

Anna Kuzina

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RESEARCH INTERESTS

My research interests lie in biomedical machine learning, particularly medical image analysis and computational immunology. I am interested in developing and evaluating models for small, heterogeneous biomedical datasets, building on my experience in 3D image segmentation and experimental molecular immunology.

EDUCATION

- I.M. Sechenov First Moscow State Medical University** Sep 2020 – Aug 2026
Specialist Degree in Medical Biochemistry — GPA 5.00/5.00 (highest attainable) Moscow, Russia
- Six-year integrated programme; the Russian Specialist Diploma is a single-tier qualification benchmarked at **integrated Master's / MSc level** (EQF 7). Institute of Biodesign and Complex Systems Modeling.
- School 21 × Sechenov University Joint Campus** Sep 2024 – Jun 2025
Artificial Intelligence in Medicine — peer-to-peer engineering programme Moscow, Russia
- Admitted through a competitive selection intensive (**3:1**); algorithms, systems and relational databases worked through in Bash, SQL/PostgreSQL and Python, followed by a deep learning specialisation in PyTorch.
- Sechenov University — Professional Retraining Programmes** Sep 2023 – Aug 2026
Medical Data Analyst · Translator/Interpreter in Professional Communication (English) Moscow, Russia

RESEARCH EXPERIENCE

- Clinic of Urology, Sechenov University** Jun 2026 – Present
ML Developer Intern · supervised by Ivan Chernenkiy, Lead Software Engineer Moscow, Russia
- Developed a **MONAI/PyTorch** pipeline for liver and hepatic lesion segmentation from multiphase CT, covering curation, preprocessing, multiphase input handling, training and evaluation.
 - Investigated the persistent failure to learn the lesion class and jointly reworked the overlapping-label representation, loss and class-aware patch sampling, establishing a trainable lesion baseline.
 - Replaced single-split evaluation with **class-stratified five-fold cross-validation**, keeping all phases of each case in the same fold; analysed per-case errors and identified an association between lesion volume and segmentation performance.
 - Implemented reproducible cluster training with **GitLab CI**, **SLURM** and **Singularity**, versioned configurations and experiment tracking.
- I.I. Mechnikov Research Institute of Vaccines and Sera** Sep 2023 – Present
Research Assistant, Molecular Immunology · Prof. O.A. Svitich, MD, Corr. Member RAS Moscow, Russia
- **First author of a conference abstract** on hormonal modulation of immune gene expression in HIV-1 infection. Performed RT-qPCR experiments and quantitative analysis contributing to **three co-authored peer-reviewed publications**.
 - **First author of conference abstracts** on innate immune gene expression in oral mucosal repair and in a bacteriophage-treated *Pseudomonas aeruginosa* wound-infection model.
 - Quantified **CCR5/CCR8** and **TLR2/4/9** gene expression by RT-qPCR in PBMCs from multiple donors across three HIV-1 subtypes (A6, B, G) and varying hormone concentrations; analysed differences across experimental conditions and donor-to-donor variation.
- P.K. Anokhin Research Institute of Normal Physiology** Nov 2020 – Sep 2023
Senior Laboratory Technician, Functional Neurochemistry · Marina A. Gruden, PhD Moscow, Russia
- Related apoptosis-regulator gene expression to spatial-memory performance (Morris water maze), integrating molecular and behavioural measurements into a single analysis; owned the RT-qPCR workflow end to end.

PEER-REVIEWED PUBLICATIONS

- Nosik M., Bystritskaya E., Ryzhov K., Kostyuchenko E., **Kuzina A.**, Kravtchenko A., Sevostyanihin S., Demenok I., Zverev V., Svitich O. Expression of Toll-like Receptors and Chemokine Receptors in the Early and Advanced Stages of HIV Infection Aggravated by *Mycobacterium tuberculosis*. *International Journal of Molecular Sciences*, 2026, 27(18), 8161. doi:10.3390/ijms27188161
- Nosik M., Ryzhov K., Berezhnaya E., Bystritskaya E., Lobach O., Kiseleva I., Kostyuchenko E., **Kuzina A.**, Meremianina E., Kireev D., Svitich O. Gonadocorticoids Have Different Effects on the Expression of Toll-like Receptors When Infected with Various HIV-1 Subtypes. *Viruses*, 2025, 17(11), 1512. doi:10.3390/v17111512
- Nosik M.N., Bystritskaya E.P., Ryzhov K.A., Berezhnaya E.V., Lobach O.A., Kiseleva I.A., Kireev D.E., **Kuzina A.V.**, Kostyuchenko E.P., Vasilieva V.E., Zimina A.A., Svitich O.A. Effect of Female Sex Hormones on the Expression of CCR5/CCR8 Coreceptor Genes and Viral Replication in HIV-1 Infection. *Bulletin of Experimental Biology and Medicine*, 2025, 179(4), 480–484. doi:10.47056/0365-9615-2025-179-4-480-484

AWARDS AND FUNDING

- **Scholarship of the Government of the Russian Federation**, 2024/25 and 2025/26: granted by federal order under a national quota of **4,500** student awards per year.

- **Prize Winner, “I am a Professional” All-Russian Student Olympiad**, Preventive Medicine track, two consecutive seasons: in the 2024/25 season 3,838 medals were awarded across 185,610 participants nationally (top 2%).
- **1st place** (best oral presentation), Lomonosov International Scientific Conference 2024, Fundamental Medicine · **2nd place, oral**, Medical Spring International Youth Forum, 2024 and 2025 · **2nd place**, VI Scientific Career Centre Conference, 2022.
- **Winning team**, IPHARMA case, BIOMEDTECH championship 2025 (Skolkovo × Moscow State University), against 15 teams and 64 participants.

SELECTED CONFERENCE PRESENTATIONS

- **Kuzina A.V.**, Stepanchikova E.A., Kostyuchenko E.P., et al. Effect of phage therapy on the expression profile of innate immunity factors in an *in vivo Pseudomonas aeruginosa* wound infection model. *New Approaches in Microbiology, Virology, Immunology and Epidemiology*, 2026 (**oral**). (*first author*)
- **Kuzina A.V.**, Zimina A.A., Bystritskaya E.P. Effect of estradiol and progesterone on CCR5/CCR8 coreceptor gene expression in HIV-1 subtype G infection. Lomonosov International Scientific Conference, Fundamental Medicine (Experimental Research), 2024 (**1st place, oral**; also presented as a poster). (*first author*)
- **Kuzina A.V.** The role of innate immunity gene expression in oral mucosal repair after vestibuloplasty. Medical Spring International Youth Scientific Forum, 2025 (**2nd place, oral**). (*first author*)
- Kostyuchenko E.P., **Kuzina A.V.**, Bystritskaya E.P. Influence of sex hormones on Toll-like receptor expression in cells infected with HIV-1 subtype G. Lomonosov International Scientific Conference, Experimental Research, 2025 (poster). (*co-authored abstract*)
- Posters at the XLVI Scientific Session “Systemic Organisation of Physiological Functions” (2022) and the Young Scientists Conference “Current Issues in Developmental Biology” (2021). Co-authored abstracts at *New Approaches in Microbiology, Virology, Immunology and Epidemiology* (2024; 2026, oral). Ten or more contributions in total, 2021–2026.

APPLIED MACHINE LEARNING PROJECTS

Clinical NLP and retrieval systems | *RoBERTa*, *PharmBERT*, *RAG*, *FastAPI*, *PostgreSQL/pgvector* 2025–2026

- *plaint.com*: adverse-drug-reaction mining from patient narratives, where I built backend, frontend and the ML/NLP layer (LDA/NMF topic modelling, transformer classification, rule-based extraction over 800+ reviews; winning team, BIOMEDTECH). *42.doc*: clinician matching by embedding retrieval with evidence-snippet attribution. *Oncomatrix*: temporal retrieval answering oncology questions against the guideline version in force at the date of the clinical event.

Medical imaging coursework | *PyTorch*, *Ultralytics YOLOv8*, *torchvision* 2025

- Dental pathology detection on panoramic radiographs (YOLOv8, mAP@0.5 0.761) and three-class breast ultrasound classification by transfer learning (accuracy 0.87, macro ROC-AUC 0.95).

SKILLS

Machine learning: PyTorch, MONAI, scikit-learn, OpenCV; 3D medical image segmentation, CNNs, transfer learning, object detection, cross-validation design, evaluation under class imbalance (Dice, ROC-AUC, F1, mAP)

Programming and infrastructure: Python, SQL, Bash; SLURM, Singularity, Docker, GitLab CI, MLflow, TensorBoard, FastAPI, PostgreSQL, Git, Linux

Quantitative biology and statistics: pandas, NumPy, SciPy, GraphPad PRISM; gene-expression quantification and differential analysis, non-parametric inference, donor variability analysis, experimental design for small cohorts

Laboratory: RT-qPCR, RNA extraction, cDNA synthesis, gel electrophoresis, gene-expression quantification, *in vitro* PBMC infection experiments, molecular analysis of samples from *in vivo* infection models

Languages: Russian (native); English — **IELTS 7.5**, and a professional translator/interpreter qualification; German (A1)