
APPLICANT BIOGRAPHICAL SKETCH

NAME OF APPLICANT: Claire Ellen Gustafson

eRA COMMONS USER NAME (credential, e.g., agency login): gustafsc

POSITION TITLE: Postdoctoral Researcher

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	START DATE MM/YYYY	END DATE (or expected end date) MM/YYYY	FIELD OF STUDY
University of Washington	B.S.	09/2003	06/2007	Molecular, Cellular and Dev. Biology
University of Colorado – Anschutz Medical Campus	Ph.D	08/2009	10/2014	Immunology
Stanford University (postdoc)	n/a	01/2015	Present	Immunology

A. Personal Statement

As a long-term research goal, I would like to utilize my knowledge on human immune development to investigate underlying adaptive immune limitations in infants and the elderly to better understand why human are more susceptible to life-threatening infections at extremes of age. My academic training and research experiences provided me with a diverse background in molecular biology, genetics, systems biology and immunology. As an undergraduate working at Santa Cruz Biotechnology and with Dr. Kelly D. Smith at the University of Washington, I learned the basics of molecular biology. During my time as a research associate at the Institute for Systems Biology, I helped develop a novel immunoprecipitation technique and utilized genetic- and systems-based approaches to characterize protein-RNA complexes. As a predoctoral student with Dr. Edward Janoff, my research focus was on understanding mucosal B cell development in human infants, where I gained experience in both basic and translational immunology research. I developed an *in vitro* assay for studying IgA responses in newborn infants and found that TLR9 specifically mediates IgA responses from neonatal B cells (*manuscript in progress*). In addition, I was first author of the initial characterization of IgA and mediators of IgA in the human infant intestinal tract during the first years of life, highlighting the importance of T-cell independent class switching in IgA development during infancy. In collaboration with Drs. Mair Churchill and Chris Malarkey, I interrogated the function of mitochondrial transcription factor A in preventing TLR-mediated antibody production (*manuscript in process*). I was awarded the Clinical and Translational Science Predoctoral Fellowship, under the clinical mentorship of Dr. Edwin De Zoeten, providing me with additional training in translational human immunology. During my graduate career, I also received several other research-based awards, was elected as a officer for the Immunology Student Council, taught courses to undergraduate and graduate students and co-organized a symposium for the Molecular Pathogenesis of Infectious Disease program. For my postdoctoral training, I will continue to build on my previous training in translational human immunology by changing my focus to investigate another important adaptive immune cell, CD8 T cells, and the functional changes in CD8 T cell responses to infection and vaccination during human aging. My mentor Dr. Jorg Gornozky is an expert on human T cell aging and has trained many successful post-doctoral fellows. The proposed research will provide me with more extensive knowledge of T cell biology and infectious disease, requires new technical training in immunology, molecular biology, flow- and mass- cytometry and allows me the opportunity to expand my research of human adaptive immunity. Together, this training will provides me with new tools and enhanced knowledge to further my goal of studying human immune development at the extremes of age and in the context of infection and vaccination.

B. Positions and Honors

ACTIVITY/ OCCUPATION	START DATE (mm/yy)	END DATE (mm/yy)	FIELD	INSTITUTION/ COMPANY	SUPERVISOR/ EMPLOYER
Lab /Technical Service Assistant	01/05	09/06	Molecular Biology	Santa Cruz Biotechnology	Stephanie Guzman
Research Assistant	01/07	09/07	Molecular Biology	University of Washington	Kelly Smith
Research Associate	09/07	06/09	Molecular Biology	Institute for Systems Biology	John Aitchison
Postdoc	01/15	present	Immunology	Stanford University	Jorg Goronzy

Academic and Professional Honors

Dean's list, University of Washington, 2007

Quantitative Systems Immunology Summer School Travel Scholarship, 2010

Colorado Clinical and Translational Sciences Institute TL1 Pre-doctoral Fellowship, University of Colorado - Anschutz Medical Campus, 2011-2012

Colorado Clinical and Translational Sciences Institute and the Cancer Center RNA-sequencing Pilot Grant Awardee, University of Colorado-Anschutz Medical Campus, 2012

Student Research Forum Poster of Merit Award, University of Colorado-Anschutz Medical Campus, 2012, 2013

Society of Mucosal Immunology Poster of Merit Award, International Congress of Mucosal Immunology, 2013

International Congress of Mucosal Immunology Young Investigator Travel Award, 2013

The Gerber Foundation Novice Research Award, 2013-2014

Molecular Pathogenesis of Infectious Disease Program Pre-doctoral Trainee, University of Colorado-Anschutz Medical Campus, 2013-2014

Modeling Mucosal Immunity Summer School and Symposium Travel Award, Virginia Polytechnic Institute and State University, 2014

Modeling Mucosal Immunity Symposium First place Poster Award, Virginia Polytechnic Institute and State University, 2014

Memberships in professional societies

American Association of Immunologists

Federation of Clinical Immunology Societies

C. Contributions to Science

My Contributions to Science are organized into two time periods: I. Early Career; and II. Graduate Career.

I. Early Career: My early research contributions were focused on developing an integrated, systems approach for 1) characterizing the dynamics of proteins associating with cytoplasmic processing bodies (P-bodies), a protein-RNA complex, and 2) assaying, in an unbiased way, the complete set of RNA transcripts contained within P-bodies in *Saccharomyces cerevisiae*. I helped develop a novel rapid immunopurification method to identify the protein and RNA components of P-bodies in collaboration with the Rout Lab at the Rockefeller University. Using this technique in conjunction with more system-based techniques (mass spectrometry, co-localization screening and microarrays), I was able identify two novel protein components of P-bodies as well as demonstrate that RNA transcripts contained within P-bodies vary under specific environmental conditions.

Abstracts

Gustafson, C, Garmendia-Torres, C, Ahnyong, V, Niemisto, A, Taylor, JR, Falconnet, D, Hansen, CL, Galitski, T, Shmulevich, I, Aitchison, J, Dudley, A. Spatial and Temporal Dynamics in Systems Biology, poster presentation at Institute for Systems Biology International Symposium, Seattle, WA, 2008.

Gustafson, C, Garmendia-Torres, C, Dudley, A, Aitchison, J, P-bodies: Analysis of Dynamic Cytoplasmic mRNPs, oral presentation at National Center for Dynamic Interactome Research Annual Retreat, Institute for Systems Biology, Seattle, WA, 2008.

II. Graduate Career: My graduate research contributions focused on investigating the basic and translational aspects of how human infants develop their mucosal immune system during the first year of life. During my graduate career, I characterized the temporal development of IgA plasma cells in the infant intestinal tract and identified the molecule APRIL as a potential mediator of the development of intestinal IgA during human infancy (*Gustafson et. al., Mucosal Immunology, 2014*). Moreover, I established a robust *in vitro* cell culture model system to interrogate the direct effect of specific molecules, such as APRIL, on the induction of IgA class switch recombination and antibody production by peripheral B cells in newborn infants and adults. Utilizing this *in vitro* system, I found T cell-dependent IgA production from newborns is promoted specifically by the engagement of TLR9 on neonatal B cells, a novel mechanism for infant IgA induction (*manuscript in review*). These data suggest intrinsic TLR9 signaling in neonatal B cells is essential for the development of mucosal IgA during early human infancy. Moreover, B cell-specific TLR9 ligands may serve as effective adjuvants to promote IgA responses to vaccination and to provide enhanced protection against mucosal infections in young infants.

Research Papers

Gustafson CE, et. al. Toll-like receptor 9 engagement induces IgA class switching in human neonatal B cells. *In preparation*.

Gustafson CE, et. al. Limited Expression of APRIL and its Receptors Prior to Intestinal IgA Plasma Cell Development During Human Infancy. *Mucosal Immunol.* 2014 May;7(3):467-77

Palaia J, McConnell M, Achenbach, J, Gustafson CE, et. al. Neutralization of HIV-1 Subtypes A and D by Breast Milk IgG from HIV-1-Infected Women in Uganda. *J Infect.* 2014 Mar;68(3):264-72

Janoff EN, Gustafson C, and Frank DN. The world within: Living with our microbial guests and guides. *Transl Res.* 2012 Oct;160(4):239-45

A complete list of published works in MyBibliography:

<http://www.ncbi.nlm.nih.gov/sites/myncbi/1PwK4ln7axkD/bibliography/47333717/public/?sort=date&direction=ascending>.

D. Scholastic Performance

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
	UNIVERSITY OF WASHINGTON		2006	Recomb DNA Tech	3.8
2004	Calc with Apps	A	2006	Emerging Diseases	3.5
2004	Cell Molecular Biology	A	2007	Adv. Cell Bio	3.9
2004	Calc with Several Var	A	2007	Cell Mol Bio Disease	3.6
2005	Intro to Genetics	4.0			
2006	Gene Action	3.3			
	UNIVERSITY OF COLORADO		2010	Spc Tpcs Cln Immunology	A
2009	Res: Biomedical Science	A	2010	Host Response/Infectious Disease	A

YEAR	SCIENCE COURSE TITLE	GRADE	YEAR	OTHER COURSE TITLE	GRADE
2009	Ethics in Research	A	2010	Signal Transduction Immun Sys	A
2009	Immunology	B+	2011	Statistics for Basic Sciences	A
2009	Research:Immunology	A	2011	Tissue Biol/Disease Mech	A
2010	Science as a Profession	A	2011	Epidemiology	A

All grades listed above are passing grades.