

**BIOMEDICAL & VETERINARY SCIENCES
GRADUATE PROGRAM**



ANNOUNCES

The Doctor of Philosophy Seminar
and Examination of

Kristin Beth Eden

**“Noncanonical NF- κ B in Gastrointestinal
Disease”**

Tuesday September 18, 2018

9:00 am

Classroom 102

Bio



Kristin received her bachelor's degree cum laude in Biochemistry from Virginia Tech in 2006 and her DVM from Virginia Maryland College of Veterinary Medicine in 2010. She then completed a three-year residency in anatomic pathology at Texas A&M University and became a Diplomate of the American College of Veterinary Pathologists in 2013. Returning to the New River Valley that fall, she began pursuing her PhD studies under an NIH T32 grant. In the past five years she has presented her work at over a dozen local and national conferences and has produced three first-author manuscripts, a book chapter on mouse models of inflammatory bowel disease, and is a co-author on four additional manuscripts. She will be continuing her career in academia in order to advance her goals of teaching and mentoring the next generation of clinician-scientists as well as contributing to the ever-expanding fields of mucosal immunology, veterinary pathology, and translational medicine. When not in the lab, she can be found spoiling her cat, playing tennis, gardening, watching good (and bad) horror movies, and planning a goat farm.

Funded by

VMCVM NIH T32 Program
R03 and K01 grants awarded to Dr. Allen via the National Institute of Diabetes and Digestive and Kidney Diseases

Washington DC.

3. **K. Eden**, B. Heid, E.K. Holl, I.C. Allen. "Map3K14 signaling attenuates the development of colorectal cancer through activation of the non-canonical NF- κ B signaling cascade." American Association of Immunologists Annual Meeting 2017, Washington DC.

4. **K. Eden**, D. K. McDaniel, B. Heid, I.C. Allen. "Lack of NF- κ B-Inducing kinase (NIK) results in eosinophilic esophagitis (EoE) and gastric hyperplasia in mice: Implications for noncanonical NF- κ B signaling in human EoE." Experimental Biology 2017, Chicago IL.

5. **K. Eden**, D. K. McDaniel, B. Heid, I.C. Allen. "NF- κ B-inducing kinase (NIK): A novel modulator of eosinophilic esophagitis in mouse models and human patients." American Association of Immunologists Annual Meeting 2017, Washington DC

6. **K. Eden**, D. Sorrentino, K. Knight, I.C. Allen. "Regulatory NLRs and noncanonical NF- κ B signaling in inflammatory bowel disease and colitis-associated cancer." Virginia-Maryland College of Veterinary Medicine Annual Research Symposium 2016, Blacksburg VA.

7. **K. Eden**, D. K. McDaniel, B. Heid, I.C. Allen. "Lack of NF- κ B-Inducing kinase (NIK) results in eosinophilic esophagitis (EoE) and gastric hyperplasia in mice: Implications for noncanonical NF- κ B signaling in human EoE." American College of Veterinary Pathologists Annual Meeting 2016, New Orleans, LA.

8. **K. Eden**, R. Hontecillas, M. Viladomiu, C. Philipson, A. Carbo, A. Leber, N. Philipson, I. Tattoli, S.E. Girardin, I.C. Allen, and J. Bassaganya-Riera. "Loss of NLRX1 results in increased intestinal pathology and T cell responses in mice with inflammatory bowel disease." American Association of Immunologists 2015, New Orleans LA and the American College of Veterinary Pathologists Annual Meeting 2015, Minneapolis MN.

Awards and Academic Achievements

- 2017** Virginia Tech Graduate Research Development Grant Award
- 2017** American Association of Immunologists Trainee Abstract Award
- 2017** Virginia Tech Graduate Student Association Gold Award for Best Oral Presentation

Lay Language Abstract

The gastrointestinal system has a complex set of checks and balances to maintain overall health. If factors involved in the promotion or suppression of inflammation, the regulation of growth, or the prevention of tumor formation become dysregulated, there can be catastrophic consequences for the human body. The aim of this work is to investigate a pathway called noncanonical NF- κ B in the development of various diseases in the GI tract. Noncanonical NF- κ B is not a well-understood pathway and to date has mostly been studied in the context of white blood cell development. However, we discovered that noncanonical NF- κ B has several very important functions in the GI tract that have implications in conditions such as inflammatory bowel disease and colorectal cancer. First we explored the role of noncanonical NF- κ B in the upper GI tract, namely the esophagus, and found that this signaling pathway is critically involved in the movement of white blood cells called eosinophils to the esophagus, resulting in throat inflammation in both mouse models and human patients. Secondly, we determined that this same pathway also has effects in the lower GI tract. Human patients with inflammatory bowel disease, especially those who develop resistance to popular medications, see an upregulation of this pathway in their colon tissue. Loss of this pathway in the colons of mice also causes changes in growth of the colonic epithelium, and predisposes them to the formation of colon cancer. Interestingly, in human colon cancer patients, we also see similar changes in expression of genes associated with this pathway. Overall, we have found many new and exciting roles for this underappreciated pathway in the gut.

Publications

1. **Eden K.** "Adoptive Transfer Colitis." Mouse Models of Innate Immunity: Methods and Protocols, Second Edition. Springer Protocols 2018 [in press]
2. **Eden K, Rothschild DE, McDaniel DK, Heid B, Allen IC.** "Noncanonical NF- κ B signaling and the essential kinase NIK modulate critical features associated with eosinophilic esophagitis pathogenesis." Disease Models and Mech. 2017 Dec 1; 10(12): 1517–1527. Pubmed PMID: 29259025.

3. Mu Q, Tavella VJ, Kirby JL, Cecere TE, Chung M, Lee J, Li S, Ahmed SA, **Eden K**, Allen IC, Reilly CM, Luo XM. "Antibiotics ameliorate lupus-like symptoms in mice." *Sci Rep*. 2017 Oct 20;7(1):13675. Pubmed PMID: 29057975.
4. Leber A, Hontecillas R, Tubau-Juni N, Zoccoli-Rodriguez V, Hulver M, McMillan R, **Eden K**, Allen IC, Bassaganya-Riera J. "NLRX1 regulates effector and metabolic functions of CD4+ T cells." *J Immunol*. 2017 Mar 15;198(6):2260-2268. PubMed PMID: 28159898.
5. McDaniel DK*, **Eden K***, Ringel VM*, Allen IC. "Emerging roles for moncanonical NF- κ B signaling in the modulation of inflammatory bowel disease pathobiology." *Inflamm Bowel Dis*. 2016 Sep;22(9):2265-79. PubMed PMID: 27508514.
6. Coutermarsh-Ott S*, **Eden K***, Allen IC. "Beyond the inflammasome: Regulatory NOD-like receptor modulation of the host immune response following virus exposure." *J Gen Virol*. 2016 Apr;97(4):825-38. PubMed PMID: 26763980
7. Davis BK, Philipson C, Hontecillas R, **Eden K**, Bassaganya-Riera J, Allen IC. "Emerging significance of NLRs in inflammatory bowel disease." *Inflamm Bowel Dis*. 2014 Dec;20(12):2412-32. PubMed PMID: 25153506.
8. Carbo A, Hontecillas R, Andrew T, **Eden K**, Mei Y, Hoops S, Bassaganya-Riera J. "Computational modeling of heterogeneity and function of CD4+ T cells." *Front Cell Dev Biol*. 2014 Jul 29;2:31. PubMed PMID: 25364738.

*co-first authorship

Presentations

1. **K. Eden**, D.E. Rothschild, E. Holl, I.C. Allen. Old dog, new tricks: NIK as a control switch for stem cell function in the gut. Virginia-Maryland College of Veterinary Medicine Annual Research Symposium, 2018 and the Virginia Tech Graduate Research Symposium, 2018.
2. **K. Eden**, V.Q. Nguyen, K. Knight, D. Sorrentino, I.C. Allen. "Noncanonical NF- κ B signaling is elevated in inflammatory bowel disease patients and may be associated with therapeutic response." American Association of Immunologists Annual Meeting 2017,

- 2016** Virginia Tech Graduate Research Development Grant Award
2016
- 2016** American Society for Investigative Pathology/ American
College of Veterinary Pathologists Experimental Biology Award
- 2015** American Association of Immunologists Trainee Poster Award

Examination Graduate Committee

Major Advisors/Co-Chairs:

Irving Coy Allen, PhD, MBA
Assistant Professor
Biomedical Sciences and Pathobiology
& Pathobiology

Graduate Advising Committee Members:

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