

Loren Gragert, Ph.D.

October 2022

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## Education

2014 Ph.D., Biomedical Informatics and Computational Biology, University of Minnesota, Minneapolis, MN  
2001 B.S., Biochemistry, University of St. Thomas, Saint Paul, MN  
B.A., Quantitative Methods / Computer Science, University of St. Thomas, Saint Paul, MN

## Academic Appointments

2015- Assistant Professor, Department of Pathology and Laboratory Medicine  
Tulane University School of Medicine, New Orleans, LA

## Clinical Appointments

2020- Histocompatibility Laboratory Director-In-Training (Expected F(ACHI) Board Certification 03/2023)  
Section of Clinical Immunology, Allergy, and Rheumatology, Department of Medicine  
Tulane University School of Medicine, New Orleans, LA

## Professional Experience

2003-15 Senior Bioinformatics Scientist, National Marrow Donor Program / Be The Match, Minneapolis, MN  
2001-03 Software Engineer, Lockheed Martin Tactical Systems, Eagan, MN

## Professional Organizations

2004- American Society for Histocompatibility and Immunogenetics (ASHI)  
2007- European Federation of Immunogenetics (EFI)  
2018- American Society of Transplantation (AST)  
2008-15 World Marrow Donor Association (WMDA)  
2006-12 American Society of Human Genetics (ASHG)

## Professional Activities

### Institutional Service

2018- Faculty Advisor, Computational Biology at Tulane student organization

### Teaching

2020- Tulane SOM GBCH 7240, Advanced Bioinformatics | Graphics and Deep Learning units  
2018- Tulane SOM MCPB 6070, Molecular and Cellular Pathobiology | Bioinformatics unit  
2018- Tulane SOM GBCH 7230, Intro to Bioinformatics | Python and Sequence Alignment units  
2016- Tulane SOM Pathology Resident Training Program | Pathology Informatics unit

### Current Trainees

2020- D. Giovanni Biagini, PhD program in Biomedical Sciences  
2020- Marian Dribus, PhD program in Biomedical Sciences  
2020- Grace Wager, PhD program in Biomedical Sciences

### Trainee Alumni

2016-19 Navchetan Kaur (Postdoctoral Fellow | Postdoctoral Fellow, Atul Butte Lab, UCSF | Natera)  
2016-17 Richard Davis (MD/MPH Practicum and Culminating Experience | Pathology Resident, Duke)

### Extramural Services

2022- International HLA and Immunogenetics Workshop (IHIW) Councilor  
 2021- Virtual Crossmatch Advisory Committee, National Marrow Donor Program / Be The Match  
 2021- Director-In-Training Career Development Workshop Subcommittee, ASHI  
 2021- Instructor, Basic & Population Genetics; Bioinformatics, AFDT Histocompatibility Specialist Course  
 2021- Louisiana Organ Procurement Agency (LOPA) HLA Subcommittee  
 2020- Editorial Board, *Human Immunology*  
 2019 Local Organizer, 2nd Immune Polymorphism and Population Dynamics Workshop, New Orleans, LA  
 2019- Immunobiology Working Committee, Center for International Blood and Marrow Transplant Research  
 2019- Project Leader, HLA Dictionary, 18th International HLA and Immunogenetics Workshop  
 2018 Co-Organizer, 1st Immune Polymorphism and Population Dynamics Workshop, Ramat Gan, Israel  
 2015- Editorial Board, *HLA* (formerly *Tissue Antigens*)  
 2013-2015 Information Technology Committee, American Society for Histocompatibility and Immunogenetics

#### Journal Reviewing

Human Immunology (Editorial Board) | HLA (Editorial Board) | American Journal of Transplantation | Transplantation | Cancer Research | Bioinformatics | Cell Genomics | Journal of the American Society of Nephrology | PLoS ONE | PLoS Neglected Tropical Diseases | Cytotherapy | BMC Bioinformatics | International Journal of Immunogenetics | Frontiers in Genetics | Exploration of Immunology | Health Policy and Technology

#### Grant Reviewing

NIH PBKD Study Section (ECR Program) | UK MRC Fellowship

### **Invited Talks**

#### National & International

12/2022 Georgetown University, Current Topics in Histocompatibility and Transplantation Teleconference  
 12/2022 Canadian Blood Services - HLA Webinar Series  
 06/2022 American Transplant Congress - IMPACT Session Speaker  
 12/2021 Georgetown University, Current Topics in Histocompatibility and Transplantation Teleconference  
 04/2021 European Federation for Immunogenetics Virtual Conference, Educational Session  
 10/2020 Georgetown University, Current Topics in Histocompatibility and Transplantation Teleconference  
 10/2020 American Society for Histocompatibility and Immunogenetics (ASHI) Virtual Conference  
 03/2020 One Lambda Technical Workshop, Rancho Mirage, CA  
 09/2019 American Society for Histocompatibility and Immunogenetics (ASHI) Conference, Pittsburgh  
 09/2019 Georgetown University, Current Topics in Histocompatibility and Transplantation Teleconference  
 05/2019 Georgetown University, Current Topics in Histocompatibility and Transplantation Teleconference  
 07/2018 University of Pennsylvania, Dept. of Pathology, Histocompatibility Laboratory  
 01/2015 American Association of Blood Bankers (AABB) Audioconference  
 09/2014 Georgetown University, Current Topics in Histocompatibility and Transplantation Teleconference  
 09/2012 Georgetown University, Current Topics in Histocompatibility and Transplantation Teleconference  
 10/2011 American Association of Blood Bankers (AABB) Conference, San Diego  
 06/2011 Cord Blood Symposium, Plenary Session, San Francisco

#### Regional & Institutional

07/2022 Tulane University, Biomedical Informatics and Genomics seminar series  
 12/2018 Tulane University, Primate Research Center seminar series  
 10/2018 Tulane University, Computer Science Department seminar series  
 07/2018 University of Alabama-Birmingham, Informatics Institute seminar series  
 01/2018 Tulane University School of Medicine, Biochemistry and Molecular Biology Department seminar series  
 04/2017 LSU Health Sciences Center, Epidemiology Department seminar series  
 03/2017 Tulane University School of Medicine, Structural and Cellular Biology Department seminar series  
 11/2014 National Marrow Donor Program Council Meeting

### **Research Support**

## Pending

2023-2028 NIAID Parent R01 - "HLA Immunogenetics and Kidney Allograft Outcomes" - (Co-I; 25% effort)  
(Reviewed with Impact Score 19; Percentile 4%)

## Ongoing

2020-2025 NIAID HLA/KIR Region Genomics 1U01AI152960-01 - (Co-I; 22.5% effort)  
"MHC and KIR Sequencing and Association Analyses in the iGeneTRAIN Studies"  
2020-2022 United Network for Organ Sharing, Sponsored Project - (PI)  
"Update Calculated Panel Reactive Antibody (CPRA) Calculator"  
2015- National Marrow Donor Program (NMDP) Sponsored Project - (PI)  
"HLA Bioinformatics Research"

## **Awards**

2022 American Transplant Congress, Young Investigator Award  
2021 ASHI Conference, Most Clinically Relevant Poster Abstract Award  
2010 World Marrow Donor Association (WMDA) International Donor Registries Conference (IDRC), Best Abstract  
2009 British Society of Histocompatibility and Immunogenetics (BSHI) Meeting, Best Abstract  
2009 European Federation of Immunogenetics (EFI) Conference, Best Abstract

## **Publications**

### Original Investigations

1. Stahl M, Li Q, Lynch K, Koletzko S, Mehta P, **Gragert L**, Norris J, Aronsson C, Lindfors K, Kurppa K, Ilonen J, Krischer J, Alkolkar B, She J, Ziegler A, Toppari J, Rewers M, Agardh D, Hagopian, W, Liu E, and the TEDDY Study Group. (2022) Incidence of Pediatric Celiac Disease Varies by Region. American Journal of Gastroenterology. In Press.
2. **Gragert L**, Kadatz M, Alcorn J, Stewart D, Gill J, Liwski R, Gebel H, Gill J, Lan J. (2022) ABO-Adjusted Calculated Panel Reactive Antibody (cPRA): A Unified Metric for Immunologic Compatibility in Kidney Transplantation. American Journal of Transplantation. doi: 10.1111/ajt.17175.
3. Rushakoff J, **Gragert L**, Pando MJ, Huang E, Stewart D, Lindblad K, Zhang X, Patel JK, Kobashigawa J, Kransdorf EP. (2022) HLA Homozygosity and Sensitization in Kidney Transplant Candidates. Transplantation Direct 8, e1312.
4. Schindler E, Dribus M, Duffy BF, Hock K, Farnsworth CW, **Gragert L**, Liu C. (2021) Human leukocyte antigen genetic polymorphism in patients with Coronavirus Disease 2019 in Midwestern United States. HLA 98(4): 370-379.
5. Copley H, **Gragert L**, Leach A, Kosmoliaptsis, V. (2021) Influence of HLA class II polymorphism on predicted cellular immunity against SARS-CoV-2 at the population and individual level. Frontiers in Immunology 12:6-8.
6. Israeli S, **Gragert L**, Maiers M, Louzoun Y. (2021) HLA Haplotype Frequency Estimation for Heterogeneous Populations Using a Graph-Based Imputation Algorithm. Human Immunology 82(10) 746-757.
7. Sajulga R, Madbouly A, Fingerson S, **Gragert L**, Bashyal P, Bolon YT, Maiers M. (2021) Predicting HLA-DPB1 Permissive Probabilities through a DPB1 Prediction Service towards the Optimization of HCT Donor Selection. Human Immunology 82(21) 903-911.
8. Mayor N, Wang T, Lee SJ, Kuxhausen M, Vierra-Green C, Barker DJ, Auletta J, Bhatt VR, Gadalla SM, **Gragert L**, Inamoto Y, Morris GP, Paczesny S, Reshef R, Ringden O, Shaw BE, Shaw P, Spellman S, Marsh SGE. (2021) Impact of Previously Unrecognized HLA Mismatches Using Ultrahigh Resolution Typing in Unrelated Donor Hematopoietic Cell Transplantation. Journal of Clinical Oncology 39:21 2397-2409.
9. Story, MS, Wang T, Bhatt VR, Battiwalla M, Badawy SM, Kamoun M, **Gragert L**, Brown V, Baxter-Lowe LA, Marsh SGE, Gadalla SM, Schetelig J, Mytilineos J, Miklos D, Waller E, Kuxhausen M, Spellman S, Lee S, Armistead PM (2021) Genetics of HLA peptide presentation, and impact on outcomes in HLA-matched allo-HCT. Transplantation and Cellular Therapy 27:7 591-599.
10. Kransdorf E, Pando M, Stewart D, Lindblad K, Patel J, Kim I, Zhang X, Maiers M, Kobashigawa J, **Gragert L**. (2021) Stem Cell Donor HLA Typing Improves CPRA in Kidney Allocation. American Journal of Transplantation 21(1) 138-147.
11. Sullivan, H, **Gragert L**, Smith G, Lindblad K, Gebel H, Bray R. (2020) A simple electronic tool for comparing amino acid sequences of HLA-DPB1 alleles. Human Immunology 81(8): 430-436.
12. Kaur N, Pinelli D, Kransdorf E, Pando M, Smith G, Murphey C, Kamoun M, Bray R, Tambur A, **Gragert L**. (2020) A blueprint for electronic utilization of ambiguous molecular HLA typing data in organ allocation systems and virtual crossmatch. Human Immunology 81(2-3) 65-72.

13. Lobkovsky A, Levi L, Wolf Y, Maiers M, **Gragert L**, Alter I, Louzoun Y, Koonin E. (2019) Multiplicative fitness, rapid haplotype discovery and fitness decay explain evolution of human MHC. Proceedings of the National Academy of Sciences 116(28): 14098-14104.
14. Zhong C, **Gragert L**, Maiers M, Hill BT, Garcia-Gomez J, Gendzekhadze K, Senitzer D, Song J, Weisenburger D, Goldstein L, Wang S. (2019) The association between HLA and non-Hodgkin lymphoma subtypes, among a transplant-indicated population. Leukemia & Lymphoma 60(12): 2899-2908.
15. Allan D, Kiernan J, **Gragert L**, Dibdin M, Bartlett D, Campbell T, Mostert K, Halpenny M, Ganz K, Maiers M, Petraszko T, Elmoazzen H. (2019) Reducing ethnic disparity in access to high quality HLA-matched cord blood units for transplantation: analysis of the Canadian Blood Services' Cord Blood Bank inventory. Transfusion 59(7): 2382-2388.
16. Maiers M, Halagan M, **Gragert L**, Bashyal P, Schneider J, Lutsker P, Louzoun Y. (2019) GRIMM : GGraph IMputation and Matching for HLA Genotypes. Bioinformatics 35(18): 3520-3523.
17. Kaur N, Kransdorf EP, Pando MJ, Maiers M, Ray B, Lee JH, Lalli P, Murphey C, Bray R, **Gragert L**. (2018) Mapping molecular HLA typing data to UNOS antigen equivalents. Human Immunology 79: 781-789.
18. Louzoun Y, Alter I, **Gragert L**, Albrecht M, Maiers M. (2018) Modeling Coverage Gaps in Haplotype Frequencies via Bayesian Inference to Improve Stem Cell Donor Selection. Immunogenetics 70: 279-292.
19. Alter I, **Gragert L**, Fingerson S, Maiers M, Louzoun Y. (2017) HLA Class I Haplotype Diversity Is Consistent with Selection for Frequent Existent Haplotypes. PLoS Computational Biology 13(8): e1005693.
20. Dehn J, Setterholm M, Buck K, Kempenich J, Beduhn B, **Gragert L**, Madbouly A, Fingerson S, Maiers M (2016) A Predictive HLA Matching Algorithm to Enhance Rapid Identification of the Optimal Unrelated Hematopoietic Stem Cell Sources for Transplant. Biology of Blood and Marrow Transplantation 22(11): 2038-2046.
21. Bochtler W, **Gragert L**, Patel ZI, Robinson J, Steiner D, Hofmann JA, Pingel J, Baouz A, Melis A, Schneider J, Eberhard HP, Oudshoorn M, Marsh SGE, Maiers M, Muller CR (2016) A comparative reference study for the validation of HLA-matching algorithms in the search for allogeneic hematopoietic stem cell donors and cord blood units. HLA 87(6): 439-48.
22. Beksac M\*, **Gragert L\***, Fingerson S, Maiers M, Zhang MJ, Albrecht M, Zhong X, Cozen W, Dispenzeiri A, Lonial S, Hari P. (2016) HLA Polymorphism and Risk of Multiple Myeloma. Leukemia 30, 2260-2264. \*Equal Contributions
23. Paunić V, **Gragert L**, Schneider J, Müller C, Maiers M. (2016) Charting Improvements in US Registry HLA Typing Ambiguity Using a Typing Resolution Score. Human Immunology 77(7): 542-9.
24. Torikai H, Mi L, **Gragert L**, Maiers M, Najjar A, Ang S, Maiti S, Dai J, Switzer K, Huis H, Dulay G, Reik A, Rebar E, Holmes M, Gregory P, Champlin R, Shpall E, Cooper L.J.N. (2016) Genetic editing of HLA expression in hematopoietic stem cells to broaden their human application. Scientific Reports 6, 21757.
25. Petz LD, Burnett JC, Li H, Li S, Tonai R, Bakalinskaya M, Shpall S, Armitage S, Kurtzberg J, Regan D, Clark P, Querol S, Gutman J, Spellman S, **Gragert L**, Rossi J. (2015) Progress toward curing HIV infection with hematopoietic cell transplantation. Stem Cells Cloning 8: 109-16.
26. Slater N, Louzoun Y, **Gragert L**, Maiers M, Chatterjee A, Albrecht M. (2015) Power Laws for Heavy-Tailed Distributions: Modeling Allele and Haplotype Diversity for the National Marrow Donor Program. PLoS Computational Biology 11(4), e1004204s.
27. **Gragert L**, Eapen M, Williams E, Freeman J, Spellman S, Baitty R, Hartzman R, Rizzo JD, Horowitz M, Confer D, Maiers M. (2014) HLA Match Likelihoods for Hematopoietic Stem-Cell Grafts in the U.S. Registry. The New England Journal of Medicine 371, 339-348.
28. **Gragert L**, Fingerson S, Albrecht M, Maiers M, Kalaycio M, Hill BT. (2014) Fine-Mapping of HLA Associations with Chronic Lymphocytic Leukemia in US Populations. Blood 124(17), 2657-65.
29. Madbouly A, **Gragert L**, Freeman J, Leahy N, Gourraud PA, Hollenbach JA, Kamoun M, Fernandez-Vina M, Maiers M. (2014) Validation of statistical imputation of allele-level multilocus phased genotypes from ambiguous HLA assignments. Tissue Antigens 84(3), 285-92.
30. **Gragert L**, Madbouly A, Freeman J, Maiers M. (2013) Six-locus high resolution HLA haplotype frequencies derived from mixed-resolution DNA typing for the entire US donor registry. Human Immunology 74, 1313-1320.
31. Eberhard HP, Madbouly AS, Gourraud PA, Balere MA, **Gragert L**, Torres HM, Pingel J, Schmidt AH, Steiner D, van der Zanden HG, Oudshoorn M, Marsh SG, Maiers M, Muller CR. (2013) Comparative validation of computer programs for haplotype frequency estimation from donor registry data. Tissue Antigens 82(2), 93-105.
32. Milius RP, Mack SJ, Hollenbach JA, Pollack J, Heuer ML, **Gragert L**, Spellman S, Guethlein LA, Cooley S, Bochtler W, Mueller CR, Robinson J, Marsh SG, Maiers M (2013) Genotype List String: a grammar for describing HLA and KIR genotyping results in a text string. Tissue Antigens 82, 106-12.

33. Petz LD, Redei I, Bryson Y, Regan D, Kurtzberg J, Shpall E, Gutman J, Querol S, Clark P, Tonai R, Santos S, Bravo A, Spellman S, **Gragert L**, Rossi J, Li S, Li H, Senitzer D, Zaia J, Rosenthal J, Forman S, Chow R. (2013) Hematopoietic Cell Transplantation with Cord Blood for Cure of HIV Infections. Biology of Blood Marrow Transplantation 19, 393–7.
34. Maiers M, **Gragert L**, Madbouly A, Steiner D, Marsh SGE, Gourraud PA, Oudshoorn M, Zanden H, Schmidt AH, Pingel J, Hofmann J, Muller C, Eberhard HP (2013) 16(th) IHIW: Global analysis of registry HLA haplotypes from 20 Million individuals: Report from the IHIW Registry Diversity Group. International Journal of Immunogenetics 40(1):66–71.
35. Hollenbach JA, Madbouly A, **Gragert L**, Vierra-Green C, Flesch S, Spellman S, Begovich A, Noreen H, Trachtenberg E, Williams T, Yu N, Shaw B, Fleischhauer K, Fernandez-Vina M, Maiers, M (2012) A combined DPA1~DPB1 amino acid epitope is the primary unit of selection on the HLA-DP heterodimer. Immunogenetics 64(8):559–69.
36. Paunić V\*, **Gragert L\***, Madbouly A, Freeman J, Maiers M. (2012) Measuring Ambiguity in HLA Typing Methods. PLoS ONE 7(8):e43585. \*Equal Contributions
37. Klitz W, **Gragert L**, Trachtenberg E. (2012) Spectrum of HLA associations: the case of medically refractory pediatric acute lymphoblastic leukemia. Immunogenetics 64(6):409–19.
38. Abi-Rached L, Jobin M, Kulkarni S, McWhinnie, A, Dalva K, **Gragert L**, Babrzadeh F, Gharizadeh B, Luo M, Plummer F, Kimani J, Carrington M, Middleton D, Rajalingam R, Beksac M, Marsh SGE, Maiers M, Guethlein L, Tavoularis S, Little AM, Green RE, Norman PJ, Parham P (2011) The Shaping of Modern Human Immune Systems by Multiregional Admixture with Archaic Humans. Science 334(6052), 89-94.
39. Klitz W, **Gragert L**, Maiers M, Fernandez-Viña M, Ben-Naeh Y, Benedek G, Brautbar C, Israel S (2010). Genetic differentiation of Jewish populations. Tissue Antigens 76(6), 442-58.
40. Klitz W, **Gragert L**, Maiers M, Tu B, Lazaro A, Yang R, Xu Q, Masaberg C, Ng J, Hurley CK (2009) Four-locus high-resolution HLA typing in a sample of Mexican Americans. Tissue Antigens 74: 508-513.
41. Klitz W, Maiers M, **Gragert L** (2008) Re-creation of the genetic composition of a founder population. Human Genetics 124: 417-421.
42. Howard DH, Meltzer D, Kollman C, Maiers M, Logan B, **Gragert L**, Setterholm M, Horowitz MM (2008) Use of cost-effectiveness analysis to determine inventory size for a national cord blood bank. Medical Decision Making 28: 243-253.
43. Kollman C, Maiers M, **Gragert L**, Muller C, Setterholm M, Oudshoorn M, Hurley CK (2007) Estimation of HLA-A, -B, -DRB1 haplotype frequencies using mixed resolution data from a national registry with selective retyping of volunteers. Human Immunology 68: 950-958.
44. Maiers M, **Gragert L**, Klitz W (2007) High-resolution HLA alleles and haplotypes in the United States population. Human Immunology 68: 779-788.

#### Reviews and Commentary

1. Yu N, Askar M, Wadsworth K, **Gragert L**, Fernandez-Vina M. (2022) Current HLA Testing recommendations to support HCT. Human Immunology DOI: 10.1016/j.humimm.2022.04.008 PMID: 35798627
2. **Gragert L**. A New Tool for Interpreting Molecular HLA Typing Data for Entry into UNet. (2019) ASHI Quarterly 42(4) 30-31.
3. Kransdorf E, Pando M, **Gragert L**, Kaplan B. (2017) HLA Population Genetics in Solid Organ Transplantation. Transplantation 101(9):1971-1976.

#### Book Chapters and Government Reports

1. Organ Procurement and Transplantation Network (OPTN) Public Comment Proposal - "Change Calculated Panel Reactive Antibody (CPRA) Calculation". Spring 2022. <https://optn.transplant.hrsa.gov/policies-bylaws/public-comment/change-calculated-panel-reactive-antibody-cpra-calculation/>
2. Petz LD, Spellman S, **Gragert L**. Cord Blood: Biology, Transplantation, Banking, and Regulation. Broxmeyer H, editor. Bethesda, MD: AABB Press; 2011. Chapter 32, The Underutilization of Cord Blood Transplantation: Extent of the Problem, Causes, and Methods of Improvement; p.557-584. 714p.
3. Howard DH, Maiers M, Kollman C, Logan B, **Gragert L**, Setterholm, M. Cord Blood - Establishing a National Hematopoietic Stem Cell Bank Program. Meyer EA, Hanna K, Gebbie K, editors. Washington, DC: Institute of Medicine of the National Academies: The National Academies Press; 2005. Chapter Appendix E, A Cost-Benefit Analysis of Increasing Cord Blood Inventory Levels; p.221-241. 314p. <https://www.nap.edu/read/11269/chapter/14>

Preprints:

1. Nilsson J, Kaabinejadian S, Yari H, Peters B, Barra C, **Gragert L**, Hildebrand W, Nielsen M. (2022) Machine learning reveals limited contribution of trans-only encoded variants to the HLA-DQ immunopeptidome by accurate and comprehensive HLA-DQ antigen presentation prediction. [BioRxiv](https://doi.org/10.1101/2022.09.14.507934) DOI: 10.1101/2022.09.14.507934

Abstracts: (130+ conference abstracts; available upon request)