STRATEGIC ACADEMIC UNIT
“TRANSLATIONAL 7P MEDICINE”

http://7p-medicine.kpfu.ru
Translational medicine is a rapidly growing discipline in biomedical research which aims to expedite the discovery of new diagnostic tools and treatments by using a multi-disciplinary, highly collaborative, "bench-to-bedside" approach.

PARTICIPANTS OF the StrAU

- Institute of Fundamental Medicine and Biology + 14 other Institutes and Departments of KFU
Research in the framework of the StrAU will be concentrated in five interrelated research areas:

- Personalized medicine (20%)
- Regenerative medicine (20%)
- Neurotechnology (27%)
- Chemistry of Living Systems (17%)
- Biomedical Physics (16%)
What about preclinical research, clinical trials & standard practice?

- The only in Russia infrastructure for full cycle pre-clinical research and clinical trials, translation into health care system
- University Clinic, scalable GMP production factory for gene therapy drugs and diagnostics
What is translational 7P medicine?

Translating personalized medicine in clinical practice

The future of medicine might best be considered as predictive, preventive, personalized and participatory - P4 medicine.

The concept of P4 medicine highlights the future potential of personalized approaches to healthcare.

Decision + additional 3P

The key issues affecting the development and implementation of personalized medicine

- Education
- Proactive or preemptive development
- Multidisciplinarity
- Infrastructure
- Regulatory frameworks
- Ethical, legal and social issues

Providing medical services not only at the patient bedside but also using the advanced distance diagnostics and treatment technologies. Thus a person becomes a focus point of medical services regardless of his/her physical location.

1. Provide the interdisciplinary education of healthcare professionals and scientists from the earliest stages of professional development
2. Provide training of healthcare professionals, biomedical scientists, ICT professionals.

Emphasis on research and education at frontiers of biomedical and social sciences. Rapid translation of such research into preclinical and clinical trials, providing additional insight into safety and efficiency of developing technologies.
Do we have international collaborations?

**INTERNATIONAL CENTRES IN KFU**

- **Centre of Translational Medicine “KFU-RASA”** (Russian-speaking Academic Science Association). Coordination of academic programs, joint research, staff and student exchange.
- **RIKEN–KFU Research Centre**, joint centre conducting Russian-Japanese projects in the field of translational medicine and related fields.
- **Cochrane-Russia Centre** (Evidence based medicine).
- **International associated laboratory "Neurobiology of development"** jointly with INSERM (France).
- **Simulation Medicine Center**, Juntendo University (Japan).

**INTERNATIONAL RESEARCH AND EDUCATIONAL PLATFORMS ABROAD CO-OWNED BY KFU**

- Neurobiology «Mirror Lab» (Inserm-U901, France)
- Chemo-Bio Informatics Center (Strasbourg, France)
- Simulation Medicine Center (Juntendo, Japan). In 2015, eight simulators built in KFU were delivered to Juntendo University (Japan) and, currently, there is an ongoing adaptation and translation of KFU academic programs into the Japanese language.
- Preventive Medicine Unit (RIKEN, Japan) - Innovative Program in Preventive Medicine & Diagnosis

**LEADERS OF TRANSFORMATION**

- Y. Hayashizaki (h-index 83)
- K. Preissner (h-index 60)
- R. Khazipov (h-index 39)
- S. Bellusci (h-index 39)
- V. Erokhin (h-index 25)
- P. Masson (h-index 36)
- A. Varnek (h-index 27)
- R. Giniatullin (h-index 25)
- A. Rozov (h-index 25)
- M. Yusupov (h-index 23)

**PARTNERS**
What is new in the StrAU and how it will involve the whole university?

We are expanding horizons of translational research taking advantage of the unique capabilities of the Classical University. On the basis of Cochrane-Russia Centre, faculties of economics, law and humanities along with physicians and biologists will develop evidence-based medicine under Phase T3 of the translational research. And within the phase T4 of the translational medicine personalized new methods of diagnostics and treatment based on the genetic background of certain ethnic groups will be developed in cooperation with ethnographers and historians.

The StrAU is based on the Institute of Fundamental Medicine and Biology. The StrAU’s structure will include University Clinic, 4 Centres of Excellence, 3 centres of shared facilities, Research and Educational Centre of Pharmaceutics, as well as individual laboratories and departments of Institute of Chemistry, Institute of Physics, Institute of Psychology and Education, Higher School of Information Technologies and Information Systems, Institute of Computational Mathematics and Information Technologies, Institute of Philology and Intercultural Communication, Institute of International Relations, History and Oriental Studies, Faculty of Law, Institute of Engineering, Institute of Management, Economics and Finance, Institute of Social and Philosophical Sciences and Mass Communications.
What are the expected changes in education?

The current model of professional training in which members of each health profession are trained in isolation from the others until they meet at the workplace, needs to be revised. We will change that paradigm through interprofessional and transprofessional education, where members of different professions are trained in common educational environment to be members of health teams.

We are moving to the third stage of the “system-oriented” education, based on the competencies in academic health systems (i.e., health systems providing professional education in different service situations). It has key importance for personalized medicine.

Money allocated to the StrAU (240 mln RUB for educational activities) will be used for transformation of education, including:

- development of new transprofessional academic programs of training students and retraining university teachers and doctors; reduction of teaching load; integration of educational and clinical processes in health professionals’ training process; development and implementation of distance learning programs, etc. (40% of the budget);
- internships and professional training for teaching and administrative staff of the StrAU in the world’s leading universities (15% of the budget);
- engagement of the leading professors from the top Russian and foreign universities (7% of the budget);
- implementation of the full-scale academic mobility programs for the staff and students of the StrAU (15% of the budget);
- organization of international scientific and educational conferences in spring of 2016 (8% of the budget);
- development of the simulation centre’s infrastructure, including creation of a Wet Lab (15% of the budget).
What kind of translational research will be conducted?

The total amount of funding allocated for research is **410 mln RUB**. Scientific research conducted in the framework of the StrAU will be concentrated in five interrelated research areas:

1) **Personalized medicine (20%, 80 mln RUB):**
   - Development of new diagnostic approaches in the field of pharmacogenetics, taking into account ethnic specifics of population of the Republic of Tatarstan and Russia as a whole
   - Search for new biomarkers for early / non-invasive prospective diagnostics of esophageal cancer, adenocarcinoma of lungs and breast cancer
   - Study of molecular mechanisms of changes regulation in tissues and organs under hypometabolism, modified gravity and using the data to develop methods of gene therapy and rehabilitation
   - Pharmaco-FANTOM project aimed at generation of a database of pharmacogenetically significant polymorphisms in the genome of the Russia’s population
   - Personalized selection of chemotherapeutic agents for the treatment of cancer, based on the model of xenotransplantation of tumor cells of a patient to nude mice
   - Prediction and diagnostics of prethrombotic states and thrombosis.

2) **Regenerative medicine (20%, 80 mln RUB):**
   - Study of the genetic basis of cell aging
   - Search for new markers of resistance to EGFR inhibitors
   - Layer-by-layer intravital functionalisation of human cells for tissue engineering
   - Development of nanoscale containers for targeted delivery and controlled release of drugs
   - Gene and cell therapy of ischemic diseases, injuries of the peripheral and central nervous system, neurodegenerative, autoimmune and infectious diseases
   - Development of methods for diagnostics and treatment of cancer
   - “Suicide” gene therapy and immunotherapy of cancer based on gene-cell therapy
   - Tissue bioengineering
   - Novel approaches to treatment of mitochondrial diseases

3) **Neurotechnology (27%, 110 mln RUB):**
   - Neurobiology of development
   - Pain and Migraine
   - Synaptic Plasticity
   - Research of the Molecular Basis of Neurodegenerative Diseases
   - Neuropharmacology
   - Neuromuscular Transmission
   - Biosimilar System
   - Neuromodulation
   - NEUCOGAR - neurobiologically inspired architecture
   - SIM – virtual simulations of the brain and central nervous system
   - Clinical neurolinguistics

4) **Biomedical Physics (16.5%, 70 mln RUB):**
   - Study of quantum effects manifestations in biological processes
   - Development of fast-acting spintronic magnetoresistive biosensors with high sensitivity for neurosensory and cytometry
   - Study of nanoparticles of rare-earth fluorides as the systems of targeted selective influence on cells
   - Development of new methods of magnetic resonance imaging (MRI) for the recording of fast processes, such as electrical activity of individual brain regions
   - Medical robotics, 3D-prototyping, plasma technologies for biomedicine
   - Modern methods of EPR, NMR and MRI in medicine

5) **Chemistry of Living Systems (16.5%, 70 mln RUB):**
   - Development of targeted drug delivery systems based on modified one-dimensional and two-dimensional carbon nanomaterials
   - Data analysis systems of high and low molecular weight biomarkers
   - Highly sensitive biosensors
   - Biocompatible and bioreplacable materials
   - Synthesis, optimization of the structure, efficiency and safety of leading compounds-candidates for antineoplastic, nootropic, anticholinesterase, antimicrobial and cardiovascular drugs
   - Development of screening methods and the search for novel drugs-candidates to treat Parkinson’s disease
   - Development of innovative antibacterial drugs for prevention and treatment of infections caused by multidrug-resistant gram-positive bacteria
Financial model of the StrAU

**Income**

- Income from the use of intellectual results
- Income from scientific activities
- Income from tuition fees
- Federal funds for other activities (including 5-100), mln RUB
- Federal funds for research activities
- Federal funds for educational activities

**Expenditures**

- Labour costs
- Expenditures for research
- Costs of equipment and expendables
- Other current expenses
Strategic Academic Unit – an open convergent system providing sustainable development of the university, the region and the Russian Federation.