

VITALY V. GANUSOV

Curriculum vitae

January 4, 2015

General information

Current position: Assistant Professor. Joint position between Department of Microbiology (75%) and Department of Mathematics (25%). University of Tennessee, Knoxville, TN, USA.

Mailing address: Department of Microbiology, M409 Walters Life Sciences, University of Tennessee, Knoxville, TN 37996-0845

Email: Vitaly.Ganusov@gmail.com, vitaly@utk.edu

Phone: +1 865 974 4547

Fax: +1 865 974 4007

Web: <http://web.bio.utk.edu/Ganusov/>
https://www.researchgate.net/profile/Vitaly_Ganusov?ev=prf_high

Academic history

2010-14: Assistant Professor (University of Tennessee, Knoxville, USA).

2008-10: Post-doctoral fellow with Dr. Alan S. Perelson (Los Alamos National Laboratory, Los Alamos, USA).

2005-08: Post-doctoral fellow with Prof. Dr. Rob J. De Boer (Theoretical Biology, Utrecht University, Utrecht, The Netherlands).

2003-04: Post-doctoral fellow with Dr. Rustom Antia (Emory University, Atlanta, GA, USA).

2003: Ph. D. degree (Emory University, Atlanta, GA, USA; thesis adviser: Rustom Antia, Ph.D)

2001: Candidate of Physical and Mathematical sciences (Russian equivalent of Ph.D. degree; Institute of Biophysics, Krasnoyarsk, Russia; thesis adviser: Anatoly V. Brilkov, Doctor of Biology).

2000: Master of Science (Krasnoyarsk State University, Krasnoyarsk, Russia; major: physics/biophysics; thesis adviser: Anatoly V. Brilkov, Doctor of Science)

1997: Bachelor of Science (Krasnoyarsk State University, Krasnoyarsk, Russia; major: physics/biophysics; thesis adviser: Anatoly Brilkov, Ph.D.)

Invited talks and presentations at conferences

1. **Invited talk.** AIDS and Cancer Virus Program, Frederick National Laboratory for Cancer Research (NIH/NCI, Frederick, MD, Dec 5, 2014).

2. **Invited talk.** Annual meeting of the Society for Mathematical Biology (Osaka, Japan, July 28 - Aug 1, 2014).
3. **Poster presentations.** Annual meeting “HIV dynamics and evolution” (Tuscon, AZ, May 7-10, 2014).
4. **Selected oral and poster presentations.** Annual meeting of the American Association of Immunologists (Pittsburgh, PA, May 2-6, 2014).
5. **Invited talk.** Southeastern Spring Sectional Meeting of the American Mathematical Society (Knoxville, TN, 21-23 March, 2014).
6. **Poster presentation.** Keystone meeting “Tissue-resident memory T cells” (Snowbird, UT, Jan 12-16, 2014).
7. **Selected oral presentation.** Third international workshop “Systems approaches in immunology” (Santa Fe, NM, Jan 10-11, 2014).
8. **Invited talk.** Theoretical Biology and Bioinformatics, Utrecht University (Utrecht, The Netherlands, Dec 18, 2013).
9. **Invited talk.** Virolab (Ab Osterhaus) Erasmus Medical Center, (Rotterdam, The Netherlands, 16-17 December, 2013).
10. **Invited talk.** Kyoto University, Michio Tomura laboratory (Kyoto, Japan, May 27 - June 2, 2013).
11. **Selected oral presentation.** Annual meeting of the American Association of Immunologists (Honolulu, HI, May 5-8, 2013).
12. **Invited talk.** University of Pennsylvania Veterinary School, Gudrun Debes laboratory (Philadelphia, PA, 27-29 March, 2013).
13. **Invited talk.** NIAID/NIH, Ron Germain laboratory for systems biology (Washington, DC, Nov 30, 2012).
14. **Invited talk.** Miniprogram “Quantitative Immunology: Experiments Meet Modeling” (UCSB/Kavli Institute for Theoretical Physics, Santa Barbara, CA, Nov 26 - Dec 20, 2012).
15. **Poster presentation.** Annual meeting of the American Association of Immunologists (Boston, MA, May 4-8, 2012).
16. **Selected oral presentation.** Annual meeting “HIV dynamics and Evolution” (Ashville, NC, April 27-30, 2012).
17. **Invited talk.** Second International workshop “Lymphocyte repertoire” (Jerusalem, Israel, February 19-23, 2012).
18. **Poster presentation.** Annual meeting of the American Association of Immunologists (San Francisco, CA, May 13-17, 2011).
19. **Invited talk.** Physics of Immunity: Complexity Approach (Dresden, Germany, April 04 - 08, 2011).
20. **Poster presentation.** Annual Meeting “AIDS vaccine” (Atlanta, GA, 28 September - 1 October, 2010).
21. **Invited talk.** UT Medical Center, Graduate School of Medicine (Knoxville, TN, Sept 14, 2010)

22. **Poster presentation.** Keystone meeting "HIV biology and pathogenesis" (Santa Fe, NM, USA, 12-16 January, 2010).
23. Workshop on Mathematical Immunology at the annual Life Sciences meeting of the Society for Industrial and Applied Mathematics (Pittsburg, PA, July 12-15, 2010).
24. **Invited talk.** Lectures at the Fields Institute for research in mathematical sciences (Toronto, Canada, July 19-30, 2010; *was unable to attend*).
25. **Invited plenary lecture.** The annual meeting of the Society for Mathematical Biology (Rio De Janeiro, Brazil, July 26-29, 2010; *was unable to attend*).
26. **Invited talk.** University of Luebeck (Luebeck, Germany, November 25-28, 2009)
27. **Participation.** An annual Center for HIV/AIDS vaccine immunology (CHAVI) meeting (Raleigh, NC, USA, October 4 - 7, 2009).
28. **Poster presentation.** The CMPI Symposium on "Multi-Scale Modeling of Host/Pathogen Interactions" (Pittsburgh, PA, USA, June 23 - 25, 2009).
29. **Invited talk.** Fred Hutchinson Cancer Research Center (Seattle, WA, June 3-5, 2009).
30. **Poster presentation.** Keystone meeting "HIV Immunobiology: From Infection to Immune Control" (Keystone, CO, USA, 22-27 April, 2009).
31. **Invited talk.** University of Massachusetts Medical School (Worcester, MA, April 18, 2009).
32. **Invited talk.** National Institutes of Health (Bethesda, MD, April 10-13, 2009).
33. **Invited talk.** Center for Mathematics and Informatics (CWI, Amsterdam, Netherlands, April 3, 2009).
34. **Invited talk.** An international conference "Antigenic variation and immune evasion" (Annecy, France, March 30 - April 2, 2009).
35. **Invited talk.** University of Tennessee, Department of Microbiology (Knoxville, TN, USA, March 11-13, 2009).
36. **Poster presentation.** Keystone meeting "Immune memory and host defence" (Keystone, CO, USA, 8-13 February, 2009).
37. **Poster presentation.** Conference "Frontiers in Immunological Memory" (Newport Beach, CA, USA, 26-27 September, 2008).
38. **Invited talk.** An international workshop "Lymphocyte kinetics in health and disease" (London, UK, May 19-20, 2008).
39. **Poster presentation.** Annual conference "HIV dynamics and Evolution" (Santa Fe, NM, USA, 27-30 April, 2008).
40. **Invited talk.** Wistar Institute, University of Pennsylvania (Philadelphia, USA, April 25, 2008).
41. **Invited talk.** University of Bordeaux 2 (Victor Segalen), Institute for Public Health, Epidemiology and Development (ISPED) (Bordeaux, France, April 8-10, 2008).
42. **Invited talk.** International workshop "Modeling and identification of distributed parameter systems for cell population dynamics" (Leuven, Belgium, March 12-14, 2008).

43. **Invited talk.** University of Bath, Department of Mathematics (Bath, UK, January 23-25, 2008).
44. **Poster presentation.** Annual meeting of the Dutch Immunology Society (NVVI) (Congress Hotel NH "De Leeuwenhorst", Noordwijkerhout, the Netherlands, December 20-21, 2007).
45. **Invited talk.** Mount Sinai Medical School (New York, NY, USA, December 4, 2007).
46. **Invited talk.** Yale University (New Haven, CT, USA, December 3, 2007).
47. **Invited talk.** Instituto Gulbenkian de Ciencia (Lisbon, Portugal, November 11-14, 2007).
48. **Invited talk.** Insitute for Numerical Mathematics (Moscow, Russia, October 23-24, 2007).
49. **Invited talk.** Central Institute for Tuberculosis (Moscow, Russia, October 23-24, 2007).
50. **Invited talk.** Los Alamos National Laboratory (Los Alamos, New Mexico, USA, July 16-20, 2007).
51. **Selected oral presentation.** 1st International Symposium on Genetic and Immune Correlates of HIV Infection and Vaccine-Induced Immunity (Budapest, Hungary, June 10-13, 2007).
52. **Invited talk.** Annual meeting of the Canadian Mathematical Society-MIDAS (Winnipeg, Canada, June 3-4, 2007).
53. **Selected oral Presentation.** 14th international meeting "HIV Dynamics and Evolution" (Segovia, Spain, April 17-20, 2007).
54. **Poster presentation.** Keystone meeting "Immunologic memory" (Santa Fe, New Mexico, March 3-8, 2007).
55. **Invited talk.** DIMACS workshop "Immuno-epidemiology", Rutgers University (New Brunswick, NJ, USA, December 10-14, 2006).
56. **Invited talk.** Department of Mathematics, University of Glasgow (Glasgow, UK, October 23, 2006).
57. **Invited talk.** Department of Biology, GA Tech (Atlanta, USA, August 7, 2006).
58. **Selected oral presentation.** Annual Meeting of the Society for Mathematical Biology, joint with SIAM (North Carolina State University, Raleigh, July 31-August 4, 2006).
59. **Selected oral presentation.** International Forum "Immunology days" (St. Petersburg, Russia, May 29 – June 1, 2006).
60. **Invited talk.** Annual meeting of the Dutch Society for Medical Microbiology (Arnhem, The Netherlands, April 2006).
61. **Poster presentation.** Annual meeting of the Swiss Immunology Society (ETH, Zurich, Switzerland, March 30-31, 2006).
62. **Poster presentation.** 34st Annual Autumn Immunology conference (Chicago Marriott Downtown, Chicago, Illinois, November 19-21, 2005).
63. **Invited talk.** Laboratory of Ecology, Pierre and Marie Curie University (Paris, France, November 2005).
64. **Invited talk.** Theoretical Biology department, Utrecht University (Utrecht, the Netherlands, July 2004).

65. **Selected oral presentation.** Annual meeting of the Society for the Study of Evolution (Colorado State University, Fort Collins, Colorado, June 26-30, 2004).
66. **Invited talk.** Mathematical Biosciences Institute, Ohio State University (Columbus, Ohio, June 2004).
67. **Selected oral presentation.** “Immunology Models: Cell Signaling and Immune Dynamics”: workshop on mathematical modeling in immunology (Mathematical Biosciences Institute, Ohio State University, Columbus, Ohio, May 10-14, 2004).
68. **Poster presentation.** Annual meeting of the Dutch Immunology Society (NVVI) (Congress Hotel NH “De Leeuwenhorst”, Noordwijkerhout, the Netherlands, December 8-9, 2005).
69. **Selected oral presentation.** Annual meeting of the Society for the Study of Evolution (California State University, Chico, California, June 20-24, 2003).
70. **Selected oral presentation.** Workshop on Theoretical Immunology (Florida State University, Gainesville, Florida, May 27-29, 2002).
71. **Poster presentation.** 31st Annual Autumn Immunology conference (Chicago Marriott Downtown, Chicago, Illinois, November 22-25, 2002).
72. **Poster presentation.** Annual meeting of the Society for the Study of Evolution (University of Tennessee, Knoxville, Tennessee, June 26-30, 2001).
73. **Selected oral presentation.** 1st annual Duke University’s conference on Mathematical immunology (Duke University, Durham, North Carolina, April 23-26, 2000).
74. **Poster presentation.** International Conference on Mathematics Applied to Biology and Annual Meeting of the Society for Mathematical Biology (University of Utah, Salt Lake City, Utah, April 3-5, 2000).
75. **Selected oral presentation.** 3rd Siberian Congress on industrial and applied mathematics (INPRIM-98) (Novosibirsk State University, Novosibirsk, Russia, June 22-27, 1998).
76. **Selected oral presentation.** 8th International Symposium “Reconstruction of homeostasis” (Krasnoyarsk Scientific Center, Krasnoyarsk, Russia, March 15-20, 1998).

Outreach activities (presentations, etc.)

1. **Undergraduate supervision.** Summer Research Experience for Undergraduates (SRE) at NIM-BIoS, the National Institute for Mathematical and Biological Synthesis (Knoxville, TN, summer 2014).
2. **Invited talk.** Oak Ridge League of Women Voters (Oak Ridge, TN, March 4, 2014)
3. **Undergraduate supervision.** Summer Research Experience for Undergraduates (SRE) at NIM-BIoS, the National Institute for Mathematical and Biological Synthesis (Knoxville, TN, summer 2012).
4. **Undergraduate supervision.** Summer Research Experience for Undergraduates (SRE) at NIM-BIoS, the National Institute for Mathematical and Biological Synthesis (Knoxville, TN, summer 2011).

Organized conferences/workshops/etc

1. Southeastern Spring Sectional Meeting of the American Mathematical Society (21-23 of March 2014, Knoxville, TN). Co-organized with Megan Powell (University of St. Francis) and Judy Day (UTK).
2. Third international workshop "Systems approaches in immunology" (10-11 of January 2014, Santa Fe, NM). Co-organized with Steven Kleinstein (Yale), Ruy M. Ribeiro (LANL), and Alan S. Perelson (LANL).
3. Annual meeting of the Society for Mathematical Biology, SMB (Co-organized with Lou Gross, Suzanne Lenhard, Sergey Gavrilets, Judy Day, Yetta Jager; 27-30 of July, 2012, Knoxville, TN)
4. Second international workshop "Systems approaches in immunology" (6-7 of January 2012, Santa Fe, NM). Co-organized with Steven Kleinstein (Yale), Ruy M. Ribeiro (LANL), and Alan S. Perelson (LANL).
5. An International workshop "T cell kinetics in viral infections" (24-25 of January 2011, Regent's College Conference Center, London, UK). Co-organized with Derek Macallan (St. George's University of London), Becca Asquith (Imperial college) and Jose Borghans (University Medical Center Utrecht).
6. An international workshop "Systems approaches in immunology" (10-11 of January 2010, Santa Fe, NM). Co-organized with Steven Kleinstein (Yale), Ruy M. Ribeiro (LANL), and Alan S. Perelson (LANL).
7. A Minisymposium "Systems approaches in immunology" during the Society for Mathematical Biology annual meeting (27-30 July 2009, Vancouver, Canada).
8. An International workshop "Lymphocyte kinetics in health and disease" (19-20 May 2008, Regent's College Conference Center, London, UK). Co-organized with Derek Macallan (St. George's University of London), Becca Asquith (Imperial college) and Jose Borghans (University Medical Center Utrecht).

Editor/Guest Editor for journals

PLoS Computational Biology

Refereed/co-refereed for journals

American Naturalist

BMC Bioinformatics

BMC Theoretical Biology and Medical Modelling

Bullutin of Mathematical Biology

Epidemics

Evolution

Evolutionary Applications

Evolutionary Ecology
Genetics
Immunology and Cell Biology
Journal of Biological Dynamics
Journal of Mathematical Biology
Journal of Mathematical Analysis and Applications
Journal of the Royal Society Interface
Journal of Theoretical Biology
Journal of Immunology
Mathematical Analysis and Applications
Mathematical Biosciences
Mathematical Biosciences and Engineering
Nature
Nature Medicine
PLoS Biology
PLoS Computational Biology
PLoS One
PLoS Pathogens
Proceedings of the National Academy of Science of USA
Proceedings of the Royal Society of London: series B
Theoretical Biology and Medical Modelling
Trends in Microbiology
Viruses

Refereed for grant agencies

Army Research Office
US-Israel Binational Funding
ANR (French analogue of NIH)
Swiss Science Foundation
Invited reviewer at the National Institutes of Health of the US (P01 grant)

Teaching experience

1. **Course “Calculus for Life Sciences” (MATH 151: Spring 2013, UTK, Knoxville, TN).**
In this 11 student course I used active learning room environment and flipped format of the course to promote group discussions/problem solving.
2. **Course “Introductory Immunology” (MICRO 330: Fall 2014, UTK, Knoxville, TN).**
In this introductory course I use various active learning techniques such as online quizzes before the lecture, in class clicker quizzes, case study discussions and online blogging.
3. **Course “Immunology” (MICRO 430: Fall 2010-2013, UTK, Knoxville, TN).**
In this 100+ student course I actively we use online quizzes, clickers, and group-based discussions to improve learning experience of the students.
4. **Course “Pathogenesis of infectious diseases” (MICRO 620, Spring 2012, UTK, Knoxville, TN).**
In this 5-student course we analyzed and critiqued recent publications in the area of infectious diseases and immunology.
5. **Course “Data-driven mathematical modeling in immunology” (MATH 682, Spring 2011, UTK, Knoxville, TN).**
In this 7 student course I taught the students basics of the mathematical modeling in immunology and data analysis. Groups of Students then analyzed specific sets of immunological data and developed mathematical models to explain these data. Results of the work of one group have been submitted for publication.
6. **Course “Bioinformatica” (100-level, Fall 2006, Utrecht University, the Netherlands)..**
Teaching assistant for a group of 25 biology students during recitation sessions.
7. **Course “Theoretical Biology” (100-level, Fall 2005, Utrecht University, the Netherlands)..**
Teaching assistant for a group of 25 biology students during recitation sessions.
8. **Course “Immunology and Epidemiology” (Fall 2001, Emory University, Atlanta, GA).** Teaching assistant (grading exams, performing preparation sessions).

Supervising experience

Post-docs

1. Clemente Aguilar (NIMBioS post-doc, 2013-14. Topic: “Development of novel tools for predicting CD4 T cell epitopes”).
2. Gesham Magombedze (NIMBioS post-doc, 2012-14. Topic: “Mathematical modeling of the dynamics of MAP infection in cattle”). Placement: post-doc, Imperial College, London, UK).
3. Calistus Ngonghala (NIMBioS post-doc, 2013. Topic: “Mathematical modeling of the lymphocyte migration via spleen”). Placement: Post-doc, Harvard University, Cambridge, MA, USA).
4. Yiding Yang (2010-11. Topic: “Mathematical modeling of CD8 T cell response to HIV”).

PhD students

1. Elizabeth Johnson (2011-14, Micro/UTK. Topic: “Mathematical models of early HIV evolution”).

Master students

1. Reka Kelemen (2014, UTK. Topic: “Discriminating between alternative hypotheses of T cell clustering using computational and mathematical modeling”). Placement: Vienna Graduate School of Population Genetics, Vienna, Austria).
2. Jorg Calis (2008, Utrecht University. Topic: “Mathematical modeling of the impact of vaccination on SHIV dynamics”). Placement: PhD program (Theoretical Biology and Bioinformatics, Utrecht, Netherlands)
3. Tjibbe Donken (2006, Utrecht University. Topic: “Mathematical modeling of the immune response to influenza”). Placement: researcher (University of Groningen, Netherlands).

Undergraduate students

1. Dustin Le (2011-14, college scholars). Placement: University of Texas Southwestern School of Medicine
2. Wendy Caldwell (2013-14, Mathematics). Placement: Arizona State University Graduate school.
3. Margaret McDaniel (2013-15, BCMB/Math). Placement: still at UKT
4. Gloria Kwak (2013-14, BCMB). Placement: still at UTK
5. Moriah Cox (2013-14, Microbiology). Placement: still at UTK
6. Daniel Morse (2013-14, Microbiology). Placement: unknown

Other programs

1. Several rotation PhD/MS students.
2. Research Experience for Undergraduates (REU) at NIMBioS, the National Institute for Mathematical and Biological Synthesis (Summer 2011, Summer 2012, Summer 2014)

Scientific expertise

- Mathematical biology
- Mathematical modeling of cellular immune responses to viral infections
- Data-driven modeling of immune responses
- Ecology and evolution of infectious diseases

Programming skills

- *Mathematica*
- *R, matlab, C*

List of potential referees

Referees for competence in mathematical modelling

- Alan S. Perelson, ph.D. (Los Alamos National Laboratory, USA; expertise: *population biology, theoretical immunology*, asp@lanl.gov)
- Rob J. De Boer, Prof. Dr. (Utrecht University, The Netherlands; expertise: *population biology, theoretical immunology*, r.j.deboer@uu.nl)
- Rustom Antia, ph.D. (Emory University, USA; expertise: *population biology, theoretical immunology*, rustom.antia@emory.edu)
- Sergei S. Pilyugin, ph.D. (University of Florida, USA; expertise: *dynamical systems, theoretical immunology*, pilyugin@math.ufl.edu)
- Becca Asquith, ph.D. (Imperial College, UK; expertise: *theoretical immunology*, b.asquith@imperial.ac.uk)
- Daniel Coombs, ph.D. (University of British Columbia, Canada; expertise: *population biology, theoretical immunology*, coombs@math.ubc.ca)

Referees for competence in experimental immunology

- Barry T. Rouse, (University of Tennessee, Knoxville, TN, USA; expertise: *T cell response to herpes simplex virus*, btr@utk.edu)
- Frank Miedema, Prof. Dr. (University Medical Center Utrecht, The Netherlands; expertise: *population biology of HIV infection*, F.Miedema@umcutrecht.nl)
- Phillip D. Hodgkin, ph.D. (Walter and Eliza Hall Institute of Medical Research, Australia; expertise: *experimental and theoretical immunology*, hodgkin@wehi.edu.au)
- Francesca Di Rosa, ph.D. (University of Rome "La Sapienza", Italy; expertise: *experimental immunology*, francesca.dirosa@uniroma1.it)
- Irina Lyadova, Doctor of Science (Institute of Tuberculosis, Moscow, Russia; expertise: *experimental immunology*, ivlyadova@mail.ru)

Referees for competence in microbiology

- Anatoly V. Brilkov, Doctor of Science (Federal Siberian University, Krasnoyarsk, Russia; expertise: *experimental and theoretical microbiology*, abrilkov@lan.krasu.ru)

Awards and Fellowships

- 2014 Undergraduate faculty travel award from the American Association of Immunologists (Pittsburgh, PA, May 2-6, 2014).
- 2014 Quest scholar of the week (University of Tennessee, Knoxville, TN, March 2014).
- 2013 Junior faculty travel award from the American Association of Immunologists (Honolulu, HI, May 5-8, 2013).
- 2012 Junior faculty travel award from the American Association of Immunologists (Boston, MA, May 8-12, 2012).

- 2011 Junior faculty travel award from the American Association of Immunologists (San Francisco, CA, May 13-17, 2011).
- 2010 New Investigator Award during the "AIDS vaccine" meeting (Atlanta, GA, September 28 - October 1st, 2010).
- 2010 Travel grant to participate in the work of the Keystone meeting "HIV biology and pathogenesis" (Santa Fe, NM, January 12-16, 2010).
- 2009 Travel grant to participate in the work of the workshop "Multi-Scale Modeling of Host/Pathogen Interactions" (Pittsburgh, PA, USA, June 23-25, 2009)
- 2009 Travel grant to participate in the work of the Keystone meeting "HIV Immunobiology: From Infection to Immune Control" (Keystone, CO, March 22-27, 2009).
- 2008-10 Director's Postdoctoral Research Fellowship, Los Alamos National Laboratory, United States Department of Energy (Los Alamos, NM, USA; total amount ~ \$170k for 2 years)
- 2007 Travel grant to participate in the work of the Keystone meeting "Immunologic memory" (Santa Fe, NM, 2007).
- 2006 First place in the contest of oral presentations of young immunologists during the conference "Immunology days", St. Petersburg, 2006
- 2005-07 Marie Curie Incoming International Fellowship (# 019735, title: "Developing quantitative methods for estimating birth and death rates of immune cells using CFSE label"; total amount ~ €130k for 2 years)
- 2002 Krasnoyarsk Region Science Foundation personal grant for young scientists (KRSF #13G094)
- 2002 Krasnoyarsk Region Science Foundation grant (KRSF #11F0007M)
- 1998-99 Scholarship of the President of Russia for outstanding students for studying abroad (Emory University, Atlanta, GA, USA; total award ~ \$50k for 1 year).
- 1996-99 Scholarships of the President of Russia for outstanding students.
- 1997 Award of the Mayor of Krasnoyarsk City to young talents.
- 1996-99 Fellowship grants of the International Soros Science Education Program (ISSEP) (s96-1710, s97-188, s98-963, s99-407).
- 1995 Fellowship of the Krasnoyarsk Region Science Foundation for outstanding students.

Grants

- 2014-15: Center for Wildlife Health Research grant (Institute of Agriculture/UTK, PI: S. Eda, Co-PI: Vitaly Ganusov, total amount \$10k).
- 2014-15: Center of Excellence in Livestock Diseases and Human Health (COE) Research Award (Institute of Agriculture/UTK, PI: S. Eda, Co-PI: Vitaly Ganusov, total amount \$5k).
- 2013-17: Scientist Development Grant: "Modeling escape of HIV from CD8 T cell responses" (American Heart Association, PI: Vitaly Ganusov, total amount/direct cost: \$301/\$274k).

- 2013: Support for the Third Bi-annual workshop on “Systems approaches in Immunology”. Army Research Office (PI: Vitaly Ganusov, total amount: \$10k).
- 2013-14: AgResearch Innovation Grant: “Mathematical modeling of immune response to *Mycobacterium avium* subsp. *paratuberculosis* in Johne’s disease”. Ag Campus, UTK (PI: Shige Eda, Co-PI: Vitaly Ganusov, total amount: \$25k).
- 2012: Support for the Annual meeting of the Society for Mathematical Biology. Army Research Office (PI: Vitaly Ganusov, total amount: \$9k).

Publications in preparation

1. Handagama, W., N. Krishna, M. McDaniel, S. Eda, and **V. V. Ganusov** Quantifying Limits on Replication, Death, and Quiescence of *Mycobacterium tuberculosis* in Mice. *J Theor Biol*
2. Song, H., **V. V. Ganusov**, F. Cai, J. Kirchherr, J. W. Pavlicek, S. Chen, B. Hora, P. Hraber, C. Jiang, B. Keele, B. F. Haynes and F. Gao (2015) Immense impact of recombination on HIV-1 evolution. *Cell*
3. McDaniel, M. and **V. V. Ganusov** (2015) Using mathematical modeling to predict residence times of lymphocytes in ovine lymph nodes *J Immunol*
4. Yang, Y. and **V. V. Ganusov** (2015) Competition of cytotoxic T lymphocyte responses for access to HIV-infected cells may slow down the kinetics of HIV escape *PLoS Comp Biol*
5. Yang, Y. and **V. V. Ganusov** (2015) Kinetics of CD8 T cell response to HIV *J Immunol*
6. Kelemen, R. K., I. A. Cockburn, **V. V. Ganusov** (2015) Formation of clusters around plasmodium-infected hepatocytes is rapid and is driven by antigen specific cells *J Immunol*
7. Leviyang, S. and **V. V. Ganusov** (2015) Broad CTL Response in Early HIV Infection Drives Multiple Concurrent CTL Escapes. *PLoS Comp Biol* (in revision)
8. **Ganusov, V. V.**, D. Klinkerberg, A. D. Koets (2015) Limited contribution of the cellular and humoral immune responses to the control of shedding of MAP in cattle *Vet Res* (under review)
9. Noecker, C., K. Schaefer, K. Zaccheo, S. Smallwood-Satchell, Y. Yang, J. Day, and **V. V. Ganusov** (2015) Simple models do not accurately predict early SIV dynamics *Viruses* (invited submission)

Peer-reviewed publications

1. Le, D., Miller, J. D. & **Ganusov, V. V.** 2015 Mathematical modeling provides kinetic details of the human immune response to vaccination. *Front Cell Infect Microb*, **in press**.
2. White, C. E., Villarino, N. F., Sloan, S. S., **Ganusov, V. V.**, & Schmidt, N. W. 2015 Plasmodium suppresses expansion of T cell responses to heterologous infections. *J Immunol*, **in press**.
3. **Ganusov, V. V.** & Auerbach, J. 2014 Mathematical modeling reveals kinetics of lymphocyte recirculation in the whole organism. *PLoS Comp Biol*, **10**, e1003586.
4. Magombedze, G., Eda, S. & **Ganusov, V. V.** 2014 Competition for antigen between Th1 and Th2 responses determines the timing of the immune response switch during *mycobacterium avium* subspecies *paratuberculosis* infection in ruminants. *PLoS Comput Biol*, **10**, e1003414.

5. Kelemen, R., He, G., Woo, H., Lane, T., Rempe, C., Wang, J., Cockburn, I. A., **Ganusov, V. V.** & Berry, M. W. 2014 Classification of T cell movement tracks allows for prediction of cell function. *Int. J. Comput. Biol Drug Desig*, **7**, 113–129.
6. Magombedze, G., Reddy, P. B. J., Eda, S. & **Ganusov, V. V.** 2013 Cellular and population plasticity of helper CD4⁺ T cell responses. *Front Physiol*, **4**, 1–9.
7. Cockburn, I. A., Amino, R., Kelemen, R. K., Kuo, S. C., Tse, S.-W., Radtke, A., Mac-Daniel, L., **Ganusov, V. V.**, Zavala, F. *et al.* 2013 In vivo imaging of CD8⁺ T cell-mediated elimination of malaria liver stages. *Proc Natl Acad Sci U S A*, **110**(22), 9090–9095. doi:10.1073/pnas.1303858110.
8. Liu, M. K. P., Hawkins, N., Ritchie, A. J., **Ganusov, V. V.**, Whale, V., Brackenridge, S., Li, H., Pavlicek, J. W., Cai, F. *et al.* 2013 Vertical T cell immunodominance and epitope entropy determine HIV-1 escape. *J Clin Invest*, **123**(1), 380–393. doi:10.1172/JCI65330.
9. **Ganusov, V. V.**, Neher, R. A. & Perelson, A. S. 2013 Modeling HIV escape from cytotoxic T lymphocyte responses. *J Stat Mech*, **2013**(01), P01 010.
10. **Ganusov, V. V.** & Boer, R. J. D. 2012 A mechanistic model for bromodeoxyuridine dilution naturally explains labelling data of self-renewing T cell populations. *J R Soc Interface*, **10**(78), 1–12. doi:10.1098/rsif.2012.0617.
11. Nikitina, I. Y., Kondratuk, N. A., Kosmiadi, G. A., Amansahedov, R. B., Vasilyeva, I. A., **Ganusov, V. V.** & Lyadova, I. V. 2012 Mtb-Specific CD27(low) CD4 T Cells as Markers of Lung Tissue Destruction during Pulmonary Tuberculosis in Humans. *PLoS One*, **7**(8), e43733. doi:10.1371/journal.pone.0043733.
12. Louzoun, Y. & **Ganusov, V. V.** 2012 Evolution of viral life-cycle in response to cytotoxic T lymphocyte-mediated immunity. *J Theor Biol*, **310C**, 3–13. doi:10.1016/j.jtbi.2012.06.020.
13. Bar, K. J., Tsao, C.-Y., Iyer, S. S., Decker, J. M., Yang, Y., Bonsignori, M., Chen, X., Hwang, K.-K., Montefiori, D. C. *et al.* 2012 Early Low-Titer Neutralizing Antibodies Impede HIV-1 Replication and Select for Virus Escape. *PLoS Pathog*, **8**(5), e1002721. doi:10.1371/journal.ppat.1002721.
14. Riou, C., **Ganusov, V. V.**, Champion, S., Mlotshwa, M., Liu, M. K. P., Whale, V. E., Goonetilleke, N., Borrow, P., Ferrari, G. *et al.* 2012 Distinct kinetics of Gag-specific CD4(+) and CD8(+) T cell responses during acute HIV-1 infection. *J Immunol*, **188**(5), 2198–2206. doi:10.4049/jimmunol.1102813.
15. **Ganusov, V. V.**, Goonetilleke, N., Liu, M. K. P., Ferrari, G., Shaw, G. M., McMichael, A. J., Borrow, P., Korber, B. T. & Perelson, A. S. 2011 Fitness Costs and Diversity of the Cytotoxic T Lymphocyte (CTL) Response Determine the Rate of CTL Escape during Acute and Chronic Phases of HIV Infection. *J Virol*, **85**(20), 10518–10528. doi:10.1128/JVI.00655-11.
16. **Ganusov, V. V.**, Barber, D. L. & De Boer, R. J. 2011 Killing of targets by CD8 T cells in the mouse spleen follows the law of mass action. *PLoS One*, **6**(1), e15959.
17. Fischer, W., **Ganusov, V. V.**, Giorgi, E. E., Hraber, P. T., Keele, B. F., Leitner, T., Han, C. S., Gleasner, C. D., Green, L. *et al.* 2010 Transmission of single HIV-1 genomes and dynamics of early immune escape revealed by ultra-deep sequencing. *PLoS One*, **5**(8), e12303.
18. Zilman, A., **Ganusov, V. V.** & Perelson, A. S. 2010 Stochastic models of lymphocyte proliferation and death. *PLoS One*, **5**(9), e12775. doi:10.1371/journal.pone.0012775.

19. **Ganusov, V. V.**, Lukacher, A. E. & Byers, A. M. 2010 Persistence of viral infection despite similar killing efficacy of antiviral CD8(+) T cells during acute and chronic phases of infection. *Virology*, **405**(1), 193–200.
20. Lyadova, I. V., Tsiganov, E. N., Kapina, M. A., Shepelkova, G. S., Sosunov, V. V., Radaeva, T. V., Majorov, K. B., Shmitova, N. S., van den Ham, H. J. *et al.* 2010 In mice, tuberculosis progression is associated with intensive inflammatory response and the accumulation of Gr-1 cells in the lungs. *PLoS One*, **5**(5), e10469.
21. **Ganusov, V. V.**, Borghans, J. & De Boer, R. J. 2010 Explicit kinetic heterogeneity: mechanistic models for interpretation of labeling data of heterogeneous cell populations. *PLoS Comp Biol*, **6**(2), e1000666.
22. Goonetilleke, N., Liu, M. K., Salazar-Gonzalez, J. F., Ferrari, G., Giorgi, E., **Ganusov, V. V.**, Keele, B. F., Learn, G. H., Turnbull, E. L. *et al.* 2009 The first T cell response to transmitted/founder virus contributes to the control of acute viremia in HIV-1 infection. *J Exp Med*, **206**(6), 1253–72.
23. Asquith, B., Borghans, J. A., **Ganusov, V. V.** & Macallan, D. C. 2009 Lymphocyte kinetics in health and disease. *Trends Immunol*, **30**(4), 182–9.
24. **Ganusov, V. V.** & De Boer, R. J. 2008 Estimating in vivo death rates of targets due to CD8 T-cell-mediated killing. *J Virol*, **82**(23), 11749–11757.
25. **Ganusov, V. V.** & De Boer, R. J. 2008 Tissue distribution of lymphocytes and plasma cells and the role of the gut: response to Pabst *et al.* *Trends Immunol*, **29**(5), 209–10.
26. Althaus, C. L., **Ganusov, V. V.** & De Boer, R. J. 2007 Dynamics of CD8+ T cell responses during acute and chronic lymphocytic choriomeningitis virus infection. *J Immunol*, **179**(5), 2944–2951.
27. **Ganusov, V. V.** & De Boer, R. J. 2007 Do most lymphocytes in humans really reside in the gut? *Trends Immunol*, **28**(12), 514–8.
28. **Ganusov, V. V.**, Milutinovic, D. & De Boer, R. J. 2007 IL-2 regulates expansion of CD4+ T cell populations by affecting cell death: insights from modeling CFSE data. *J Immunol*, **179**(2), 950–957.
29. **Ganusov, V. V.** 2007 Discriminating between Different Pathways of Memory CD8+ T Cell Differentiation. *J Immunol*, **179**(8), 5006–5013.
30. De Boer, R. J., **Ganusov, V. V.**, Milutinovic, D., Hodgkin, P. D. & Perelson, A. S. 2006 Estimating Lymphocyte Division and Death Rates from CFSE Data. *Bull Math Biol*, **68**(5), 1011–1031.
31. **Ganusov, V. V.** & Antia, R. 2006 Imperfect vaccines and the evolution of pathogens causing acute infections in vertebrates. *Evolution*, **60**(5), 957–69.
32. **Ganusov, V. V.** & De Boer, R. J. 2006 Estimating costs and benefits of CTL escape mutations in SIV/HIV Infection. *PLoS Comput Biol*, **2**(3), e24.
33. **Ganusov, V. V.**, Pilyugin, S. S., Ahmed, R. & Antia, R. 2006 How does cross-reactive stimulation affect the longevity of CD8+ T cell memory? *PLoS Comput Biol*, **2**(6), e55.
34. **Ganusov, V. V.**, Pilyugin, S. S., de Boer, R. J., Murali-Krishna, K., Ahmed, R. & Antia, R. 2005 Quantifying cell turnover using CFSE data. *J Immunol Methods*, **298**(1-2), 183–200.
35. **Ganusov, V. V.** & Antia, R. 2005 Pathology during acute infections: contributions of intracellular pathogens and the CTL response. *Biology letters*, **1**(2), 239 – 242.

36. Antia, R., **Ganusov, V. V.** & Ahmed, R. 2005 The role of models in understanding CD8+ T-cell memory. *Nat Rev Immunol*, **5**(2), 101–111.
37. Pilyugin, S. S., **Ganusov, V. V.**, Murali-Krishna, K., Ahmed, R. & Antia, R. 2003 The rescaling method for quantifying the turnover of cell populations. *J Theor Biol*, **225**(2), 275–283.
38. **Ganusov, V. V.** 2003 The role of the cytotoxic T-lymphocyte response and virus cytopathogenicity in the virus decline during antiviral therapy. *Proc R Soc Lond B Biol Sci*, **270**(1523), 1513–8.
39. **Ganusov, V. V.** & Antia, R. 2003 Trade-offs and the evolution of virulence of microparasites: do details matter? *Theor Popul Biol*, **64**(2), 211–20.
40. **Ganusov, V. V.** 2003 Evolution of virulence: adaptive or not? *Trends Microbiol*, **11**(3), 112–3; author reply 113–4.
41. **Ganusov, V. V.** & Brilkov, A. V. 2002 Estimating the instability parameters of plasmid-bearing cells. I. Chemostat culture. *J Theor Biol*, **219**(2), 193–205.
42. **Ganusov, V. V.**, Bergstrom, C. T. & Antia, R. 2002 Within-host population dynamics and the evolution of microparasites in a heterogeneous host population. *Evolution*, **56**(2), 213–23.
43. Brilkov, A. V., **Ganusov, V. V.**, Morozova, E. V. & Pechurkin, N. S. 2001 Computer modeling of the biotic cycle formation in a closed ecological system. *Adv Space Res*, **27**(9), 1587–1592.
44. **Ganusov, V. V.**, Bril'kov, A. V. & Pechurkin, N. S. 2001 Population dynamics of bacterial plasmids. *Mathematical modelling*, **13**(1), 77–98.
45. **Ganusov, V. V.**, Bril'kov, A. V. & Pechurkin, N. S. 2000 Mathematical modeling of the population dynamics of unstable plasmid-bearing bacterial strains during continuous cultivation in the chemostat. *Biofizika*, **45**(5), 881–887.
46. Pechurkin, N. S., Brilkov, A. V., **Ganusov, V. V.**, Kargatova, T. V., Maksimova, E. E. & Popova, L. Y. 1999 Modelling of genetically engineered micro-organisms introduction in closed artificial microcosms. *Adv Space Res*, **24**(3), 335–41.
47. **Ganusov, V. V.**, Bril'kov, A. V. & Pechurkin, N. S. 1999 Structural approach to simulating the population dynamics of unstable recombinant strains of bacteria containing multicopy plasmids. *Dokl Akad Nauk*, **369**(2), 267–70.