SUMMARY

(1) Continuing the implementation of the digitalized Patient Order Sets throughout the Jewish General Hospital and continue to expand this throughout the CIUSSS including LTC and eReferrals.

(2) To expand Special Chemistry testing by incorporating Mass Spectrometry in separation techniques, to further reduce costs and developing mass spectrometry assays.

(3) Upgrade out-of-date, overtaxed and sluggish instrumentation particularly in the Corelab and Special Hematology sections.

(4) To work on a Mobile app development for critical values alert service with Concordia. The purpose of the App is to allow instantaneous transfer of the critical patient result to the physician’s phone.

(5) Try to get funds and continue the upgrading of the Proteomics Laboratory at the Jewish General Hospital.

(6) Digital Health and IT upgrade implementation

1. Research and publications:

   Research
   • The Proteomics Department at the Jewish General Hospital has had 14 projects that were either completed or ongoing this past year, including 7 collaborations with different researchers within the Lady Davis Institute/Jewish General Hospital.

2. Teaching and learning (undergraduate and graduate):

   2.1 MacNamara, Elizabeth, M.D., FRCPS(C)

   Undergraduate and graduate, McGill University
   Medical Student Elective Medical Biochemistry (4 week)
   Medical Biochemistry Resident (8 month/year)
   Palliative Care Attending on 4M, (26 weeks/year supervision of Resident and/or Medical student)
   McGill Palliative Care Residents Teaching 22 x 1 hour per year

   Attendance at Medical Grand Rounds (17/year)
   Attendance at the Association des Médecins Biochimistes du Québec/Canadian Association of Clinical Biochemists Annual Congress
   Comité de suivi des examens (FMSQ)
   Mass Spectrometry: Applications to the Clinical Lab (MSACL)
   Canadian Society of Palliative Care Physicians Conference, Alberta
   Palliative Care Continuing Professional Education Day, McGill
   Abstract Reviewer for the 22nd International Palliative Care Congress of Canada
Lectures given (EM):
AMBQ / CAMB 2019 Annual Congress, Montreal, Quebec
The Ketogenic Diets

Medical Grand Rounds – Jewish General Hospital, Montreal, Quebec
Ketogenic Diet and Diabetes: Why the Resistance?

Family Medicine Rounds- Jewish General Hospital, Montreal, Quebec
Ketogenic Diet and Diabetes: Why the Resistance?

2.2 Eintracht, Shaun, M.D., FRCPS(C)

Undergraduate, McGill University
Postgraduate, McGill University
Resident Supervision/One-on-One Teaching
McGill Medical Biochemistry Residents teaching (12 month period)
Teaching of Hematology and Rheumatology Resident
Attendance at Medical Grand Rounds (4/month)
Attendance at the Association des Médecins Biochimistes du Québec/Canadian Association of Clinical Biochemists Annual Congress
Internal Medicine Rounds
Journal Club (Ad hoc basis)

Lectures given (SE):

AMBQ / CAMB 2019 Annual Congress, Montreal, Quebec
Approach to Data Analysis.

AMBQ / CAMB 2019 Annual Congress, Montreal, Quebec
The Ketogenic Diets

Medical Grand Rounds – Jewish General Hospital, Montreal, Quebec
Ketogenic Diet and Diabetes: Why the Resistance?

4. Partnerships:

- Dr. MacNamara has been appointed as the Chair and External Examiner for the Medical Biochemistry and Metabolic Medicine Program, Kuwait Institute for Medical Specialization (KIMS). Duties include reviewing the exam questions, participating in the oral module of the final exam, and marking the exam with the members of the exam committee.

- Abstract Reviewer for the 22nd International Palliative Care Congress of Canada

5. Milestones:

Dr. Christoph Borchers has been appointed Head of the Division of Clinical and Research Proteomics at the Jewish General Hospital.
Dr. René Zahedi has been appointed the facility manager of the Proteomics Laboratory, Jewish General Hospital.

**SECTION I – DIVISION STATUS UPDATE**

1. **Mission and Objectives of the Division**

   **Mission Statement**

   To provide laboratory and clinical services consistent with the needs of the health care team and their patients in a professional and caring manner.

   To initiate and collaborate in research activities directed towards the improved understanding of disease, its diagnosis and monitoring.

   To ensure the optimal use of the laboratory service.

2. **A nominative list of academic staff, their academic rank**

   Dr. Elizabeth MacNamara, Medical Biochemist, Chief, Division of Medical Biochemistry, Jewish General Hospital
   Associate Professor of Medicine, McGill University (active)

   Dr. Shaun Eintracht, Medical Biochemist, Division of Medical Biochemistry, Jewish General Hospital
   Assistant Professor of Medicine, McGill University (active)
   JGH Medical Biochemistry Site Director-Optilab

   Dr. Christoph Borchers, FCAHS
   Research Professor, Department of Oncology, McGill University, Montreal
   McGill- Segal Chair in Molecular Oncology

**SECTION II – GRANTS, PUBLICATIONS AND SERVICE OUTSIDE OF McGill**

1. **Grants and Awards received: currently active**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Title</th>
<th>PI</th>
<th>Time Period</th>
<th>Total amount awarded to Dr. Borchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Economy and Innovation - Quebec</td>
<td>Curbing Atherosclerosis Through Precision Medicine</td>
<td>C. Borchers T. Alquier JC. Tardiff</td>
<td>2018-22</td>
<td>$237,500</td>
</tr>
<tr>
<td>Genome Canada / Genome BC</td>
<td>Proteogenomic Improved Guided Quantification Pipeline (PIGQpipe): Toward Personalized Targeted Proteomics</td>
<td>C. Borchers</td>
<td>2018-21</td>
<td>$556,472</td>
</tr>
<tr>
<td>NSERC - EGP</td>
<td>Molecular characterization of SSI products from Qu biologics</td>
<td>C. Borchers</td>
<td>2018-19</td>
<td>$25,000</td>
</tr>
<tr>
<td>The Fonds de recherche du Québec and the Flemish Research</td>
<td>Innovative cleavable link strategy based on mass spectrometry for the elucidation of drug binding sites</td>
<td>C. Borchers</td>
<td>2017-20</td>
<td>$298,450</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------</td>
<td>---------</td>
<td>-----------</td>
</tr>
<tr>
<td>Genome Canada / Genome BC</td>
<td>The Metabolomics Innovation Centre</td>
<td>C. Borchers D. Wishart</td>
<td>2017-22</td>
<td>$1,782,990</td>
</tr>
<tr>
<td>CFI-MSI</td>
<td>The Metabolomics Innovation Centre</td>
<td>C. Borchers D. Wishart</td>
<td>2017-22</td>
<td>$899,215</td>
</tr>
</tbody>
</table>

**Personal Support Awards (Indicate type of award, agency, term)**

<table>
<thead>
<tr>
<th>Agency</th>
<th>Subject</th>
<th>$ /Year</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Warren Y. Soper Charitable Trust</td>
<td>The Innovative Translational Proteomics Program</td>
<td>100,000</td>
<td>2015 - 24</td>
</tr>
<tr>
<td>Segal McGill Chair</td>
<td>Molecular Oncology</td>
<td>40,000</td>
<td>2014 - 19</td>
</tr>
<tr>
<td>BC Leading Edge Endowment</td>
<td>LEEF Chair</td>
<td>200,000</td>
<td>2011 - 28</td>
</tr>
</tbody>
</table>

2. **Scholarly works published in the 2019 calendar year:**

**Publications**


Chertkow H., Borrie M., Whitehead V., Black H. Feldman, MacNamara E., The Comprehensive Assessment of Neurodegeneration and Dementia Canadian Cohort Study.(The Canadian Journal of Neurological Sciences,2019;00:1-13)


Borchers C.H.

1. LC-MS/MS based comparative proteomics of floral nectars reveal different mechanisms involved in floral defense of Nicotiana spp., Petunia hybrida and Datura stramonium.
Silva F, Guirgis A, von Aderkas P, Borchers CH, Thornburg R.
PMID: 31846763. IF: 3.537

2. The intestinal microbiome potentially affects thrombin generation in human subjects.
Mohammed Y, Kootte RS, Kopatz WF, Borchers CH, Böller HR, Versteeg HH, Nieuwdorp M, van Mens TE.
PMID: 31808596. IF: 4.662

3. Proteogenomics of Colorectal Cancer Liver Metastases: Complementing Precision Oncology with Phenotypic Data.
PMID: 31805664. IF: 6.162

4. Targeted and Untargeted Proteomics Approaches in Biomarker Development.
Review.
PMID: 31729135. IF: 3.106

5. Ligand-induced disorder-to-order transitions characterized by structural proteomics and molecular dynamics simulations.
Makepeace KAT, Brodie NI, Popov KI, Gudavicius G, Nelson CJ, Petrochenko EV, Dokholyan NV, Borchers CH.
PMID: 31683063. IF: 3.537

6. Insight into the Structure of the "Unstructured" Tau Protein.
Popov KI, Makepeace KAT, Petrochenko EV, Dokholyan NV, Borchers CH.
PMID: 31628033. IF: 4.576

7. MeCP2-E1 isoform is a dynamically expressed, weakly DNA-bound protein with different protein and DNA interactions compared to MeCP2-E2.
PMID: 31601272. IF: 4.185

9. The Gut Microbiome and Metabolome of Two Riparian Communities in the Amazon.

10. A Unique Morphological Phenotype in Chemoresistant Triple-Negative Breast Cancer Reveals Metabolic Reprogramming and PLIN4 Expression as a Molecular Vulnerability.


12. Recommendations for performing, interpreting and reporting hydrogen deuterium exchange mass spectrometry (HDX-MS) experiments.

13. Increased sulfation of bile acids in mice and human subjects with sodium taurocholate cotransporting polypeptide deficiency.


PMID: 31045356. IF:6.35

Brodie NI, Popov KI, Petrotchenko EV, Dokholyan NV, Borchers CH.
eCollection 2019 Mar.
PMID: 30917118. IF:4.428

16. The molecular mechanisms driving physiological changes after long duration space flights revealed by quantitative analysis of human blood proteins.
PMID: 30871558. IF:3.317

17. Chaperone activation and client binding of a 2-cysteine peroxiredoxin.
Teixeira F, Tse E, Castro H, Makepeace KAT, Meinen BA, Borchers CH, Poole LB, Bardwell JC, Tomás AM, Southworth DR, Jakob U.
PMID: 30737390. 11.878

PMID: 30632678. IF: 2.324

19. Changing the Apoptosis Pathway through Evolutionary Protein Design.
PMID: 30625288. IF: 5.067

(c) Patents and patent applications

A Penn, CH Borchers, Panel of ACVS-Associated Proteins for Diagnosis and Prognosis.
US provisional patent application filed: 17/03/2017 (62/473,214) 15/05/2017 (62/506,392)

H Li, CH Borchers, Immuno-MALDI (iMALDI) Technology for Quantitation and Identification of Peptides and Proteins.
US provisional patent application filed: 06/06/2017 (62/346,080). (Expired)

R Popp, CH Borchers, Immuno-MALDI to Measure AKT1 and AKT2 Phosphorylation.
J Han, X Wang, CH Borchers, System and Method for Matrix-Coating Samples for Mass Spectrometry.

EV Petrochenko, CH Borchers, Methods for Early Detection of Blood Disorders.
Patent No.: US 8,691,515 B2 Date of Patent: April 8 2014

CH Borchers, Methods of Quantitation and Identification of Peptides and Proteins

CH Borchers, Methods of Quantitation and Identification of Peptides and Proteins.
Patent No.: US 7,846,748 B2 Date of Patent: Dec 7 2010

(d). Other publications

CH Borchers, “Biodesix, MRM Proteomics Partner on Lung Cancer Assays”.
Interview for Genomeweb (29/01/2019)

3. Academic and community engagement service outside of McGill by individual members of the unit

In 2019, a collaboration was formally established with the Skolovo Institute of Science and Technology in Moscow, Russia where I now hold an appointment as Full Professor. The collaboration has already led to the funding of a major “mega grant” proposal with McGill for $2.4M (see section 1).

a. Conference organizational committees

MRM & PRM Proteomics Workshop, Workshop Organizer, Tuebingen, Germany 05/11 – 08/11/19
9th Symposium of Structural Proteomics, Symposium Organizer, Göttingen, Germany, 03/11 - 06/11/19
3nd Int. Workshop of PROTEOMICS – from Introduction to Clinical Applications, Workshop Organizer, Iasi, Romania, 08/07 - 12/07/19
MRM & PRM Proteomics Workshop, Workshop Organizer, Montreal, 14/07 – 17/06/19

b. Membership and service on international, national and provincial professional bodies and societies

<table>
<thead>
<tr>
<th>HUPO Council</th>
<th>Committee member, 2009-2018, once per year, 4 hrs per year</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUPO Standards Committee</td>
<td>Committee member, 2006-2008, 12 hours/year</td>
</tr>
<tr>
<td>HUPO Marketing Committee</td>
<td>Member &amp; chair, 2015-2018, 24 hours/year</td>
</tr>
<tr>
<td>Structural Proteomics Society</td>
<td>Founding member, 2018, 24 hours/year</td>
</tr>
<tr>
<td>CNPN Human Proteome Project “white paper”</td>
<td>Committee member, 2011, 40 hours per year</td>
</tr>
</tbody>
</table>

c. Grant committees
2018: NIH Diabetes – DiaComp Collaborative Funding Program
Ontario Research Fund

d. Grant proposals reviewed

2018: NIH Diabetes – DiaComp Collaborative Funding Program
Ontario Research Fund

e. Thesis review

2019: Nicholas I. Brodie, University of Victoria

f. Visiting scientists hosted in 2019 (include lab visitors who have spent more than two weeks in your group)

09/18-03/19  Mengxuan Wang, UVic GBC Proteomics Centre (Visiting student)
01/19-04/19  Mia Frier, UVic GBC Proteomics Centre (Co-op student)
04/19-08/19  Nicole York, UVic GBC Proteomics Centre (Co-op student)
08/19-09/19  Abbey Wilson, UVic GBC Proteomics Centre (Visiting Post-Doc)
09/19-12/19  Alexandra Klem, UVic GBC Proteomics Centre (Co-op student)
09/19-12/19  Jiajia Jia, UVic GBC Proteomics Centre (Visiting student)

09/18-04/19  Evgeniy Petrochenko, McGill University (Visiting scientist)
03/19-04/19  Marius Gramlich, UVic GBC Proteomics Centre (Visiting scientist)

g. Editorships

Journals

Editor, special issue - Proteomics Clinical Applications 2017
Editor: Journal of Proteomics, Special issue HUPO 2015 2016
Editor: Future eBook, Advanced LC-MS Applications in Metabolomics 2015
Editor: Methods, Special issue on Structural Proteomics (2014/2015) 2014

Editorial Boards (Journal name, years)
Ad hoc reviews (List journals for last three years)

<table>
<thead>
<tr>
<th>Journal Name</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Journal of Tropical Medicine &amp; Hygiene</td>
<td></td>
</tr>
<tr>
<td>Analytical and Bioanalytical Chemistry</td>
<td></td>
</tr>
<tr>
<td>Analytical Chemistry</td>
<td></td>
</tr>
<tr>
<td>BBA GEN</td>
<td></td>
</tr>
<tr>
<td>BBA PRO</td>
<td></td>
</tr>
<tr>
<td>Bioanalysis</td>
<td></td>
</tr>
<tr>
<td>Bioinformatics</td>
<td></td>
</tr>
<tr>
<td>Chemical Science</td>
<td></td>
</tr>
<tr>
<td>Clinical Mass Spectrometry</td>
<td></td>
</tr>
<tr>
<td>Current Medicinal Chemistry</td>
<td></td>
</tr>
<tr>
<td>Expert Reviews of Proteomics</td>
<td></td>
</tr>
<tr>
<td>International journal of proteomics</td>
<td></td>
</tr>
<tr>
<td>Journal of Chromatography A</td>
<td></td>
</tr>
<tr>
<td>Journal of Mass Spectrometry</td>
<td></td>
</tr>
<tr>
<td>Journal of Pharmaceutical and Biomedical Analysis</td>
<td></td>
</tr>
<tr>
<td>Journal of Proteome Research</td>
<td></td>
</tr>
</tbody>
</table>
h. Reviews for journals, book reviews, published commentaries (12 papers reviewed in 2019)

Analytical and Bioanalytical Chemistry, Molecular and Cellular Proteomics, Journal of Proteome Research, Nucleic Acids Research, Expert Review of Molecular Diagnostics, EMBO Molecular Medicine, Computational and Structural Biotechnology Journal

SECTION III-CONFIDENTIAL INFORMATION

1. Consulting activities: None reported

Respectfully submitted,

Elizabeth MacNamara, MD
Chief, Division of Medical Biochemistry
Department of Medicine-JGH