

PHENOMENON OF DEMIKHOV.

At the Sklifosovsky Institute (1960-1986).

**Nomination as a Corresponding Member to the USSR Academy of
Sciences (1966)**

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*The article has described, analyzed, and introduced into scientific
circulation some previously unknown facts from V.P. Demikhov's life,
namely, his nomination as a Corresponding Member to the USSR Academy
of Sciences in the specialty "physiology" in May, 1966, and his
experimental and research work in 1966. The inspection of his scientific*

activities undertaken on behalf of the Academic Council of N.V.Sklifosovsky Institute for Emergency Medicine, showed that the discoveries and achievements V.P. Demikhov had made in the field of physiology were significant, and he was worthy of being nominated for the rank of a Corresponding Member to the USSR Academy of Sciences. However, he lacked several votes for being elected to the Academy. Meanwhile, in 1966 V.P. Demikhov continued his unique research, having initiated studying the coronary blood flow of the transplanted heart, implementing immunosuppression in kidney transplantation, and starting the experiments on creating a bank of organs to preserve their functions before transplantation.

Keywords: history of medicine, transplantation, V.P. Demikhov, 1967

At the beginning of 1966, Doctor of Medical Sciences L.L. Gugushvili (Fig. 1) was elected a Senior Researcher at the Organ Transplantation Laboratory, where he worked for the next 20 years under V.P. Demikhov's leadership. It should be noted that after defending his doctoral Thesis L. L. Gugushvili applied for the competition for several positions in several departments at once. But he was elected neither the Head of the Organizational and Methodological Department (instead of I.M. Grigorovsky, who had taken the position of the Science Secretary of the Institute), nor a Senior Researcher in any of the clinical departments.



Fig. 1. L.L. Gugushvili, Doctor of Medical Sciences, an employee of the Organ Transplantation Laboratory at N.V. Sklifosovsky Institute. 1960s [Museum of A.N. Bakoulev National Medical Research Center for Cardiovascular Surgery (NMRC CVS), a copy]

Why did Levan Lukich decide to link his further scientific destiny with experimental surgery? We believe that it was not only because his doctoral Thesis on the vascular architectonics of the liver was based on experimental research, namely, in V.P. Demikhov-headed Laboratory and, possibly, with V. P. Demikhov's participation. Most likely, even then he and V.P. Demikhov began to nurture the decision to take up a new trend in Soviet Surgery that was liver transplantation. In any case, with the arrival of L.L. Gugushvili to the Organ Transplantation Laboratory of N.V. Sklifosovsky Institute, this topic gradually became the leading one in the research of V.P. Demikhov's Laboratory.

Thus, despite very vague prospects of transplanting an isolated or additional heart in clinic, as well as of using a decapitated organism to create a bank of organs, V.P. Demikhov (Fig. 2) again felt himself necessary, and his experience in organ transplantation being in demand.

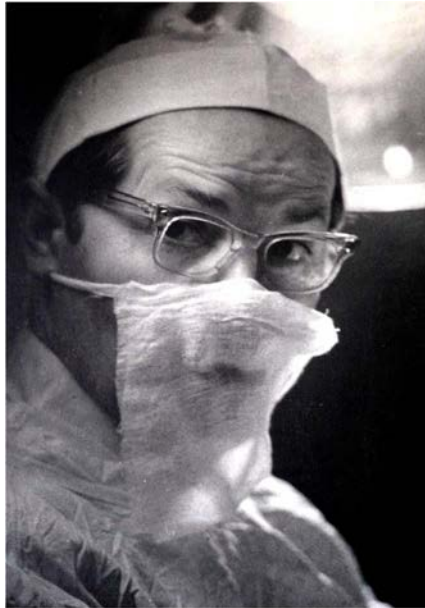


Fig. 2. V.P. Demikhov, Doctor of Biological Sciences, Head of the Organ Transplantation Laboratory at N.V. Sklifosovsky Institute. 1960s. [Museum of A.N. Bakoulev NMRC CVS, a copy]

**Meeting of N. V. Sklifosovsky Institute Academic Council
of May 4, 1966**

It was obvious that it was too early to write off V.P. Demikhov as a "fighter of the transplant front". So, on May 3, 1966, a following application was put on the table in the office of M. M. Tarasov, the Director of N.V. Sklifosovsky Institute, an Honoured Doctor of the Ukrainian SSR:

"To the Academic Council of the Sklifosovsky
Institute
from the Head of the Organ Transplantation
Laboratory,
Doctor of Biological Sciences,
Honorary Doctor of the University of Leipzig,
Honorary Member of the Swedish Scientific
Royal Society of Uppsala
V.P. Demikhov

APPLICATION

I hereby request to be considered for nomination as a candidate to a Corresponding Member of the USSR Academy of Sciences in the Department of Physiology. I am a physiologist by education. I have been making research in the field of physiology and experimental medicine for 29 years, since 1937.¹

During this time, I have made a number of inventions that have gained recognition from Soviet and foreign scientists. Some of these inventions: a mechanical heart prosthesis, kidney transplant procedure, coronary artery surgery have started to be implemented in healthcare practice.

V. Demikhov

May 3, 1966"[1].

The promptness with which the application was considered can be comparable to the speed with which the news spread throughout the Institute. For the very next day, May 4, 1966, a record number of those present - more than 80 people - gathered in the Academic Council hall of Sklif. Only 22 of them were the Academic Council members (of its total number of 33 members). The rest were the Institute employees (Fig. 3).

¹ In 1937, V.P. Demikhov, being a 4th year student at Voronezh University, designed an implantable electromechanical "heart" for the first time.



Fig. 3. V.P. Demikhov (in the 3rd row, 2nd from the left) at the Academic Council Meeting of N.V. Sklifosovsky Institute. 1960s. [Museum of A.N. Bakoulev NMRC CVS, a copy]

The first issue to be heard was "On the nomination of V.P. Demikhov as a Corresponding Member to the USSR Academy of Sciences in the Department of Physiology". Professor I.M. Grigorovsky read out the announcement published in the Izvestia newspaper on April 18, 1966, notifying of the Competition of nominees for Full Membership and Corresponding Membership to the USSR Academy of Sciences, read out V.P. Demikhov's application and opened the debate.

The first to speak was M.M. Tarasov, the Director of the Institute, who chaired the Council Meeting. He described V.P. Demikhov as a prominent Soviet physiologist, whose works were known both in the USSR, but also abroad, and a whose monograph on transplantation of vital organs had been published in the USSR, USA, Germany, and would soon be published in Spain². According to the speaker, a prosthetic heart invented by V.P. Demikhov had lately been used in human in the United

² V.P. Demikhov's monograph "Experimental Transplantation of Vital Organs" was published in the USSR in 1960, in the USA in 1962, in Germany in 1963, and in Spain in 1967.

States³. Concluding his speech, M.M. Tarasov called the Academic Council members to support V.P. Demikhov as a candidate for his nomination as a Corresponding Member to the USSR Academy of Sciences.

However, the next speaker, Professor I.I. Sokolov, said the exact opposite of what the Director had just recently spoken about. So, he said the following:

"I am not aware of Demikhov's works. It would be desirable to postpone consideration of this issue. It would be necessary to get informed with the scientific activities of Dr. Demikhov and his work at the Institute. In my opinion, it would be premature to vote for the nomination of Demikhov now"[2]. [4]⁴

I.I. Sokolov's speech caused genuine bewilderment among those present, for I.I. Sokolov as the Head of *a Trauma Clinic* where all the research topics were closely related to the research of V.P. Demikhov's Organ Transplantation Laboratory in the early 1960s, could not help knowing of what his colleague was doing.

The next speaker was L.L. Gugushvili. As follows from the transcript of the Academic Council meeting, he spoke only positively and unambiguously about the candidacy of V. P. Demikhov, whose works, as L.L. Gugushvili said, were "known to the whole world", and he also sent the previous speaker to the library to read V.P. Demikhov's books, if I.I. Sokolov still did not know them!

³ The world's first artificial left atrial-aortic conduit-like pump (artificial ventricle of the heart) designed by D. Liotta was implanted to a human by E.S. Crawford at Houston Methodist Hospital in 1963. The second implantation of the left atrial-arterial diaphragmatic pump of D. Liotta design was performed there by M.E. DeBakey in 1966.

⁴ In the opinion of the Journal Editorial Board, I.I. Sokolov made his statement then in relation to the fact that neither in 1965 nor in 1966 V.P. Demikhov published a single scientific article, or submitted any single application for an invention or rationalization proposal, made any single scientific report or presentation at a Meeting of the Institute Academic Council.

L. L. Gugushvili was supported by the employee of I. I. Sokolov's clinic, traumatologist P. N. Petrov, Candidate of Medical Sciences, who said the following:

"We have no reason to postpone consideration of this issue to the next Meeting. Demikhov's name and work are well known. With his research, Dr. Demikhov glorifies our socialist homeland. I consider it possible to vote Demikhov's nomination at this Meeting"[2].

Nevertheless, M.M. Tarasov, the Director of the Institute, said that if the Council members were not sufficiently familiar with V.P. Demikhov's research, the consideration of his nomination could be postponed; and he called on his colleagues to speak "on this issue, so that there would be complete clarity".

Clarity was made by Professor B.A. Petrov, a Corresponding Member of the USSR Academy of Medical Sciences, Deputy Director of the Institute, who had been nominated as a candidate for Full Membership to the USSR Academy of Medical Sciences at the previous Council Meeting⁵:

"I find it difficult to assess the works of Dr. Demikhov in physiology. I agree with Professor Sokolov that consideration of the issue should be postponed. I request Professor Grigorovsky to prepare and thoroughly report on the work of Dr. Demikhov for the next Academic Council Meeting. The author should also be encouraged to submit an assessment of his work by a specialist in physiology" [2].

Let us leave the speech of the Deputy Director of the Institute without comment. In the previous article, we talked about the fact that

⁵ B.A. Petrov was elected a Corresponding Member of the USSR Academy of Medical Sciences in 1961.

during the several years preceding that Meeting, not a single V.P. Demikhov's report on his research were introduced at the Academic Council Meetings; and as for the topics of his scientific research, perhaps they might have been included in the Institute Research Plans, but we did not find them. However, let us ask the question: what studies, except for physiology, in this case, of blood circulation, could be published by a graduate of the biological faculty of the University, a physiologist by specialty V.P. Demikhov. And it was exactly in this specialty that he requested for his nomination to the Membership in the USSR Academy of Sciences. Worthwhile to remind that A. Carrel, an American surgeon of French origin was awarded the Nobel Prize in 1912, and not in surgery, but in physiology and medicine "in recognition of his work on vascular suture and transplantation of blood vessels and organs" [3]. And the Nobel Committee had no doubts whether it was worth giving this prestigious award to an experimental surgeon.

I.M. Grigorovsky, being next to take the floor, said the following:

“I think,” he said, “that the Scientific Council in its work should be guided by the principles of democracy in science. We must objectively assess Demikhov's candidacy and consider the application he submitted.

But if the value of his candidacy as a physiologist has not been yet clear to all members of the Academic Council, then it is necessary to bring complete clarity to this issue”[2].

Feeling that the discussion of his candidacy is reaching a dead end, V.P. Demikhov asked to speak and briefly outlined the topics of the main research that he had been doing for many years. He emphasized once again that he was a physiologist by education, that he graduated from Moscow State University, rather than from a Medical Training Institute, as some people believe, and that the vast majority of his research had

been devoted to the physiology of the cardiovascular system: heart prosthetics, heart and lung transplants, and operations on coronary vessels. "All these are physiological experiments," V.P. Demikhov stressed.

He was supported by B.G. Zhilis, the Doctor of Medical Sciences, a leading anesthesiologist of the Institute. He said that he knew well V.P. Demikhov's works and considered them respectable, and their author to be a great physiologist, and that he very much regretted that Professor I. I. Sokolov had not yet familiarized himself with V.P. Demikhov's research and his monograph on experimental transplantation of vital organs. Concluding his speech, Boris G. Zhilis said that he supported the nomination of V.P. Demikhov as a Corresponding Member to the USSR Academy of Sciences, proposed to complete the debate and put the issue to a vote. Following him, "to raise the issue of the nomination procedure" and to start voting were suggested by the following Council members: surgeons D.A. Arapov and P.I. Androsov who have also assessed positively V.P. Demikhov's works.

Nevertheless, V.V. Novoselskaya, the Head of the Clinical Laboratory stipulating that, although she considered V.P. Demikhov "to be a prominent scientists in the field of physiology", and the majority of those sitting in the audience are practicing physicians and surgeons, "who do not understand anything in this matter," she suggested "seeking an opinion about V.P. Demikhov from any prominent scientist-physiologist in writing and hear it at the next Meeting."

It is not clear why the opinion of the Candidate of Medical Sciences in the field of laboratory science exceeded the opinion of Professor D.A. Arapov, the Stalin Prize Laureate, Honoured Scientist, Corresponding Member of the USSR Academy of Medical Sciences, Lieutenant General

of the Medical Service, and Professor P.I. Androsov, the Stalin Prize Laureate, is not clear.

After her speech, Professor B.A. Petrov suggested “to agree with the proposal of Comrade V.V. Novoselskaya "to return to the consideration of this issue" a week later after having prepared additional material on the V.P. Demikhov nomination. At that point, the consideration of the first issue of the agenda was completed, and the members of the Academic Council proceeded to the consideration of other issues. And V.P. Demikhov, as not being a member of the Council, left the Auditorium.

We shall draw the conclusions. Six members: M. M. Tarasov, L.L. Gugushvili, P.N. Petrov, B.G. Zhilis, D.A. Arapov and P.I. Androsov voted in favour of supporting the nomination of V.P. Demikhov and his election as a Corresponding Member to the USSR Academy of Sciences. I.I. Sokolov, B.A. Petrov, I.M. Grigorovsky and V.V. Novoselskaya spoke in favour of clarifying V.P. Demikhov's scientific merits and the postponement of voting on this issue to the next Academic Council Meeting.

There is indirect evidence that the Party Organization of the Sklifosovsky Institute was in favour of V.P. Demikhov nomination. Anyway, the Archives contain a draft of his Reference Letter with the amendments made by V.P. Demikhov in blue ink, and by N.S. Uteshev, the Secretary of the Party Organization, in red ink. The draft of the Reference Letter was the one that was given to V.P. Demikhov in spring, 1964, for the document submission to the Higher Attestation Commission at the Ministry of Higher and Secondary Specialized Education for his Thesis defense (Fig. 4). It added phrases about the reprint of V.P. Demikhov books in many countries, about his election as a Member of the Royal Society in Uppsala in 1963 and about the award granted him in 1965 by the Sklifosovsky Institute Administration "for the successful

implementation of a number of experimental studies". To the phrase "This Reference Letter has been issued for introducing..." N.S. Uteshev added the words "... him to the USSR Academy of Sciences as a Candidate for the election as a Corresponding Member to the USSR Academy of Sciences", then crossed out the words "to the USSR Academy of Sciences". But A. Borisenko, the Chairman of the local Committee who revised the document in pencil after him, crossed out everything, leaving only the end "for introducing him to the USSR Academy of Sciences". We do not know the date when this Reference Letter was drawn up, however, at the very bottom of the document, in square brackets, the inscription "[1966]" is visible.

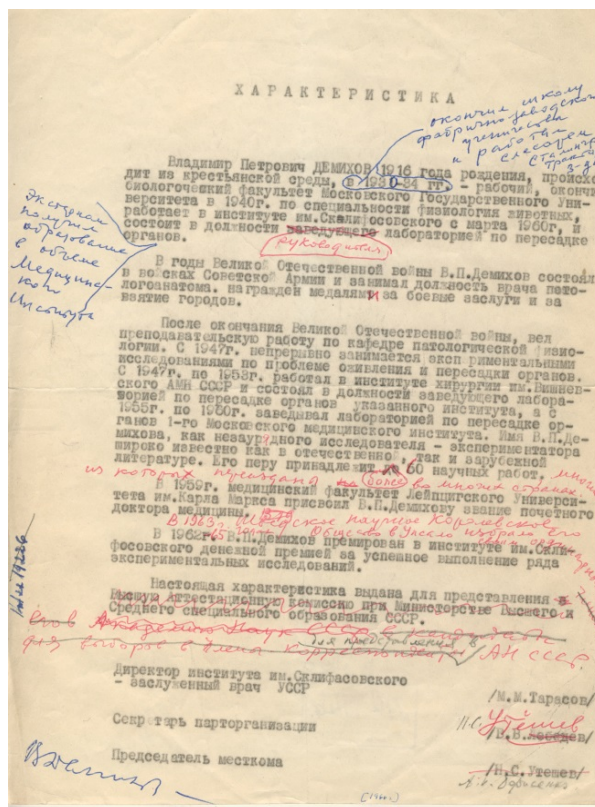


Fig. 4. A draft characteristic prepared for the nomination of V.P. Demikhov as a Corresponding Member to the USSR Academy of Sciences. 1966. [Museum of A.N. Bakoulev NMRC CVS, a copy]

**Meeting of N.V. Sklifosovsky Institute Academic Council
of May 11, 1966**

On May 11, 1966, the next Academic Council Meeting was held where only 19 of the total number of members (33) were present, 3 people less than on May 4. There were more people present at the council, 65 (instead of 58 people who came to the previous Meeting). From V.P. Demikhov's Laboratory staff, L.L. Gugushvili, V.M. Goryainov and M.M. Razgulov were present at the Council Meeting. But for some reason, M.M. Tarasov, the Director of the Institute did not attend the Meeting. Therefore, in the absence of the Director, the Council Meeting, as usually, was chaired by his deputy Professor B.A. Petrov (Fig. 5) [4].

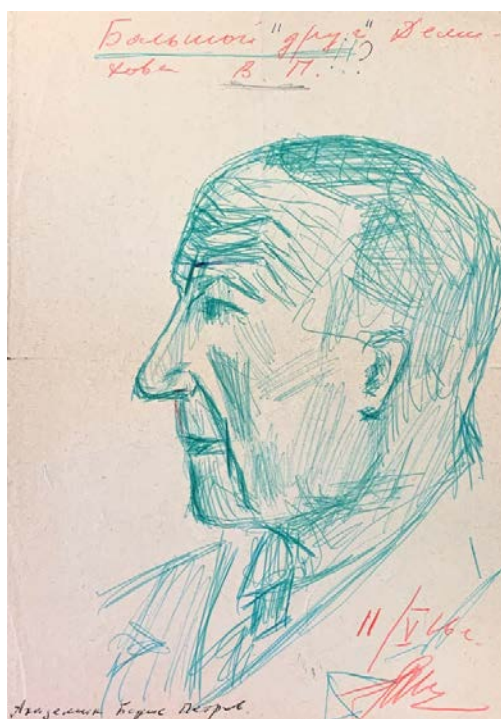


Fig. 5. Professor B.A. Petrov, Deputy Director for Science of N.V. Sklifosovsky Institute, Corresponding Member of the USSR Academy of Medical Sciences, May 11, 1966. The inscription on the top: "V.P. Demikhov's great "friend"!!?" [Unknown author; Museum of A.N. Bakoulev NMRC CVS, a gift from M.M. Razgulov]

The question of nominating V.P. Demikhov to the USSR Academy of Sciences was again the first on the agenda to be discussed. B.A. Petrov suggested to I. M. Grigorovsky to announce "The comment on the significance of V.P. Demikhov's research for the science and communist construction of the USSR".

We shall cite its text in full, since this document contains all the main achievements of V.P. Demikhov by 1966:

"In 1938⁶ the author designed and experimentally tested a device for mechanical heart massage; this device was the first experimental model in science for automatic heart massage.

At the end of April 1966, the American surgeon De Becky replaced the function of the left ventricle of the human heart with a prosthesis according to the principle experimentally developed by V.P. Demikhov⁷.

In 1940, in an experiment on cats, the author carried out a transplant of a living, natural heart into the femoral vessels <...> It has been shown that when the heart is transplanted to peripheral vessels, outside the chest, it cannot be actively included in the blood circulation, since it does not communicate with the pulmonary vessels from where aerated blood comes under natural conditions at a pressure close to zero.

In 1946, after demobilization from the front of the Great Patriotic War, the author carried out experiments on dogs for making heart and lung transplants, but already into the chest, which for that time was the first in science and was previously [considered] impossible. The author for the first time experimentally developed more than 40 options for including the transplanted heart and lungs into the circulatory system of a new body. These heart transplant schemes may not only be the models for

⁶ I.M.Grigorovsky mentioned a cardiac massage device, and "forgot" about a mechanical heart, although both of those devices were described in the book "Experimental Transplantation of Vital Organs" (1960). But it is obvious that he was referring precisely to a prosthetic heart, as it follows from the next sentence.

⁷ It is absolutely true: "up to V.P. Demikhov's principle" rather than "method", because V.P. Demikhov used a donor's live heart to bypass the left heart, and M.DeBakey used a pneumatic diaphragmatic device.

physiological research, but also contribute to human heart transplantation in the future. A study of the transplanted heart function has shown that it is capable of carrying all the load of maintaining blood circulation in a new (apparently obtained after a heart transplant. - *Author*) body.

A study [of the effect] of strophanthus group of cardiac drugs on dogs with two hearts showed that these drugs that which for 400 years of use had been considered specifically cardiac, had an effect on the heart via the nervous system. In the humoral way, these drugs did not have a corresponding effect on the transplanted denervated heart⁸.

In a number of experiments, a second, additional heart was transplanted into the dog's chest and covered from the outside with a transparent plastic cap-case. It turned out that the created negative pressure around the heart led to its arrest. As soon as negative pressure was removed, the heart resumed its activity⁹. This fact provides a basis for a new explanation of cardiopulmonary insufficiency ("cor pulmonale") in humans.

The author organized experiments to study the movement of blood in blood vessels. It was shown that the blood moves in the venous system due to the force of heart contractions rather than due to the suction action of the chest, as had been asserted before¹⁰. Prior to this, it was believed that the strength of heart contractions was not enough for the moving the blood through the capillaries and veins. Thus, the theory of the "peripheral heart" was refuted.

The author has developed a method to prevent a cardiac arrest during operations on the chest. This method consists of temporarily clamping the thoracic aorta, which leads to an increase in blood pressure and restoration of weakened cardiac activity¹¹.

⁸ V.P. Demikhov made that invention jointly with Soviet pharmacologists and German surgeons.

⁹ It was a very interesting phenomenon first discovered by V.P.Demikhov.

¹⁰ It was another brilliant invention in the field of circulation physiology. The opinion about the "suction" effect of the chest on venous blood flow turned out to be so tenacious that some physiologists of blood circulation still share it nowadays.

¹¹ This method is still being used by modern cardiac surgeons. It bases the mechanism of indirect cardiac massage (chest compressions) developed by C.Beck (Cleveland, USA) in the 1960s.

The author has experimentally developed a method for relieving cardiac ventricular fibrillation by applying an electric current discharge from a conventional lighting network (127 volts). In clinical practice, this method has been successfully applied by Professor F.G. Uglov¹².

The author has developed a new effective method of open heart massage, which consists of a longitudinal dissection of the sternum, the creation of a Trendelenburg position¹³, maintenance of mechanical ventilation, temporary clamping of the thoracic aorta, and two-handed heart massage.

In 1946, the author for the first time in science performed experimental lung transplantation. Human lung transplants have now been described¹⁴.

In 1953, the author for the first time developed a method for preventing heart infarction in atherosclerosis of the initial part of the coronary artery by directly connecting the coronary artery to the internal thoracic artery¹⁵.

The author has developed a method and for the first time in science performed the transplantation of a second head to a dog. The study of a transplanted head function conducted jointly with the Berlin Institute for Cortico-Visceral Pathology showed that with severe irritation of the brain, special substances are released that have an exciting effect on the other head in the humoral way¹⁶.

¹² F.G.Uglov, RAMS Academician, repeatedly wrote in his books and told the author of this article about his first in the world use of household electric current for defibrillation, perhaps without knowing that the idea had originally belonged to V.P.Demikhov and was described in his report at the XXVI All-Union Congress of Surgeons in January 1955.

¹³ The patient's torso position when his legs are located higher than the head.

¹⁴ The first human lung transplantation in 1963 was performed by J.Hardy from Mississippi State University (USA).

¹⁵ The first operation of mammary-coronary bypass grafting in a human was performed by V.I.Kolesov in 1965 in the Faculty-affiliated Surgical Clinic of the 1st LMI named after I.P.Pavlov.

¹⁶ It is known that head transplantation in dogs was studied by N.P.Sinitsyn from the Gorky Medical Institute in the 1940s for the purpose of a pharmacological experiment. However, he found this technique too difficult to implement and began experimenting on frogs. Unlike his pharmacologist colleague, physiologist V.P.Demikhov brought this experience to its logical conclusion. In 1959, the dog Pirate lived for 29 days having the second head on its neck.

The author has developed a new method of cardiopulmonary preparation¹⁷, which can be used externally for various physiological studies, and for human heart transplantation in the future.

The author has experimentally developed a scheme for the preservation of revitalized organs and the use of cross circulation for therapeutical purposes. The practical implementation of this scheme can have a great effect on the development of physiology and surgery.

This is basically the content of V.P. Demikhov's works.

Based on the above, we can assume that the V.P. Demikhov's research works are of great importance both for Soviet science and for Communist construction in our country. I believe that V.P. Demikhov can be nominated as a Corresponding Member of the USSR Academy of Sciences in the speciality of physiology.

Professor I.M. Grigorovsky

May 11, 1966." [5].

There was no debate that time. In any case, they did not appear in the transcript of the Meeting. Perhaps, because everything was clear for the Academic Council members and all the staff of the Institute who attended the Meeting and listened carefully to I.M. Grigorovsky. Moreover, from the context of the speech of the Head of the Organizational and Methodological Department, it followed that the vote should only be positive. This is the only way we can explain the fact that no one spoke out either "in favour" or "against".

B. A. Petrov who chaired the Council Meeting proposed to elect a Counting Committee consisting of M.K. Shcherbatenko (Radiologist), O.I. Vinogradova (Surgeon), and D.A. Arapov (Surgeon). Ballot papers were distributed to nineteen members of the Academic Council, and voting took place. As reported by the Counting Committee, "9 members

¹⁷ It was another V.P. Demikhov's unique achievement. Moreover, his cardiopulmonary complex had a coronary circulation instead of a larger one, which radically differed from all the models proposed earlier.

of the Sklifosovsky Institute Academic Council voted for the nomination of V.P. Demikhov as a Corresponding Member of the USSR Academy of Sciences in the speciality of Physiology, 10 members voted against it. All 19 Council members voted openly for the proposal to approve the Minutes of the Counting Committee. In other words, everyone was satisfied with this result.

Since the voting was secret, then, taking into account the opinions of some Council members expressed at the previous Meeting, as well as the document available at our disposal (Fig. 6), we can assume that D.A. Arapov, P.I. Androsov, I.M. Grigorovsky, B.G. Zhilis, P.N. Petrov, E.N. Popov and 3 other Council members could vote for V.P. Demikhov's nomination. B. A. Petrov, P. L. Sukhinin, O. I. Vinogradov, V. S. Dashkovskaya and 6 more people voted against.

Thus, V.P. Demikhov lacked only two votes for being nominated to the USSR Academy of Sciences.

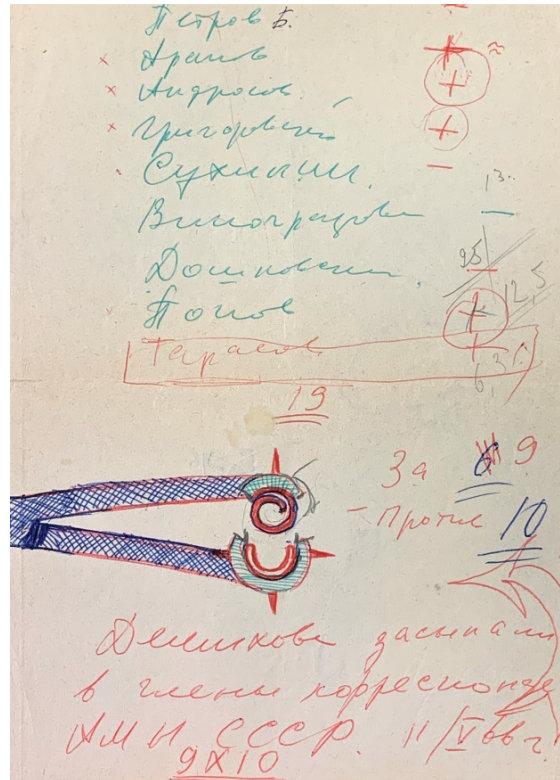


Fig. 6. The reverse side of Fig. 5. The voting results are (partially) presented on top: B. Petrov (-), Arapov (+), Androsov (+), Grigorovsky (+), Sukhinin (-), Vinogradova (-), Dashkovskaya (-), Tarasov (+); and figure "19" is underlined twice (obviously, that was the number of the Academic Council members voted). And lower is written: "9 votes for the candidate, 10 votes against him" and the phrase: "Demikhov was flunked at voting for a Corresponding Member of the USSR Academy of Sciences. May 11, 1966 ". However, the record "Tarasov (+)" is not quite clear in that document, because, according to the archival transcript, M.M. Tarasov was absent from the Academic Council Meeting on May 11. [Unknown author; Museum of A.N. Bakoulev NMRC CVS, a gift from M.M. Razgulov]

Chronicle of further events related to V.P. Demikhov in 1966

The chronicle of further events that year in relation to V.P. Demikhov is as follows. On May 25, 1966, the Doctoral Thesis of N.I. Koretskaya entitled "Sternum Transplantation" was removed from the Research Plan of the Institute with the wording "in connection with the author's transfer to the Central Institute of Blood Transfusion" [6]. The

topic of the dissertation was Demikhov's. Most likely, V.P. Demikhov was the scientific advisor for her work.

On July 28, 1966, on the eve of his 50th birthday, V.P. Demikhov received congratulations on the occasion of his anniversary from the Sklifosovsky Institute Administration. It stated that:

"Dear and dear Vladimir Petrovich!

The Directorate of the Sklifosovsky Institute on the day of your 50th anniversary sincerely congratulates you on this significant date in your life and wishes you health, long life, and further success in your scientific activities.

In your person, Soviet science has a bright and distinctive representative in the difficult and promising section on restoring the body vital functions through organ transplantation.

Your experimental research on the transplantation of the heart, lungs, head, and other organs has become **widely known** (emphasis added - *Auth.*) both in the Soviet Union, and in many other countries.

The issue of organ transplantation is currently attracting special attention of a large circle of native and foreign scientists.

You are a pioneer in these important studies and have deserved and received wide recognition <....

We hope that in the future your many-year experimental research and experience will help to successfully solve many vital issues of rendering emergency care in the emergency surgery practice.

Director of the Institute,
Honoured Doctor of the Republic
M.M. Tarasov (Figure 7).

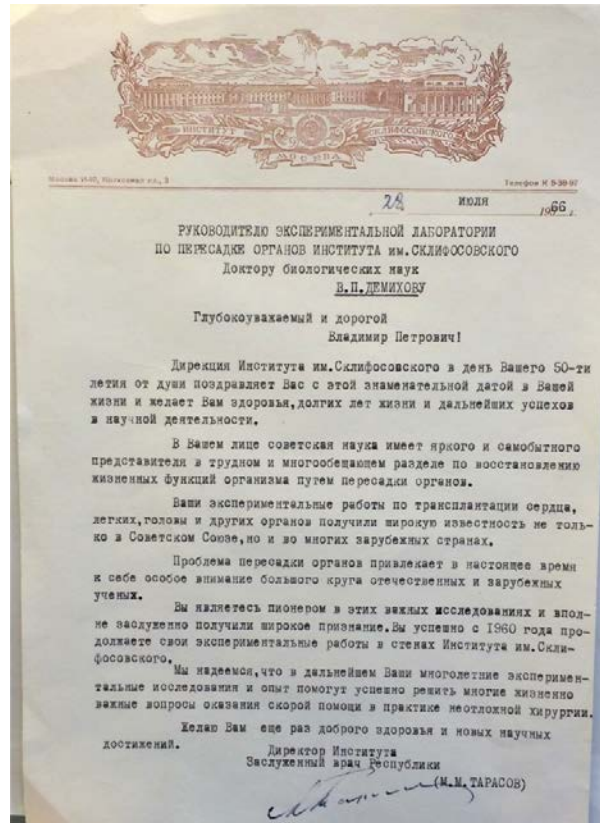


Fig. 7. The text of congratulation address for V.P. Demikhov's 50th birthday on July 28, 1966. [Museum of A.N. Bakoulev NMRC CVS, a copy; the original is stored in the Museum of N.V. Sklifosovsky Research Institute for Emergency Medicine]

The words about "wide recognition" of V.P. Demikhov and his research have been confirmed in the recollections of L.M. Kurkina, the Candidate of Biological Sciences, Senior Lecturer of the Department of Ecological and Experimental Medicine of the Faculty of Fundamental Medicine, Moscow State University named after M.V. Lomonosov, dating back to 1965:

“I learned about Demikhov and his experiments, while still in school, from the “Nature” journal where his articles were published. **In those years, Demikhov and his research were known even to schoolchildren** (emphasis added - *Auth.*). Because of this, I wanted to

enter the medical. But failed to enter, and went to Moscow State University. After graduating from the Biology Department with a degree in Biochemistry, I applied for postgraduate school to Vladimir A. Negovsky. In June 1965, I passed the entrance exams and was relatively free.

Once Negovsky received a call from the Healthcare Ministry and was told that they had a request from the United States from Blanca Smith, an American from Ohio State University, the Head of the Liver Transplantation Laboratory, who would like to visit the USSR, including, and mainly, in our Laboratory¹⁸. Negovsky called me and said: "As far as you passed your English exam with "5", you will accompany her. Practice your English at the same time".

I was summoned to the Healthcare Ministry, where I was instructed on where foreigners could be taken, and where not. For example, the request included some Moscow restaurants where foreigners were not allowed to enter. She was refused from visiting the Institute of Transplantology, that was being founded at that time¹⁹. Like, there is still nothing there and there is nothing to see. But she was allowed to visit Demikhov's Laboratory where she also wanted to go.

When Blanca came to us and we met, I accompanied her for 2 weeks. After seeing everything at our Institute, she said that she needed to visit Demikhov's. At the Healthcare Ministry she was told that Demikhov worked at the Sklifosovsky Institute. And I went to Sklif to arrange an appointment with Demikhov.

The next time I went there with Blanca. There was a heart and lung transplantation. The operation took a long time, about 4 hours. Blanca spoke the entire course of surgery on a dictaphone. Then Demikhov showed us his Laboratory, postoperative dogs, including those with two

¹⁸ We are speaking about the Laboratory of Experimental Physiology for body revitalization headed then by V.A. Negovsky and affiliated to the USSR Academy of Medical Sciences. Now it is V.A. Negovsky Institute of General Reanimatology (Critical Care) of the Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitation.

¹⁹ The Institute of Organ and Tissue Transplantation of the USSR Academy of Medical Sciences was established in 1969. Now it is Academician V.I. Shumakov National Medical Research Center of Transplantology and Artificial Organs, Ministry of Health of the Russian Federation.

heads. I think he was also the Head of the Cadaveric Blood Laboratory. In any case, he showed it to us.

Blanca's impression of his surgery was overwhelming. She said that there was no second such scientist in the world. Besides transplantation, she was interested in the technique of suturing vessels using the Gudov device.

I also remembered this acquaintance with an outstanding person for the rest of my life” [7].

On July 30, 1966, speaking at the Academic Council Meeting, I.M. Grigorovsky announced a list of science research topics approved by the Healthcare Ministry, which development, according to I.M. Grigorovsky, the employees of the Sklifosovsky Institute could participate in. We will not list the titles of all the topics, but we will point out that Topic No. 30 sounded like this: "Organ and tissue transplantation", and the principal investigator site was appointed to be MOLMI named after I.M. Sechenov where V.P. Demikhov had worked before he came to work at the Sklifosovsky Institute.

After the list of topics was announced, B.A. Petrov who pointed out that in 1967 the Institute *should confine itself* (emphasis added by us. - *Author*) to the development of the following topics: Trauma and traumatism, Abdominal surgery, the Issue of combating poisoning, Cardiovascular diseases, Nervous system surgery, Anesthesiology and Critical Care, Transfusion of blood and blood substitutes, Blood diseases, Cancer surgery. As for other topics, the Institute, according to B.A. Petrov, cannot (or should not) be directly involved.

L.L. Gugushvili asked for the floor, and stated that the issues of organ and tissue transplantation should take an important place in the research topics of the Institute in the next year, 1967. Moreover, the research, in L. L. Gugushvili's opinion, should be made both in the

experiment, and in clinic. To do this, it is necessary to declare such topics as explorative ones, and in the future to create a team of surgeons for organ transplantations and implantations. But this remark was not heard, because it had been proposed to limit themselves to the topics voiced by B.A. Petrov [8].

August passed. The staff of the Institute returned from vacations. On September 28, 1966, the Academic Council regular Meeting considered the issue of approving the Science Research Plan of the Sklifosovsky Institute for year 1967. I.M. Grigorovsky took the floor again and said that when drawing up the plan, the requests from the Heads of all clinics, departments and laboratories were taken into account. On M.M. Tarasov's proposal, the Plan was approved. We do not know, whether V.P. Demikhov's submitted a request for participation in Topic No. 30 "Transplantation of Organs and Tissues", but there was no such topic in the Institute's Plan for 1967 [9].

In September 1966, the Institute was inspected by the RSFSR Healthcare Ministry Committee headed by Professor M.G. Grigoriev. His report was presented at the Institute Scientific Council Meeting on October 3. The report contained both words of praise addressed to the Management of the Institute and its employees, and identified shortcomings in its work. The Committee took its responsibilities very seriously: the work and research of almost all clinics and laboratories were inspected, their plans and reports, staffing tables, and cost estimates were commented [10]. But no matter how thoroughly we were looking in this lengthy reports for any traces of the Organ Transplantation Laboratory or mentions of V.P. Demikhov's name, we could found nothing of that.

But the Institute Research Plan for 1966 planned the topic "Comparative assessment of the functional capabilities of the coronary

system of a normal and transplanted heart”, and V.P. Demikhov, the Head of the Organ Transplantation Laboratory, was designated the Project Leader, and N.M. Sharovskaya, a Junior Researcher of that Laboratory, was designated as the Investigator. Within the framework of the topic, chronic experiments on heart transplantation were planned with investigation using electrocardiography, the measurements of blood pressure, volumetric coronary blood flow, myocardial contractility, and polarograms²⁰ of donor's and recipient's hearts in normal condition and with reversible coronary occlusion. A series of experiments in dogs was planned to monitor the role of the denervation factor and the functional capabilities of the coronary system in the transplanted heart. In total, it was planned to conduct 40 chronic experiments in 20 dogs within a year (at the beginning, the readings were taken from a healthy heart, and then, after the transplantation, an additional one). The total number of animals that were supposed to undergo transplant operations was 50. That is, during 1966, V.P. Demikhov operated (only for that topic) about 1 animal per week, and the project on that topic was designed for three years. The study results were planned to be reported as a published scientific article [11].

Judging by the date on the document (November 16, 1965), it was drawn up a year earlier than the events described. But let us open the Report on the scientific activities of the Institute for 1966 and list the topics, which development, as the document stated, “determined the scientific credo” of N.V. Sklifosovsky Institute. We summarized these data in a Table and compared them with those that were proposed for implementation on July 30, 1966, for the year of 1967 (See Table).

²⁰ Polarography is a method to determine the partial pressure of oxygen in fluids and tissues.

Table. Topics of the Research developed at N.V. Sklifosovsky Research Institute for Emergency Medicine in 1966 and planned for 1967

Topics of Research developed in 1966 [12]	Topics of Research planned for 1967 [8]
Trauma and traumatism; Abdominal surgery; Poisoning and combating it; Chronic coronary insufficiency; Heart failure; Surgery of the heart and blood vessels; Nervous system surgery; Anesthesiology and Critical Care; Acute diseases of the female genital organs; Blood and blood substitute transfusions.	Trauma and traumatism; Abdominal surgery; The Issue of combating poisoning; } Cardiovascular diseases; Nervous system surgery; Anesthesiology and Critical Care; This topic was not included in the 1967 work plan. Blood and blood substitute transfusions Blood diseases Cancer surgery

It is easy to see that the topics planned for 1967 were mainly in line with those that the Institute developed in 1966, and that there were no problems related to organ transplantation in those plans. Although it is possible that the Research Topic, which annotation we have cited above (the study of coronary blood flow in normal and transplanted hearts) was planned within the framework of the Research Topic "Chronic coronary insufficiency" or "Surgery of the heart and blood vessels", and in the following year it was included the Topic "Cardiovascular diseases ". But it looks too new and unusual. Only two and a half years had passed since the world's first mammary-coronary artery bypass grafting operation (V.I. Kolesov, February, 1964), there were six months before the first coronary artery bypass grafting (R. Favaloro, May, 1967) and a little more than a year before the first heart transplantation (C. Barnard, December 1967). And V.P. Demikhov was already interested in the function of the coronary arteries of the transplanted (denervated) heart! However, V.P.

Demikhov studied this function, most likely, from the point of view of the nervous factor impact on coronary insufficiency. Indeed, at that time the coronary heart disease was believed to pass the stage of functional (reversible) disorders caused by the spasm of coronary arteries under the influence of nervous irritation, and the stage of organic (irreversible) alterations in coronary arteries with the deposition of atherosclerotic plaques and calcium in their walls. But we should emphasize that coronary arteries were studied in dogs with heart transplants. And that meant that in 1966 V.P. Demikhov continued experiments with heart transplants, studying the blood circulation in them.

The main scientific achievements of the Institute in 1966, mentioned in the same report by I.M. Grigorovsky, were the following: along with cadaveric blood, the patients began to receive plasma transfusions; emergency diagnostic X-ray was implemented for acute diseases of abdominal organs; a gastric hypothermia method in acute gastric bleeding and a method of surgical treatment of pelvic bone injuries using metal osteosynthesis were developed and implemented; an original tendon suture was developed. Among the achievements of the Institute, there was no place to V.P. Demikhov's research and developments, which, on May 4, 1966, were said to be the world-class ones.

Finally, after a long search in the puffy inventory of archival files, among the documents, often filed without taking into account their chronology, we managed to find the Topic of organ transplantation. It turned out that it was part of the Trauma and Injury Research.

There were three documents found on the Topic of organ transplantation. The first was a Research Reporting Sheet on examining the effect of antimetabolites and corticosteroids on the engraftment of renal homografts in dogs. The Project Leaders on the Topic were V.P. Demikhov (on behalf of the Sklifosovsky Institute) and M.M.

Kapichnikov (on behalf of the Laboratory of Immunology of the Institute of Experimental Biology of the USSR Academy of Medical Sciences). The Investigators were V.P. Demikhov, V.M. Goryainov, M.M. Kapichnikov, and N.G. Sushko. The methods of research planned included a chronic experiment and laboratory investigations, the output should be a scientific article.

The essence of the work was outlined in its summary:

“Recent studies have shown the possibility of weakening or suppressing the immune response of various tissue and organ homografts by posing the effects of antimetabolites and corticosteroids on the recipient's body. However, in order to maintain the recipient's unresponsiveness to the homograft, it is necessary to freely administer large doses of these drugs, as a result of which serious complications arise that lead to the death of experimental animals. In experiments with kidney homotransplantation, the efficacy of agents widely used in clinic for suppressing the reaction of transplant immunity was revealed. It is planned to conduct clinical, immunological and pathomorphological studies on kidney transplants with and without antimetabolites. Results: scientific and practical recommendations” [13].

It follows from this document that in 1966 V.P. Demikhov who had previously attempted to overcome transplant immunity by biological methods, began to use immunosuppressive substances to suppress the rejection reaction, studying this reaction with the help of immunologists from a respected academic institute. But why were only the kidneys? We believe because after successful kidney transplantation in the USSR a year before the events described, studying the issue of this organ homotransplantation was more urgent than the issue of heart transplantation, which time would come a year after. Pay attention to the phrase at the end of the summary: "it is planned to conduct clinical

studies". This may have meant that V.P. Demikhov planned to start kidney transplants in clinic at Sklif.

The second and third documents were also the Research Reporting Sheets for 1966 on the same topic "Organ transplantation". The former of them was drawn up based on the results of studying the function of the transplanted heart using electrocardiography, which was investigated by V.M. Goryainov under V.P. Demikhov's guidance. The summary read as following: "The ECG was recorded during the heart transplantation experiments, which were conducted by V.P. Demikhov using a multi-channel apparatus" and that "in the future, when a human heart is transplanted, the data obtained would be used to assess the graft functioning"[14]. The latter Reporting Sheet was devoted to the research related to creating a bank of vital organs for their transplantation. Here is its full text:

"Research topic: Transplantation of the heart and lung [of a dog] in an experiment after revitalizing [the animal] and a long-term preservation of [these organs] in a perfused case.

Project Leader and Investigator: V.P. Demikhov.

Methodology: Chronic experiment.

Expected result: Scientific article.

Summary: In previous studies [we] developed schemes for heart and lung transplantation and began experiments to preserve revitalized organs in cases for their subsequent transplantation. The iliac vessels of large dogs were connected by means of vascular prostheses to cadaveric organs of other dogs, [after which these organs] were revived with the inclusion of cross-circulation and their long-term keeping alive. In these studies, these experiments are to be continued.

Results: the proposals for practice have been developed on the basis of experiments" [15].

Thus, the discovered documents confirm our assumption expressed at the beginning of the article that it was too early to discard V.P. Demikhov from the list of "fighters of the transplant front" at that time. Having received no permission to perform a kidney or heart transplantation in clinic, which he dreamed of in 1962–1963, and once again showing his fighting character, V.P. Demikhov took on to research at a new level: to study the possibility of suppressing the recipient's immune response to drugs, including corticosteroids, in kidney transplantation, and to study the possibility of long-term preservation of the organs alive before their transplant in lung and heart transplantation (Figure 8). Perhaps he still hoped that he would receive permission for their transplantation, and when he received it, he would have living organs at hand.



Fig. 8. The experimental surgery is performed by V.P. Demikhov (left). V.F. Gudov-designed vascular stapling device can be seen in his left hand. [Museum of A.N. Bakoulev NMRC CVS, a copy]

But that was V.P. Demikhov's dramatic destiny: after graduating from the Faculty of Biology of Moscow State University with the Degree in human and animal physiology, he was a biologist, not a doctor, so formally Administration of Sklif had no legal grounds to permit him to clinical work, including organ transplantation in clinic.

So another year in V.P. Demikhov's life and work passed. The year 1967 came, which would revolutionize the idea of humanity about the possibilities of surgeons in the field of transplantation.

To be continued

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