

Nikolay S. Markov

Curriculum Vitæ


nikolay.markov@northwestern.edu

Education

- M.S. in Bioinformatics, Newcastle University, Newcastle upon Tyne, UK 2017–2018
Distinction
Dissertation: Evaluation of machine learning strategies for classification and unbiased discovery of the new cell types in the single cell RNA-seq datasets
Advisors:
– Jaume Bacardit, Reader at Newcastle University;
– Alexander Misharin, Assistant Professor at Northwestern University.
- Undergraduate coursework in Biology, Moscow State University, Moscow, Russia 2003–2006
Genetics major


Publications

Rogan A. Grant*, Luisa Morales-Nebreda*, **Nikolay S. Markov***, Suchitra Swaminathan, Estefany R. Guzman, Darryl A. Abbott, ... Ankit Bharat, Cara J. Gottardi, GR Scott Budinger, Alexander V. Misharin, Benjamin D. Singer, Richard G. Wunderink, The NU SCRIPT Study Investigators


Circuits between infected macrophages and T cells in SARS-CoV-2 pneumonia. *Nature*, 2021; 590, 635–641. <https://doi.org/10.1038/s41586-020-03148-w> 

* equally contributing first co-author


Ankit Bharat, Melissa Querrey, **Nikolay S. Markov**, Samuel Kim, Chitaru Kurihara, Rafael Garza-Castillon, Adwaiy Manerikar, Ali Shilatifard, Rade Tomic, Yuliya Politanska, Hiam Abdala-Valencia, Anjana V. Yeldandi, Jon W. Lomasney, Alexander V. Misharin, G.R. Scott Budinger

Lung transplantation for pulmonary fibrosis secondary to severe COVID-19. *Science Translational Medicine*, 2020. <https://doi.org/10.1126/scitranslmed.abe4282> 

Satoshi Watanabe, **Nikolay S. Markov**, Ziyang Lu, Raul Piseaux Aillon, Saul Soberanes, Constance E. Runyan, Ziyang Ren, Rogan A. Grant, Mariana Maciel, Hiam Abdala-Valencia, Yuliya Politanska, ... Richard I. Morimoto, Paul A. Reyfman, G.R. Scott Budinger, Alexander V. Misharin


Resetting proteostasis with ISRIB promotes epithelial differentiation to attenuate pulmonary fibrosis. *PNAS*, 2021; 118 (20) e2101100118. <https://doi.org/10.1073/pnas.2101100118> 

Masahiro Yoshida, Kaylee B. Worlock, Ni Huang, Rik G.H. Lindeboom, ... **NU SCRIPT Study Investigators***, ... Alexander V. Misharin, Sam M. Janes, Sarah A. Teichmann, Marko Z. Nikolić, Kerstin B. Meyer

The local and systemic response to SARS-CoV-2 infection in children and adults. *medRxiv*, 2021. <https://doi.org/10.1101/2021.03.09.21253012> 


* part of the collective author

Clarissa M. Koch, Andrew D. Prigge, Kishore R. Anekalla, Avani Shukla, Hanh Chi Do-Umehara, Leah Setar, Jairo Chavez, Hiam Abdala-Valencia, Yuliya Politanska, **Nikolay S. Markov**, Grant R. Hahn, Taylor Heald-Sargent, L. Nelson Sanchez-Pinto, William J. Muller, Alexander V. Misharin, Karen M. Ridge, Bria M. Coates


Immune response to SARS-CoV-2 in the nasal mucosa in children and adults. *medRxiv*, 2021. <https://doi.org/10.1101/2021.01.26.21250269> 

Matthew L. Speir, Aparna Bhaduri, **Nikolay S. Markov**, Pablo Moreno, Tomasz J. Nowakowski, Irene Papatheodorou, Alex A. Pollen, Lucas Seninge, W. James Kent, Maximilian Haeussler


Luisa Morales-Nebreda, Kathryn A. Helmin, **Nikolay S. Markov**, Raul Piseaux, Manuel A. Torres Acosta, Hiam Abdala-Valencia, Yuliya Politanska, Benjamin D. Singer

Aging imparts cell-autonomous dysfunction to regulatory T cells during recovery from influenza pneumonia. *JCI Insight*, 2021. <https://doi.org/10.1172/jci.insight.141690> 


Constance E. Runyan, Lynn C. Welch, Emilia Lecuona, Masahiko Shigemura, Luciano Amarelle, Hiam Abdala-Valencia, Nikita Joshi, Ziyang Lu, Kiwon Nam, **Nikolay S. Markov**, Alexandra C. McQuattie-Pimentel, Raul Piseaux-Aillon, Yuliya Politanska, Lango Sichizya, Satoshi Watanabe, Kinola J.N. Williams, G. R. Scott Budinger, Jacob I. Sznajder, Alexander V. Misharin

Impaired phagocytic function in CX3CR1⁺ tissue-resident skeletal muscle macrophages prevents muscle recovery after influenza A virus-induced pneumonia in old mice. *Aging Cell*, 2020; 19:e13180. <https://doi.org/10.1111/ace1.13180> 

Nikita Joshi, Satoshi Watanabe, Rohan Verma, Renea P. Jablonski, Ching-I Chen, Paul Cheresch, **Nikolay S. Markov**, Paul A. Reyfman, Alexandra C. McQuattie-Pimentel, Lango Sichizya, Ziyang Lu, Raul Piseaux-Aillon, David Kirichenbuechler, Annette S. Flozak, Cara J. Gottardi, Carla M. Cuda, Harris Perlman, Manu Jain, David W. Kamp, G.R. Scott Budinger, Alexander V. Misharin

A spatially restricted fibrotic niche in pulmonary fibrosis is sustained by M-CSF/M-CSFR signalling in monocyte-derived alveolar macrophages. *European Respiratory Journal*, 2020; 55 (1) 1900646. <https://doi.org/10.1183/13993003.00646-2019> 

Invited talks

Circuits between infected macrophages and T cells in SARS-CoV-2 pneumonia
American Thoracic Society Allergy, Immunology and Inflammation (AII)
assembly journal club. [Recording](#) 

June 2021

Work Experience

Post-Baccalaureate Research Fellow, Division of Pulmonary and Critical Care,
Feinberg School of Medicine, Northwestern University, Chicago, USA

2019–present

Analyse transcriptomic data from human samples and mouse experiments to gain insights into COVID-19, pulmonary fibrosis, systemic sclerosis and other pulmonary diseases. Write manuscripts, support and organize data exchange, data management infrastructure, survey and apply new tools to RNA-seq analysis, develop in-house algorithms, design biological experiments to test hypothesis generated from analysis of transcriptomic data.

Head of maintenance tools development group, Yandex, Moscow, Russia

2014–2017

Develop, design and support web-services and console tools for system administrators and other employees. Manage a team of developers on these projects: mentor, resolve conflicts, improve performance, code review.

Full-stack software engineer, Yandex, Moscow, Russia

2007–2014

Develop, design and support web-services and console tools for automating and improving employees' workflows.

Software engineer, Art. Lebedev Studio, Moscow, Russia

2006–2007

Develop and support web-sites and content management system.

Teaching Experience

Summer Students Program 2020 at Division of Pulmonary and Critical Care

2020

Oversaw a group of 4 college students on a bioinformatics project of analysis of single-cell bronchial brushing samples in a remote setting during the 4-week

Summer Students Program. Contributed to project's design, teaching R programming environment, single-cell RNA-seq experimental technology, single-cell analysis software (Seurat), mentoring and troubleshooting.

Introduction to Python, Introduction to Pandas and Matplotlib 2020
Small introductory lecture series during Data Science Nights at NICO, Northwestern University.

Introduction to Programming, Newcastle University, Newcastle upon Tyne, UK 2017
Unofficial 5-lecture course for fellow students.

Introduction to Computer Science with Python 3, Yandex, Moscow, Russia 2013
High-school students.

Coursework

DGP 440 Immunology, Northwestern University 2020
Auditioned the course

Evaluation of machine learning strategies for classification and unbiased discovery of the new cell types in the single cell RNA-seq datasets 2018
M.S. thesis, Newcastle University.

Advisers:

- Jaume Bacardit, Reader at Newcastle University;
- Alexander Misharin, Assistant Professor at Northwestern University.

We evaluated the possibility of using machine learning methods to rapidly annotate new single cell RNA-seq datasets based on the reference dataset.

We assessed the performance of a gradient boosting algorithm `catboost` for predicting cell types in Mouse Cell Atlas dataset and 3 samples of mouse lungs.

We explored several strategies to explicitly train our models to detect novel cell types that are absent in the reference dataset. `Catboost` showed good performance, and was able to detect novel cell types while retaining good quality of cell type predictions. This demonstrated the possibility to use machine learning classification for unbiased high-throughput cell type discovery.


Miscellaneous

Contributions to single-cell RNA-seq open-source tools `Seurat` and `CellBrowser`, bioinformatics tool `biopython` 2018–present

Dataset visualisation for Reyfman *et al.*, 2019 for Northwestern University 2018
Create a website with interactive dataset visualisation for single-cell RNA-seq lung datasets from Reyfman *et al.*, 2019 using open-source tools.

Lab system administrator, Polilov lab, Moscow State University, Moscow, Russia 2017–2019
Install and maintain software for connectome proofreading from Janelia Institute. Setup file sharing and backup for lab members.

Programming languages

Python, R, Java, C++, Ruby, Perl. Linux. Latex. HTML, JS.
Github: <https://github.com/mxposed> 

Personal Information

Spanish: basic; French: basic; Japanese: basic

Hobbies: piano, photography

Russian citizenship

Born in 1986