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Case Western Reserve University School of Medicine, Department of Pathology
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EDUCATION

Harvard University

Ph.D. in Virology

Dissertation: HIV-1 capsid engages nucleoporin NUP153 to promote viral nuclear entry

Date of dissertation defense: 10/4/2013, Date of degree: 3/7/2014

Major fields: Virology, Molecular Genetics, Biochemistry, Cell Biology

Cambridge, MA

9/2006 – 11/2013

University of California, Los Angeles

B.S. with Honors in Microbiology, Immunology & Molecular Genetics.

Magna Cum Laude

Los Angeles, CA

9/2002 – 6/2006

ACADEMIC POSITIONS

Case Western Reserve University School of Medicine

Department of Pathology

Assistant Professor

Cleveland, OH

9/2019 – current

University of Washington

Department of Genome Sciences

American Cancer Society Postdoctoral Fellow in the laboratory of Douglas Fowler, Ph.D.

Seattle, WA

5/2014 – 8/2019

Dana-Farber Cancer Institute

Department of Cancer Immunology and AIDS

Research Fellow in the laboratory of Alan Engelman, Ph.D.

Boston, MA

12/2013 – 4/2014

Harvard Medical School at the Dana-Farber Cancer Institute

Program in Virology & Department of Cancer Immunology and AIDS

Graduate student in the laboratory of Alan Engelman, Ph.D.

Boston, MA

9/2006 – 11/2013

PDL BioPharma

Intern under the direction of Audie Rice, Ph.D.

Fremont, CA

7/2006 – 8/2006

University of California, Los Angeles

Department of Microbiology, Immunology and Molecular Genetics

Undergraduate research / honors thesis in the laboratory of Benhur Lee, Ph.D.

Los Angeles, CA

5/2004 – 6/2006

PUBLICATIONS

Peer reviewed:

Suiter CS, Moriyama T, **Matreyek KA**, Yang W, Scaletti ER, Nishii R, Yang W, Hoshitsuki K, Singh M, Trehan A, Parish C, Smith C, Bhojwani D, Yuen L YP, Li C-K, Li C-H, Yang Y-L, Walker GJ, Goodhand JR, Kennedy NA, Klussmann FA, Bhatia S, Relling MV, Kato M, Hori H, Bhatia P, Ahmad T, Yoeh AE, Stenmark P, Fowler DM, Yang JJ. Massively parallel variant characterization identifies NUDT15 alleles associated with thiopurine toxicity. *Proc. Natl. Acad. Sci. U.S.A.* 2020 Feb 24. pii: 201915680. doi: 10.1073/pnas.1915680117. PMID: 32094176

Glazer AM, Kroncke BM, **Matreyek KA**, Yang T, Wada Y, Shields T, Salem JE, Fowler DM, Roden DM. Deep Mutational Scan of an SCN5A Voltage Sensor. *Circ Genom Precis Med.* 2020 Jan 12;10.1161 PMID: 31928070.

Matreyek KA^o, Stephany JJ, Chiasson MA, Hasle N, Fowler DM. An improved platform for functional assessment of large protein libraries in mammalian cells. *Nucleic Acids Res.* 2019 Oct; <http://doi.org/10.1093/nar/gkz910> ^o **co-corresponding**

Matreyek KA^{*}, Starita LM^{*}, Stephany JJ, Martin B, Chiasson MA, Gray VE, Kircher M, Khechaduri A, Dines JN, Hause RJ, Bhatia S, Evans WE, Relling MV, Yang W, Shendure J, Fowler DM. Multiplex assessment of protein variant abundance by massively parallel sequencing. *Nat Genet.* 2018 Jun; 50(6):874-882 ***contributed equally**

Hill AJ, McFaline-Figueroa JL, Starita LM, Gasperini MJ, **Matreyek KA**, Packer J, Jackson D, Shendure J, Trapnell C. On the design of CRISPR-based single cell molecular screens. *Nat Methods.* 2018 Apr;15(4):271-274.

Matreyek KA, Stephany JJ, Fowler DM. A platform for functional assessment of large variant libraries in mammalian cells. *Nucleic Acids Res.* 2017 Jun;15(4):e102.

Matreyek KA, Wang W, Serrao E, Singh P, Levin HL, Engelman A. Host and viral determinants for MxB restriction of HIV-1 infection. *Retrovirology.* 2014 Oct; 11:90.

Fribourgh JL^{*}, Nguyen HC^{*}, **Matreyek KA**^{*}, Alvarez FJD, Summers BJ, Dewdney TG, Shi J, Aiken C, Zhang P, Engelman A, Xiong Y. Structural insight into HIV-1 restriction by MxB. *Cell Host Microbe.* 2014 Nov; 16:1-12. *** contributed equally**

Matreyek KA, Yücel SS, Li X, Engelman A. Nucleoporin NUP153 phenylalanine-glycine motifs engage a common binding pocket within the HIV-1 capsid protein to mediate lentiviral infectivity. *PLoS Pathog.* 2013 Oct;9(10):e1003693.

Koh Y, Wu X, Ferris AL, **Matreyek KA**, Smith SJ, Lee K, KewalRamani VN, Hughes SH, Engelman A. Differential effects of human immunodeficiency virus type 1 capsid and cellular factors nucleoporin 153 and LEDGF/p75 on the efficiency and specificity of viral DNA integration. *J Virol.* 2013 Jan;87(1):648-58.

Matreyek KA, Engelman A. The requirement for nucleoporin NUP153 during human immunodeficiency virus type 1 infection is determined by the viral capsid. *J Virol.* 2011 Aug;85(15):7818-27.

Koh Y, **Matreyek KA**, Engelman A. Differential sensitivities of retroviruses to integrase strand transfer inhibitors. *J Virol.* 2011 Apr;85(7):3677-82.

Krishnan L*, **Matreyek KA***, Oztop I*, Lee K, Tipper CH, Li X, Dar MJ, Kewalramani VN, Engelman A. The requirement for cellular transportin 3 (TNPO3 or TRN-SR2) during infection maps to human immunodeficiency virus type 1 capsid and not integrase. *J Virol.* 2010 Jan;84(1):397-406. * **contributed equally**

Aguilar HC, **Matreyek KA**, Choi DY, Filone CM, Young S, Lee B. Polybasic KKR motif in the cytoplasmic tail of Nipah virus fusion protein modulates membrane fusion by inside-out signaling. *J Virol.* 2007 May;81(9):4520-32.

Aguilar HC, **Matreyek KA**, Filone CM, Hashimi ST, Levroney EL, Negrete OA, Bertolotti-Ciarlet A, Choi DY, McHardy I, Fulcher JA, Su SV, Wolf MC, Kohatsu L, Baum LG, Lee B. N-glycans on Nipah virus fusion protein protect against neutralization but reduce membrane fusion and viral entry. *J Virol.* 2006 May;80(10):4878-89.

Invited papers:

Hasle N, **Matreyek KA**, Fowler DM. The Impact of Genetic Variants on PTEN Molecular Functions and Cellular Phenotypes. *Cold Spring Harb Perspect Med.* 2019 Aug 26. doi: 10.1101/cshperspect.a036228

Matreyek KA, Engelman A. Viral and cellular requirements for the nuclear entry of retroviral preintegration nucleoprotein complexes. *Viruses.* 2013 Oct 7;5(10):2483-511. doi: 10.3390/v5102483.

Matreyek KA*, Oztop I*, Freed EO, Engelman A. Viral latency and potential eradication of HIV-1. *Expert Rev Anti Infect Ther.* 2012 Aug;10(8):855-7. * **contributed equally**

Pre-publication research papers:

Chao JT, Hollman R, Meyers W, Meilli F, **Matreyek KA**, Austin P, Fowler DM, Haas K, Roskelley CD, Loewen CJR. A premalignant cell-based model for functionalization and classification of PTEN variants. *Manuscript in review.*

GRANTS AND AWARDS

Finalist, UW Postdoc Mentoring Award (2019)	<i>5/2019</i>
National Institutes of Health (NIH) National Institute of Allergy and Infectious Diseases (NIAID) Career Transition (K22) Phase I Award Notification	<i>6/2018</i>
Finalist, UW Postdoc Mentoring Award (2018)	<i>4/2018</i>
American Cancer Society Postdoctoral Fellowship (PF-15-221-01)	<i>1/2016</i>
University of Washington / Fred Hutchinson Cancer Research Center (FHCRC) Interdisciplinary Training Grant in Cancer (2T32CA080416)	<i>12/2014</i>
Wasserman Scholarship - Undergraduate Research Scholarship Program	<i>9/2005</i>

RESEARCH PRESENTATIONS

Matreyek KA, Stephany JJ, Fowler DM. Large-scale characterization of PTEN missense variants that differentially affect intracellular protein abundance and phosphatase activity. Poster presentation at the Protein Society Annual Meeting 33 (PS33), June 2019, Seattle, WA.

Matreyek KA, Stephany JJ, Chiasson MA, Hasle N, Fowler DM. Improved Methods for Recombinase-Mediated Multiplex Assessments of Variant Libraries in Mammalian Cells. Poster presentation at the Mammalian Synthetic Biology Workshop 6 (mSBW6), May 2019, Chicago, IL.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. University of Pittsburgh School of Medicine. March 2019, Pittsburgh, PA.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. Case Western Reserve University School of Medicine. March 2019, Cleveland, OH.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. National Institutes of Allergy and Infectious Diseases. February 2019, Bethesda, MD.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. Icahn School of Medicine at Mount Sinai. February 2019, New York, NY.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. Wayne State University. February 2019, Detroit, MI.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. The Wistar Institute. January 2019, Philadelphia, PA.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. Mayo Clinic. January 2019, Rochester, MN.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. Vanderbilt University Medical Center. December 2018, Nashville, TN.

Matreyek KA. Massively Parallel Assays for Protein Function in Disease. Oral Presentation / Invited Speaker. University of Toledo Medical Center. December 2018, Toledo, OH.

Matreyek KA. Massively Parallel Assays for Protein Dysregulation in Disease. Oral Presentation / Invited Speaker. University of Illinois, Urbana-Champaign. October 2018, Urbana-Champaign, IL.

Matreyek KA, Starita LM, Stephany JJ, Martin B, Chiasson M, Gray VE, Kircher M, Khechaduri A, Dines JN, Hause RJ, Bhatia S, Evans WE, Relling MV, Yang W, Shendure J, Fowler DM. Multiplex assessment of protein variant abundance by massively parallel sequencing: PTEN and TPMT. Oral presentation at the Critical Assessment of Genome Interpretation 5 Conference, July 2018, Chicago, IL.

Matreyek KA, Stephany JJ, Fowler DM. Recombinase-Mediated Massively Parallel Characterization of Protein Function in Mammalian Cells. Poster presentation at the Engineering Biology Research Consortium (EBRC) spring retreat, March 2018, Seattle, WA.

Matreyek KA, Starita LM, Stephany JJ, Martin B, Chiasson M, Gray VE, Kircher M, Khechaduri A, Hause RJ, Shendure J, Fowler DM. Multiplex, prospective identification of unstable pathogenic variants of clinically important genes. Oral presentation given at the 2017 Curating the Clinical Genome meeting, June

2017, Washington D.C.

Matreyek KA, Yucel SS, Engelman A. The NUP153 C-terminal FG domain binds HIV-1 capsid to promote viral nuclear import. Oral presentation given at the Cold Spring Harbor Meeting on Retroviruses, May 2012, Cold Spring Harbor, NY.

Matreyek KA, Yucel SS, Engelman A. Capsid determines the requirement for NUP153 during HIV-1 nuclear import. Poster presentation at Keystone Symposium: Frontiers in HIV pathogenesis, Therapy and Eradication, March 2012 in Whistler, British Columbia, Canada.

Matreyek KA, Engelman A. Capsid determines the requirement for cellular NUP153 during a nuclear step of HIV-1 infection. Oral presentation given at the Cold Spring Harbor Meeting on Retroviruses, May 2011, Cold Spring Harbor, NY.

Matreyek KA, Engelman A. The requirements for NUP153 and NUP358 during lentiviral infection map to the capsid protein. Poster presentation at the Cold Spring Harbor Meeting on Retroviruses, May 2010, Cold Spring Harbor, NY.

MEMBERSHIPS

CWRU / UH Center For AIDS Research (CFAR) *12/2019 - present*

TEACHING / OUTREACH EXPERIENCE / SERVICE

Ad Hoc Reviewer, Nature Structural & Molecular Biology *5/2019 - present*

Public Lecture, American Cancer Society Relay for Life Fundraising Meeting, Tacoma, WA *3/2019*

Ad Hoc Reviewer, Nucleic Acids Research *11/2017 - present*

Undergraduate Student Research Mentor, Cailin Winston *10/2017 – 12/2018*

Public Lecture, American Cancer Society Relay for Life, Willapa Bay, WA *6/2016*

Undergraduate Summer Student Mentor, Suna Sara Yücel *6/2011- 9/2011*
