



Local Cluster Saratov: goals and perspectives

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The mission of the LCS is to further develop nationally and internationally recognized interdisciplinary research programs and to promote comparable excellence in clinical care and education in the field of biophotonics.

Local members and partners:

1. **Department of Physics at Saratov State University (SSU):** Chair and Research-Educational Institute of Optics and Biophotonics, International Research-Educational Center of Optical Technologies in Industry and Medicine “Photonics” (Prof. Dr. Sc. Valery V. Tuchin); Laboratory of Biodynamics (Prof. Dr. Sc. Dmitry E. Postnov); International Institute of Nonlinear Dynamics, Laboratory of Physics of Oscillations (Prof. Dr. Sc. Alexey N. Pavlov)
2. **Department of Biology at SSU:** Laboratory of Experimental Physiology (Assoc. Prof. Dr. Oksana V. Semyachkina-Glushkovskaya) and Chair of Biochemistry and Biophysics (Assistant Prof. Dr. Elena S. Tuchina)
3. **Saratov State Medical University:** Scientific Institute of Fundamental and Clinical Urology, Department of Morphology (Prof. Dr. Sc. Galina N. Maslyakova); Research-Educational Center of Fundamental Medicine and Nanotechnology (REC FMN) (Dr. Sc. Alla B. Bucharskaya); Department of Hospital Surgery, Gastroenterology Centre (Prof. Dr. Sc. Sergey V. Kapralov); Department of Ophthalmology and Eye Disease Clinics (Prof. Dr. Sc. Tatiana G. Kamenskikh); Departments of Otorinolaryngology (Prof. Dr. Sc. Oleg V. Mareev), Gerontology (Tatiana P. Denisova), Children Dentistry (Dr. Dmitry E. Suetenkov), Skin & Venereal Disease (Prof. Dr. Sc. Natalia A. Slesarenko), Normal Physiology (Prof. Dr. Sc. Vyacheslav F. Kirichuk), Pathological Physiology (Prof. Dr. Sc. Gregory E. Brill), Microbiology, Virology & Immunology (Prof. Dr. Sc. Gennady M. Shub)
4. **Saratov Scientific Research Institute of Cardiology** (Prof. Dr. Sc. Lidia I. Malinova)
5. **First Veterinary Clinic of Saratov** (Dr. Sc. Georgy S. Terentyuk)
6. **Institute of Biochemistry and Physiology of Plants and Microorganisms of RAS,** Laboratory of Physical and Chemical Methods of Investigation of Cell Structures, Biophysics Group (Prof. Dr. Sc. Nikolai G. Khlebtsov)

7. **Russian Research Anti-Plague Institute «Microbe»**, Laboratory of Biomolecular Diagnostics
8. **Private Clinics and Enterprises:** Family Doctor Clinics (Dr. Alexey I. Bazin), “MedStom” Clinics (Prof. Dr. Sc. Alexander V. Lepilin), “Sova” Clinics (Dr. Vladimir A. Titorenko), LLC SPI “Nanostructured Glass Technology” (Dr. Julia S. Skibina), and INJECT Enterprise (Sergey N. Sokolov)

Saratov State Medical University is one of the major partners of the LCS. It is one of the oldest universities in Russia. Its 5 clinical centres and institutions provide care for 100,000 in- and outpatients per year, as well as teaching for 7000 students of medicine and dentistry.

For LCS members there are available a number of facilities for pre-clinical and clinical studies, including vivarium, a few operating rooms and well-equipped laboratories for biomedical research.

Examples of intercluster current Projects:

- ❖ “Experimental justification of new diagnostic and treatment methods characterizing vascular resistance to stress-induced gastrointestinal bleedings”
- ❖ “Photodynamic, photocatalytic and photothermal effects in microorganisms sensitized by dyes and nanoparticles”
- ❖ “Blood flow pattern in patients with coronary heart disease: from bench to bed”
- ❖ “Noninvasive assessment of topical drug delivery in soft tissues”
- ❖ “Dynamical patterns of calcium signalling in a functional model of neuron–astrocyte networks” “Dynamical structures in binary media of potassium-driven neurons”

P4L mini-projects:

First-call:

“New synergies of nanomedicine and biomedical optics: gold nanoparticles, NIR lasers and biological targets,”

P4L partners: IFAC & University of Florence; IMPERIAL; University of Twente; ULUND; Institute for Health and Consumer Protection (IHCP).

Second-call:

“Quantitative analysis of therapeutic nanoparticle induced hyperthermia,”

P4L partners: SP-USTAN, SM-USTAN, ICFO, IFAC.

Third-call:

“Optical Clearing Agents (OCAs) as a means to enhance the depth penetration of Laser speckle flowmetry (LSF) and optical intrinsic signals imaging (OIS),”

P4L partners: LC Barcelona, LC Saratov (submitted)

“Diagnosis of skin tumors – morphology and molecular fingerprints,”

P4L partners: LC Jena, LC Lund, LC Paris, LC Saratov (submitted)

Current National and International Grants and Projects :

- ❖ Grant RUB1-2932-SR-08 of U.S. Civilian Research and Development Foundation for the Independent States of the Former Soviet Union (CRDF) 2009-2011, “Monitoring and quantification of molecular transport in ocular tissues”
- ❖ 2.1.1/4989, RF Federal Agency of Education, “Optical methods of diagnostics of nano- and mesoscopic media”
- ❖ 2.2.1.1/2950, RF Federal Agency of Education, “The development of research-educational unit of coherent optics and Biophotonics”
- ❖ RFBR N08-02-92224-NNSF (RF-P.R. China) “Physical and physiological mechanisms of optical clearing”
- ❖ FTP “Scientific and scientific-pedagogical personnel of innovative Russia” (2009-2013) “Study of therapeutic, toxic and thermal action of nanoparticle-photosensitizer complexes at laser irradiation,” Governmental contract N° 02.740.11.0484
- ❖ FTP “Scientific and scientific-pedagogical personnel of innovative Russia” (2009-2013), “The development of optical methods of study and monitoring of alteration of biological tissue and whole blood parameters at concentration of glucose in human and animal tissues”, Governmental contract N° 02.740.11.0770
- ❖ FTP “Designing of the novel photonic technologies for analysis of biophysical processes in living organisms on subcellular, cellular and tissue levels to solve problems of noninvasive and least-invasive diagnostics and therapy,” Governmental contract N° 02.740.11.0879
- ❖ “Biophotonics technologies for novel diagnostic and therapeutic applications“ by Finnish Funding Agency for Technology and Innovation (“Tekes”) (2011-2014)

