

Anna Kuzina

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RESEARCH INTERESTS

My research interests lie in machine learning for medical imaging: 3D segmentation of organs and lesions in clinical CT, with particular attention to structures nested inside larger ones and to findings rare enough that standard metrics mislead. I am equally interested in how such models are evaluated, since clinical cohorts run to tens rather than thousands of patients, and in linking quantitative imaging endpoints to molecular readouts of host response.

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
- Segment liver and hepatic lesions on multi-phase contrast CT (arterial, portal, venous) in **MONAI** and **PyTorch**. I own the pipeline: NIfTI curation, intensity windowing, isotropic resampling, model configuration, cluster training and evaluation. Retuning voxel spacing and patch size brought local iteration time from **110s to 3s**, letting me screen configurations before committing cluster jobs.
 - **Found the target formulation that made the lesion class unlearnable.** Lesions sit nested inside the liver, so a mutually exclusive 3-class softmax collapsed them into the parent class and held lesion Dice at 0.00 whatever the architecture or sampling. I isolated the cause with controlled single-case and held-out runs, then rebuilt the target as **multilabel**: independent sigmoid channels under a custom Dice plus weighted-BCE objective. Lesion Dice rose to **0.37** on validation, liver to **0.96**.
 - **Corrected the evaluation protocol.** The lesion metric rested on a handful of patients, so I moved the study to **class-stratified 5-fold cross-validation** and traded headline performance for a number I can trust.
 - Built the research infrastructure: reproducible MONAI bundle configs, **SLURM** and **Singularity** jobs driven from GitLab CI on the institute's GPU cluster, MLflow and TensorBoard tracking, unit-tested curation tooling. Identifiable clinical data stays inside institutional systems.
- 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, hormones and HIV-1 entry:** estradiol and progesterone effects on CCR5/CCR8 coreceptor expression in HIV-1 subtype G infection. I ran the RT-qPCR panels, did the analysis and wrote the abstracts; the work took prizes at two national conferences and fed the *Bulletin of Experimental Biology and Medicine* paper below.
 - **First author, two further lines:** innate-immunity gene expression during oral mucosal repair after vestibuloplasty, and expression profiling of innate-immunity factors in an *in vivo Pseudomonas aeruginosa* wound-infection model under bacteriophage therapy.
 - Quantified **CCR5/CCR8** coreceptor and **TLR2/4/9** expression across multi-donor PBMC panels, three HIV-1 subtypes (A6, B, G) and graded hormone conditions: a factorial design in which donor genetic background is the dominant variance component. Non-parametric inference (Kruskal–Wallis) relating expression to viral load ($3.8\times$, $p = 0.0033$); underpins **two peer-reviewed papers**.
- 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., 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, variance decomposition across donors and conditions, experimental design for small cohorts
- Laboratory**: RT-qPCR, RNA extraction, cDNA synthesis, gel electrophoresis, gene-expression quantification, *in vivo* infection models
- Languages**: Russian (native); English — **IELTS 7.5**, and a professional translator/interpreter qualification; German (A1)

REFEREES

Prof. Oxana A. Svitich, MD, Corresponding Member of the Russian Academy of Sciences — Director, I.I. Mechnikov Research Institute of Vaccines and Sera.

Ivan Chernenkiy, Lead Software Engineer — Clinic of Urology, Sechenov University.

Full contact details available on request.