BIOGRAPHICAL SKETCH

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NAME: Beaulieu, Aimee Melissa

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

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Colgate University, Hamilton, NY	B.A.	12/2000	Chemistry, Ancient Greek
Cornell University, New York, NY	Ph.D.	09/2009	Immunology & Microbial Pathogenesis
Memorial Sloan-Kettering Cancer Center, New York, NY	Postdoctoral	09/2015	Immunology

A. Personal Statement

As a tenure-track Assistant Professor at the Rutgers University New Jersey Medical School, I run an active R01-funded research program focused on defining the molecular and cellular signals that regulate immune responses by Natural Killer (NK) cells and “helper” innate lymphoid cells (ILC1s). My research has led to the discovery of multiple novel molecular pathways that critically regulate NK cell and/or ILC1 development and function, including antigen-specific effector and memory responses during viral infection. Some notable examples include my finding that the transcription factors, Zbtb32 and Blimp1, act in NK cells in an antagonist regulatory circuit to control the proliferative expansion of virus-specific NK cells, as well as my finding that the microRNA, miR-155, plays key roles in NK cell development and effector and memory cell function *in vivo*. We use a range of genetic and molecular tools, including transgenic mouse models and cutting-edge genomics techniques, to identify novel molecular pathways that regulate NK cell immunity at steady-state and in settings of inflammation and infection. Ongoing projects in our lab include the investigation of the molecular and cellular signals that regulate antigen-specific effector and memory immune by NK cells during infection and/or the function of unique tissue-resident NK cell and ILC1 populations that contribute to host defense and other inflammatory processes in the tissue.

Ongoing projects that I would like to highlight include:

R01 HL139818
Beaulieu (PI)
01/01/19 – 12/31/23
Birc5 as a regulator of NK cell development and immune function

R01 AI148695
Douglas & Beaulieu (Multi-PIs)
09/21/2010 – 7/31/24
Innate immune mechanisms at the maternal-fetal interface in normal and superovulatory pregnancy

B. Positions, Scientific Appointments and Honors

Positions and Scientific Appointments

2015– Present	Assistant Professor & Chancellor Scholar, Department of Microbiology, Biochemistry, and Molecular Genetics, Rutgers University - New Jersey Medical School, Newark, NJ (tenure-track)
2015 – Present	Member, Center for Immunity and Inflammation, Rutgers University - New Jersey Medical School, Newark, NJ
2015 – Present	Review Editor, Frontiers in Immunology (NK and Innate Lymphoid Cell Biology section)
2015 – Present	Member, American Association of Immunologists
2012 – Present	Member, Society of Natural Immunity
2018	Member, Society for Leukocyte Biology
2012 – 2015	Adjunct Professor, Chemistry Department, New York Institute of Technology, New York, NY
2009 – 2015	Postdoctoral Fellow, Department of Immunology, Memorial Sloan-Kettering Cancer Center, New York, NY
2003 – 2009	Ph.D. Student, Immunology & Microbial Pathogenesis Program, Weill Cornell Graduate School of Medical Sciences, Cornell University, New York, NY
2003	Visiting Scientist, Department of Invertebrate Zoology, American Museum of Natural History, New York, NY
2001 – 2003	Assistant Chemist, Pfizer Inc., Groton, CT

Honors

2015	AAI Thermo-Fisher Trainee Achievement Award
2015	Oral Short Talk Invitee & Travel Award, AAI 2015 Meeting
2015	Best Poster Presentation Award, NK2015 Meeting of the Society of Natural Immunity
2012	Oral Short Talk Invitee & Travel Award, NK2012 Meeting of the Society of Natural Immunity
2000	Teaching Assistant of the Year, Department of Chemistry, Colgate University
2000	Baldwin Greek Prize, Colgate University
1996 – 2000	Alumni Memorial Scholar, Colgate University

C. Contributions to Science

1. One focus of my research has been to understand the molecular pathways that regulate NK cell and innate lymphocyte development and immune function, particularly in settings of inflammation and infection. This work led to the discovery that the BTB-ZF transcription factor, Zbtb32, is essential for the proliferation of activated NK cells and for protective anti-viral immunity by NK cells. I also identified a previously unknown antagonistic relationship between Zbtb32 and the transcriptional repressor, Blimp-1, and showed that this pathway acts as a critical link between inflammation and proliferation in activated NK cells. My work has led to the identification of a number of other regulators – e.g. ID2, Nfil3, PLZF, microRNA-155, and Birc5 (unpublished) – that are important for the development and immune function of NK cells and other innate lymphocyte subsets. These findings are broadly relevant to the many human diseases modulated by innate lymphocyte function and dysfunction.

    a. Zook EC, Li Z, Xu Y, de Pooter RF, Verykokakis M, **Beaulieu AM**, Lasorella A, Maienschein-Cline M, Sun JC, Sigvardsson M, Kee BL. The transcription factor ID2 prevents E proteins from enforcing a naïve T lymphocyte gene program during natural killer cell development. *Science Immunol.* 3(22): eaao2139. 2018. PMC29703840
    b. **Beaulieu AM**, Zawislak CL, Nakayama T, Sun JC. The transcription factor Zbtb32 controls the proliferative burst of virus-specific NK cells responding to infection. *Nat Immunol.* 15(6):546-53. 2014. PMC4404304
    c. Firth MA, Madera S, **Beaulieu AM**, Gasteiger G, Castillo EF, Schluns KS, Rothman PB, Viver E, Sun JC. Nfil3-independent lineage maintenance and antiviral response of natural killer cells. *J Exp Med.* 210(13):2981-90. 2013. PMC3865482

d. Zawislak CL** & **Beaulieu AM****, Loeb GB, Karo J, Canner D, Bezman NA, Lanier LL, Rudensky AY, Sun JC. Stage-specific regulation of natural killer cell homeostasis and response against viral infection by microRNA-155. *Proc Natl Acad Sci U S A.* 110(17):6967-72. 2013. (**co-first author paper). PMC3637707

2. A second key focus of my independent research program is understanding the signaling pathways that regulate immune responses by unique tissue-specific NK cell and innate immune cell populations in mucosal organs such as the lung, gut, skin, and uterus. Our recent work includes investigation of the inflammatory signals that regulate uterine NK/ILC1 function during pregnancy, with a particular focus on vascular and tissue remodeling during decidualization and early placentation in mice. We have also made important contributions related to the role of innate immune cells in mucosal immune responses during helminth infection.

   a. Valero-Pacheco N, Tang EK, Massri N, Loia R, Chemerinski A, Wu T, Begum S, El-Naccache DW, Gause WC, Arora R, Douglas NC, **Beaulieu AM**. Maternal IL-33 critically regulates tissue remodeling and type 2 immune responses in the uterus during early pregnancy in mice; *Proc Natl Acad Sci U S A*. Aug 30;119(35):e2123267119; 2022. PMC9436313.
   b. Inclan-Rico JM, Ponessa JJ, Valero-Pacheco N, Hernandez CM, Sy CB, Lemenze AD, **Beaulieu AM,** Siracusa MC; Basophils prime group 2 innate lymphoid cells for neuropeptide-mediated inhibition; *Nat Immunol.* Oct;21(10):1181-1193; 2020. PMC9357342.
   c. Inclan-Rico JM, Hernandez CM, Henry EK, Federman HG, Sy CB, Ponessa JJ, Lemenze AD, Joseph N, Soteropoulos P, **Beaulieu AM,** Yap GC, Siracusa MC; Trichinella spiralis-induced mastocytosis and erythropoiesis are simultaneously supported by a biopotent mast cell/erythrocyte precursor cell; *PLoS Pathogens*; 16(5):e1008579, 2020. PMC7259795
   d. Begum S, Begum S, Perlman BE, Valero-Pacheco N, O'Besso V, Wu T, Morelli SS, **Beaulieu AM**** & Douglas NC**. Dynamic Expression of Interleukin-33 and ST2 in the mouse reproductive tract is influenced by superovulation. *J. Histochem Cytochem.* 28:22155420911049. 2020. (**co-last author paper). PMC7132822

3. As a doctoral student I studied the interaction between host immune cells and the single-most widespread and lethal human bacterial pathogen, *Mycobacterium tuberculosis*. Understanding how *M. tuberculosis,* a BSL-3 respiratory pathogen, establishes persistent, life-long infection in otherwise healthy individuals is of paramount importance to global health, and my graduate work contributed to this endeavor by identifying dozens of *M. tuberculosis* genes that regulate or subvert host immune responses. Several of these genes are now the focus of ongoing research and may someday serve as potential targets for therapeutic intervention.

   a. **Beaulieu AM**, Rath P, Imhof M, Siddall ME, Roberts J, Schnappinger D, Nathan CF. Genome-wide screen for *Mycobacterium tuberculosis* genes that regulate host immunity. *PLoS One.* 5(12):e15120. 2010. PMC3000826.

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/1fupd9v0K-L5X/bibliography/public/