

Marian H. Hettiaratchi, Ph.D.

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EDUCATION

Georgia Institute of Technology & Emory University

Ph.D., Biomedical Engineering

2011 – 2016

University of Calgary

B.Sc., Chemical Engineering with Biomedical Specialization (Internship Program, With Distinction)

2006 – 2011

RESEARCH EXPERIENCE

Sustained Delivery of Designer Proteins to Enhance Central Nervous System Repair

Post-Doctoral Fellow

Jan. 2017 – Present

Department of Chemical Engineering & Applied Chemistry, University of Toronto

Advisor: Molly Shoichet, Ph.D.

Collaborators: Brian Shoichet, Ph.D. (UCSF), Benjamin Hackel, Ph.D. (University of Minnesota)

Development of Heparin Microparticles for Therapeutic Protein Delivery for Bone Repair

Doctoral Candidate

Aug. 2011 – Dec. 2016

Department of Biomedical Engineering, Georgia Institute of Technology & Emory University

Advisors: Todd McDevitt, Ph.D., and Robert Guldberg, Ph.D.

Collaborators: Andrés García, Ph.D., Susan Thomas, Ph.D., Ronghu Wu, Ph.D., Johnna Temenoff, Ph.D.

Evaluation of Cryopreservation Protocols for Human Mesenchymal Stem/Stromal Cells

Undergraduate Researcher (Part-time)

May 2008 – Aug. 2009, Sept. 2010 – May 2011

Pharmaceutical Production Research Facility, University of Calgary

Advisor: Arindom Sen, Ph.D.

Novel Methods of Asphaltene Isolation from Athabasca Bitumen

Internship Student

Sept. 2009 – Aug. 2010

Syncrude Research Centre, Syncrude Canada Ltd.

PUBLICATIONS

Google Scholar Profile: <https://scholar.google.ca/citations?user=v2uIR-MAAAAAJ&hl=en>

1. Shoichet, M.S., **Hettiaratchi, M.H.** (2019) *Modulated Protein Delivery to Engineer Tissue Repair*. Tissue Engineering: Part A. In press.
2. **Hettiaratchi, M.H.**, O'Meara, M.J., Teal, C.J., Payne, S.L., Pickering, A.J., Shoichet, M.S. (2019) *Local Delivery of Stabilized Chondroitinase ABC Degrades Chondroitin Sulfate Proteoglycans in Stroke-Injured Rat Brains*. Journal of Controlled Release. 297: 14-25.
3. Nori, S., Khazaei, M., Ahuja, C.S., Ahlfors, J.E., Yokota, K., Liu, Y., Wang, J., Shibata, S., Chio, J., **Hettiaratchi, M.H.**, Fuehrmann, T., Shoichet, M.S., Fehlings, M.G. (2018) *Human Oligodendrogenic Neural Progenitor Cells Delivered with Chondroitinase ABC Facilitate Functional Repair of Chronic Spinal Cord Injury*. Stem Cell Reports 11(6): 1433-1448.
4. **Hettiaratchi, M.H.***, Schudel, A.*, Rouse, T., Garcia, A.J., Thomas, S.N., Guldberg, R.E., McDevitt, T.C. (2018) *A Rapid Method for Determining Protein Diffusion Through Hydrogels for Regenerative Medicine Applications*. APL Bioengineering 2: 026110. *Equal contribution.
5. Rinker, T.E., Philbrick, B.B., **Hettiaratchi, M.H.**, Smalley, D., McDevitt, T.C., Temenoff, J.S. (2018)

Microparticle-Mediated Sequestration of Cell-Secreted Proteins to Modulate Chondrocytic Differentiation. Acta Biomaterialia 68: 125-136.

6. **Hettiaratchi, M.H.**, Fuehrmann, T., Shoichet, M.S. (2017) *Recent Advances in Regenerative Medicine Approaches for Spinal Cord Injury. Current Opinion in Biomedical Engineering* 4: 40-49.
7. **Hettiaratchi, M.H.**, Rouse, T., Chou, C., Krishnan, L., Stevens, H.Y., Li, M.T.A., McDevitt, T.C., Guldborg, R.E. (2017) *Enhanced In Vivo Retention of Low Dose BMP-2 Via Heparin Microparticle Delivery Does Not Accelerate Bone Healing in a Critically Sized Femoral Defect. Acta Biomaterialia* 59: 23-31.
8. **Hettiaratchi, M.H.**, Chou, C., Servies, N., Smeekens, J.M., Cheng, A., Esancy, C., Wu, R., McDevitt, T.C., Guldborg, R.E., Krishnan, L. (2017) *Competitive Protein Binding Influences Heparin-Based Modulation of Spatial Growth Factor Delivery for Bone Regeneration. Tissue Engineering: Part A* 23(13-14): 683-695.
9. Zimmermann, J.A., **Hettiaratchi, M.H.**, McDevitt, T.C. (2017) *Enhanced Immunosuppression of T Cells by Sustained Presentation of Bioactive Interferon- γ Within Three-Dimensional Mesenchymal Stem Cell Constructs. Stem Cells Translational Medicine* 6(1): 223-237.
 - Altmetric Score (517) within the top 1% of 8 million articles ranked for online attention and impact.
 - Press release: "How to Engineer a Stronger Immune System"
<https://gladstone.org/about-us/news/how-engineer-stronger-immune-system>
10. **Hettiaratchi, M.H.**, Guldborg, R.E., McDevitt, T.C. (2016) *Biomaterial Strategies for Controlling Stem Cell Fate Via Morphogen Sequestration. Journal of Materials Chemistry B* 4(20): 3464-81.
11. **Hettiaratchi, M.H.**, Miller, T., Temenoff, J.S., Guldborg, R.E., McDevitt, T.C. (2014) *Heparin Microparticle Effects on Presentation and Bioactivity of Bone Morphogenetic Protein-2. Biomaterials* 35(25): 7228-38.
 - Altmetric Score (113) within the top 5% of 8 million articles ranked for online attention and impact.
 - Press release: "Engineering a Better Way to Rebuild Bone Inside the Body"
<http://www.news.gatech.edu/2014/05/29/engineering-better-way-rebuild-bone-inside-body>

ADDITIONAL MANUSCRIPTS SUBMITTED OR IN PREPARATION

12. **Hettiaratchi, M.H.**, O'Meara, M.J., O'Meara, T.R., Pickering, A.J., Shoichet, M.S. *A Computational Approach to Identifying Stabilizing Mutations for Chondroitinase ABC*. In preparation.
13. Pickering, A.J., Delplace, V., **Hettiaratchi, M.H.**, Zhao, S., Shoichet, M.S. *Inverse Electron Demand Diels-Alder Methylcellulose Hydrogels Enable Co-Delivery of Chondroitinase ABC and Neural Stem Cells*. In preparation.
14. **Hettiaratchi, M.H.**, Krishnan, L., Rouse, T., Chou, C., McDevitt, T.C., Guldborg, R.E. *Heparin-Mediated Delivery of Bone Morphogenetic Protein-2 Improves Spatial Localization of Bone Regeneration*. Submitted.

RESEARCH FUNDING

Natural Sciences and Engineering Research Council (NSERC) Post-Doctoral Fellowship Government of Canada (\$45,000 per year)	2018 – 2020
Philanthropic Educational Organization (PEO) Scholar Award PEO Sisterhood (\$15,000)	2014 – 2015
NSERC Post-Graduate Scholarship – Doctoral Level (PGS-D3) Government of Canada (\$21,000 per year)	2012 – 2015
NSERC Post-Graduate Scholarship – Master's Level (PGS-M) Government of Canada (\$17,500)	2011 – 2012

Markin Undergraduate Student Research Program University of Calgary (\$4500)	2008 – 2009
NSERC Undergraduate Student Research Award Government of Canada (\$4500 per year)	2007, 2008

AWARDS AND HONOURS

Second Place in 3 Minute Thesis Competition Georgia Institute of Technology (\$1500) Video available at: https://www.youtube.com/watch?v=dr3VA3CfCTo&t=54s	2015
Interdisciplinary “Above and Beyond” Leadership Award Georgia Institute of Technology	2014
Travel Award Tissue Engineering and Regenerative Medicine International Society (TERMIS)	2014
Outstanding Poster Award Georgia Tech Biomaterials Day	2014
APEGA Gold Medical for Chemical Engineering Association of Professional Engineers and Geoscientists of Alberta (APEGA)	2011
Edward Wichert Undergraduate Scholarship University of Calgary (\$5000)	2009 – 2010
Schulich Academic Excellence Scholarship University of Calgary (\$30,000)	2006 – 2009
Louise McKinney Scholarship Government of Alberta (\$2500 per year)	2007, 2008, 2009
Governor General’s Bronze Academic Award Government of Canada	2006

PRESENTATIONS

INVITED PRESENTATIONS

- Foundation for Student Science and Technology (FSST)** Toronto, ON, 2018
How to Be Successful in STEM
- Distinguished Young Scholars Seminar, University of Washington** Seattle, WA, 2017
Bio-inspired Drug Delivery Strategies for Treating Bone Defects and Spinal Cord Injuries
- Philanthropic Educational Organization (PEO) Georgia State Convention** Atlanta, GA, 2016
PEO Scholar Award Recipient Presentation

ORAL PRESENTATIONS

- Biomedical Engineering Society** Atlanta, GA, 2018
Affinity-based Delivery of Stabilized Chondroitinase ABC for CNS Repair
- World Biomaterials Congress** Montreal, QC, 2016
Heparin Microparticles Loaded with Bone Morphogenetic Protein-2
Induce Bone Regeneration in a Rat Femoral Defect Model

6. **Orthopedic Research Society** Orlando, FL, 2016
Controlled Heparin Microparticle Deposition on Polycaprolactone Nanofiber Meshes for Spatial Control of Bone Regeneration
7. **Orthopedic Research Society** Las Vegas, NV, 2015
Development of Heparin Microparticles for Enhanced Delivery of BMP-2
8. **Tissue Engineering Regenerative Medicine International Society** Washington, DC, 2014
Heparin Microparticle Delivery of BMP-2 for Bone Regeneration
9. **Georgia Tech Biomaterials Day** Atlanta, GA, 2014
Heparin Microparticle Delivery of BMP-2 for Bone Regeneration
10. **Tissue Engineering Regenerative Medicine International Society** Atlanta, GA, 2013
Controlled Presentation of Bioactive BMP-2 via Heparin Methacrylamide Microparticles

POSTER PRESENTATIONS

11. **Canadian Biomaterials Society** Victoria, BC, 2018
Affinity-based Delivery of Chondroitinase ABC for Tissue Repair after Spinal Cord Injuries
12. **Tissue Engineering Regenerative Medicine International Society** Boston, MA, 2015
Functionalized Electrospun Membrane for Spatial Control of Bone Regeneration
13. **Tissue Engineering Regenerative Medicine International Society** Boston, MA, 2015
BMP-2-Loaded Heparin Microparticles Facilitate Functional Bone Formation in Large Defects
14. **Hilton Head Workshop on Regenerative Medicine** Hilton Head, SC, 2014
Heparin Microparticles Enhance Bioactivity of Osteogenic Growth Factors
15. **Hilton Head Workshop on Regenerative Medicine** Hilton Head, SC, 2013
Development of Heparin Microparticles to Sequester and Release Bioactive Growth Factors

TEACHING AND MENTORING EXPERIENCE

Research Mentor

Jan. 2013 – Present

McDevitt, Guldberg, and Shoichet Laboratories

- Supervised 5 students conducting independent research and assisted in obtaining their funding.
 - Andrew Pickering (2018-present): NSERC Undergraduate Student Research Award
 - Nikhil Gupte (2014-2016): President's Undergraduate Research Award
 - Catherine Chou (2013-2015): Petit Undergraduate Research Scholar Program
 - Nick Servies (2014-2015): President's Undergraduate Research Award
 - Camden Esancy (2013-2014): Petit Undergraduate Research Scholar Program

Cybermentor

Sept. 2010 – Present

Cybermentor Program

- Encourage girls in Grades 6-12 to pursue careers in science and engineering by broadening their knowledge of career opportunities and serving as a positive female role model in STEM.

Instructor

Sept. 2017 – Dec. 2017

University of Toronto

- Taught Oral Presentation Skills for Non-Native English Speakers (2 lecture hours/week).
- Provided feedback for students writing research proposals for NSERC scholarships (3 contact hours/week).

Calculus Tutor Aug. 2014 – Dec. 2015
Georgia Tech Athletic Association (GTAA)
• Conducted weekly one-on-one and group tutoring sessions for students (3 contact hours/week).

Teaching Assistant Aug. 2012 – May 2013
Georgia Institute of Technology
• Led tutorials for ~50 students for Conservation Principles in Biomedical Engineering (2 contact hours/week).

SERVICE AND LEADERSHIP EXPERIENCE

Scholar Awards Committee 2018 – Present
Chapter R Ontario, Philanthropic Educational Organization (PEO)

Ad Hoc Peer Reviewer 2017 – Present
Biomaterials, Tissue Engineering: Parts A, B, C

Poster Judge May 2017, May 2018
Institute of Biomaterials and Biomedical Engineering (IBBME) Annual Research Conference (iARC)

Volunteer Aug. 2017
IBBME Biomedical Engineering and Me (iBEAM) Program
• Led students in Grades 7-9 in hands-on biomaterials experiments.

Participant – Graduate Leadership Program Sept. 2014 – May. 2015
Georgia Institute of Technology

Chair Jul. 2013 – Jul. 2015
Bioengineering & Bioscience Unified Graduate Students (BBUGS)
• Managed an annual budget of ~\$5000 and 7 BBUGS committees that organized over 50 social events, outreach activities, and educational seminars for 200 students each year.

Participant – Stem Cell Biomanufacturing IGERT Program Aug. 2011 – Aug. 2013
Georgia Institute of Technology

Project Leader/Mentor Aug. 2011 – Dec. 2015
BBUGS Education and Outreach Committee
• Delivered lectures and developed demos and science projects on stem cells and biotechnology.
• Led a bimonthly science club to provide hands-on science mentorship to 30-50 high school students from BEST Academy and Coretta Scott King High School in Atlanta.

Engineering Representative Sept. 2008 – Apr. 2009, Sept. 2010 – Apr. 2011
Women in Science and Engineering (WISE) Club
• Organized events to promote diversity in Schulich School of Engineering and expose women to STEM.

PROFESSIONAL MEMBERSHIPS

Biomedical Engineering Society 2018 – Present

Canadian Biomaterials Society 2018 – Present

Tissue Engineering Regenerative Medicine International Society 2013 – Present

Orthopedic Research Society 2015 – 2017

Engineer-in-Training, Association of Professional Engineers & Geoscientists of Alberta 2011 – 2016