Annotation-report for the I half-year of 2014
of the research conducted under the guidance
of the leading scientists in the Russian institutions
of higher professional education

The agreement between the Ministry of Education and Science of the Russian Federation, the State Budgetary Institution of Higher Professional Education the Kuban State Medical University of the Ministry of Health Care and Social Development of Russian Federation and Paolo Macchiarini on giving a grant of the Government of the Russian Federation for state support of scientific research conducted under the guidance of the leading scientists of the institutes of higher professional education from October, 19, 2011 № 11.G34.31.0065.

Project direction: «Molecular and Cell Biology, Biotechnology, Regenerative Medicine»

Aim of the project: development of new approaches in tissue engineering and cell therapy for regeneration of airways and pulmonary tissue, search for the optimal methods, transfer of obtained results into clinical practice.

17 researchers took part in the project, among them 1 corresponding member of RAMS, 3 professors, 5 candidates of medical sciences, 3 postgraduate students, 3 undergraduate students.

During the report period the research part of the project was focused on creation of extracellular matrices of the following organs: heart, lungs, diaphragm and trachea with further recellularization (seeding) of obtained scaffolds with mesenchymal stem cells (MSC_s). Moreover, in the frames of the grant biomechanical testing of native and decellularized organs and recellularized scaffolds was carried out in the polymer materials laboratory of the research and development center "Kurchatov Institute". Small mammals' and non-human primates' organs were used for research.

In February-March 2014 a series of *in vivo* research, i.e. orthotopic transplantation of the left dome of the tissue-engineered diaphragm in small animal models (rats), were successfully performed in the International Center of regenerative medicine of KSMU.

According to the research plan 7 scientific results were achieved by the research team in the first half-year of 2014:

1.Technical conditions: «Method of biomechanical testing of rat diaphragm transplant».

2. Technical conditions: «Rat lung recellularization protocol using decellularized matrix in a bioreactor».

3. Technical conditions: «Rat heart recellularization protocol using decellularized matrix in a bioreactor».

4. Technical conditions: «Heterotopic transplantation (subcutaneous test) of decellularized diaphragm matrices in a rat model».

5. Technical conditions: «Tissue-engineered diaphragm Orthotopic transplantation in a rat model».

6. Technical conditions: «Heterotopic transplantation (subcutaneous test) of decellularized heart matrices in a rat model».

7. Technical conditions: «Spirometry in small animal models (rats) protocol for functional properties assessment of respiratory system after tissue-engineered diaphragm transplantation»

In the frame of the international clinical trials tissue-engineered trachea transplantation was performed 03.06.2014 on the base of Krasnodar Clinical Hospital №1 and clinical lab of the International Research Center of Regenerative Medicine For the first time in Russia a 6-month-old child suffering from serious congenital defects of respiratory organs was operated on for partial recovery of these organs – as a preparatory stage for the prearranged tracheal transplantation on the 28th of June 2013.

3 articles were published at the international scientific journals (WOS):

«Experimental orthotopic transplantation of a tissue-engineered esophagus in rats» (*Nature Com.*);

«Dynamic decellularization and cross-linking of rat tracheal matrix» (*Int.Journal of Biomaterials*)

«Decellularized matrices evaluation for tissue engineering intrathoracic organs» at the Proceedings of the 5th Russian National Conference "Stem Cells and Regenerative Medicine".

It is worth to note that grant research team' member, PhD student Alexander Sotnichenko, 26, became the first Russian scientist-co-author at the Nature Journal in the field of regenerative medicine.

Grant research team members (3) participated in the 3rd International Conference "Genetics of Aging and Longevity" with 1 plenary lecture (April 06-10, 2014).

The young researcher Alina Popova had training at ACTREM Karolinska Institute (Stockholm, Sweden) 14.05-05.06 2014.

The research and clinical results had a full coverage in the Russian Media:
www.regmedgrant.com

http://www.vesti.ru/doc.html?id=1488611
http://celltranspl.ru/novosti/nashi-v-nature
http://www.gazeta.ru/science/2014/04/16_a_5993461.shtml
http://ria-ami.ru/read/28033
http://www.vesti.ru/only_video.html?vid=604465
http://www.kp.ru/daily/26219.5/3102832/
http://rusrep.ru/article/2014/05/21/serdtse-iz-bioreaktora
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http://meddaily.ru/article/09Jul2014/stenoztra
http://9tv.ru/news/item/48779
http://www.kp.ru/online/news/1753383/
http://ria.ru/society/20140604/1010621872.html
http://www.interfax-russia.ru/South/news.asp?id=506547&sec=1671
http://www.kuban.aif.ru/health/details/1182866

At the present stage all the efficiency indicators for the 1st half-year of 2014 have been performed.

Leading scientist **P. Macchiarini**