

Jonathan Hoggatt, PhD  
Hematology, Immunology, Oncology, Rare Disease



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## Professional Summary

Scientist, educator, leader, and innovator with 18+ years of translational science and drug development experience. Former Assistant Professor of Medicine at Harvard Medical School, and a Scientific Founder of Magenta Therapeutics. Currently the Senior Director of Hematology and Immune Therapeutics at Moderna. Broad expertise in stem cell science, hematology, immunology, oncology, gene therapies, and regenerative medicine with a track record of developing multiple therapeutic approaches now being explored in clinical trials. A former Police Commissioner and City Councilor with strong leadership and management skills, and ability to collaborate cross functionally with teams to advance project and organization goals.

## Experience

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|----------------|--|
| 2023 - current | Senior Director of Hematology Immune Therapeutics – Moderna <ul style="list-style-type: none"><li>• Built and lead a new team to develop hematology therapeutics</li><li>• Responsible for program strategy, disease and target identification, CRO and collaborator management, etc.</li><li>• Cross functional collaboration and leadership including advancing innovations in nucleic acid and delivery platforms</li><li>• Experience with internal and external due diligence, competitor analysis, and strategy.</li></ul> |
| 2021 - 2023    | Director of Hematology – Moderna Therapeutics  |
| 2015 - 2022    | Assistant Professor of Medicine – Harvard Medical School<br>Cancer Center, and Center for Transplantation Sciences - MGH<br>Harvard Stem Cell Institute Principal Faculty Member <ul style="list-style-type: none"><li>• Multi NIH award recipient, including 5 year R01</li><li>• American Society of Hematology Scholar</li><li>• Projects and publications in hematopoietic stem cells, hair follicle stem cells, immunology, oncology, and gene editing</li></ul>  |
| 2015 - 2021    | Assistant Professor and Affiliate Faculty – Harvard University<br>Stem Cell and Regenerative Biology Department <ul style="list-style-type: none"><li>• Undergraduate Immunology Professor</li><li>• Created a new course at Harvard University focusing on current immunology literature as well as “classic” immunology papers.</li><li>• Developed the entire curriculum and taught twice a week for 1.5 hours each session, as well as met individually with students.</li></ul>   |
| 2014 - 2015    | Instructor of Medicine – Harvard Medical School  |
| 2011 - 2014    | Postdoctoral Fellow – Harvard University   |

## **Other Experience and Positions**

2021 - current	American Society of Gene and Cell Therapy Committee on Non-viral Therapeutic Delivery
2021 - current	American Society of Hematology – Communications Committee
2019 - current	Associate Editor, StemJournal
2017 - current	American Society of Hematology – Gene Therapy Spokesperson
2017 - current	Editorial Board, Stem Cell Reviews and Reports
2013 - 2021	American Society of Hematology – Government Affairs Committee
2016 - 2021	Scientific Co-founder – Magenta Therapeutics <ul style="list-style-type: none"><li>• Inventor of key assets and platform concept</li><li>• Co-developed company vision, scientific and funding strategies, etc.</li><li>• Clinical Advisory Board Member</li></ul>
2015 - 2018	Contributing Editor, The Hematologist
2009 - 2011	City Councilor – West Lafayette, Indiana <ul style="list-style-type: none"><li>• Fiscal review and budgeting for \$15+ million budget</li><li>• Cross functional leadership and collaborations to maintain and improve city services</li></ul>
2006 - 2009	Police Commissioner – West Lafayette, Indiana <ul style="list-style-type: none"><li>• Responsible for hiring, firing, promotion, demotion and discipline of the city-wide force of uniformed officers (48)</li></ul>

## **Education**

2010	Doctor of Philosophy – Hematology – Indiana School of Medicine
2006	Master of Science – Biology – IUPUI
2005	Bachelor of Science – Pharmacy (minor Psychology) – Purdue University

## Clinical Innovations

- GRO- $\beta$  Mobilization** The standard of care for clinical mobilization is a multiday regimen of G-CSF, followed by one or more sessions of apheresis. A single day process with high quality yields would truly transform this process. Developed a rapid mobilization regimen using a combination of GRO- $\beta$  + AMD3100 which results in high levels of stem cell mobilization within an hour of injection ([Hoggatt et al., Cell, 2018](#)). This innovation has resulted in licensed intellectual property, the formation of Magenta Therapeutics, and several Phase 1 and 2 clinical trials NCT03932864, NCT04762875, NCT04552743, and in sickle cell NCT05445128.
- NSAID Mobilization** Developed a novel mobilization regimen to enhance hematopoietic stem and progenitor yield using non-steroidal anti-inflammatory drugs in combination with Neupogen ([Hoggatt et al., Nature, 2013](#)). Successfully co-wrote a Leukemia and Lymphoma Society grant to fund a Phase 2, randomized, placebo-controlled study at MGH NCT02003625, and work resulted in an independent clinical trial at Indiana University NCT02078102. Recently, this clinical innovation was applied by an independent group in Switzerland and shown to be efficacious (Bone Marrow Transplant. 2018 Feb;53(2):175-179.)
- CD26 Inhibited Niche** In collaboration with Hal Broxmeyer, discovered that inhibition of CD26 results in enhanced potency of many hematopoietic growth factors, and defined for the first time the effects of enzymatic n-terminal cleavage on complex receptor formation and signaling ([Broxmeyer and Hoggatt, et al., Nature Medicine, 2012](#)). Clinical trials exploring the role of treating a patient with CD26 inhibitors to enhance stem cell engraftment were performed: NCT00862719, NCT01720264.
- PGE<sub>2</sub> Enhanced HSC** Work from the Zon Laboratory from Boston Children's reignited interest in regulation of hematopoiesis by prostaglandin E<sub>2</sub> (PGE<sub>2</sub>). My work identified key mechanisms mediating enhancement of stem cells ([Hoggatt et al, Blood, 2009](#)), and in collaboration with Fate Therapeutics, developed formulation changes and release assays to advance the therapy for cord blood transplantation. [Published a Phase 1b study](#) and further clinical trials within the HMS system, and outside: NCT01527838, NCT02354443, NCT02354417, NCT01627314.
- ADCs for Transplant** Current conditioning regimens prior to transplant require toxic chemotherapy and/or irradiation. Developed a novel method using antibody-drug-conjugates ([Palchaudhuri, Saez, Hoggatt, et al., Nature Biotechnology, 2016](#)) resulting in clinical trial NCT05223699.

## Patents and Filings

Methods and Compositions for Mobilizing Stem Cells	<a href="#">US20200268850A1</a>
Materials and Methods to Enhance Hematopoietic Stem Cells Engraftment Procedures	<a href="#">AU2018241208B2</a>
Highly Engraftable Hematopoietic Stem Cells	<a href="#">EP3419617A4</a>
Methods to Enhance Delivery and Engraftment of Stem Cells Including The Identification of Specific Prostaglandin E2 Receptors	<a href="#">US20120315253A1</a>
Enhancement of Stem Cell Engraftment with Oncostatin M	<a href="#">WO2017079744A1</a>
Materials and Methods for Treating Radiation Poisoning	<a href="#">WO2012061820A2</a>
Materials and Methods for Mobilizing Cells Including CD34+, Hematopoietic Colony Forming, and Endothelial Colony Forming Cells	<a href="#">WO2012061822A2</a>

## Publications

### *Primary Research*

1. **Hoggatt J**, Singh P, Sampath J, Pelus LM. "Prostaglandin E<sub>2</sub> enhances hematopoietic stem cell homing, survival, and proliferation". *Blood* 2009;113(22):5444-55.
2. Hoggatt A, **Hoggatt J**, Pelus LM. "A spoonful of sugar helps the medicine go down: A novel technique to improve oral gavage in mice". *J Am Assoc Lab Anim Sci*. 2010;49(3):329-34.
3. **Hoggatt J**, Pelus LM. "Eicosanoid regulation of hematopoiesis and hematopoietic stem and progenitor trafficking." *Leukemia* 2010;24(12):1993-2002.
4. Pelus LM, **Hoggatt J**, Singh P. "Pulse exposure of hematopoietic grafts to Prostaglandin E<sub>2</sub> *in vitro* facilitates their engraftment and recovery." *Cell Proliferation*. 2011;44 Suppl 1:22-9.
5. Singh P, **Hoggatt J**, Hu P, Speth JM, Fukuda S, Breyer RM, Pelus LM. "Blockade of prostaglandin E<sub>2</sub> signaling through EP1 and EP3 receptors attenuates Flt3L-dependent dendritic cell development from hematopoietic progenitors". *Blood* 2012;119(7):1671-82.
6. Singh P, Hu P, **Hoggatt J**, Moh A, Pelus LM. "Expansion of bone marrow neutrophils following G-CSF administration in mice results in osteolineage cell apoptosis and mobilization of hematopoietic stem and progenitor cells". *Leukemia* 2012;26(11):2375-83.

7. Broxmeyer HE\*, **Hoggatt J\***, O'Leary HA, Mantel C, Chitteti BR, Cooper S, Messina-Graham S, Hangoc G, Farag S, Rohrabough SL, Ou X, Speth JM, Pelus LM, Srouf EF, Campbell TB. "CD26/Dipeptidylpeptidase IV Negatively Regulates Colony Stimulating Factor Activity and Stress Hematopoiesis". *Nature Medicine* 2012, Dec;18(12):1786-9.

**\*co-first authors**

Featured interview on Nature Medicine Podcast, December 2012, "Blood Cell Boost", <http://www.nature.com/nm/podcast/index-2012-12-06.html>

Comment in: Enhancing hematopoietic growth factor performance. *Nat Med.* 2012 Dec;18(12):1740-1.

8. **Hoggatt J**, Singh P, Stilger KN, Plett PA, Sampson CH, Chua HL, Orschell CM, Pelus LM. "Recovery from hematopoietic injury by modulating prostaglandin E(2) signaling post-irradiation." *Blood Cells Molecule and Diseases* 2013;50(3):147-53.
9. **Hoggatt J**, Mohammad KS, Singh P, Hoggatt AF, Chitteti BR, Speth JM, Hu P, Poteat BA, Stilger KN, Ferraro F, Silberstein L, Wong FK, Farag SS, Czader M, Milne GL, Breyer RM, Serezani CH, Scadden DT, Guise T, Srouf EF, Pelus, LM. "Differential Stem and Progenitor Cell Trafficking by Prostaglandin E<sub>2</sub>". *Nature* 2013, Mar 21;495(7441):365-9.

Featured Interview on the HSCI Science Update, May 2013, "Aspirin-like Drugs Enhance Bone Marrow Transplants", <http://www.hsci.harvard.edu/newsroom/aspirin-drugs-enhance-bone-marrow-transplants>

Comment in: Stem cells: Painkillers caught in blood-cell trafficking. *Nature.* 2013 Mar 21;495(7441):317-8

Comment in: Blood disorders: Boosting the stem cell harvest. *Nat Rev Drug Discov.* 2013 May;12(5):344-5.

10. Zhao W, Breese E, Bowers A, **Hoggatt J**, Pelus LM, Broxmeyer HE, Goebel M, Harrington MA. "SIMPL Enhancement of Tumor Necrosis Factor- $\alpha$  Dependent p65-MED1 Complex Formation is Required for Mammalian Hematopoietic Stem and Progenitor Cell Function." *PLoS One* 2013;8(4):e61123.
11. Cutler C, Multani P, Robbins D, Kim HT, Le T, **Hoggatt J**, Pelus LM, Desponst C, Chen Y, Rezner B, Armand P, Koreth J, Glotzbecker B, Ho VT, Alyea E, Isom M, Kao G, Armant M, Silberstein L, Hu P, Soiffer RJ, Scadden DT, Ritz J, Goessling W, North TE, Mendlein J, Ballen K, Zon LI, Antin JH, and Shoemaker DD. "Prostaglandin-Modulated Umbilical Cord Blood Hematopoietic Stem Cell Transplantation." *Blood* 2013;122(17):3074-3081.
12. **Hoggatt J**, Mohammad KS, Singh P, Pelus LM. "Prostaglandin E<sub>2</sub> Enhances Long-term Repopulation but Does Not Permanently Alter Inherent Stem Cell Competitiveness." *Blood* 2013;122(17):2997-3000.

13. Speth JM, **Hoggatt J**, Singh P, Pelus LM. "Pharmacologic Increase in HIF1 $\alpha$  Enhances Hematopoietic Stem and Progenitor Homing and Engraftment." *Blood*, 2014;123(2):203-207.
14. Fukuda S, **Hoggatt J**, Singh P, Abe M, Speth JM, Hu P, Conway EM, Nucifora G, Yamaguchi S, Pelus LM. "Survivin modulates genes with divergent molecular functions and regulates proliferation of hematopoietic stem cells through Evi-1." *Leukemia*, 2015 Feb;29(2):433-40.
15. **Hoggatt J**<sup>+</sup>, Hoggatt AF<sup>\*</sup>, Tate TA, Fortman J, Pelus LM<sup>+</sup>. "Bleeding the Laboratory Mouse: Not All Methods are Equal." *Experimental Hematology*, 2016: Feb;44(2):132-137.

**\* co-first authors, + co-corresponding authors**

16. Palchadhuri R, Saez B, **Hoggatt J**, Schajnovitz A, Sykes DB, Tate TA, Czechowicz A, Kfoury Y, Ruchika F, Rossi DJ, Verdine GL, Mansour MK, Scadden DT. "Non-genotoxic conditioning for hematopoietic stem cell transplantation using a hematopoietic cell-specific internalizing immunotoxin." *Nature Biotechnology*, 2016 Jul;34(7):738-745.
17. Silberstein L, Goncalves KA, Kharchenko PV, Turcotte R, Kfoury Y, Mercier F, Baryawno N, Severe N, Bachand J, Spencer JA, Papazian A, Lee D, Chitteti BR, Srour EF, **Hoggatt J**, Tate T, Lo Celso C, Ono N, Nutt S, Heino J, Sipilä K, Shioda T, Osawa M, Lin CP, Hu GF, Scadden DT. "Proximity-based differential single-cell analysis of the niche to identify stem/progenitor cell regulators." *Cell Stem Cell*, 2016; Oct 6;19(4):530-543.
18. Singh P, **Hoggatt J**, Mohammad KS, Kamocka MM, Saunders MR, Hu P, Speth J, Carlesso N, Guise TA, Pelus LM. "Neuropeptide-Y regulates a vascular gateway for hematopoietic stem/progenitor cells." *Journal of Clinical Investigation*, 2017; Dec 1;127(12):4527-4540.
19. **Hoggatt J**<sup>\*</sup>, Singh P, Tate TA, Chou BK, Datari SR, Fukuda S, Liu L, Kharchenko PV, Schajnovitz A, Baryawno N, Mercier FE, Boyer J, Gardner J, Morrow DM, Scadden DT, Pelus LM. "Rapid mobilization reveals a highly engraftable hematopoietic stem cell." *Cell*, 2018; Jan11;172(1-2):191-204.

**\* lead corresponding author**

Featured in the NIH Director's Blog December 12, 2017, "Helping People in Need of a Stem Cell Transplant." <https://directorsblog.nih.gov/2017/12/12/helping-people-in-need-of-a-stem-cell-transplant/>

20. Czechowicz A, Palchadhuri R, Scheck A, Hu Y, **Hoggatt J**, Saez B, Pang WW, Mansour MK, Tate TA, Chan YY, Walck E, Wernig G, Shizuru JA, Winau F, Scadden DT, Rossi DJ. "Selective hematopoietic stem cell ablation using CD117-antibody-drug-conjugates enables safe and effective transplantation with immunity preservation." *Nature Communications*, 2019; Feb6;10(1):617-628.
21. Patterson AM, Liu L, Sampson CH, Plett PA, Li H, Singh P, Mohammad KS, **Hoggatt J**, Capitano ML, Orschell CM, Pelus LM. "A Single Radioprotective Dose of Prostaglandin E<sub>2</sub> Blocks Irradiation-Induced Apoptotic Signaling and Early Cycling of Hematopoietic Stem Cells." *Stem Cell Reports*, 2020; Jul 17:S2213-6711(20)30247-2.

22. Alvarez D, Masse-Ranson G, Sedimbi SK, Wisti P, Rodriguez L, Santana J, Manning T, Towner T, Geilich B, Mihai C, Mishra A, Gurumurthy S, Frederick J, von Andrian UH, **Hoggatt J**, Moore MJ, Mora JM. "Functional mRNA delivery to hematopoietic stem and progenitor cells in vivo." *BioRxiv*, 2022; <https://doi.org/10.1101/2022.12.15.520650>
23. Chen Cy, Vander Kooi A, Cavedon A, Cai X, **Hoggatt J**, Martini PGV, Miao CH. "Induction of long-term tolerance to a specific antigen using anti-CD3 lipid nanoparticles following gene therapy. *Molecular Therapy: Nucleic Acids*, 2023; Oct 5:34:102043.

*Other peer-reviewed publications*

24. Pelus LM, **Hoggatt J**, Singh P, Sampath J. "Hematopoietic Agents." *Burger's Medicinal Chemistry, Drug Discovery and Development*. Seventh Edition, 2010:567-608.
25. **Hoggatt J**, Pelus LM. "Mobilization of Hematopoietic Stem Cells From the Bone Marrow Niche to the Blood Compartment." *Stem Cell Research and Therapy*. 2011 Mar 14;2(2):13.
26. **Hoggatt J**, Pelus LM. "Many mechanisms mediating mobilization: an alliterative review." *Current Opinion in Hematology*. 2011 Jul 18(4):231-8.
27. Pelus LM, **Hoggatt J**. "Pleiotropic effects of prostaglandin E<sub>2</sub> in hematopoiesis; prostaglandin E<sub>2</sub> and other eicosanoids enhance hematopoietic stem and progenitor function." *Prostaglandins and Other Lipid Mediators*. 2011;96(1-4):3-9.
28. Pelus LM, Speth J, **Hoggatt J**. "Prostaglandin E<sub>2</sub> and other eicosanoid based strategies to enhance umbilical cord blood stem cell engraftment." *Cord Blood Biology, Transplantation, Banking and Regulation*. AABB 2011.
29. **Hoggatt J**, Pelus LM. "Hematopoietic Stem Cell Mobilization with Agents Other than G-CSF." *Methods in Molecular Biology* 2012;904:49-67.
30. **Hoggatt J**, Scadden DT. "The Stem Cell Niche: Tissue Physiology at a Single Cell Level." *Journal of Clinical Investigation* 2012;122(9):3029-34.
31. Park D\*, **Hoggatt J\***, Ferraro F\*, Scadden DT. "The Skeletal Stem Cell." *Osteoporosis*, 4th edition, 2013, Chapter 7, 127-147. **\*co-first authors**
32. **Hoggatt J**, Pelus LM. "Hematopoiesis." *Brenner's Encyclopedia of Genetics*, 2nd Edition, 2013; 418-421. **Hoggatt J\***, Speth JM and Pelus LM\*. "Sowing the seeds of a fruitful harvest: hematopoietic stem cell mobilization." *Stem Cells*, 2013;31(12):2599-2606. **\*co-corresponding authors**
33. **Hoggatt J\***, Pelus LM\*. "How beneficial is the use of NSAIDs in stem-cell transplantation?" *Expert Opinion on Pharmacotherapy*, 2013;14(18):2453-2456. **\*co-corresponding authors**

34. **Hoggatt J\*** and Pelus LM\*. "New G-CSF Agonists for Neutropenia Therapy." Expert Opinion On Investigational Drugs, September 27, 2014;23(1):21-35.  
**\*co-corresponding authors**
35. **Hoggatt J\***, Tate TA and Pelus LM\*. "Hematopoietic Stem and Progenitor Cell Mobilization in Mice." 3<sup>rd</sup> Edition Hematopoietic Stem Cell Protocols, Methods in Molecular Medicine, Humana Press, 2014;1185:43-64. **\*co-corresponding authors**
36. **Hoggatt J\***, Tate TA and Pelus LM\*. "Role of Lipegfilgrastim in the Management of Chemotherapy Induced Neutropenia." International Journal of Nanomedicine, 2015;10:2647-52. **\*co-corresponding authors**
37. **Hoggatt J**, Kfoury Y and Scadden DT. "Hematopoietic Stem Cell Niche in Health and Disease." Annual Review of Pathology, 2016;11:555-581.
38. **Hoggatt J** and Scadden DT. "Structure and Function of the Bone Marrow Hematopoietic Niche." Encyclopedia of Immunobiology, 2016; Volume 3:400-406.
39. Menendez-Gonzalez JB and **Hoggatt J**. "Hematopoietic Stem Cell Mobilization: Current Collection Approaches, Stem Cell Heterogeneity, and a Proposed New Methods for Stem Cell Transplant Conditioning." Stem Cell Reviews and Reports, 2021;17(6):1939-1953.

*Non-peer reviewed scientific or medical publications/materials in print or other media*

40. **Hoggatt J**. "Stem Cell Barcoding: Is it time to change our definition of a hematopoietic stem cell?" The Hematologist, Jan-Feb 2015 Issue.
41. **Hoggatt J**. "Ebola Infection in Mice." The Hematologist, May-Jun 2015 Issue.
42. **Hoggatt J**. "Designer Babies?" The Hematologist, Jul-Aug 2015 Issue.
43. Rasmussen HK, **Hoggatt J**. "Hematopoietic Stem Cells Should Hold Their Breath." The Hematologist, Sep-Oct 2015 Issue.
44. **Hoggatt J**. "Anti-CD47 Therapy is More Than a Dinner Bell." The Hematologist, Nov-Dec 2015 Issue.
45. **Hoggatt J**. "Therapeutically Enhancing Stem Cell Engraftment." The Hematologist, Jan-Feb 2016 Issue.
46. **Hoggatt J**. "A Clearer View of HSCs." The Hematologist, Mar-Apr 2016 Issue.
47. **Hoggatt J**. "Jedi T Cells." The Hematologist, Jul-Aug 2016 Issue.
48. **Hoggatt J**. "Gene Therapy for 'Bubble Boy' Disease." **Cell**, 2016; Jul 14;166(2):263.
49. Chou BK, **Hoggatt J**. "Strength in Numbers." The Hematologist, Sep-Oct 2016 Issue.



50. **Hoggatt J.** "A SWAT Team for Stem Cell Transplantation." The Hematologist Nov-Dec 2016 Issue.
51. **Hoggatt J.** "Novel Insights into Mitochondrial Regulation of Hematopoiesis." The Hematologist Jan-Feb 2017 Issue.
52. **Hoggatt J.** "Learning to Count Beyond Four." The Hematologist Mar-Apr 2017 Issue.
53. **Hoggatt J.** "Seeing the Future." The Hematologist May-Jun 2017 Issue.
54. **Hoggatt J.** "Cellular Heterogeneity Based on Microniches." The Hematologist Jul-Aug 2017 Issue.
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56. **Hoggatt J.** "Successes in Gene Therapy: 2017." The Hematologist Jan-Feb 2018 Issue.
57. **Hoggatt J** and Pelus LM. "The Factory of Blood Production: Hematopoietic Stem Cells." Methods in Molecular Biology, 2023;2567:3-7.

#### *Books*

Editor of "Hematopoietic Stem Cells: Methods and Protocols."

<https://www.amazon.com/Hematopoietic-Stem-Cells-Protocols-Molecular-ebook/dp/B0BJPDCKTX/>