Delivering solutions to important health issues and improving the quality of life of Canadians through glycomics

2015 ANNUAL REPORT

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MESSAGE FROM THE CHAIR OF THE BOARD OF DIRECTORS

As the chair of the Board of Directors, I am pleased to share my comments for GlycoNet’s first annual report, highlighting the network’s many successes and milestones since its inception. The Canadian Glycomics Network links, for the first time, the glycomics research community across Canada, including members of academia, industry and government, in an exciting partnership. With more than 60 researchers at 22 member institutions and more than 30 partners across sectors, our aim is to collaborate from coast to coast to catalyze new glycomics-based solutions to unmet health challenges.

GlycoNet has a bold vision. We are seeking nothing short of delivering new treatments for important health issues to improve the quality of life of Canadians – all through glycomics. Canada has been an international leader in this field for decades, but it is through GlycoNet that we will capitalize on this expertise for the benefit of Canada. Not only will we drive innovative research through the funding and support of network projects, but we will also work to attract investment in Canadian research, foster the formation and incubation of spin-out companies from GlycoNet projects, and ultimately accelerate the commercial advance of new therapies to treat disease.

One of GlycoNet’s major achievements this year was the implementation of strong leadership at the board and management levels. The network has been extremely fortunate to attract exceptional individuals into key governance and operating roles to ensure we focus on delivering our mandate in the coming years. Our Board of Directors comprises some of Canada’s foremost leaders in biotechnology, and includes: Dr. Karimah Es Sabar, President and CEO of the Centre for Drug Research and Development; Sanofi Pasteur President Mark Lievonen; and international leaders in such fields as health policy, corporate finance, and pharmaceuticals. The expertise of these individuals is crucial in guiding the activities of GlycoNet. The Research Management Committee and Scientific Advisory Board have also been assembled with experts drawn from academia and industry in the United States and Canada. The responsibility of these critical governance structures is to provide necessary guidance on Network strategies, foster collaboration and partnership, and support the translation of research.
GlycoNet has made similar progress in building a superb and experienced management team under the leadership of the Scientific Director, Dr. Todd Lowary, including Associate Scientific Director Dr. Stephen Withers, Executive Director Dr. Elizabeth Nanak, and four administrative staff members. Collectively the experience of the team is expansive and will ensure the continued success of network operations.

As partnership and collaboration is a key component of GlycoNet, we also initiated discussions at the board level on strategies for strengthening network partnerships, and plan to have a partnering strategy in place in the coming year. GlycoNet leadership has continued discussions with partners in the area of High Throughput Screening and with the Centre for Mathematics, Science and Technology Education (CMASTE). We also have many project-specific partnerships in development, and these partners have been engaged in the development of proposals.

GlycoNet’s first year has been both busy and productive. I offer my congratulations to all involved in the network – you have contributed greatly to our achievements thus far, paving the way for a promising future. I note just a few of our successes, and I invite you to peruse this report for the full story of our past milestones and future objectives. Together, we will ensure that GlycoNet has national and international impacts, ultimately enhancing the quality of life of people around the world and improving human health.

"Together, we will ensure that GlycoNet has national and international impacts, ultimately enhancing the quality of life of people around the world and improving human health."

Frank Gleeson
Chair, Board of Directors
The launch of the Canadian Glycomics Network marks an exciting milestone for the field of glycomics in Canada. GlycoNet is a pan-Canadian research network, bringing together partners from academia, government and industry, with the shared vision of developing solutions to unmet human health needs and improving the quality of life of Canadians through the study of glycomics.

The need for GlycoNet is abundantly clear. Total health care spending in Canada reached $211 billion in 2013, according to the Canadian Institute for Health Information. All signs indicate that this number will only grow in the future. Incidences of cardiovascular disease, stroke, and other age-related diseases are steadily increasing. The emergence of drug-resistant infections poses an imminent threat, with many predicting we are on the brink of a post-antibiotic era. All told, the challenges in human health are real and tackling diseases where current treatments are failing, or where solutions do not yet exist, requires a novel approach.

Glycomics offers that novel approach, and is recognized as one of the most promising emerging fields in human health. Glycomics is the study of carbohydrates (sugars or glycans) in biological systems. Sugars play a pivotal role in virtually all biological processes, and so increased understanding in this area has the potential to unlock solutions to a host of human health issues, from genetic disorders to diseases caused by pathogens.

In fact, decades of basic research on the role of carbohydrates in biological systems have underpinned several recent commercial breakthroughs, with the successful commercialization of carbohydrate-based drugs including Tamiflu (an anti-influenza drug), Cerezyme (a treatment for Gaucher disease) and Precose (used to treat diabetes). GlycoNet intends to drive further commercial successes, through supporting Canada’s experts in the field.
Canada has been an international leader in the field of glycomics for more than 50 years. Now, with the establishment of GlycoNet, we will capitalize on this knowledge, bringing together an interdisciplinary group of more than 60 researchers at 22 institutions, whose collective expertise in this field is unrivalled.

GlycoNet commenced operations in early 2015 and our first few months have been spent laying the groundwork for future success. GlycoNet has incorporated, assembled the Board of Directors, Research Management Committee and Scientific Advisory Board, and has hired several administrative staff members to support its activities. We expect to see the achievement of research accomplishments over the coming year, with the release of research funding, as well as the implementation of training and partnering strategies.

GlycoNet’s objectives and structure, goals for the future, and key achievements to date will be summarized over the following pages. A financial overview, list of board members, partners, network investigators, and staff biographies can be found in the appendices.

It is my pleasure to present GlycoNet’s first annual report and I hope you find the information on the following pages enlightening and exciting. We hope that you will follow us as we continue to build upon Canada’s international leadership in the field of glycomics and work towards creating a healthier future for Canadians.

Dr. Todd L. Lowary
Scientific Director
who we are

60 principal investigators

22 post-secondary institutions

32 network partners across sectors

8 international partners

$38 million in total funding
The Canadian Glycomics Network (GlycoNet) is a national research network linking the glycomics research community across Canada, including 22 network institutions, as well as collaborators from industry and government.

GlycoNet was incorporated in February 2015 and is funded by the Government of Canada through the Networks of Centres of Excellence program. GlycoNet also receives funding from Alberta Innovates – Technology Futures, the University of Alberta and other partners.

**What is glycomics?**

*Glycomics is the study of carbohydrates or sugars in biological systems. Carbohydrate chains, or glycans, are found in the cell membrane of every living cell and are key to almost every biological process. It is a field that is experiencing an explosion of activity, with the recognition that there are many ways scientists can utilize carbohydrates to improve human health.*
Network Structure

GlycoNet is incorporated as a not-for-profit entity with its administrative office at the University of Alberta. Our management and governance structure is an effective, accountable framework to support and achieve the network objectives.
Vision

The vision of GlycoNet is to deliver solutions to important health issues and improve the quality of life of Canadians through glycomics.

Mission

The mission of GlycoNet is to:

1. Ensure that the network and Canada are **internationally recognized as the leader** in glycomics research

2. **Deliver exceptional training** in glycomics research and entrepreneurship

3. **Bridge the translation gap** between research and industry

4. Translate research advances into **tangible benefits for Canadians**

Minister Rona Ambrose (third from left) at the GlycoNet network announcement in February 2015
Objectives
FOR THE NEXT FIVE YEARS

1. Achieve innovative multidisciplinary research excellence in glycomics, with a particular emphasis on human health, to advance Canadian health care and the biotechnology and pharmaceutical industries in Canada.

2. Develop core services in glycan screening, complex glycan structure analysis, glycan synthesis, and high-throughput screening, for use by GlycoNet researchers and industry partners.

3. Establish a Canada-wide curriculum for training in glycomics, which will be viewed as the international gold standard.

4. Foster strategic partnerships with biotech and pharmaceutical companies to accelerate and power translational research.
5. **Stimulate new ventures** created through GlycoNet and a new generation of entrepreneurs to benefit Canadian industry

6. **Provide unified Canadian leadership and vision** in international glycomics research initiatives

7. Cultivate the maturation of GlycoNet into the **one-stop global destination for academic and industry organizations** that seek solutions to problems through applied glycomics research
Engaging in cutting-edge research to improve human health

Glycomics is a multidisciplinary field with broad potential applications. GlycoNet’s research program focuses primarily on applications in human health and is based on five synergistic themes: antimicrobials, rare genetic diseases, diabetes and obesity, chronic diseases and therapeutic proteins and vaccines.
During the course of the coming year, the first full year of GlycoNet’s operation, we will ramp up research activities within each of these themes.

**Antimicrobials**

Resistance to antimicrobials has shot up in the last decade and development of new antimicrobials continues to fall. Many, including the Centers for Disease Control in the United States, predict that we stand on the brink of a post-antibiotic era and that we will soon lack the necessary tools to treat bacterial and fungal infections. Carbohydrates play vital roles in many fungal and bacterial virulence processes. They are critical components of the cell wall—an antimicrobial target that is absent from human cells—and are key elements in adherence, immune evasion and antimicrobial resistance. Research in the field of glycomics has already validated attractive drug targets and we are poised to make further significant contributions in developing novel antimicrobial agents.

**Rare Genetic Diseases**

Glycomics presents an opportunity to develop novel treatments for rare genetic diseases that arise from deficiencies in sugar metabolism, such as Gaucher’s disease and Fabry’s disease. Understanding the biochemical and molecular basis of single gene disorders has led to therapeutic strategies for rare diseases and a realization that development of many common disorders involves altered molecular pathways identified in many rare diseases. Developing therapies for rare diseases thus potentially impacts common disorders.

**THEME LEADER**

Dr. Lorne A. Clarke, University of British Columbia

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**THEME LEADERS**

Dr. Eric Brown, McMaster University
Dr. Donald Sheppard, McGill University
Diabetes and Obesity

Most human energy and nutrition supply comes from breaking down carbohydrates. Glucose released by these processes is critical for human development, particularly the brain, and for maintaining health. Many serious clinical conditions can be traced to or be treated by regulating this glucose release, such as diabetes, nutritional disorders and certain types of obesity. This theme investigates the major mechanisms in the human breakdown of nutritional carbohydrates, by host human enzymes and those from the resident microbiome. These enzyme systems together are thought to be chiefly responsible for the metabolic activity that forms glycogen—energy stores—from nutritional sources. Regulating their activities offers a means to treat associated clinical conditions.

THEME LEADER
Dr. David Rose, University of Waterloo

Chronic Diseases

For decades we have known that an enzymatic process called glycosylation is abnormal in cancerous cells and other diseased human tissues, yet therapeutic strategies addressing this biochemical change have remained elusive. An attempt to modify the glycosylation process has become a new target for therapeutics.

This theme will address a range of targets for human health by applying knowledge gained in glycomics over the last decade, with the aim to bridge the gap between fundamental advances and therapeutic applications in cancer, inflammation and cardiovascular disease.

THEME LEADER
Dr. Christopher W. Cairo, University of Alberta
Therapeutic Proteins and Vaccines

Glycoconjugates—glycans linked with proteins, lipids, or other molecules—are a crucial component of many therapeutics, including protein-based drugs and vaccines targeting microbial pathogens. The innate immune system detects proteins and pathogens via their non-host surface glycans, leading to the activation of an immune response and a clearance of these molecules from the body. In this theme we will advance approaches in this area to develop new therapeutic proteins and vaccines for a host of conditions.

THEME LEADER
Dr. Warren Wakarchuk, Ryerson University

In addition, GlycoNet will offer a set of four core service facilities for researchers: high-throughput screening, glycan screening, glycan structure analysis and chemical synthesis.

These core services will be invaluable to advancing the work of GlycoNet investigators and will serve as a magnet for industry partners seeking to undertake applied research in glycomics.
Fostering the next generation

The Canadian glycomics community is built upon more than 50 years of outstanding training of highly qualified personnel. Pioneers in the field began their careers in the 1950s and 1960s, training scientists who led groups across Canada in the subsequent decades. A third and fourth generation of Canadian-trained glycomics scientists are now carrying out groundbreaking research in glycomics and are leading GlycoNet.
GlycoNet is committed to an excellent training program. The fundamental goal of GlycoNet training activities is to provide trainees with a broadly-based skill set for successful careers in academia as well as in the pharmaceutical and biotech industries.

**GLYCONET TRAINING INITIATIVES INCLUDE:**

**Course Materials**
The development of new glycomics course materials, including a Canada-wide glycomics curriculum for use in undergraduate and graduate education, and an outreach program that will bring GlycoNet research into high school classrooms.

**Professional Development**
Professional development opportunities for trainees, particularly in technology transfer, entrepreneurship and project management, as well as in ‘soft skills’ such as communication and networking.

**Research Training**
The opportunity for multidisciplinary research training between groups, including lab exchanges and industrial internships available to trainees.

**Technology Workshops**
The opportunity for trainees to attend specialized workshops on technologies developed by various GlycoNet research groups.
Building connections that grow our knowledge base

The majority of research projects supported by GlycoNet will ultimately have commercial applications, and thus GlycoNet is committed to a partnering strategy that bridges the gap between academia and industry in an effort to accelerate research into tangible benefits.
GlycoNet is committed to developing partnerships, with the ultimate goal of accelerating research and fostering business development.

The Commercialization Committee will catalyze the integration of new partners into the network by engaging in business development activities, including the provision of promotional materials and assistance in formalizing agreements. The Commercialization Committee will also develop a formal partnership strategy to expand partnering initiatives.

GLYCONET PARTNERSHIP INITIATIVES INCLUDE:

Outreach
Attend relevant trade shows to initiate outreach and highlight GlycoNet and its research programs.

Business Intelligence
Gather detailed business intelligence relevant to network projects and follow up with partners of potential interest.

Networking
Invite potential new partners to the GlycoNet annual general meeting to learn about research activities.

Brainstorming Sessions
Host formal brainstorming sessions with industry, clinicians, partners and other potential end users of GlycoNet research.
Accelerating research into commercial advances

GlycoNet is committed to solving important health challenges by advancing knowledge that supports intellectual property of commercial value and to accelerating this process through our core services. The multinational structure of the pharmaceutical industry, with many major players based abroad, is not always conducive to retaining value created by Canadian researchers. GlycoNet will implement strategies to translate the competitive advantage of strong Canadian glycomics research into economic gains, contributing to the Canadian economic base.
GlycoNet’s Knowledge And Technology Exchange And Exploitation (KTEE) strategy is framed by four drivers, identified in the Canadian Institutes of Health Research commercialization and innovation strategy.

For all research discoveries, we seek an appropriate balance between publication to freely share results and IP protection. GlycoNet will collaborate with the technology transfer offices of associated research institutions on IP protection and prosecution, and will play an active role in IP protection, including financial support of patent filings.

Research Excellence
Identify research gaps and opportunities and launch strategic initiatives with commercial relevance.

Establish Linkages
Engage and partner with industry, and expand stakeholder participation in research process.

Cultivate Talent
Offer professional development workshops required for a successful career in industry and academia.

Furnish Capital
Provide funding initiatives that target different life stages and aspects of research projects, and facilitate creation of startups.
Laying the groundwork for success

The start-up phase of GlycoNet has been crucial in laying the groundwork for success moving forward. We have already achieved major milestones that have promising implications for the future.
Excellence in Governance

GlycoNet has implemented network governance and management structures, including the assembly of the Board of Directors. The GlycoNet Board of Directors is comprised of some of Canada’s foremost leaders in biotechnology, as well as leaders in health policy, corporate finance and pharmaceuticals. The expertise of these individuals will be invaluable moving forward.

We have also assembled the Research Management Committee and Scientific Advisory Board, comprised of experts in academia and industry from the United States and Canada. These individuals will play a crucial role in awarding research funds to GlycoNet projects.

GlycoNet has also made significant progress in assembling a management and administrative team, under the direction of Scientific Director Dr. Todd Lowary. Dr. Stephen Withers, a professor of Chemistry at the University of British Columbia and former Scientific Director of the Protein Engineering Network, has been named Associate Scientific Director. Dr. Elizabeth Nanak has assumed the role of Executive Director, having served as the Associate Director, Business for the Alberta Glycomics Centre from 2007-2015. Individuals were recruited for the positions of financial administrator, communications associate, training coordinator, and administrative assistant. The administrative team will be responsible for running the day-to-day operations of GlycoNet, and will be key to the success of the network. A full list of GlycoNet committees and members, as well as staff biographies, are located in Appendix A and B.
Implementation of Agreements

GlycoNet has successfully incorporated and executed the funding and host agreements in March 2015. The network agreement was signed by members and fully executed in July 2015.

Building Research Excellence & Networking

The research program was developed and refined with five theme meetings held in February 2015, which brought together network investigators to discuss how the impact of the network could be maximized by expanding the projects described in our application. We also met with several partners to develop GlycoNet core services and training initiatives.

Increase GlycoNet Visibility

An official funding announcement was made in February 2015, with the participation of Minister of Health Rona Ambrose and Canadian Institutes of Health Research President Alain Beaudet. This announcement garnered significant media coverage locally and nationally. The network also planned and hosted an official launch event, held in April 2015 and hosted by Jay Ingram, former host of Quirks and Quarks and Discovery Channel’s Daily Planet. The GlycoNet website was launched with the network announcement and will continue to evolve.
2014-2015
Achievement Timeline

October 2014 – Scientific Director informed
GlycoNet selected for funding

December 2014
- Meeting of the application steering committee with Chair of Board of Directors

February 2015
- Five theme meetings held in Toronto and Vancouver
- GlycoNet website launched
- Network officially incorporated
- Draft network agreement sent to members for feedback
- Official announcement of GlycoNet funding by Minister Rona Ambrose

March 2015
- Recruitment of administrative staff
- Received first tranche of NCE funding
- Host agreement executed
- Official launch event, hosted by Jay Ingram
- GlycoNet funding agreement executed

April 2015
- Deadline for first call for project proposals

June 2015
- Inaugural meeting of the Board of Directors

July 2015
- Call for proposals for second round of funding
- Network agreement executed
- Announcement of successful projects
- Network agreement executed
- Inaugural meeting of the Board of Directors
- Announcement of successful projects
- Call for proposals for second round of funding
- Network agreement executed

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Operational Plan

Excellence in Governance & Management

- Revise the five-year strategic plan, prioritize goals and assess the network’s needs to achieve them
- Recruit additional staff and board and committee members; complete all necessary agreements

Research Excellence

- Fund the most promising projects and provide project management support; facilitate partnerships to ensure their success
- Develop calls for new proposals to build the network’s portfolio by adding early- and late-stage projects

Developing Tomorrow’s Glycomics Leaders

- Develop trainees’ interdisciplinary knowledge and skills through online learning resources, internships, and workshops
- Foster ongoing professional development through workshops, networking events and the Annual General Meeting

Strengthening Partnerships

- Formalize existing partnerships
- Engage industry and other stakeholders and develop a partnership strategic plan

Accelerating Knowledge Transfer

- Develop and implement processes to identify and protect newly generated IP and to assess their market potential
- Identify projects with high commercial potential, perform market intelligence and find industrial partners

Increasing Visibility and Outreach

- Promote network activities through website, social media and events
- Engage high school students with glycomics course materials
CONCLUSION

Driving Canada’s continued leadership in the field of glycomics

The disbursement of the first round of research funding will allow investigators to begin working towards our vision of improved health outcomes through the study of glycomics. In the coming year, we will also request proposals for additional grants, and expand the number of researchers and trainees involved in the network. We will begin to implement our training initiatives, and work on developing and implementing a robust strategy for networking and partnership. We will promote and publicize the network, and work to educate partners and society about the field of glycomics.

We have much work ahead of us, but we are confident that GlycoNet will make breakthroughs in human health, building on Canada’s longstanding expertise in glycomics. We are committed to our vision and look forward to driving Canada’s continued leadership in the field of glycomics.
APPENDIX A: BOARDS & COMMITTEES

Board of Directors

- Mr. Frank Gleeson, President, Gleeson & Associates (Chair)
- Dr. Lorne Babiuk, Vice-President, Research, University of Alberta
- Dr. Don Back, Vice-President, Alberta Innovates - Technology Futures
- Dr. Armand Balboni, Partner and Managing Director of Investment Banking, Bloom Burton and Company
- Dr. Timothy Caulfield, Professor, University of Alberta
- Dr. Karimah Es Sabar, President and CEO, Centre for Drug Research and Development
- Mr. Joseph Garcia, Partner, Blake, Cassels & Graydon LLP
- Dr. Digvir Jayas, Vice-President, Research and International, University of Manitoba
- Dr. Joy Johnson, Vice-President, Research, Simon Fraser University
- Mr. Mark Lievonen, President, Sanofi Pasteur Limited
- Mr. Michael Lorimer, Managing Director, Euro Pacific Canada
- Dr. Todd Lowary, Scientific Director & Professor, Canadian Glycomics Network (GlycoNet)
- Dr. Mark Nitz, Professor, University of Toronto
- Mr. Stewart Roth, Chair, Alberta Glycomics Centre
- Dr. Michael Rudnicki, Scientific Director, Canadian Stem Cell Network
- Dr. Elizabeth Nanak, Executive Director, Canadian Glycomics Network (GlycoNet) (observer)
- Mr. Richard Schwartzburg, Senior Program Manager, Networks of Centres of Excellence (observer)

Research Management Committee

- Dr. Todd Lowary, Scientific Director & Professor, Canadian Glycomics Network (GlycoNet) (Chair)
- Dr. Armand Balboni, Partner and Managing Director of Investment Banking, Bloom Burton and Company
- Dr. Yvan Guindon, Professor, Institut de Recherches Cliniques
- Dr. Vern Schramm, Professor & Ruth Merns Chair in Biochemistry, Albert Einstein College of Medicine of Yeshiva University
- Dr. Donald Vinh, MD, Research Institute of the McGill University Health Centre
- Dr. Chris Whitfield, Professor, University of Guelph
- Dr. Stephen Withers, Associate Scientific Director, Canadian Glycomics Network
- Dr. Steven Xanthoudakis, Director, Merck Research Lab
- Mr. Frank Gleeson, President, Gleeson & Associates (observer)
- Dr. Elizabeth Nanak, Executive Director, Canadian Glycomics Network (observer)
- Mr. Richard Schwartzburg, Senior Program Manager, Networks of Centres of Excellence (observer)

Scientific Advisory Board

- Dr. James Paulson, Acting President, Scripps Research Institute (Chair)
- Dr. Lai-Xi Wang, Professor, University of Maryland
- Dr. Jacquelyn Gerbey Hague, Professor, Department of Chemistry, University of California, Davis
- Dr. Robert Young, Professor, Department of Chemistry, Simon Fraser University
- Dr. Jeffrey Gildersleeve, Head, Chemical Glycobiology Section, Chemical Biology Laboratory, National Cancer Institute
- Dr. Linda Hsieh-Wilson, Professor of Chemistry and Howard Hughes Medical Institute Investigator, California Institute of Technology
- Dr. William Pavliak, Associate Director of Analytical Development, Vaccine Research, Pfizer
- Dr. Todd Lowary, Scientific Director & Professor, Canadian Glycomics Network (GlycoNet) (observer)
APPENDIX B: ADMINISTRATIVE STAFF BIOGRAPHIES

Dr. Todd L. Lowary, Scientific Director
Dr. Todd Lowary is the Scientific Director of GlycoNet. Todd Lowary received his B.A. in Chemistry from the University of Montana in 1988 and his Ph.D. in Organic Chemistry under the supervision of Professor Ole Hindsgaul at the University of Alberta in 1993. Subsequent postdoctoral research appointments were with Professor David R. Bundle at the University of Alberta (1993–1995), and Dr. Morten Meldal at the Carlsberg Laboratory in Copenhagen, Denmark (1995–1996). In 1996, he took a position in the Department of Chemistry at The Ohio State University as an Assistant Professor and in 2002 was promoted to Associate Professor with tenure. He returned to the University of Alberta in 2003, where he currently is a Professor in the Department of Chemistry. Group research interests are focused in the areas of carbohydrate chemistry and biochemistry, in particular as these fields relate to bacterial glycans. For several years, the group has carried out studies on the synthesis, conformation and biochemistry of furanoside-containing glycans from mycobacteria, including Mycobacterium tuberculosis, the organism that causes tuberculosis. More recently, work has focused on a program on synthesizing glycans from Campylobacter jejuni, a gut pathogen that produces carbohydrates with a wide degree of structural diversity. Recognitions include an EWR Steacie Memorial Fellowship and the Bernard Belleau Award from the Canadian Society for Chemistry (CSC). In 2011 he and four colleagues were co-recipients of the Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering from NSERC. He is the former Director of the Alberta Glycomics Centre and was recently awarded a Tier One Canada Research Chair in carbohydrate chemistry.

Dr. Elizabeth Nanak, Executive Director
Dr. Elizabeth Nanak is the Network’s Executive Director. Dr. Nanak was involved in the GlycoNet initiative since the Letter of Intent stage and served as the Associate Director, Business for the Alberta Glycomics Centre from 2007–2015. Prior to her position with the Centre, she worked as a manager of large-scale and multi-institutional projects with Genome Prairie. In addition to her PhD in biochemistry, Elizabeth has an MBA in biotechnology management.

Alexandria Daum, Communications Associate
Alexandria Daum is the Communications Associate for GlycoNet. She is responsible for all internal and external communications of the Network, including the management of events such as the AGM and Symposium, development of press releases and promotional materials, website updates and maintenance and social media. Alexandria has a background in communications and journalism, having previously worked for Peace Library System, the Faculty of Agricultural, Life and Environmental Sciences at the University of Alberta, and Venture Publishing.
APPENDIX B: ADMINISTRATIVE STAFF BIOGRAPHIES CONTINUED

Jennifer Hicks, Administrative Assistant

Jennifer Hicks is the Network Administrative Assistant. She is the point of contact for reimbursements, travel and accommodation bookings, and is responsible for the organization of GlycoNet boards and committees meetings and events. Jennifer comes to us from the Northern Alberta Institute of Technology where she had a similar position.

Heather Ross, Financial Administrator

Heather Ross is the Network’s Financial Administrator. When funds are released to investigators Heather will be in touch about getting the appropriate transfers in place and also making sure that financial reports are received back from the relevant institutions. She is also the point of contact for all financial matters aside from reimbursements. Heather has been the Financial Administrator for the Alberta Glycomics Centre for the past four years. Before that, she worked as a financial assistant for Goodwill, a not-for-profit corporation.

Ryan Snitynsky, Training Coordinator

Ryan Snitynsky is the Network Training Coordinator. Ryan received undergraduate training in chemistry and education at the University of Saskatchewan, followed by graduate training in carbohydrate chemistry at the University of Alberta. He has worked for numerous educational institutions in Saskatchewan and Alberta, and will draw upon this experience to facilitate the creation of the GlycoNet training program.
APPENDIX C: NETWORK COMMUNITY

Participating Institutions
- Dalhousie University
- Institut de recherches cliniques de Montréal
- McMaster University
- Queen’s University
- Ryerson University
- SickKids Research Institute
- Simon Fraser University
- Université Laval
- Université de Montréal
- Université du Québec à Montréal
- University of Alberta
- University of British Columbia
- University of Calgary
- University of Guelph
- University of Manitoba
- University of Ottawa
- University of Saskatchewan
- University of Toronto
- University of Victoria
- University of Waterloo
- Wilfrid Laurier University

Training Partners
- Mitacs
- Gowlings
- Centre for Mathematics, Science & Technology Education

Project Partners
- Agriculture & Agri-Food Canada
- Alberta Chicken Producers
- Alectos Therapeutics
- Canadian National Transplant Research Program
- The Hospital for Sick Children (SickKids)
- McGill University
- Montbretin Therapeutics
- PlantForm
- Seneb Biosciences
- Simon Fraser University
- The Structural Genomics Consortium
- TRIUMF
- Univalor
- University of Toronto

Foundational Partners
- University of Alberta
- Alberta Glycomics Centre
- Alberta Innovates - Technology Futures
- National Research Council
- The Centre for Drug Research & Development
- The McMaster High Throughput Screening Lab
- The SPARC BioCentre

Research Consortia Partners
- Centre de Recherches sur les Macromolécules Végétales (CERMAV, France)
- The Glycomimetics Lead Factory (GLF, Europe)
- IBCarb – Glycoscience Tools for Biotechnology & Bioenergy (UK)
- Institute for Glycomics (Australia)
- The Japan Consortium for Glycobiology & Glycotechnology (Japan)
- The Max Planck Institute for Colloids & Surfaces, Department of Biomolecular Systems (Germany)
- The National Center for Functional Glycomics (US)
- The Taiwan GlycoForum (Taiwan)
APPENDIX D: NETWORK RESEARCHERS

- Glen Armstrong, University of Calgary
- France-Isabelle Auzanneau, University of Guelph
- Robert Ben, University of Ottawa
- Andrew Bennet, Simon Fraser University
- Joerg Bohlmann, University of British Columbia
- Alisdair Boraston, University of Victoria
- Gary Brayer, University of British Columbia
- Inka Brockhausen, Queen’s University
- Eric Brown, McMaster University
- Harry Brumer, University of British Columbia
- Jillian Buriaik, University of Alberta
- Lori Burrows, McMaster University
- Christopher Cairo, University of Alberta
- Robert Campbell, University of Alberta
- Anthony Clarke, University of Guelph
- Lorne A. Clarke, University of British Columbia
- Ratmir Derda, University of Alberta
- Yvan Guindon, Institut de Recherches Cliniques
- Dennis Hall, University of Alberta
- Lynne Howell, University of Toronto
- David Jakeman, Dalhousie University
- Michael James, University of Alberta
- Allison Kermode, Simon Fraser University
- Matthew Kimber, University of Guelph
- John Klassen, University of Alberta
- Joseph Lam, University of Guelph
- Chang-Chun Ling, University of Calgary
- Todd Lowary, University of Alberta
- Mark MacLachlan, University of British Columbia
- Roman Melnyk, The Hospital for Sick Children
- Mario Monteiro, University of Guelph
- Neeloffer Mookherjee, University of Manitoba
- Margo Moore, Simon Fraser University
- Kenneth Ng, University of Calgary
- Mark Nitz, University of Toronto
- David Palmer, University of Saskatchewan
- Alexey Pshezhetsky, Université de Montréal
- James Rini, University of Toronto
- David Rose, University of Waterloo
- Rene Roy, Université du Québec à Montréal
- David Sanders, University of Saskatchewan
- Sachiko Sato, Laval University
- Paul Schaffer, University of British Columbia
- Frank Schweizer, University of Manitoba
- Donald Sheppard, McGill University
- Brian Shoichet, University of Toronto
- Steven Smith, Queen’s University
- Vesna Sossi, University of British Columbia
- Natalie Strynadka, University of British Columbia
- Bingyun Sun, Simon Fraser University
- Christine Szymbanski, University of Alberta
- Richard Uwiera, University of Alberta
- David Vocadlo, Simon Fraser University
- Warren Wakarchuk, Ryerson University
- Joel Weadge, Wilfrid Laurier University
- Frederick West, University of Alberta
- Lori West, University of Alberta
- Christopher Whitfield, University of Guelph
- Stephen Withers, University of British Columbia
- Gerard Wright, McMaster University
- George Zhanel, University of Manitoba
APPENDIX E: FINANCIAL STATEMENTS

Canadian Glycomics Network

From commencement of operations on February 4, 2015 to March 31, 2015

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Independent Auditor’s Report

To the Board of Directors of the
Canadian Glycomics Network

We have audited the accompanying financial statements of the Canadian Glycomics Network, which comprise the statement of financial position as at March 31, 2015 and the statements of operations, changes in net assets, and cash flows for the period from commencement of operations on February 4, 2015 to March 31, 2015 and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Financial Statements
Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility
Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the organization's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the organization's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.
We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

**Opinion**
In our opinion, the financial statements present fairly, in all material respects, the financial position of the Canadian Glycomics Network as at March 31, 2015 and the results of its operations, and cash flows for the period from commencement of operations on February 4, 2015 to March 31, 2015 in accordance with Canadian accounting standards for not-for-profit organizations.

Edmonton, Canada

September 8, 2015  Chartered Accountants
## Canadian Glycomics Network
### Statement of Financial Position

<table>
<thead>
<tr>
<th>March 31</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
</tr>
<tr>
<td>Current</td>
<td></td>
</tr>
<tr>
<td>Prepaid expenses</td>
<td>$ 9,257</td>
</tr>
<tr>
<td>Due from Network Host (Note 3)</td>
<td>4,095,121</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td>$ 4,104,378</td>
</tr>
</tbody>
</table>

| **Liabilities** |      |
| Current |      |
| Payables and accruals | $ 1,825 |
| Deferred revenue (Note 4) | 3,975,736 |
| **Total Liabilities** | 3,977,561 |

| **Net Assets** |      |
| Unrestricted net assets | 126,817 |
| **Total Net Assets** | 126,817 |

**On behalf of the Board**

[Signatures of Directors]

*See accompanying notes to the financial statements.*
## Canadian Glycomics Network
### Statement of Changes in Net Assets

<table>
<thead>
<tr>
<th>From commencement of operations on February 4, 2015 to March 31</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unrestricted net assets, beginning of period</td>
<td>$ -</td>
</tr>
<tr>
<td>Excess of revenues over expenditures</td>
<td>126,817</td>
</tr>
<tr>
<td>Unrestricted net assets, end of period</td>
<td>$ 126,817</td>
</tr>
</tbody>
</table>

See accompanying notes to the financial statements.
Canadian Glycomics Network
Statement of Operations

From commencement of operations on February 4, 2015 to March 31 2015

<table>
<thead>
<tr>
<th></th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenues</strong></td>
<td></td>
</tr>
<tr>
<td>Grants</td>
<td>$ 187,305</td>
</tr>
<tr>
<td>In - kind donations</td>
<td>44,541</td>
</tr>
<tr>
<td></td>
<td>231,846</td>
</tr>
<tr>
<td><strong>Expenditures</strong></td>
<td></td>
</tr>
<tr>
<td>Communications</td>
<td>1,653</td>
</tr>
<tr>
<td>Consulting fees</td>
<td>1,403</td>
</tr>
<tr>
<td>Insurance</td>
<td>842</td>
</tr>
<tr>
<td>Professional fees</td>
<td>15,693</td>
</tr>
<tr>
<td>Office</td>
<td>5,586</td>
</tr>
<tr>
<td>Salaries and employee benefits</td>
<td>47,709</td>
</tr>
<tr>
<td>Travel</td>
<td>32,143</td>
</tr>
<tr>
<td></td>
<td>105,029</td>
</tr>
<tr>
<td><strong>Excess of revenues over expenditures</strong></td>
<td>$ 126,817</td>
</tr>
</tbody>
</table>

See accompanying notes to the financial statements.
Canadian Glycomics Network  
Statement of Cash Flows

From commencement of operations on February 4, 2015 to March 31, 2015

<table>
<thead>
<tr>
<th>Increase (decrease) in cash and cash equivalents</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating</strong></td>
</tr>
<tr>
<td>Excess of revenues over expenditures</td>
</tr>
<tr>
<td>Change in non-cash working capital items</td>
</tr>
<tr>
<td>Prepaid expenses</td>
</tr>
<tr>
<td>Payables and accruals</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Financing</strong></td>
</tr>
<tr>
<td>Advances to Network Host</td>
</tr>
<tr>
<td>Deferred revenue</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Net change in cash during the period and cash at March 31, 2015</strong></td>
</tr>
</tbody>
</table>

See accompanying notes to the financial statements.
Canadian Glycomics Network
Notes to the Financial Statements

March 31, 2015

1. Nature of operations

Canadian Glycomics Network (the “Network”) is a world-leading network of glycomics researchers and trainees, government laboratories and industry partners which was incorporated on February 4, 2015. The Network addresses key challenges in human health; the Network’s research, in collaboration with Network partners, lead to novel approaches for preventing and treating disease. The Network is a not-for-profit organization and, accordingly, is exempt from income tax in accordance with Section 149(1)(e) of the Canadian Income Tax Act and Section 35 of the Alberta Income Tax Act.

2. Summary of significant accounting policies

Basis of presentation

These financial statements were prepared in accordance with Canadian accounting standards for not-for-profit organizations (ASNPO) and include the following significant accounting policies:

Use of estimates

In preparing the financial statements in conformity with ASNPO, management is required to make estimates and assumptions that affect the reported amounts of assets and liabilities, and the disclosures of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the period. The most significant estimates included in these financial statements are the valuation of the due from Network Host and accrued liabilities. Actual results could differ from these estimates.

Revenue recognition

The Network follows the deferral method of accounting for contributions. Externally restricted contributions are recognized as revenue in the year in which the related expense is incurred. Unrestricted contributions are recognized as revenue in the year received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured.

Donated material and services

Donated materials and services are recorded in the financial statements at fair value on the date contributed when fair value can be reasonably estimated and the donated materials or services would have otherwise normally been purchased by the Network.
2. Summary of significant accounting policies (continued)

Financial instruments

Financial assets and financial liabilities are initially recognized at fair value and are subsequently accounted for based on their classification as described below. The classification depends on the purpose for which the financial instruments were acquired and their characteristics. Except in very limited circumstances, the classification is not changed subsequent to initial recognition.

Financial assets and financial liabilities classified as held-for-trading are measured at fair value with changes in fair value recognized in the statement of operations. Financial assets classified as held-to-maturity or as loans and receivables, and financial liabilities classified as other financial liabilities are measured at amortized cost using the effective interest rate method. Available-for-sale financial assets are measured at fair value with changes in fair value recognized in net assets.

As at March 31, 2015, the Network had the following financial instruments:

<table>
<thead>
<tr>
<th>Financial assets and liabilities</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due from Network Host</td>
<td>Amortized cost</td>
</tr>
<tr>
<td>Payables and accruals</td>
<td>Amortized cost</td>
</tr>
</tbody>
</table>

Financial assets measured at cost or amortized cost are tested for impairment when there are indicators of impairment. Previously recorded impairment losses are reversed to the extent of the improvement provided the asset is not carried at an amount, at the date of the reversal, greater than the amount that would have been the carrying amount had no impairment loss been recognized previously. The amount of any write downs or reversals are recorded in the statement of operations.

3. Due from Network Host

Due from Network Host relates to amounts held in trust by the University of Alberta ("Network Host") in its role as network host under an agreement dated February 4, 2015 between the Network and the Network Host. Under the terms of the agreement, the Network Host is responsible for receiving and administering grant funding received under the Centres of Excellence (NCE) of Canada program, and providing administrative support in the disbursement of funds as directed by the Network.

In addition to administering grant funding for the Network, the Network Host also provides contributed services and material to the Network. In-kind donations totaling $44,541 relate to salaries and benefits paid on behalf of the Network by the Network Host. Additionally, during the period, the Network Host contributed $150,000 of grant funding, along with $17,041 of payments made on behalf of the Network, which are recorded in grant revenue.

These transactions are in the normal course of operations, and are recorded at their exchange amount, which is the amount agreed to by the parties. Due from Network Host is unsecured, non-interest bearing with no set terms of repayment.
4. Deferred revenue

Funding received in the period includes grants from the Network Centres of Excellence ("NCE") of Canada program, which are restricted to eligible expenditures under the terms of the grant agreement.

Details of the changes in deferred revenue are as follows:

<table>
<thead>
<tr>
<th></th>
<th>NCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opening balance</td>
<td>$ -</td>
</tr>
<tr>
<td>Grants received</td>
<td>3,996,000</td>
</tr>
<tr>
<td>Amounts recognized as</td>
<td>(20,264)</td>
</tr>
<tr>
<td>revenue</td>
<td></td>
</tr>
<tr>
<td>Ending balance, March</td>
<td>$ 3,975,736</td>
</tr>
<tr>
<td>31, 2015</td>
<td></td>
</tr>
</tbody>
</table>

5. Financial instruments

The Network is exposed to various risks through its financial instruments. The following provides a measure of the Network's risk exposures and concentrations at March 31, 2015. Unless otherwise noted, it is management's opinion that the Network is not exposed to significant credit, liquidity or interest rate risk.

Liquidity risk

Liquidity risk is the risk that the Network will not be able to meet its obligations as they fall due or to fund any commitments that the Network has planned. The Network is exposed to this risk mainly in respect of its payables and accruals. The Network manages liquidity risk through management of its capital structure in conjunction with cash flow forecasting including anticipated investing and financing activities.

Credit risk

The Network is exposed to credit risk related to the due from Network Host. The Network monitors the balance due from Network Host and does not consider that it is exposed to significant credit risk due to the creditworthiness of the Network Host.

6. Economic dependence

The operations of the Network are primarily dependent on NCE funding received from the Government of Canada, and ongoing support from the University of Alberta in its role as Network Host.
GlycoNet is made possible with support from the Government of Canada through the Networks of Centres of Excellence program, a joint initiative of the Natural Sciences and Engineering Research Council, the Canadian Institutes of Health Research and the Social Sciences and Humanities Research Council.
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