

OGAN K. KUMOVA, PHD

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EDUCATION

Doctor of Philosophy in Microbiology & Immunology

August 2015 – July 2020

Drexel University College of Medicine, Philadelphia, PA | GPA: 4.0

Dissertation: Altered Innate Immune Responses to Influenza in the Neonate

Minor: Health Administration | Laboratory of Dr. Alison Carey, MD

Master of Science in Infectious Diseases

January 2013 – May 2015

Drexel University College of Medicine, Philadelphia, PA | GPA: 3.97

Bachelor of Science in Biochemistry & in Bioinformatics

August 2005 – May 2009

University of the Sciences in Philadelphia, Philadelphia, PA

Minor in Mathematics

WORK EXPERIENCE

Program Officer, Vaccine Safety

February 2023 – Present

National Academies of Sciences, Engineering, and Medicine, Washington, D.C.

- Manage expert committee consensus studies on vaccine safety and immunology for federal agency sponsors (VA, DoD, CDC, FDA), overseeing the full study lifecycle: expert recruitment, committee coordination, meeting logistics, evidence synthesis, and report production.
- Currently supporting two active ad hoc studies: (1) Neurodegenerative Outcomes and Selected Military Exposures; and (2) Examination of the Direct Neurocognitive Effects of SARS-CoV-2 Infection Across the Lifespan and the Neuroprotective Effects of COVID Vaccination.
- Served as an editor and a contributor to two published National Academies reports: Evidence Review of the Adverse Effects of COVID-19 Vaccination and Intramuscular Vaccine Administration (2024) and Vaccine Risk Monitoring and Evaluation at the Centers for Disease Control and Prevention (2025), National Academies Press.
- Delivered invited briefing on COVID-19 vaccine safety to Congressional staff of the U.S. House and Senate Appropriations Committees and the Senate HELP Committee (October 2025).
- Manage project timelines, vendor contracts, and budget tracking across concurrent study portfolios; coordinates multi-stakeholder processes across federal sponsors, committee members, external reviewers, and institutional staff.

ORISE Postdoctoral Research Fellow

October 2020 – February 2023

U.S. Food and Drug Administration, Office of Vaccines Research and Review, Silver Spring, MD

Supervisor: Margaret C. Bash, MD, MPH | NIH-U19 Gonorrhea Vaccine Cooperative Research Center

- Led development and characterization of liposome- and outer membrane vesicle (OMV)-based *Neisseria gonorrhoeae* vaccine candidates, including antigen selection, formulation optimization, and adjuvant evaluation.
- Designed and executed multiparameter flow cytometry panels and immunology assays to assess systemic and mucosal B- and T-cell responses, antibody subclasses, and innate immune activation after immunization.
- Conducted murine ascending infection immunization studies, including colony maintenance, IACUC protocol management, inoculations, reproductive tract and lymphoid tissue harvests, blood collection, and downstream endpoint analysis.
- Evaluated route-of-immunization effects on anti-gonococcal immune responses; results published in *Journal of Infectious Diseases* (2025, PMID: 40971931).
- Collaborated across NIH-U19 multi-site consortium; contributed to grant progress reports, data sharing, and consortium meetings.
- Gained direct exposure to the FDA regulatory environment, including GLP standards, SOP development, regulatory documentation, and OVR's framework for preclinical vaccine safety and immunogenicity evaluation.

Laboratory Manager

December 2014 – August 2015

Drexel University College of Medicine, Philadelphia, PA | Supervisor: Alison Carey, MD

- Managed all daily operations of an active neonatal immunology research laboratory, including regulatory compliance (IACUC, IRB), equipment maintenance and calibration, and supply management.
- Oversaw laboratory budget: tracked expenditures against NIH grant accounts, reconciled credit card transactions, processed purchase orders, and liaised with departmental finance and university procurement.
- Wrote and maintained laboratory protocols for experimental procedures, regulatory submissions, and safety documentation.
- Contributed to the development and refinement of the murine neonatal influenza infection model, including optimization of inoculation methods, survival endpoints, and tissue collection procedures.
- Managed animal husbandry for murine colonies used in neonatal influenza infection studies.
- Planned and executed a full laboratory relocation across the city, coordinating the safe transport of equipment, reagents, biological materials, and records while maintaining research continuity.

Laboratory Technician II

December 2012 – December 2014

Drexel University College of Medicine, Philadelphia, PA | Supervisor: Shira Ninio, PhD

- Investigated *Legionella pneumophila* pathogenesis, including biofilm formation and regulation, OmpA-like protein characterization, and intracellular replication; contributed to peer-reviewed publications (FEMS Microbiology Letters 2016, Biomolecules 2022).
- Received and managed an independent grant to develop a murine co-infection model of influenza virus and *Legionella pneumophila*, including experimental design, protocol development, and model optimization.
- Managed day-to-day laboratory operations including supply ordering, vendor relationships, credit card transactions, and budget tracking against grant accounts.
- Maintained laboratory records, regulatory compliance documentation, reagent inventories, and equipment logs.
- Supervised and trained junior laboratory personnel.

Museum Educator

May 2003 – March 2020

Franklin Institute Science Museum, Philadelphia, PA

- Performed live science shows for general public audiences of all ages across multiple exhibit halls and theater venues, adapting content and delivery in real time to diverse audience backgrounds and age groups.
- Developed and wrote original science shows and interactive demonstrations from concept through execution, including scripts, experimental design, and audience engagement strategies.
- Developed and delivered traveling science shows to off-site venues and community locations throughout the Philadelphia region.
- Designed workshop curricula for K–12 school groups, creating hands-on, inquiry-based activities aligned with educational standards.
- Developed age-appropriate curriculum for summer camp programs across multiple weeks and age groups, building structured science education experiences in physics, biology, and chemistry.
- Served as Acting Director of the overnight camp-in program for a full season: managed and scheduled staff, oversaw program budgets, and planned and executed overnight events hosting up to 400 participants twice per week during the school year.
- Contributed to the planning, development, and execution of the Philadelphia Science Festival, coordinating public programming and science communication initiatives across the city.
- Participated in institutional development and planning activities, contributing to program strategy and outreach initiatives.

TEACHING EXPERIENCE

Senior Adjunct Faculty

August 2020 – Present

Rowan University / Rowan College at Burlington County – STEM Division

- Creator and lead instructor for BIO 112: Health and Human Microbiology, built from the ground up for health-profession students.
- Teaches BIO 155: Basic Microbiology; BIO 120: Biology I; BIO 122: Biology II.
- Delivers all courses across in-person, hybrid, and fully asynchronous online formats.

Visiting Lecturer

March 2022 – 2025

Uniformed Services University Medical College

- Delivered graduate and medical school lectures in Molecular Pathogenesis.

Guest Lecturer & Teaching Assistant

March 2015 – Present

Drexel University College of Medicine – Graduate School of Biomedical Sciences and Professional Studies,
Department of Microbiology & Immunology

- Vaccine Development (MIIM-524, January 2019–Present)
- Immunology I (MIIM-607, Fall 2016–Present): Antiviral Immunity, CD8+ T Cells, NK Cells, Apoptosis
- Introduction to Infectious Diseases (Spring 2016)
- Clinical Correlations in Infectious Diseases (Fall 2015, Fall 2016)
- Clinical Correlation in Immunology (Spring 2017)
- Teaching Assistant: Molecular Structure and Metabolism (MIIM-512 & MIIM-521)
- CRLA Level II Certified Tutor

Adjunct Faculty

January 2012 – June 2013

Drexel University – School of Arts and Sciences, Department of Chemistry

- Chemistry II; Physical Chemistry Lab; Organic Chemistry Lab; Analytical Chemistry / Instrumental Analysis

Adjunct Faculty

January 2012 – June 2013

Drexel University – Goodwin College of Professional Studies

- Chemistry for Engineers; Chemistry for Health Science

Adjunct Faculty

December 2010 – 2015

Philadelphia University – School of Science and Health

- Chemistry I; Chemistry I Lab; Chemistry II Lab
- Redesigned the Chemistry I & II Labs
- Developed an undergraduate course for health science majors to critically evaluate primary scientific literature

Teaching Assistant & Instructor

August 2007 – September 2010

University of the Sciences – Department of Chemistry & Biochemistry

- Teaching Assistant: Principles of Chemistry Laboratory CH 113 & CH 114 (August 2007–May 2009)
- Teaching Assistant: Biochemistry Laboratory CH 346 (August 2008–December 2008)
- Teaching Assistant: Chemical Sciences Orientation CH 110 (August 2008–August 2011)
- Guest Lecturer: Discussions in Chemistry for 3rd years (January 2009–Present)
- Instructor: General Chemistry Laboratory CH 102 & CH 104 (August 2009–September 2010)

Teaching Assistant

University of the Sciences – Department of Biological Sciences

- Forensic Anthropology (University of Pennsylvania, Museum of Archaeology and Anthropology)

Museum Educator & Program Developer

May 2003 – March 2020

Franklin Institute Science Museum, Philadelphia, PA

- Developed and delivered science shows, K–12 school workshops, summer camp curriculum, and traveling programs for public audiences. See Work Experience for full detail.

- Rao AS, Onufer AP, Kumova OK, Roberts LTN, Mossabeh R, Pascasio J, Carey AJ. Myeloid TLR2 signaling amplifies immunopathology in influenza-infected murine neonates. *American Journal of Respiratory Cell and Molecular Biology*. In press.
- Matthias KA, Connolly KL, Jerse AE, Kumova OK, Macintyre AN, Gray MC, Thomas KS, Criss AK, Zielke RA, Li L, Sikora AE, Ramirez-Bencomo F, Thistlethwaite A, Derrick JP, Lu WE, Bash MC. Evaluation of immunization route in induction of vaccine-mediated anti-gonococcal immune responses in a murine model of ascending infection. *Journal of Infectious Diseases*. November 2025;232(5):e765–e777. PMID: 40971931.
- Rao AS, Ugwu N, Onufer AP, Kumova OK, Carey AJ. Cathelicidin-related antimicrobial peptide (CRAMP) is toxic during neonatal murine influenza virus infection. *Journal of Immunology*. May 2025;214(5):1022–1031. PMID: 40101750.
- Kumova OK, Galani IE, Rao A, Johnson H, Triantafyllia V, Matt SM, Pascasio J, Gaskill PJ, Andreaskos E, Katsikis PD, Carey AJ. Severity of neonatal influenza infection is driven by type I interferon and oxidative stress. *Mucosal Immunology*. June 2022;15(6):1309–1320. PMID: 36352099.
- Marin C, Kumova OK, Ninio S. Characterization of a novel regulator of biofilm formation in the pathogen *Legionella pneumophila*. *Biomolecules*. January 2022;12(2):225. PMID: 35204726.
- Das P, Acharya S, Prahaladan VM, Kumova OK, Malaeb S, Behera S, Agarwal B, Christensen DJ, Carey AJ, Bhandari V. Chitin-derived AVR-48 prevents experimental bronchopulmonary dysplasia and BPD-associated pulmonary hypertension in newborn mice. *International Journal of Molecular Sciences*. August 2021;22(16):8547. PMID: 34445253.
- Chaubey S, Nader YM, Shah D, Kumova OK, Prahaladan VM, Carey AJ, Andersson S, Bhandari V. α 1,3-Fucosyltransferase-IX, an enzyme of pulmonary endogenous lung stem cell marker SSEA-1, alleviates experimental bronchopulmonary dysplasia. *Pediatric Research*. April 2021;89(5):1126–1135. PMID: 32303051.
- Gary E, O'Connor M, Chakhtoura M, Tardif V, Kumova OK, Malherbe DC, Sutton WF, Haigwood NL, Kutzler MA, Haddad EK. Adenosine deaminase-1 enhances germinal center formation and functional antibody responses to HIV-1 envelope DNA and protein vaccines. *Vaccine*. May 2020;38(22):3821–3831. PMID: 32280045.
- Kumova OK, Fike AJ, Thayer JL, Nguyen LT, Mell JC, Pascasio J, Stairiker C, Leon LG, Katsikis PD, Carey AJ. Lung transcriptional unresponsiveness and loss of early influenza virus control in infected neonates is prevented by intranasal *Lactobacillus rhamnosus* GG. *PLoS Pathogens*. October 2019;15(10):e1008072. PMID: 31603951.
- Kumova OK*, Fike AJ*, Carey AJ. Dissecting the defects in the neonatal CD8⁺ T-cell response. *Journal of Leukocyte Biology*. November 2019;106(5):1051–1061. PMID: 31260598. (Review)
- Fike AJ, Kumova OK, Tardif VJ, Carey AJ. Neonatal influenza-specific effector CTLs retain elevated CD31 levels at the site of infection and have decreased IFN- γ production. *Journal of Leukocyte Biology*. March 2019;105(3):539–549. PMID: 30536476.
- Carey AJ, Hope JL, Mueller YM, Fike AJ, Kumova OK, van Zessen DBH, Steegers EAP, van der Burg M, Katsikis PD. Public clonotypes and convergent recombination characterize the naïve CD8⁺ T-cell receptor repertoire of extremely preterm neonates. *Frontiers in Immunology*. December 2017;8:1859. PMID: 29312340.
- Fike AJ, Nguyen LT, Kumova OK, Carey AJ. Characterization of CD31 expression on murine and human neonatal T lymphocytes during development and activation. *Pediatric Research*. July 2017;82(1):133–140. PMID: 28355204.
- Goodwin IP, Kumova OK, Ninio S. A conserved OmpA-like protein in *Legionella pneumophila* required for efficient intracellular replication. *FEMS Microbiology Letters*. August 2016;363(16):fnw173. PMID: 27421957.
- Carey AJ, Gracias DT, Thayer JL, Boesteanu AC, Kumova OK, Mueller YM, Hope JL, Fraietta JA, van Zessen DB, Katsikis PD. Rapid evolution of the CD8⁺ TCR repertoire in neonatal mice. *Journal of Immunology*. March 2016;196(6):2602–2613. PMID: 26873987.

EDITORIAL WORK

- Ancona D, Kumova OK, Stratton K, Henney JE, editors. Vaccine Risk Monitoring and Evaluation at the Centers for Disease Control and Prevention. Washington, DC: National Academies Press; 2025 Oct 7. doi:10.17226/29240. PMID: 41289413.
- Rosenberg D, Kumova OK, Stratton K, Bass AR, editors. Evidence Review of the Adverse Effects of COVID-19 Vaccination and Intramuscular Vaccine Administration. Washington, DC: National Academies Press; 2024. doi:10.17226/27746. PMID: 39312602.

INVITED TALKS

- Kumova OK, CDC ISO committee. Review of CDC COVID-19 Vaccine Safety Research and Communications. Invited presentation to Congressional staff of the U.S. House and Senate Appropriations Committees and the Senate HELP Committee. Washington, DC. October 7, 2025.
- Effects of Meningococcal OMV Vaccine Preparation on Immune Responses. NIH Annual Cooperative Research Center STI Meeting. July 2022.
- Skewing Immune Responses for Optimal Gonococcal Vaccine Efficacy. US Food and Drug Administration, Office of Vaccine Research and Review. March 2022.
- Early Neonatal Unresponsiveness to Respiratory Viruses is Rescued by Probiotics. US Food and Drug Administration (FDA). Silver Spring, MD. September 2021.
- Altered Innate Immune Responses to Influenza Virus in the Neonate. Drexel University College of Medicine, Philadelphia, PA. July 2020.
- Lung transcriptional unresponsiveness and loss of early viral control in influenza virus infected neonates is prevented by intranasal *Lactobacillus rhamnosus*. US Food and Drug Administration (FDA). Silver Spring, MD. July 2020.
- Early Neonatal Unresponsiveness to Respiratory Viruses is Rescued by Probiotics. Merck. West Point, PA. June 2020.
- Type I interferons mediate pathogenic reactive oxygen species during neonatal influenza virus infection. Immunology 2020. Honolulu, HI. Abstract ID 2453.
- Lung transcriptional unresponsiveness and loss of early viral control in influenza virus infected neonates is prevented by intranasal *Lactobacillus rhamnosus*. Infection and Immunity Forum. 2019. University of Pennsylvania, Philadelphia, PA.
- Lung transcriptional unresponsiveness and loss of early viral control in influenza virus infected neonates is prevented by intranasal *Lactobacillus rhamnosus*. Discovery Day 2019. Drexel University, Philadelphia, PA.
- Revenge of the captive lab mice: Scientist's view on working with animals. Science on Tap. May 2018, Philadelphia, PA.
- Role of *Lactobacillus rhamnosus* GG in Protecting the Neonate During an Influenza Infection. Microbiology & Immunology Department Seminar. November 2017.
- Probiotic Treatment in Neonatal Mice Leads to Differential Recruitment of Key Innate Immune Cells During Influenza Infection. 755th Month Meeting Eastern Pennsylvania Branch of American Society for Microbiology. May 2016.
- Transposon Library Creation in the human pathogen *Legionella pneumophila* to Identify Genes Involved in Biofilm Formation. Temple University Lewis Katz School of Medicine, Department of Microbiology and Immunology Meeting. June 2013, Philadelphia, PA.
- Role of Mass Spectrometry in identifying DNA Modifications and Mutations. University of the Sciences, Department of Chemistry & Biochemistry – Seminar Series. May 2010, Philadelphia, PA.
- A Game That Will End the World: Tower of Hanoi Mathematical Coding and its Application to Bioinformatics Algorithms. Annual Mathematical Association of America EPADEL Meeting. April 2009, Hershey, PA.

FUNDING, HONORS & AWARDS

- VesiVax Vaccine Formulation Against *Neisseria gonorrhoeae* (SBIR)
- Oak Ridge Institute for Science and Education (ORISE) Fellowship — \$98,000/year, 3 years
- Drexel University Bondi Fellowship for Outstanding Graduate Student, 2019 — \$2,500
- Drexel University Dean's Fellowship for Excellence in Collaborative Research, 2017–2018 — \$65,000
- PAESM Infection and Immunity 2016 Poster Award
- NIH Clinical and Translational Research Workshop 2016 Cohort
- Drexel University Center for Translational Research Travel Award — \$1,000
- Drexel University College of Medicine, Biomedical Sciences and Professional Studies Dean's Award — \$250
- Drexel University Research Discovery Day 2015 Honorable Mention — Poster Presentation
- American Society for Mass Spectrometry Student Presenter Travel Award, 2010 — \$750

- Delaware Valley Mass Spectrometry Society Student Travel Award, 2010 — \$600
- Mathematical Association of America EPADEL Presentation Award, 2009
- University of the Sciences Student Leader Award, 2007, 2008, 2009

SELECTED ABSTRACTS

- Kumova OK, Williams E, Dai A, Ho SO, Matthias K, Fujii G, Bash MC. Skewing Immune Responses to *Neisseria gonorrhoeae* Liposome Based Vaccine Responses Using Adjuvants. ASM Microbe 2022. Washington, D.C. Poster #CIV-5096.
- Kumova OK, Carey AJ. Pathogenic Role of Type I Interferon-Mediated Reactive Oxygen Species in the Neonatal Lung During Influenza Infection. Drexel Discovery Day 2018. Philadelphia, PA. Abstract 11.
- Kumova OK, Fike AJ, Carey AJ. Role of *Lactobacillus rhamnosus* in Mediating Type I Interferon Responses During Influenza Infection in Neonate Mice. Infection and Immunity 2017. Philadelphia, PA. Abstract 28.
- Kumova OK, Nguyen LT, Fike AJ, Carey AJ. Toll-Like Receptor (TLR)-2 Mediated Recruitment of Neutrophils During Influenza Infection in a Neonatal Murine Model. American Association of Immunologists, Immunity 2017. Washington, D.C. Abstract P793.
- Kumova OK, Fike AJ, Carey AJ. Role of *Lactobacillus rhamnosus* in Mediating Type I Interferon Responses During Influenza Infection in Neonate Mice. Drexel Discovery Day 2016. Philadelphia, PA. Abstract 634.
- Kumova OK, Thayer JL, Fike AJ, Carey AJ. Probiotic Treatment in Neonatal Mice Leads to Differential Recruitment of Key Innate Immune Cells During Influenza Infection. Infection and Immunity 2016. Philadelphia, PA. Abstract 29.
- Kumova OK, Thayer JL, Fike AJ, Carey AJ. Probiotic treatment Confers Protection to Influenza Infection in Neonatal Mice via Activation of Toll-like Receptors and Surfactant Protein A Production. Annual Philadelphia Infection and Immunity Forum, December 2015. Abstract 27.
- Kumova OK, Thayer JL, Fike AJ, Carey AJ. Probiotic treatment Confers Protection to Influenza Infection in Neonatal Mice via Activation of Toll-like Receptors and Surfactant Protein A Production. Drexel University College of Medicine Discovery Day, October 2015. Abstract 822.
- Kumova OK, Hope JL, Fike AJ, Stairiker CJ, Hancock AS, Katsikis PD and Ninio S. Establishing a Murine Model of Influenza and *Legionella pneumophila* Co-infection. Drexel University College of Medicine Discovery Day, October 2014. Abstract 248.
- Kumova OK, Marin C, Ninio S. Biofilm Formation in the Pathogen *Legionella pneumophila*. International Symposium on Molecular Medicine and Infectious Disease, June 2014, Philadelphia, PA. Abstract B28.
- Kumova OK, Rushmore D, Bruist MB. Restriction Enzyme Digestion Time Courses of DNA Oligonucleotides for Determining Whether or not IHF Transiently Releases the DNA it Binds. Annual University of the Sciences Research Day, April 2009. Abstract 23.
- Kumova OK, Rushmore D, Bruist MB. Results of Restriction Enzyme Digestion Time Courses of DNA Oligonucleotides. Annual American Chemical Society Younger Chemist Committee Poster Session, March 2009. Abstract UG57.

PROFESSIONAL MEMBERSHIPS

- The American Association of Immunologists (2016–Present)
- American Society for Microbiology (2016–Present)
- American Society for Microbiology – Eastern Pennsylvania Branch (2014–Present)
- American Association for Cancer Research (2018–Present)
- Society for Leukocyte Biology (2018–Present)
- American Chemical Society (2005–Present)
- *N. gonorrhoeae* Research Society (2020–Present)
- American Chemical Society Younger Chemists Committee, Chair (2010–2015)
- American Society for Mass Spectrometry (2010–2014)

S E R V I C E & L E A D E R S H I P

- Biomedical Sciences Graduate Student Association – President (2018–Present)
- Drexel University Graduate Council – Member (July 2018–Present)
- Drexel University Biomedical Sciences Executive Committee – Member (July 2019–Present)
- Discovery Day Poster Judge – November 2018
- AAI Public Policy – Washington, DC Capitol Hill Day Cohort 2017
- National Institutes of Health – Clinical and Translational Research Fellow 2016
- Alpha Phi Omega (2006–Present)
- Student Government Association – Vice President of Diversity and Equality (2006–2009)

S K I L L S

Immunology & Molecular Biology

Innate and adaptive immune assays; T- and B-cell biology; cytokine profiling; vaccine immunology; host–pathogen interactions.

Laboratory Techniques

Flow cytometry (BD Fortessa Certified User & Panel Designer); ELISA; western blotting; enzyme kinetics; protein expression and purification; cloning, sub-cloning, recombinant DNA; Nanostring; single-cell sequencing; RT-qPCR and ddPCR; bacterial and mammalian cell culture; biofilm assays; murine models including BAL collection, organ harvest, and bone marrow isolation; animal husbandry and colony management.

Instrumentation

Flow cytometry; microscopy; HPLC; GC; mass spectrometry; NMR; IR; UV-Vis; atomic absorption spectroscopy; ultracentrifugation.

Computational & Bioinformatics

FlowJo; Prism; SPSS; SigmaPlot; BLAST; Galaxy; R (basic); Python; C/C++; MATLAB; Linux; SQL.

Teaching, Digital & AI Tools

Blackboard; Canvas; Kaltura; Zoom; AI-assisted tools for teaching, data synthesis, and scientific communication.

Regulatory & Project Management

GLP; SOP development; LIMS/Quartz; PMP coursework completed (exam pending).

Languages & Certifications

Bilingual: Turkish and English | BD Fortessa Certified User and Panel Designer | Category B Infectious Agent Shipping | CRLA Level II Tutor | First Aid & CPR