Stanford

Michael R. Howitt

Assistant Professor of Pathology

Bio

ACADEMIC APPOINTMENTS

- Assistant Professor, Pathology
- Member, Bio-X
- Member, Maternal & Child Health Research Institute (MCHRI)
- Faculty Fellow, Stanford ChEM-H

HONORS AND AWARDS

- NIH K01 Career Development Award, NIDDK (2017-2022)
- Harvard Digestive Diseases Center P/F Award, Harvard (2017)
- Barry R. and Irene Tilenius Bloom Fellowship, HSPH (2016)
- NIH Ruth L. Kirschstein National Research Service Award, NIDDK (2012-2015)

PROFESSIONAL EDUCATION

- Post Doctoral Fellowship, Harvard School of Public Health , Immunology and Infectious Diseases (2017)
- Ph.D., Stanford University , Microbiology and Immunology (2011)
- B.A., UC Berkeley , Molecular and Cell Biology (2002)

LINKS

- Howitt Lab website: https://www.howittlab.com

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our lab is broadly interested in how intestinal microbes shape our immune system to promote both health and disease. Recently we discovered that a type of intestinal epithelial cell, called tuft cells, act as sentinels stationed along the lining of the gut. Tuft cells respond to microbes, including parasites, to initiate type 2 immunity, remodel the epithelium, and alter gut physiology. Surprisingly, these changes to the intestine rely on the same chemosensory pathway found in oral taste cells. Currently, we aim to 1) elucidate the role of specific tuft cell receptors in microbial detection. 2) To understand how protozoa and bacteria within the microbiota impact host immunity. 3) Discover how tuft cells modulate surrounding cells and tissue.

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Connie Fung, Eli Gerrick

Doctoral Dissertation Advisor (AC)

Katherine Nico

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Immunology (Phd Program)

Publications

PUBLICATIONS

- **The Taste Receptor TAS1R3 Regulates Small Intestinal Tuft Cell Homeostasis.** *ImmunoHorizons*
  Howitt, M. R., Cao, Y. G., Gologorsky, M. B., Li, J. A., Haber, A. L., Biton, M., Lang, J., Michaud, M., Regev, A., Garrett, W. S.
  2020; 4 (1): 23–32

- **A Tuft Act to Follow: Leukotrienes Take the Stage in Anti-worm Immunity.** *Immunity*
  Fung, C., Howitt, M. R.
  2020; 52 (3): 426–28

- **Tropism for tuft cells determines immune promotion of norovirus pathogenesis.** *Science (New York, N.Y.)*
  Wilen, C. B., Lee, S., Hsieh, L. L., Orchard, R. C., Desai, C., Hykes, B. L., McAllaster, M. R., Balce, D. R., Feehley, T., Brestoff, J. R., Hickey, C. A., Yokoyama, C. C., Wang, et al
  2018; 360 (6385): 204–8

- **A single-cell survey of the small intestinal epithelium.** *Nature*
  Haber, A. L., Biton, M., Rogel, N., Herbst, R. H., Shekhar, K., Smillie, C., Burgin, G., Delorey, T. M., Howitt, M. R., Katz, Y., Tirosh, I., Beyaz, S., Dionne, et al
  2017; 551 (7680): 333–39

- **Tuft cells, taste-chemosensory cells, orchestrate parasite type 2 immunity in the gut** *SCIENCE*
  Howitt, M. R., Lavoie, S., Michaud, M., Blum, A. M., Tran, S. V., Weinstock, J. V., Gallini, C. A., Redding, K., Margolskee, R. F., Osborne, L. C., Artis, D., Garrett, W. S.
  2016; 351 (6279): 1329-1333

- **Helicobacter pylori CheZHP and ChePep form a novel chemotaxis-regulatory complex distinct from the core chemotaxis signaling proteins and the flagellar motor.** *Molecular microbiology*
  Lertsethtakarn, P., Howitt, M. R., Castellon, J., Amieva, M. R., Ottemann, K. M.
  2015; 97 (6): 1063-1078

- **The Microbial Metabolites, Short-Chain Fatty Acids, Regulate Colonic T-reg Cell Homeostasis** *SCIENCE*
  Smith, P. M., Howitt, M. R., Panikov, N., Michaud, M., Gallini, C. A., Bohlooly-Y, M., Glickman, J. N., Garrett, W. S.
  2013; 341 (6145): 569-573

- **Exploring host-microbiota interactions in animal models and humans** *GENES & DEVELOPMENT*
  Kostic, A. D., Howitt, M. R., Garrett, W. S.
  2013; 27 (7): 701-718

- **A complex microworld in the gut Gut microbiota and cardiovascular disease connectivity** *NATURE MEDICINE*
  Howitt, M. R., Garrett, W. S.
  2012; 18 (8): 1188-1189

- **ChePep Controls Helicobacter pylori Infection of the Gastric Glands and Chemotaxis in the Epsilonproteobacteria** *MBIO*
  Howitt, M. R., Lee, J. Y., Lertsethtakarn, P., Vogelmann, R., Joubert, L., Ottemann, K. M., Amieva, M. R.

2011; 2 (4)