



CHICAGO
BIOMEDICAL
CONSORTIUM

THE UNIVERSITY OF CHICAGO
UNIVERSITY OF ILLINOIS AT CHICAGO
NORTHWESTERN UNIVERSITY

2019 Perspectives



The CBC gratefully acknowledges support from the Searle Funds at The Chicago Community Trust.

CBC Mission

The mission of the Chicago Biomedical Consortium (CBC) is to stimulate collaboration among scientists at Northwestern University, The University of Chicago, the University of Illinois at Chicago and others to accelerate discovery that will transform biomedical research and improve the health of humankind.

The CBC will:

- Stimulate research and education that bridge institutional boundaries,
- Enable collaborative and interdisciplinary research that is beyond the range of a single institution,
- Mentor and develop a strong cadre of biomedical leaders, researchers, and entrepreneurs in Chicago,
- Enhance and promote the development of the biomedical ecosystem in Chicago,
- Facilitate development of therapeutics that will, over the long term, improve the health of citizens of Chicago and beyond.

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Director, Center for Wound Healing and Tissue Regeneration
Professor of Periodontics
Department of Periodontics
University of Illinois at Chicago College of Dentistry

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Scientific Director

Hospira Foundation Professor of Oncology
Section of Hematology/Oncology
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The CBC was inaugurated in 2006 with a generous grant of \$5 million per year from the Searle Funds at The Chicago Community Trust. To date, \$65 million has been invested in the CBC. As the CBC fully embraces Phase 2, efforts continue to leverage the strong foundation that has been established and intensify the focus on translational research and entrepreneurship.

As of the end of 2019, the CBC's most notable achievements since its inception include:

- **A total of 333 awards** made to date to faculty members, postdoctoral fellows, and graduate students to support discovery and cutting-edge research in basic and translational science in nearly all areas of biomedical research including antibiotic resistance, cancer, heart disease, drug development, diabetes, mental health, neurological disorders, etc.; *in 2019, 4 Accelerator Awards, 7 Director's Fund Awards, 7 Catalysts and 2 Entrepreneurial Fellows Awards were made.*
- **Organizing 66 educational events including 16 annual symposia;** all showcasing research supported by the CBC and high-end technologies available at CBC universities; *in 2019, a new CBC/Graduate School (TGS) of Northwestern/Kellogg Course: "Commercialization in Context: Life Sciences," CBC Short Course: "Preclinical Safety Assessment and Mitigation Strategies in Drug Discovery," 2019 UIC "PDA Career Development Symposium," Halo Cures: "2019 Halo Awards," 2019 CBC's "On the Table Luncheon" and 5 CBC Accelerator Network (CBCAN) meetings were organized and sponsored by CBC.*
- **Achieving a milestone of over 2,500 peer-reviewed scientific articles** published based on CBC-funded research; *in 2019, 209 new publications were reported as attributed to CBC-supported research.*
- Establishment of 6 national research centers at CBC universities; acquisition of state-of-the-art instruments to enable ground-breaking investigations of key biomedical questions and recruitment of 8 outstanding senior and junior faculty members who have gone on to receive numerous national awards.
- Professional development programs for graduate students and postdoctoral fellows; encouragement of a broad array of inter-institutional collaborations, including the Open Access Initiative; mentoring assistance for researchers interested in commercializing discoveries; engagement of biotechnology investors within the CBC community, exemplified by the landmark partnership between Deerfield Management and two of the CBC universities — Northwestern University established Lakeside Discovery in 2018 and the University of Illinois at Chicago launched West Loop Innovations in 2019.

Projects launched by the CBC have gone on to earn well over **\$767.3 million in additional funding**, with a total estimated **economic input exceeding \$2.7 billion** for the Chicago economy overall.

The Searle Funds
at The Chicago Community Trust



Summary of CBC 2019 Award Programs

Accelerator Award Program

The **Accelerator Award** program supports translational research and provides university researchers with early commercial guidance. These awards support the earliest, and therefore highest risk, stage of commercially-directed research focused on the development of a therapeutic or an associated biomarker or diagnostic. The program offers up to **\$250,000** for up to two years of funding. Applicants must be tenured or tenure-track faculty or faculty with full time clinical track appointments with research programs and their own designated laboratory space at one of the three CBC institutions. In 2019, **four new Accelerator Awards** were made (see right) bringing a total of **13 Accelerators** awarded to date. In late 2018, the **CBC Director's Fund (DF) Award of the Accelerator** program was introduced as a corollary of the original program. Eligible applicants of the Accelerator Award program who did not receive the award, can be invited to apply for the DF Award (averaging **~\$30,000**), to address one or more proposal weaknesses, strengthening the project for future funding through CBC or other award/granting agencies. **Eight DF Awards** have been made to date (see pp. 5 and 7 for examples of the DF Awards and outcomes).

Catalyst Award Program

The **Catalyst Award** program supports new inter-institutional cutting-edge biological/biomedical projects that are high-risk/high-reward, innovative and transformative. Catalysts are one-time incentive awards and not intended to support incremental progress, obvious next steps, or NIH ready projects. The program offers up to **\$250,000** for up to two years of funding. Applicants must be tenured or tenure-track faculty at the CBC universities who will initiate a new collaborative research project. Research proposals must have Co-Principal Investigators from at least two of the CBC universities. Catalyst applications are accepted twice a year. In 2019, **seven** new Catalyst Awards were selected for funding (*the three awards with start dates in 2019 are listed to the right; see also p. 6*), resulting in a **total of 98 Catalyst Awards** since the inception of the program in 2006.

Entrepreneurial Fellows Award Program

The **Entrepreneurial Fellows (EF) Award** program supports the professional development of recent biomedical sciences PhD recipients keen to acquire the skills needed to move translational projects from a university lab toward clinical and commercial applications. Fellows receive guidance from a wide range of mentors, including CBC university faculty, staff and technology transfer officers, industry experts and other representatives of the biomedical community. Fellows will have an active and central role in the development, refinement and implementation of CBC-funded awards focused on translational research projects and will support translational projects in the portfolios at the CBC universities. The CBC will support Fellows at each member institution, forming a peer network and community that will provide additional value to the experience. The term of the Fellowship will be 1-2 years, allowing exposure to multiple rounds of translational proposal development and guiding one or more translational program teams through the completion of multiple milestones. In 2019, **two Entrepreneurial Fellows Awards** were made to recent PhD recipients from Johns Hopkins and NU (see right and p. 7).



2019 Accelerator Awards

Steven Ackerman & Vadim Gaponenko (UIC) for the project:

Pre-Clinical Development of a Biased Antagonist of CCR3 for Allergic Diseases

Jeffrey Loeb (UIC) for the project:
A Noninvasive MR Spectroscopic Method to Image the Human Epileptic Brain

William Muller (NU) for the project:
A Drug to Block Ischemia/ Reperfusion Injury Following Myocardial Infarction

Karla Satchell (NU) for the project:
RAS Processing as a Strategy to Reduce RAS-Driven Tumors



2019 Catalyst Awards

Peter Savage (UChicago) & **Nancy Freitag** (UIC) for the project:
Role of Regulatory T Cells in Preventing Autoimmunity During Infection

Demet Araç-Özkan (UChicago) & **Reza Vafabakhsh** (NU) for the project:
Visualizing the Dynamic Process of Activation and Modulation in Adhesion GPCRs

Peggy Mason (UChicago), **Clifton Ragsdale** (UChicago), **Jason McAnany** (UIC) & **Megan Roy-Puckelwartz** (NU) for the project:
Uncovering the Genetic Basis for a Cryptic Pan-Sensory Disorder



2019 Entrepreneurial Fellows

Carissa Heath & Eric Schiffhauer

Top: Arnon Lavie, UIC, founder of *Enzyme By Design* and members of his startup company. Lavie acknowledges the funding and mentoring he received from a 2018 CBC Accelerator Award as a major contributor to the company's success. Middle: Yamuna Krishnan and her team at UChicago, tracking lysosome activity in live cells. Krishnan's 2018 CBC Catalyst Award led to 6 publications in 2019 in high-impact journals, including 2 articles in *Nature Nanotechnology*, 1 in *Nature Methods* and 1 in *Nature Reviews Materials*. Bottom: CBC Entrepreneurial Fellows Carissa Heath & Eric Schiffhauer enjoying the December 2019 CBC Holiday Lunch.

Meet Our 2019 Accelerator Award Recipients

Steven Ackerman and Vadim Gaponenko, UIC

*Recipients of a 2019 CBC Accelerator Award for the project:
“Pre-Clinical Development of a Biased Antagonist of CCR3 for Allergic Diseases”*

Asthma, affecting almost 20 million patients in the USA alone, is a major cause of morbidity and mortality, with considerable healthcare costs. In up to 63% of patients, eosinophils (Eos) play a dominant pathogenic role. The current standard of care is corticosteroids, +/- long-acting β -agonists that temporarily relieve symptoms and airway inflammation, however, corticosteroids' chronic use has considerable deleterious side effects, and ~10-15% patients with severe asthma are corticosteroid-resistant. In eosinophilic asthma, CCR3, a G-protein-coupled receptor (GPCR), which drives Eos recruitment into the lungs and airways leading to pulmonary pathologies, is a validated drug target for allergic inflammation.

The Ackerman and Gaponenko team developed a novel CCR3 antagonist, R321, which selectively inhibits Eos chemotaxis with nanomolar potency without blocking CCR3 internalization/degradation. Intravenous R321 administration blocks Eos recruitment into the blood, lungs and airways in therapeutic and prophylactic acute mouse asthma models, completely blocking airway hyperreactivity. The aim of Ackerman and Gaponenko's Accelerator Award-supported project is to determine whether R321 is therapeutically effective in chronic allergic and severe transgenic mouse models of eosinophilic asthma. The ultimate goal is to assess pre-clinical applicability of R321 towards developing it further as a potential new therapeutic of asthma.

A Director's Fund Award the team received earlier this year helped to enable Accelerator Award and Discovery Partners Institute funding and positioned the project as a finalist for Science2Start-Up competition in Cambridge, MA.



UIC team members, Steve Ackerman, PhD (at the microphone) and his colleague, Vadim Gaponenko, PhD, participating in a CBCAN meeting, held on August 16, 2018, at NU Feinberg Pavilion, where they presented their Letter of Intent as part of the application process to compete for a CBC Accelerator Award.



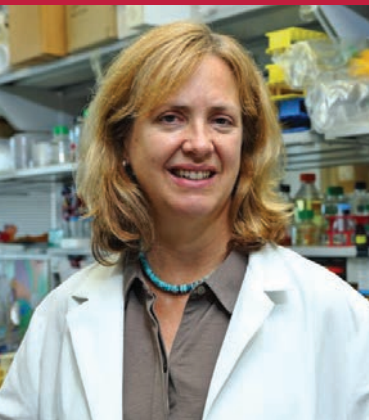
Karla Satchell, NU

*Recipient of a 2019 CBC Accelerator Award for the project:
“RAS Processing as a Strategy to Reduce RAS-Driven Tumors”*

More than 30% of all cancers have a genetic mutation in a gene called RAS. When this gene is modified, it becomes active all the time and sends a constant signal to cells to grow without control. The rapid growing cells become a tumor. Of particular concern, 52% of colon and 98% of pancreatic cancers have RAS mutations. Despite intensive exploration in the academic and private sector, no effective therapy that targets Ras is in use in the clinic and the only molecule in clinical trials specifically targets the G12C mutant of KRas. Satchell discovered a protein that can cleave all forms of Ras in cells, resulting in loss of cell growth. The CBC Accelerator Award will allow her to test if this protein can be an effective therapy against the most untreatable cancers. Satchell's ultimate goal is to advance therapeutic development and provide proof-of-principle pre-clinical evidence that this protein can block tumor growth.

Karla Satchell, PhD, discusses her Accelerator project in front of the ARB members at CBCAN meeting at Prentice Women Hospital, February 8, 2018.

Meet Our 2019 Catalyst Award Recipients

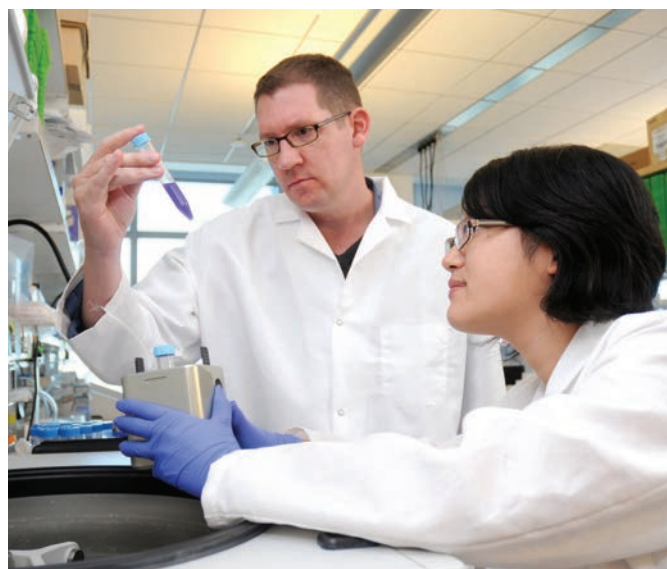


Nancy Freitag (UIC) and Peter Savage (UChicago)

Co-recipients of a 2019 CBC Catalyst Award for the project: "Role of Regulatory T Cells in Preventing Autoimmunity During Infection"

A major unanswered question in immunology lies in understanding how the immune system can mount robust protective responses against foreign pathogens, while limiting collateral damage to self tissues, a property termed "self vs. non-self discrimination." Whereas

classical paradigms suggest that the deletion of self-reactive T cells is a primary mechanism driving this process, mounting evidence suggests that other mechanisms are required. The objective of Savage's and Freitag's Catalyst project is to determine the extent to which regulatory T (Treg) cells, a critical mediator of immune suppression, confer self vs. non-self discrimination. By generating a unique model system in which a natural self-antigen is exclusively expressed by: (1) host mice; (2) the pathogen *Listeria monocytogenes* (Lm); or (3) both host and pathogen, the team will use the Catalyst Award funds to test the hypothesis that Treg cells confer self vs. non-self discrimination by shielding key self-antigens from T cell attack while leaving pathogen-derived antigens unprotected.



Reza Vafabakhsh (NU) and Demet Araç-Özkan (UChicago)

Co-recipients of a 2019 CBC Catalyst Award for the project: "Visualizing the Dynamic Process of Activation and Modulation in Adhesion GPCRs"

Coordination of cellular responses is crucial for development and nearly all aspects of adult physiology. Adhesion G-Protein Coupled Receptors (aGPCRs) are among the key mediators of mechanical cell-cell communication and are implicated in numerous disease processes such as severe developmental defects, cancer and chronic inflammation. aGPCRs make up the second largest family of GPCRs and in spite of their importance as promising drug targets, the mechanism of their activation is poorly understood. In their application for the CBC Catalyst Award, Araç-Özkan and Vafabakhsh proposed to investigate how the conformational changes of the extracellular region (ECR) of aGPCRs directly regulates the signaling

of GPR126 (an aGPCR of biological and medical significance). They will leverage a battery of state-of-the-art approaches, including single molecule Förster resonance energy transfer (smFRET) microscopy, protein engineering and functional assays, to reveal the dynamics of GPR126 activation. Such knowledge could result in the development of selective therapeutics with fewer side effects.



Top: CBC Catalyst Award (2019) recipients Nancy Freitag, PhD (left), UIC, and Peter Savage, PhD, UChicago. Sources: UIC Today and UChicago Medicine, At the Forefront, respectively. Bottom: CBC Catalyst Award (2019) recipients Reza Vafabakhsh, PhD (left), NU, speaking at the 16th CBC Annual Symposium, 2018, and Demet Araç-Özkan, PhD, UChicago. Sources: CBC and UChicago Department of Biophysical Sciences, respectively.

Meet Our EFs and DF Award Recipients



Carissa Heath and Eric Schiffhauer (CBC-EFs)

Recipients of the 2019 CBC Entrepreneurial Fellows Awards

Eric Schiffhauer was named the **inaugural Entrepreneurial Fellow (EF) Award** in March 2019. He received his PhD in Biochemistry, Cellular, and Molecular Biology from The Johns Hopkins University School of Medicine under the mentorship of Douglas Robinson, PhD. Eric's dissertation research provided valuable drug discovery experience in the cancer field. While at Johns Hopkins, Eric gained experience at the Technology Ventures office, evaluating new technology disclosures from faculty members for patentability and commercial potential. He co-founded *CordeRx*, a company in the area of adoptive cell immunotherapy and developed multiple skills in the biotech startup field. Additionally, Eric was a member at The Johns Hopkins Biotechnology Investment Group and organized an Equity Research and Stock Pitch Competition in collaboration with national asset management firms.



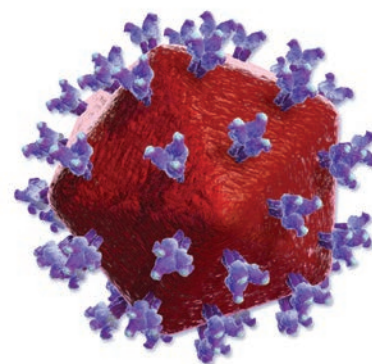
Carissa Heath, received the **second CBC EF Award** in October 2019. She received her PhD in Interdisciplinary Biological Sciences from Northwestern University under the mentorship of Sadie Wignall, PhD, in the Department of Molecular Biosciences. Carissa's thesis research focused on chromosome movement and anaphase spindle structure in oocyte meiosis. While pursuing her PhD, Carissa completed the Management for Scientist and Engineers (MSE) certificate program at Kellogg, a program designed to equip doctoral students with the necessary business and leadership skills to manage and lead teams associated with the commercialization of research. She also participated in the INVO Practicum, strengthening her understanding of commercialization, marketing, intellectual property and how the translation of cutting-edge scientific research can improve human health through entrepreneurship.

Both Eric and Carissa have been working closely with Jim Audia, the former CBC Executive Director, partners in INVO and CBC faculty across the city. They play a central role in the development, refinement and implementation of CBC-funded awards focused on translational biomedical research that has therapeutic and commercial potential.

Jonathan Leis and Chi-Hau Luan (NU)

Co-recipients of a 2019 CBC Director's Fund Award for the project: "Synthesis of a Matrix/Library of Small Molecule Viral Budding Inhibitors"

Enveloped viruses (e.g., Influenza, Hepatitis C, HIV, Zika and the currently infamous coronavirus) possess an outer layer—the envelope—which is typically derived from portions of the host cell membranes when the viruses shed off the infected cell by a process known as “budding.” Leis and Luan established that “budding” can be used as a natural target to control virus release and hence stop the infection from spreading. They also identified and characterized the mechanism of action of a class of small molecule inhibitors that disrupt “budding.” As there are no therapies to date that target this crucial process, these are first-in-class drugs potentially applicable to treating infections caused by a myriad of enveloped viruses, e.g., AIDS. The drugs have the potential to be much less susceptible to the development of drug resistant viruses and may promote more efficient removal of virus-infected cells because particles accumulate on the cell surface.



Human Immunodeficiency Virus (HIV)

In their application for a CBC Director's Fund Award, Leis and Luan, with the help of Jim Audia, then CBC's Executive Director, designed a focused library of compounds to be used in the development of the novel small molecule viral budding inhibitors. The team proposed to outsource the synthesis of the library to a Contract Research Organization, WuXi, and to subsequently screen the compounds to identify more potent analogs against the target. Determining the best compound lead would allow the team to strengthen future proposals for their research funding and bring them closer to an important proof-of-concept study blocking viral infection in rodents. If successful, Leis's and Luan's discovery could have broad public health implications in reducing spread of viral infections.

2019 "at-a-glance"

JANUARY



CBC's Nancy Tyrrell moderates BioPathways Event "2019 JP Morgan Outlook: Challenges for Women in Biotech."

FEBRUARY



CBC hosts Info Session for a Spring course "TGS518 Commercialization in Context: Life Sciences" open to graduate students from the three CBC universities.

MARCH



Round 3 Accelerator Award applicants present their projects at a CBCAN meeting held at NMH Feinberg Pavilion.

APRIL



CBC's Karen Snapp at Pre-clinical Imaging Consortium; Dr. Norman teaches CBC's course on "Preclinical Safety Assessment and Mitigation Strategies in Drug Discovery."

MAY



CBC hosts an "On the Table" luncheon in downtown Chicago at *The Grill on the Alley*, with a focus on creating a *Memo to the Mayor*.

JUNE



Students and professionals pack the room for Joe Moskal's "Fireside Chat" at a CBCAN held at NMH, Feinberg Pavilion.

JULY



CBC Executive Director, Jim Audia, among 8 high-ranking US academic representatives invited to visit Austria as part of the US Marshall delegation.

AUGUST



Mike Johnson, UIC and Bob Daum, UChicago, publish Catalyst Award-supported research on MRSA; CBC-funded research resulted in 209 articles in 2019.

SEPTEMBER



CBC Provosts announce that CBC Scientific Director for NU, Rick Morimoto, will take over for Jim Audia as CBC interim Executive Director effective Nov 1.

OCTOBER



Carissa Heath joins Eric Schiffhauer as the second CBC Entrepreneurial Fellow; Eric became the first CBC Entrepreneurial Fellow in April 2019.

NOVEMBER



In its Winter 2019 Newsletter, CBC announces the 17th Annual CBC Symposium: "Epigenetics and Disease," Save the date: Friday, October 30, 2020.

DECEMBER



CBC Accelerator Awardee Presentations: "Progress to Date & Pitch for Year 2 funding" at the 5th 2019 CBCAN, held at the Discovery Partners Institute.