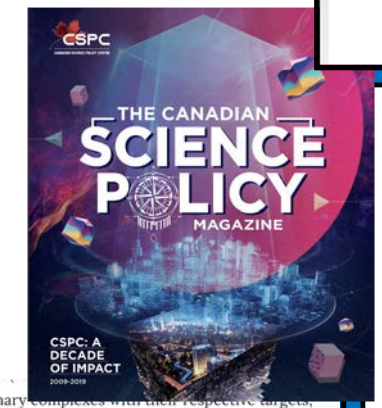
Stefania Impellizzeri and Imogen R. Coe

Abstract: Dr. Margaret-Ann Armour's career as a research chemist, educator, and advocate spanned mo
Much of her work took place within a disciplinary culture ignorant of the scholarship supporting orga
towards inclusive excellence. Her contributions are extensively covered in other articles in this spec
achievements are all the more remarkable given that her colleague, Dr. Gordon Freeman, held gender-bia
he shared in a peer reviewed article in a national science journal. Three decades later, another Canadian c
Hudlický, published a peer reviewed essay in an international chemistry journal that included his view
impacts of diversity initiatives on organic synthesis research. Both articles were retracted, but clearly a
sively biased peer review system enabled the distribution of prejudiced opinions that were neither inf
strated expertise, nor supported by data. These two events are reflective of challenges that Dr. Armour fa

POLICY CHANGE TOWARDS EQUITY AND INCLUSION IS GOOD FOR SCIENCE IN CANADA

Lesley Campbell
Associate Professor, Ryerson University

Imogen R. Coe
Professor, Ryerson University



domain before forming ternary

Science Home News Journals Topics Careers

SHARE LETTERS

Social media for social change in

Samantha Z. Yammine[1,*], Christine Liu[2], Paige B. Jarreau[3,4], Imogen R. Coe[5]
+ See all authors and affiliations

Science 13 Apr 2018:
Vol. 360, Issue 6385, pp. 162-163
DOI: 10.1126/science.aat7303

Science AAAS

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SHARE

Better advice for 'Bothered'

By Science Careers Staff | Jun. 4, 2015 , 11:00 AM

The deleted Ask Alice post offering advice to "Bothered," a female postdoc whose male adviser "won't stop looking down my shirt," brought a torrent of critical responses. Many critiqued the original advice: "As long as your adviser does not move on to other advances, I suggest you put up with it, with good humor if you can." Most criticized *Science* Careers for posting it. And some filled the gap they felt the

FACETS

a multidisciplinary open access science journal

EDITORIAL

So, you want to host an inclusive and accessible conference?

Ana Sofia Barrows[a], Mahadeo A. Sukhai[b], and Imogen R. Coe[c*]

[a]Equity, Diversity and Inclusion Office, Rotman School of Management, University of Toronto, Toronto, ON M5S 3E6, Canada; [b]CNIB, Toronto, ON M4T 1Z2, Canada; [c]Department of Chemistry & Biology, Faculty of Science, Ryerson University, Toronto, ON M5B 2K3, Canada

*imogen.coe@ryerson.ca

iPOLITICS

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OPINIONS

How diversity makes science work better

By Dr. Imogen R. Coe. Published on Sep 18, 2017 10:57am

Email Facebook Twitter LinkedIn

Just over 25 years ago, the Canadian Journal of Physics published an article by Dr. Gordon Freeman, a chemistry professor, in which he asserts that "women who work outside the home contribute to the moral degeneration of their children."

THELANCET-D-18-06918

S0140-6736(18)33188-X

Doctopic: Review and Opinion

Organisational best practices towards gender equality in science and medicine

CrossMark

IF 202.731

Imogen R Coe, Ryan Wiley, Linda-Gail Bekker

In August 2018, the president of the World Bank noted that "'Human capital'—the potential of individuals—is going to be the most important long-term investment any country can make for its people's future prosperity and quality of life". Nevertheless, leaders and practitioners in academic science and medicine continue to be unaware of and poorly educated about the nature, extent, and impact of barriers to full participation of women and minorities in science and medicine around the world. This lack of awareness and education results in failures to fully mobilise the human capital of half the population and limits global technological and medical advancements. The chronic lack of recruitment, promotion, and retention of women in science and medicine is due to systemic, structural, organisational, institutional,

Lancet 2019; 393: 587-93

Department of Chemistry and Biology, Ryerson University, Toronto, ON, Canada (Prof I R Coe PhD); **Department of Pathology and Molecular Medicine, McNaster University, Hamilton, ON, Canada** (R Wiley PhD); **Shift Health, Toronto, ON, Canada** (R Wiley); **and The Desmond Tutu HIV Centre, Institute of Infectious Disease and Molecular Medicine, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa** (Prof L-G Bekker PhD)

Correspondence to:
Prof Imogen R Coe, Department of Chemistry and Biology, Ryerson University, Toronto, ON M5B 2K3, Canada
imogen.coe@ryerson.ca

For more on the **#LancetWomen initiative** see https://www.thelancet.com/lancet-women

to their culture and climate to address this lost

itional climate can be defined as the meanings o that organisation's policies, practices, and s, and should reflect and support organisational efined as the shared values and beliefs that workplace and employee behaviour.[5-7] Climate

BOOKS

HOW DOES SCIENCE REALLY WORK?

Science is objective. Scientists are not. Can an "iron rule" explain how they've changed the world anyway?

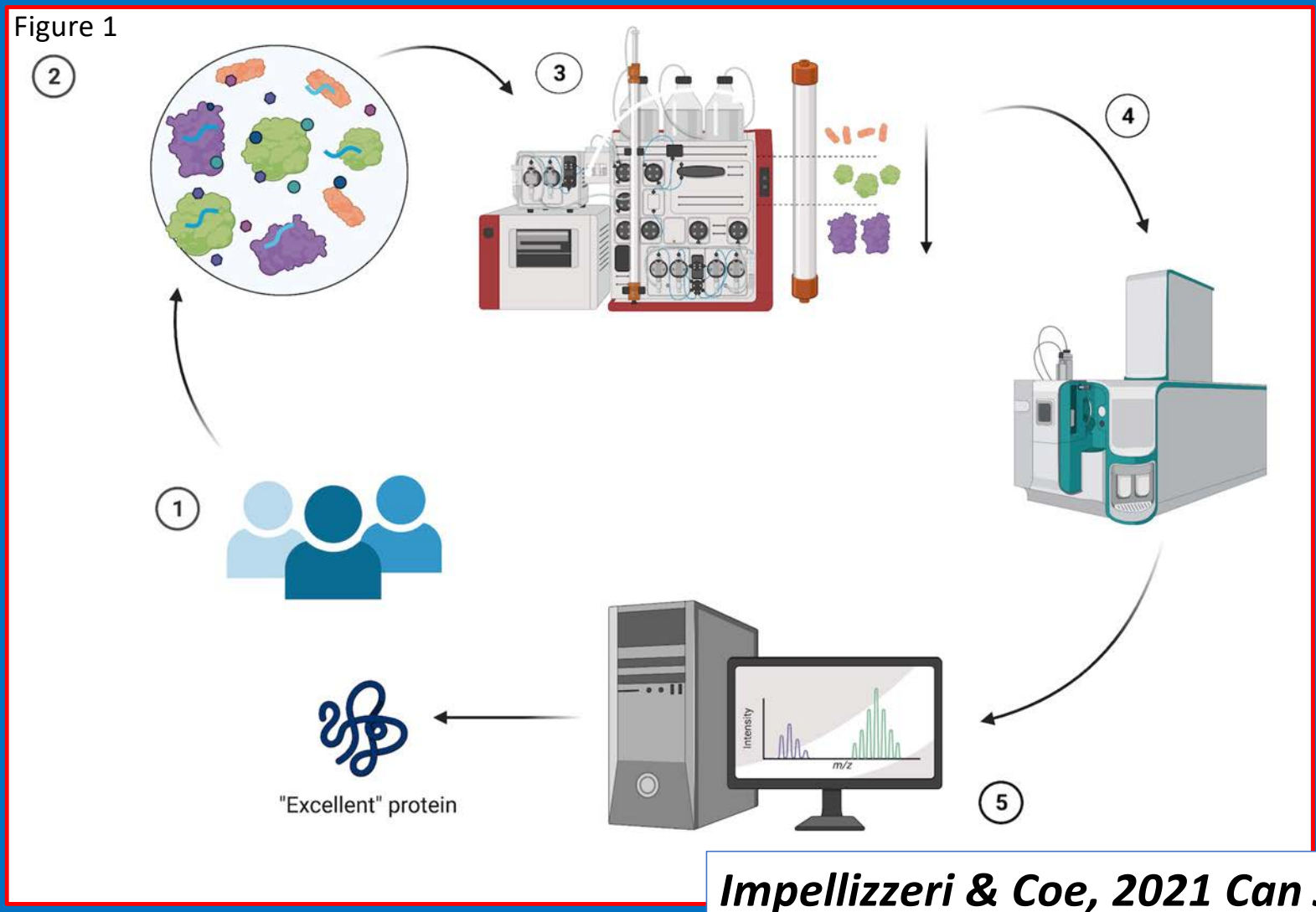
By Joshua Rothman

September 28, 2020

"Like everybody else, scientists view questions through the lenses of taste, personality, affiliation, and experience"

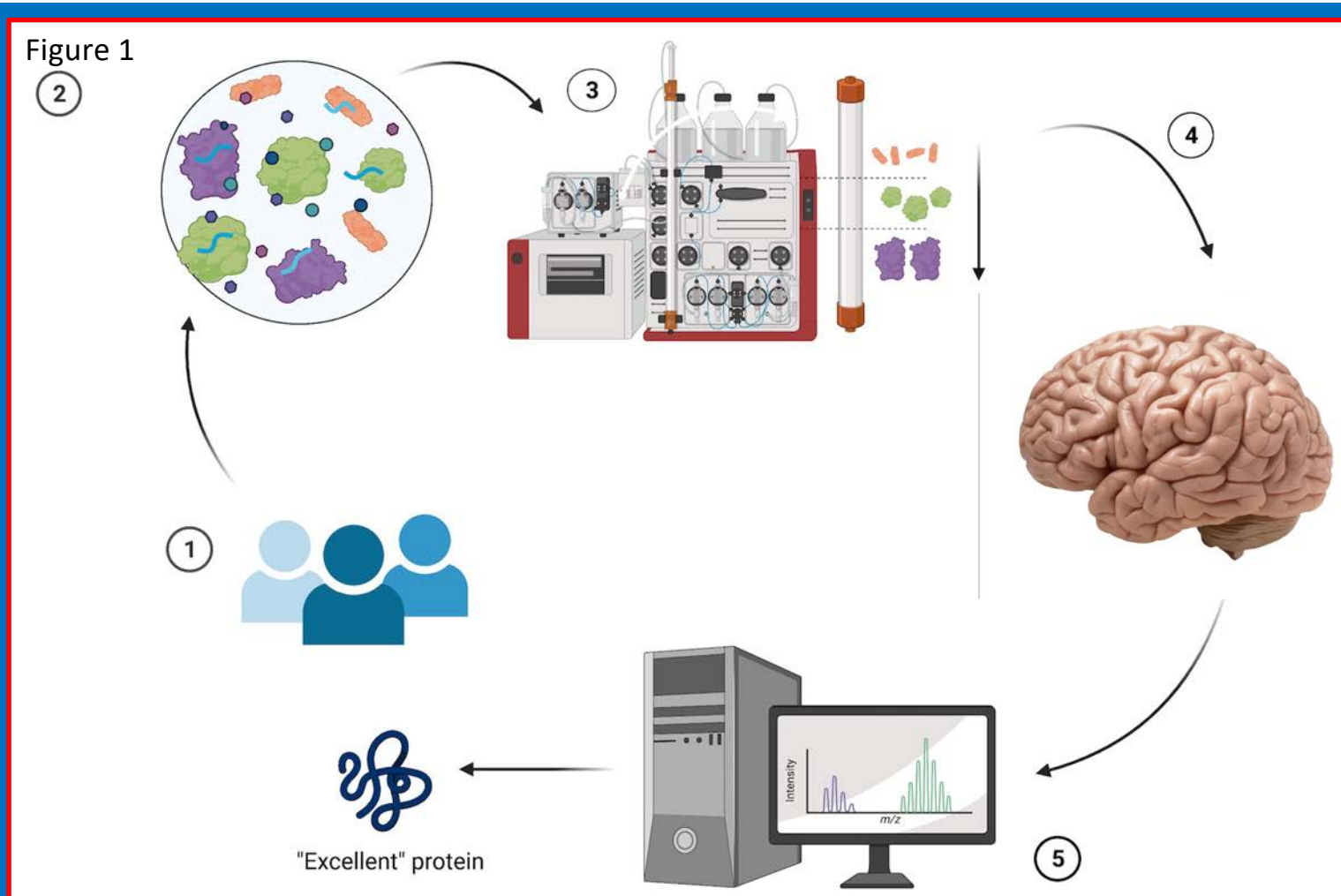
https://www.newyorker.com/magazine/2020/10/05/how-does-science-really-work

Figure 1



Impellizzeri & Coe, 2021 Can J Chem

Figure 1



Impellizzeri & Coe, 2021 Can J Chem

CanHepC
Canadian Network on Hepatitis C
Réseau Canadien sur l'Hépatite C

Equity, Diversity and Inclusion (EDI) Platform

Co-Lead: TBC, Alexandra King; the activities of the EDI Platform are coordinated centrally by the Secretariat in collaboration with partners and students.

A new EDI Platform will address systemic barriers and unconscious biases existing in our scientific research and research community. **The objectives of the EDI Platform are to**: 1) remove barriers that limit full participation of talented individuals in CanHepC through policies that ensure fair and equitable access to opportunities provided by CanHepC, including research support, training, and presentation in seminars and at our annual symposium; 2) create an inclusive culture in CanHepC where EDI becomes innate through education that focus on EDI philosophy, practices, and lived experiences, and a code of conduct to promote respectful work environments inclusive of Indigenous components (developed with the Indigenous Platform).

Systems approach

1) **Who** does the research (asks the questions, frames the debate, interprets the data, decides on priorities, builds the teams, community, etc. etc.) influences **how** the research is done.

Inclusive excellence in researchers

https://cihr-irsc.gc.ca/e/50836.html

1) **Who** does the research (asks the questions, frames the debate, interprets the data, decides on priorities, builds the teams, community, etc. etc.) influences **how** the research is done.

Excellence in researchers

https://cihr-irsc.gc.ca/e/50836.html

1) **Who** is doing the research? Who is in the room? Who isn't? **Why**? Whose voice is heard? **What** is the culture of the research environment?
Is the culture and context intentionally EDI&A-infused?

Inclusive cultures → excellence in researchers

https://cihr-irsc.gc.ca/e/50836.html

1) **Who** is doing the research? Who is in the room? Who isn't? **Why**? Whose voice is heard? **What** is the culture? Is the culture and context intentionally EDI&A-infused?

Inclusive cultures → excellence in researchers

2) **How** is the research conducted? Does it use an inclusive (SGBA+) approach which reflects experimental rigour (informed by 1)? SGBA+ (EDI&A) infused research design produces higher quality outputs. Recognize & reward the best science

Inclusive design → excellence in research

1) **Who** does the research (asks the questions, frames the debate, interprets the priorities, builds the teams etc.).
Is the culture and d ly EDI&A-infused?

Inclusive cult researchers

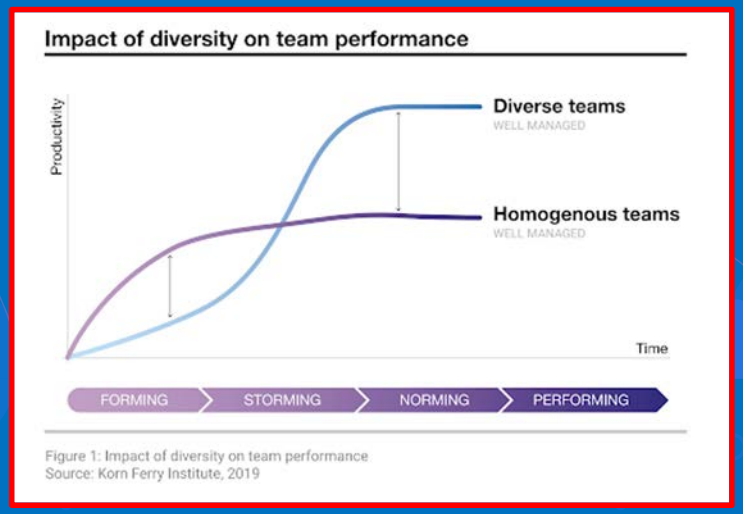
2) **How** is the research conducted? Does it use an SGBA+ approach which reflects experimental rigour (informed by 1)? SGBA+ (EDI&A) infused research design produces higher quality outputs. Recognize & reward the best science

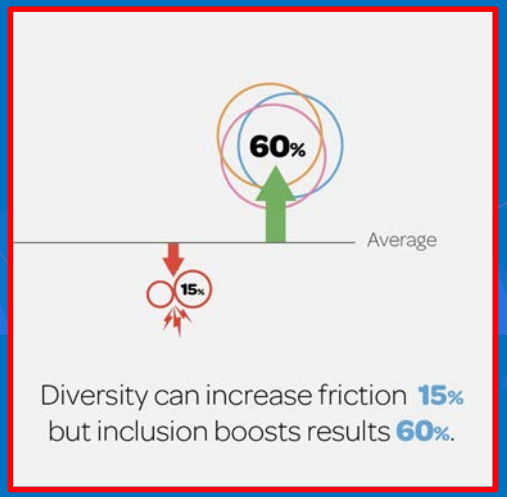
Inclusive design → excellence in research

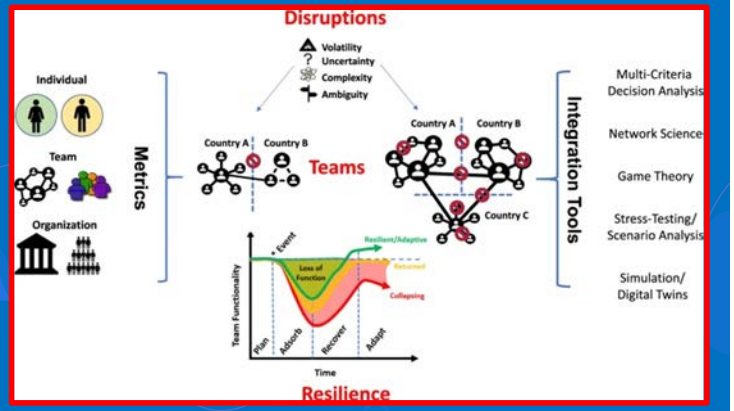
https://cihr-irsc.gc.ca/e/50836.html

https://www.forbes.com/sites/eriklarson/2017/09/21/new-research-diversity-inclusion-better-decision-making-at-work/?sh=14bc4e764cbf

https://hbr.org/2016/09/diverse-teams-feel-less-comfortable-and-thats-why-they-perform-better







Linkov et al. 2022

Who is in the room? Who isn't? Why?

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Queens University, Canada

When Black medical students weren't welcome at Queen's

The ban on Black students studying medicine was in effect for decades, then forgotten, and wasn't officially repealed until just two years ago.

BY WENDY GLAUSER
FEB 19 2020

The Queen's medical school was originally housed in this building, which still stands today. Now known simply as the Old Medical Building, it has been substantially modified since this photo was taken some time in the 1890s. Photo courtesy of Queen's University Archives.

ed to ban Black students
e time, around 15 Black
men were enrolled, representing one of the highest proportions of Black students of any medical school in the country, according to Edward Thomas, a cultural studies PhD candidate at Queen's. While those students weren't immediately forced out, they were strongly encouraged to leave by administrators.

The ban emboldened racist sentiment on campus – white students at Queen's reportedly mocked the Black medical students in a minstrel show put on by the student government. "About half [of the Black medical students] left under pressure. The other half fought it out," said

Structural Racism in Academic STEMM

Institutional Barriers

Exclusionary practice <u>as policy</u>

Celebrating a History of Resilience

February 2, 2018 | News Stories

Edward Thomas, McDonald Inst.

When Edward Thomas, Sc'06, MASc'12, learned that the Queen's School of Medicine had banned all 15 of its black students 100 years ago, his instinct was to learn more about those students.

https://www.universityaffairs.ca/features/feature-article/when-black-medical-students-werent-welcome-at-queens/

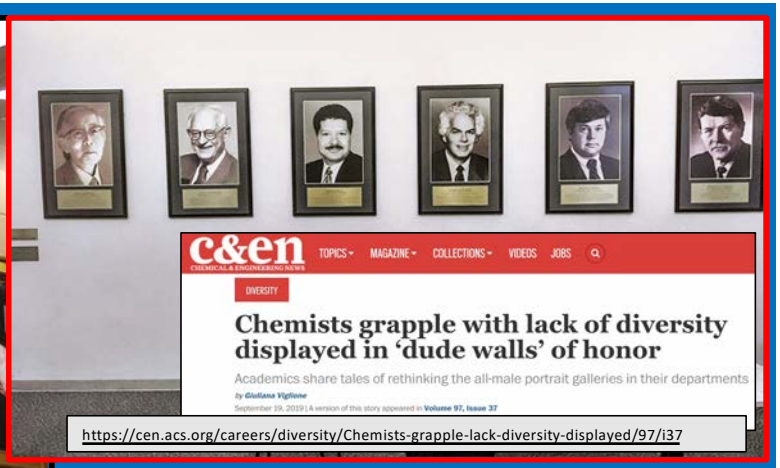
POLICY-ISH

Academic Science Rethinks All-Too-White 'Dude Walls' Of Honor

August 25, 2019 · 8:06 AM ET

Heard on Weekend Edition Sunday

https://www.npr.org/sections/health-shots/2019/08/25/749886989/academic-science-rethinks-all-too-white-dude-walls-of-honor



c&en CHEMICAL & ENGINEERING NEWS TOPICS MAGAZINE COLLECTIONS VIDEOS JOBS

DIVERSITY

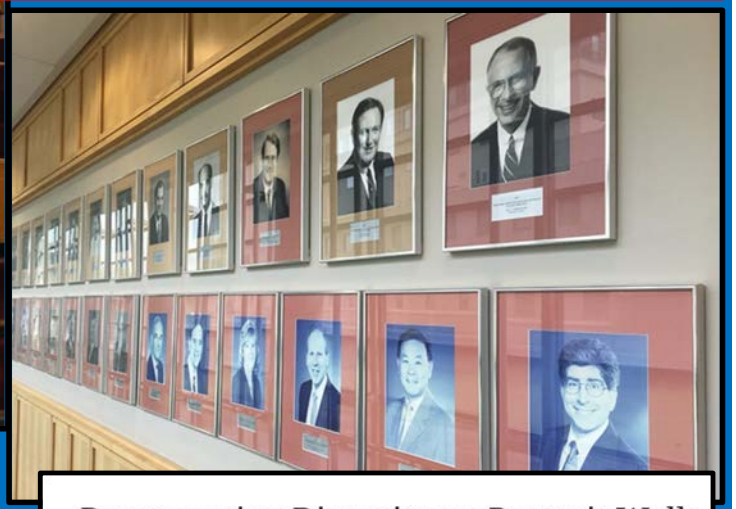
Chemists grapple with lack of diversity displayed in 'dude walls' of honor

Academics share tales of rethinking the all-male portrait galleries in their departments

by Giuliana Viglione

September 19, 2019 | A version of this story appeared in Volume 97, Issue 37

https://cen.acs.org/careers/diversity/Chemists-grapple-lack-diversity-displayed/97/i37

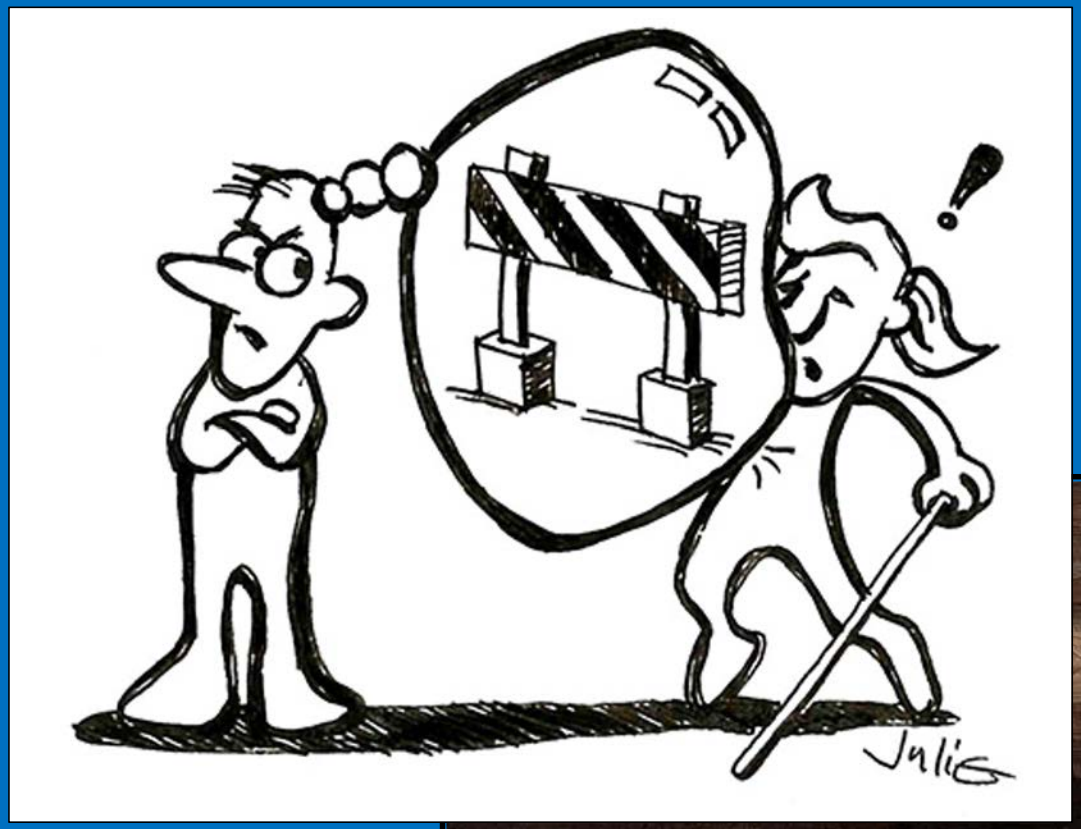


Representing Diversity on Portrait Walls Around Johns Hopkins: One Stride Taken, Many to Go

by Talia Henkle / September 11, 2019 / A Day in the Life

Exclusionary practice by design

(in built infrastructure & environment)



Attitudinal Barriers

Exclusionary practice as behaviour

Gender, disability, religion, race, geography, sexuality, socio-economic status, age, and more…

Cultural conditioning is a process through which we absorb and interpret the influences, norms, and messaging from our environment and translate them into what we believe to be acceptable behaviors.

https://www.exceptionalfutures.com/cultural-conditioning/

Messages that influence our beliefs about what's normal, acceptable, or even enjoyable. These beliefs become central to who we are and ultimately shape our behavior, reactions, and judgements about how we and others fit within society.

Recognizing and Overcoming Barriers to Participation in STEM

BY ROBIN HOUSTON, ETHAN OCH, M. JAVED KHAN, LORENZO CABAERO, HALI'A BULL, AND SHARANABASAWESHWARA ASUNDI, AIAA K-12 OUTREACH COMMITTEE, DIVERSITY SUBCOMMITTEE | APRIL 2022

PreK-12 education in science, technology, engineering, and math (STEM) in the United States continues to face challenges at structural and academic levels. These challenges are exacerbated in socioeconomically disadvantaged communities. The consequence of below-par educational opportunities for students in these communities manifests in their underrepresentation in the STEM workforce. There is a correlation between socioeconomic status and race and ethnicity; and academic performance has been linked to socioeconomic conditions. Female, Black, and Hispanic students, and students with disabilities, also participate at lower rates than their white male peers.

RECOGNIZING BARRIERS TO PARTICIPATION

Barriers to participation in STEM education – including socioeconomic, self-perception, physical, institutional, and societal constructs – significantly impact underrepresented or underserved communities, including individuals belonging to protected categories relating to race or ethnicity, gender, socioeconomic status, and disability.

https://skylight.science.ubc.ca/review-themes-and-promising-practices-stem-based-work-equity-diversity-and-inclusion

DOI 10.17226/26803

Building & maintaining diverse teams in research

Principal Investigators

- Define your values
- Recruitment – ads, websites, outreach, inclusive recruitment takes longer. Be intentional.
- Team culture – co-create team code of conduct. Revisit annually with team. Be context-specific.

Trainees

Developing a Code of Conduct for Research and Graduate Studies in our Department

What are our **values**?

From these come our **expected actions** and **conduct**

Delineate clear mechanisms to report and address behaviour inconsistent with **Code of Conduct**

A Code of Conduct should….

- **Identify** and **define** appropriate and inappropriate behaviors
- Go beyond ethical treatment of data to include the treatment of people
- Clearly specify **reporting** and **investigative procedures**
- Outline disciplinary action for conduct violations
- Include **protection against retaliation**
- Have built in mechanism for continued re-evaluation of its effectiveness and for its revision

ADVANCEGeo PARTNERSHIP

ArcticNet Event Code of Conduct

Examples of unacceptable conduct:

- Violence and threats of violence.
- Incitement of violence towards any individual.
- Derogatory comments related to gender, gender identity and expression, sexual orientation, disability, mental illness, neuro(a) typicality, physical appearance, body size, race, religion, or socio-economic status.
- Gratuitous or off-topic sexual images or behaviour in spaces where they're not appropriate.
- Posting or threatening to post other people's personally identifying information.
- Use of social or mainstream media to target individuals in a way that could harm their privacy and/or reputation.
- Deliberate misgendering such as not using a person's preferred pronouns.
- Inappropriate photography or recording.
- Physical contact or simulated physical contact (e.g. textual messages depicting physical contact) without affirmative consent.
- Unwelcome sexual attention. This includes, sexualized comments or jokes; inappropriate and unwelcome sexual advances.
- Deliberate intimidation, stalking or following (online or in person).
- Sustained disruption of community events, including talks and presentations.
- Advocating for, or encouraging, any of the above behaviour.

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Allyship training, cultural competency training, bystander intervention training can all help in upskilling people to avoid these behaviours happening

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- Attend learning opportunities with others (especially men)
- Upskill – develop strong core competencies, communication, etc.
- Actions & leadership, not good intentions & empty words

Trainees

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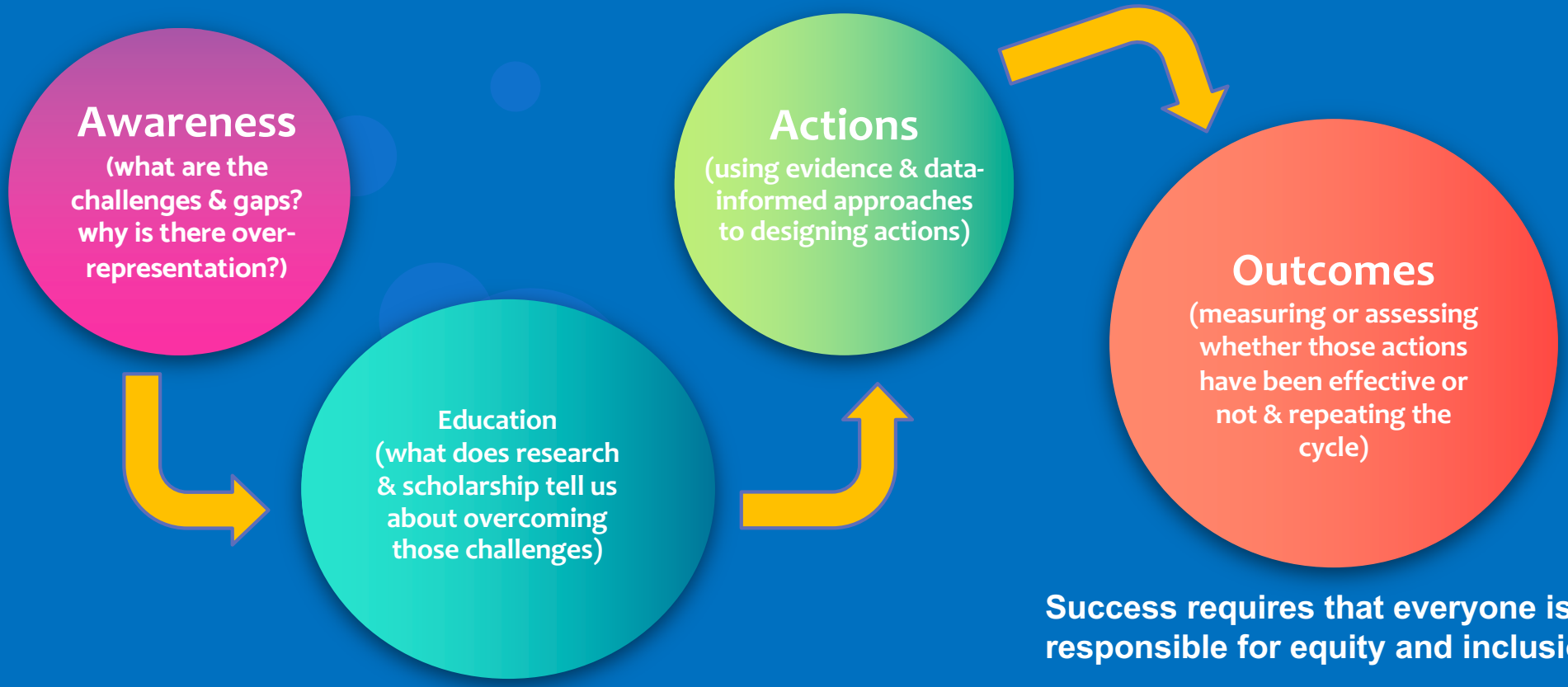
Trainee

- Define your values
- Know your rights
- Require clear communication on expectations
- Look for psychologically safe cultures
- Network with your community (e.g. CBSN, LGBTQinSTEM, etc.)
- Go beyond your community
- Expect (demand) – allyship skills, bystander intervention skills (specifically for science)
- Look for mentorship but more importantly, sponsorship (& championing)

- Awareness (there is bias in research, there are gaps, there is over-representation, privilege & power define structures, etc.)
- Education (be curious, what does the research tell us about building inclusive cultures, what is lost in non-inclusive research design, what/who is missing & why, learn, learn, learn etc.)
- Actions (be analytical, use evidence & data to drive intentional activities, be proactive, define the how & the where)
- Outcomes (use metrics, set targets, goals, measure progress).

Rinse and Repeat

Awareness requires reflection



Success requires that everyone is responsible for equity and inclusion

(credit to AthenaSWAN program, UK)

Diverse teams in science lead to better science.

Why?

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Why? **Because diverse teams are less likely to miss important questions or aspects of inclusive design.**

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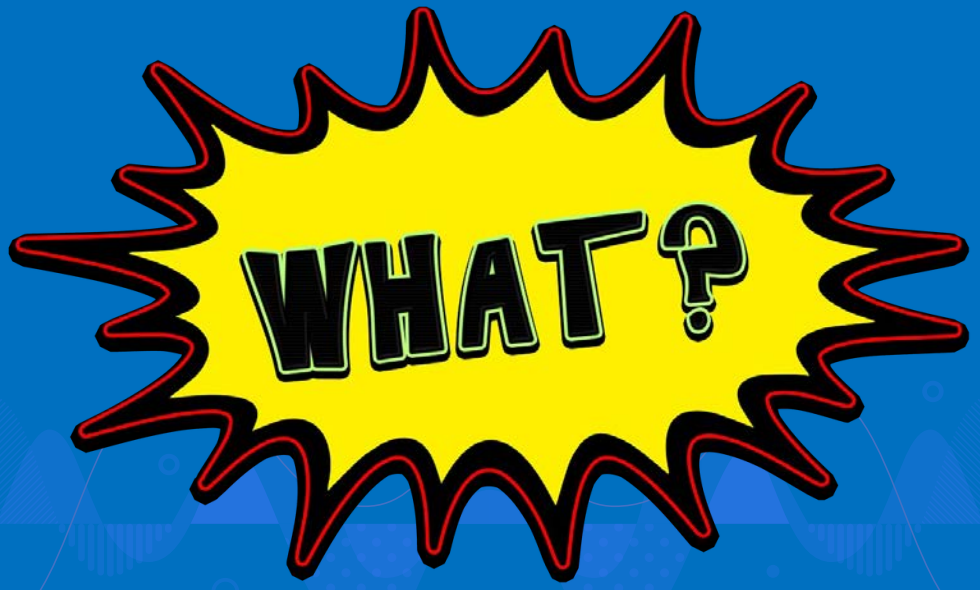

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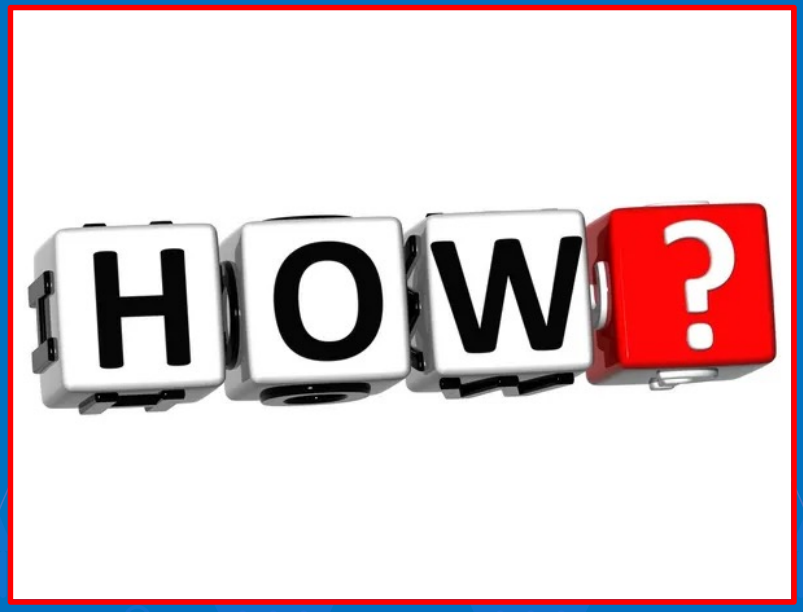

Failure to do inclusive research

Toronto · GO PUBLIC

This commonly prescribed cancer drug was supposed to help save this doctor's life. Instead, it killed him

Some provinces pre-screen patients at risk of toxic reactions, but experts say tests don't go far enough

Rosa Marchitelli, Jenn Blair · CBC News ·
Posted: Nov 27, 2023 4:00 AM EST | Last Updated: November 27

Anil (Monty) Kapoor died on Feb. 28 after being prescribed a cancer drug that was toxic to him. From left, brothers Dr. Vimal (Scott) Kapoor, Dr. Sunil Kapoor and Anil's son, Akshay Kapoor. (Keith Burgess/CBC)

184 comments

When Dr. Anil Kapoor was diagnosed with stage four colon cancer in January his prognosis was positive, and his family was hopeful treatment would buy him several more years.

But weeks later, the 58-year-old Burlington, Ont., resident was dead — killed not by the cancer, say doctors, but by the commonly prescribed cancer drug Fluorouracil (5-FU) that was supposed to help save his life.

Studies favour white populations: expert

The problem, Offer says, is that the studies used to identify the four most common variants in pre-screening mostly involve patients who are white, leaving other populations more vulnerable.

Akshay Kapoor and his dad, Anil, at a Raptors game in Toronto before Anil's cancer diagnosis. (Submitted by Scott Kapoor)

Offer warns pre-screening for the four genetic variants could be leading to false negatives, like the one Anil got, for a large number of cancer patients.

The family had full genome sequencing done on Anil after his death and specialists confirmed he carried a genetic variant that likely caused a deadly reaction to 5-FU.

That variant isn't part of the pre-screening process and is considered rare based on current medical studies.

"Three weeks later, on Feb. 28, Anil died. More testing later revealed he had a genetic variant that wasn't included in the pre-screening.

Anil's family says they were stunned to learn that current pre-screening guidelines are based on studies that largely leave out populations that aren't white, a known problem based on medical studies they found from North America and other parts of the world"

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https://www.technologyreview.com/2022/08/15/1056908/biological-sex-immune-system/

MIT Technology Review

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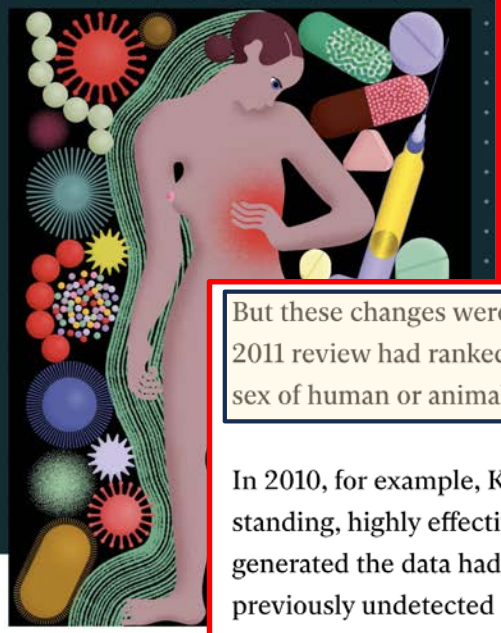
BIOTECHNOLOGY AND HEALTH

The quest to show that biological sex matters in the immune system

A handful of immunologists are pushing the field to take attributes such as sex chromosomes, sex hormones, and reproductive tissues into account.

By Sandeep Ravindran August 15, 2022



Sabra Klein is deeply aware that sex matters. During her PhD research at Johns Hopkins University, Klein learned how sex hormones can influence the brain and behavior. "I naively thought: Everybody knows hormones can affect lots of physiological processes—our metabolism, our heart, our bone density. It must be affecting the immune system," she says.

But these changes were just a start—especially in immunology, which in a 2011 review had ranked last out of 10 biological disciplines for reporting the sex of human or animal subjects in published papers.

In 2010, for example, Klein reanalyzed publicly available data on a long-standing, highly effective vaccine for yellow fever. The researchers who generated the data hadn't analyzed it by sex. When Klein did, she found a previously undetected difference in the immune response to the vaccine, with females experiencing a stronger response and potentially better protection. "That really stands out as a great contribution to the field and really showed the value of analyzing data stratified by sex," Benn says. "The overall kind of blurry result was actually covering some very significant differences in responses between males and females."

Failure to do inclusive research = poorer quality science

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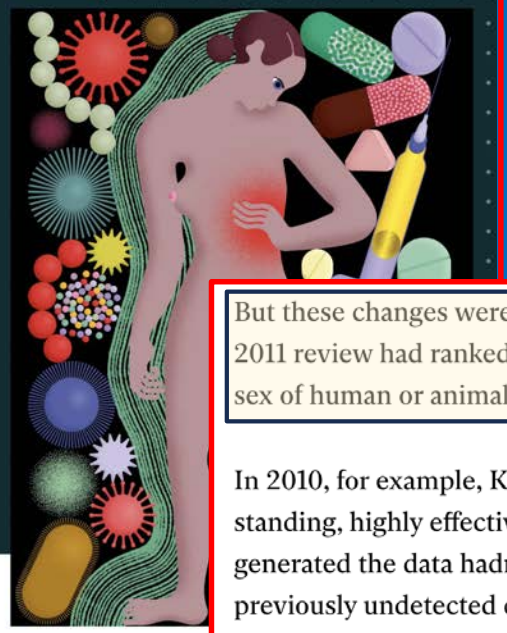

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Do you know the sex of your cells in culture?

Do you know the ethnicity of your cells?

Do you disaggregate your data by sex? Ethnicity?

If not, why not? Is your research EDI&A infused?

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Editorials

nature

that all employers, including those in the scientific and research space, can do.

The research community also needs to devote more attention and resources to studying the impact of menopause on careers everywhere, not just in high-income countries. And those organizations that have not yet started to address the difficulties that menopause can pose for working life need to do so now. It's time for the stigma around menopause to be lifted. Doing so will make research a better place to work for everyone.

Raising the bar on sex and gender reporting in research

Authors submitting to Nature journals will be prompted to provide details on how sex and gender were considered in study design.

In late 2020, the European Commission announced that its research-grant recipients would need to incorporate analyses of sex and gender in their study design. This could include disaggregating data by sex when examining cells, or considering how a technology might perpetuate gender stereotypes. Back then, *Nature* wrote that this was a significant step and urged other funders to follow suit (see *Nature* **588**, 196; 2020). At the same time, we said that publishers, too, have a role in encouraging sex and gender reporting. The responsibility does not lie only with funders.

Some journals have encouraged reporting of sex and gender analyses for years, and the number of research studies that include such data has increased substantially in the past decade. But gaps remain – especially insufficient reporting of data disaggregated by sex and gender[1–3].

To remedy this, from now on, researchers who submit papers to a subset of Nature Portfolio journals (see list at go.nature.com/3mcu0zj) will be prompted to state whether and how sex and gender were considered in their

Many research studies don't account for sex and gender.

> "We aim to promote transparency in study design and, ultimately, make findings more accurate."

At the same time, we're urging care and caution in communicating findings about sex and gender, to avoid research findings having inadvertent and harmful effects, especially where there is the potential for societal and public-policy impact. More details about these changes can be found at go.nature.com/3mcu0zj. They are part of the SAGER (Sex and Gender Equity in Research) guidelines[4].

In addition, from 1 June, four journals – *Nature Cancer*, *Nature Communications*, *Nature Medicine* and *Nature Metabolism* – will be raising awareness of the updated recommendations in letters to authors and reviewers during peer review. The aim here is to improve understanding of the degree to which sex and gender reporting is already part of study design, data collection and analysis in the research these journals publish. The journals will also evaluate author and reviewer reception of the changes so that we can iterate on them as we learn through experience.

The new measures are needed because research is still mostly failing to account for sex and gender in study design, sometimes with catastrophic results. Between 1997 and 2001, ten prescription drugs were withdrawn from use in the United States; eight of these were reported to have

Failure to do inclusive research

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nature

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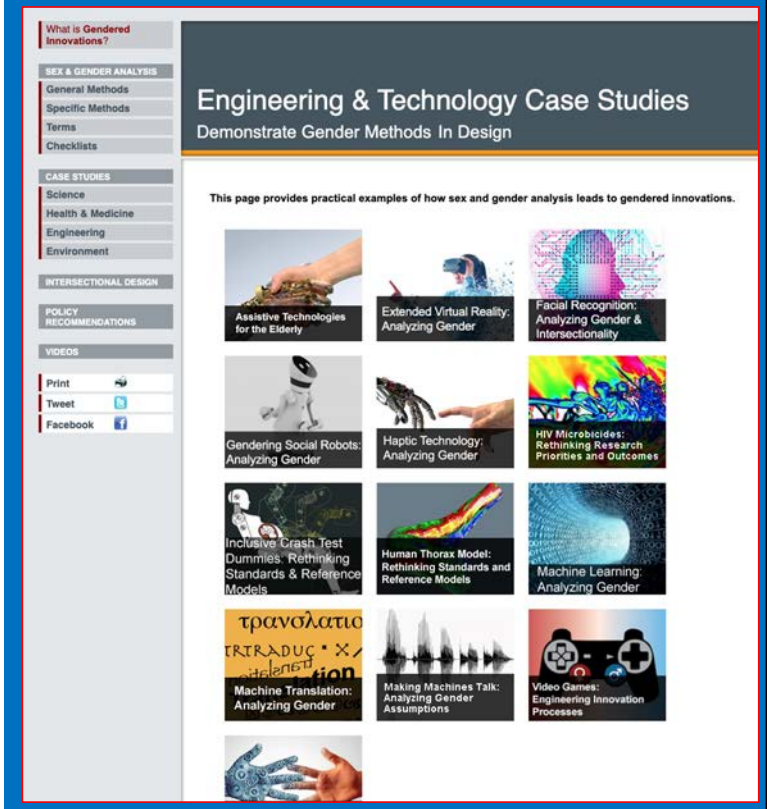
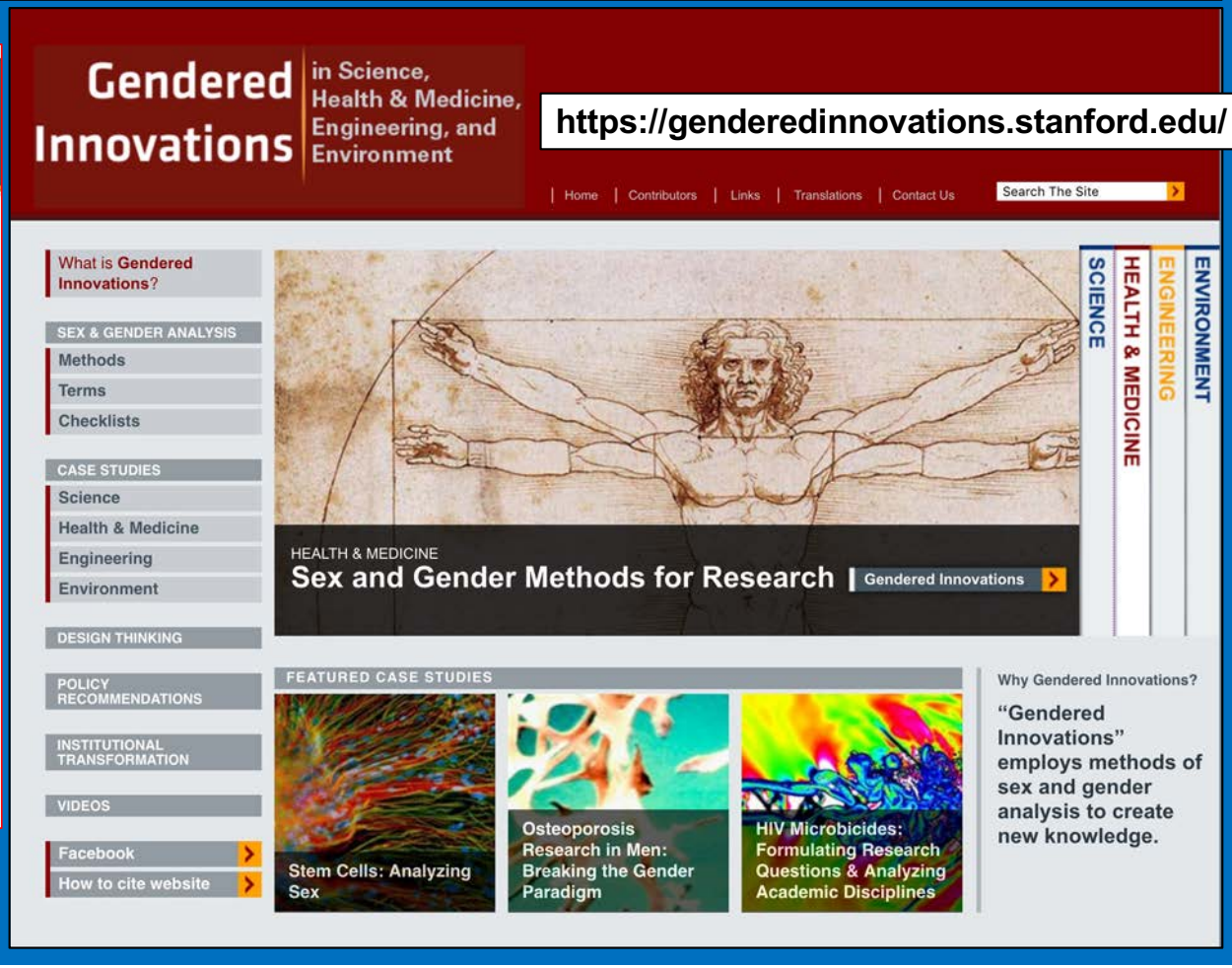
Understanding & integrating EDIA/SGBA+ principles leads to <u>improved</u> engineering, science & medicine across all disciplines & sectors (AI/ML, technology, drugs, genomics, healthcare, policy, building, governance, urban planning, etc.). This is more likely to happen with diverse teams.



Inclusive design is good for everyone



CanHepC Journal Club

frontiers | Frontiers in Virology

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Chronic HCV infection promotes cytotoxicity in antigen-specific CD8$^+$ T cells regardless of virus specificity

Ana C. Maretti-Mira[1,2*], Matthew P. Salomon[1], Angela M. Hsu[1,2], Chikako Matsuba[1] and Lucy Golden-Mason[1,2]

[1]USC Research Center for Liver Diseases, Keck School of Medicine, University of Southern California, Los Angeles, CA, United States, [2]Division of Gastrointestinal and Liver Diseases, Department of Medicine, Keck School of Medicine, University of Southern California, Los Angeles, CA, United States

Introduction: Despite advancements in hepatitis C virus (HCV) infection treatment, HCV still represents a significant public health burden. Besides progressive hepatic damage, viral persistence has lasting effects on innate and adaptive immune responses. Lack of a complete understanding of the factors driving an effective HCV response contributes to the failure to develop a vaccine for prevention. This study advances the existing knowledge on HCV-specific CD8$^+$ T cells and describes the impact of current or past HCV infection on CD8$^+$ T cells specific for other viruses.

viruses

MDPI

Review

Towards a Systems Immunology Approach to Understanding Correlates of Protective Immunity against HCV

Naglaa H. Shoukry [1,2]

[1] Centre de Recherche du Centre Hospitalier de l'Université de Montréal (CRCHUM), Tour Viger, Local R09.414, 900 Rue St-Denis, Montréal, QC H2X 0A9, Canada; naglaa.shoukry@umontreal.ca
[2] Département de Médecine, Faculté de Médecine, Université de Montréal, Montréal, QC H2X 0A9, Canada

Abstract: Over the past decade, tremendous progress has been made in systems biology-based approaches to studying immunity to viral infections and responses to vaccines. These approaches that integrate multiple facets of the immune response, including transcriptomics, serology and immune functions, are now being applied to understand correlates of protective immunity against hepatitis C virus (HCV) infection and to inform vaccine development. This review focuses on recent progress in understanding immunity to HCV using systems biology, specifically transcriptomic and epigenetic studies. It also examines proposed strategies moving forward towards an integrated systems immunology approach for predicting and evaluating the efficacy of the next generation of HCV vaccines.

Keywords: protective immunity; HCV; transcriptomic; systems immunology

check for updates

Citation: Shoukry, N.H. Towards a

1. Introduction

Acute hepatitis C virus (HCV) infection resolves spontaneously in approximately 30%

Supplementary Table 1: Subject Characteristics

Sex	Age	Ethnicity	Pathology
M	50	CA	rHCV
M	53	Asian	rHCV
M	52	CA	rHCV
M	49	N/A	rHCV
M	50	CA	cHCV
M	48	Hispanic	cHCV
F	50	AA	cHCV
M	43	CA	cHCV
F	53	CA	Control
M	31	CA	Control
F	33	CA	Control

Abbreviations: M=Male;F=Female; CA=Caucasian; rHCV= spontanously resolved HCV; cHCV= chronic HCV.

Sex/gender/ethnicity data are collected (in supplementary data) but there is no further reference to them in the paper.

Does it matter?

From the data in the paper, we can't tell.

Supplementary Table 1: Subject Characteristics

Sex	Age	Ethnicity	Genotype	DAA Tx	Pre-Tx ALT (U/L)	Pre-Tx AST (U/L)	Fib4	Pre-Tx viral level (IU/mL)†	Post-Tx viral level (IU/mL)	Duration of Tx (weeks)
M	65	CA	1	Harvoni	50	64	6.92	1,088,926	ND	12
M	68	CA	1	Harvoni/Ribavirin	59	33	1.55	positive	ND	12
M	47	CA	1	Viekira/Ribavirin	194	102	4.6	9,150,000	ND	12

Abbreviations: M=Male; CA=Caucasian; Tx=Treatment; ND=Not detected; †Limit of detection is 12 international units (IU/ml)

Ethnic differences in cellular and humoral immune responses to SARS-CoV-2 vaccination in UK healthcare workers: a cross-sectional analysis

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Summary

Background Few studies have compared SARS-CoV-2 vaccine immunogenicity by ethnic group. We sought to establish whether cellular and humoral immune responses to SARS-CoV-2 vaccination differ according to ethnicity in UK Healthcare workers (HCWs).

Methods In this cross-sectional analysis, we used baseline data from two immunological cohort studies conducted in

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"Interpretation

This study provides evidence that, in an infection naïve cohort, humoral and cellular immune responses to SARS-CoV-2 vaccination are stronger in South Asian HCWs than White HCWs.

These differences are most clearly seen in the early period following vaccination.

Further research is required to understand the underlying mechanisms, whether differences persist with further exposure to vaccine or virus, and the potential impact on vaccine effectiveness"

The Lancet 2023

eLife

FEATURE ARTICLE

SCIENCE FORUM

Best practices to promote rigor and reproducibility in the era of sex-inclusive research

Abstract To enhance inclusivity and rigor, many funding agencies and journals now mandate the inclusion of females as well as males in biomedical studies. These mandates have enhanced generalizability and created unprecedented opportunities to discover sex differences. Education in sound methods to consider sex as a subgroup category has lagged behind, however, resulting in a problematic literature in which study designs, analyses, and interpretations of results are often flawed. Here, we outline best practices for complying with sex-inclusive mandates, both for studies in which sex differences are a primary focus and for those in which they are not. Our recommendations are organized within the "4 Cs of Studying Sex to Strengthen Science: Consideration, Collection, Characterization and Communication," a framework developed by the Office of Research on Women's Health at the National Institutes of Health in the United States. Following these guidelines should help researchers include females and males in their studies while at the same time upholding high standards of rigor.

JANET W RICH-EDWARDS, DONNA L MANEY*

Rich-Edwards and Maney. eLife 2023;12:e90623. DOI: https:// doi. org/ 10. 7554/ eLife. 90623

1) Is your research environment inclusive & thus excellent?

2) Is your research design inclusive & thus rigorous?

[1, 2] NSERC DG, [2]CIHR PG, [1, 2] CFI, etc.

MICHAEL CHARLES

ASSOCIATE VICE-PRESIDENT, EQUITY, DIVERSITY, AND INCLUSION

Michael Charles comes to Centennial from Carleton University, where he has been the Assistant Vice President and University Advisor, Equity and Inclusive Communities.

Michael is recognized by his colleagues as a strategic thinker and thought leader, who brings both significant capabilities and deep humility with respect to / command of equity, diversity, and inclusion. Regarded in many circles as a subject matter expert, Michael has shared his gifts in numerous and notable

"Diverse representation is not synonymous with EDI expertise"

Michael Charles, Centennial College

<u>Everyone</u> has a responsibility to develop core competencies

We must get comfortable with discomfort

People/orgs/institutions will push back against change. Expect this. Be strategic & plan to manage the hostility, resistance, etc.

“When you are accustomed to privilege, equity feels like oppression”

Embedding EDI into science is work. Do the work.

Learn about sexism, racism, homophobia, colonialism, ableism and other systemic, structural biases in science & academia that limit participation, especially if you are from the dominant demographic.

Embedding EDI into science is work but it's worth it…..

Why?

Embedding EDI into science is work but it's worth it…..

Why?

We can all be better researchers and we can all do better research.

THANKYOU

Any questions?

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