DOI:10.23873/2074-0506-2018-10-2-142-153

THE PHENOMENON OF DEMIKHOV. In the Sklifosovsky Institute (1960-1986). The Moscow dreamer (autumn of 1960)

S.P. Glyantsev

A.N. Bakoulev National Medical Research Center

for Cardiovascular Surgery,

135 Roublyevskoe highway, Moscow 121552 Russia

Correspondence to: Sergey P. Glyantsev, Professor, Dr. Med. Sci., Head of the Medical History Department of Cardiovascular Surgery, A.N. Bakoulev National Medical Research Center for Cardiovascular Surgery, e-mail: spglyantsev@mail.ru

Received: 6 December 2017

Accepted for publication: 1 March 2018

On September 1, 1960, V.P. Demikhov was taken in the staff of the Sklifosovsky Research Institute for Emergency Medicine. But earlier, in the summer of that year, he talked at a meeting of the Academic Council of the Institute about his achievements in transplanting vital organs in warm-blooded animals in experiment, and outlined a plan for their implementation into clinical practice. In his opinion, the N.V.Sklifosovsky Institute for Emergency Medicine best suited for that purpose. However, the first months of his work in a new place showed that the Institute was neither morally nor organizationally ready to perform clinical organ transplantations. The idea of his mammary-coronary artery anastomosis developed in 1953 was not heard either.

Keywords: V.P. Demikhov, N.V. Sklifosovsky Research Institute for Emergency Medicine, Autumn 1960, organ transplantation in clinic, experimental mammary-coronary artery anastomosis

Glyantsev S.P. Phenomenon of Demikhov. In the Sklifosovsky Institute (1960–1986). The Moscow dreamer (autumn of 1960). ***Transplantologiya. The Russian Journal of Transplantation.*** **2018;10(2):142–153. (In Russian). DOI:10.23873/2074-0506-2018-10-2-142-153**

CIBT, Central Institute of Blood Transfusion

On September 1, 1960, V.P. Demikhov was enrolled in the staff of the Order of Labor Red Banner Moscow Research Institute for Emergency Medicine named after N.V. Sklifosovsky, Sklif in common parlance, of Moscow City Healthcare Department[1] (Fig. 1) on the position of the Head of the *Laboratory for Animated Organ Transplantation* [1] that had been transferred from the 1st MOLMI with all its staff on the order of S.V.Kurashov, the Healthcare Minister of the USSR. We draw the attention of the reader to one detail. Earlier, Demikhov's Laboratory used to have the name the "Organ Transplantation Laboratory" when being based in A.V. Vishnevsky Institute of Surgery, USSR AMS and in the 1st MOLMI named after I.M. Sechenov, but in the Sklifosovsky Institute its name changed in accordance with the tasks that the Laboratory had to solve, namely, to transplant revived organs.

Fig. 1. N.V. Sklifosovsky Research Institute for Emergency Medicine in 1950's. [Electronic resource: http://oldmos.ru]

[1] That was an official name of the Institute in 1960.

At that time, the Director of the Institute was Mikhail Tarasov, an eminent organizer of public healthcare, the former Chief Surgeon of partisan troops in Ukraine, an Honored Doctor of the Ukrainian SSR. His Deputy for Science was Professor Boris Alexandrovich Petrov, a famous Soviet surgeon, who had been S.S. Yudin's student (Fig. 2); and during the Great Patriotic War he was the Chief Surgeon of the Black Sea Navy and the Deputy Chief Surgeon of the USSR Navy[2].

Fig. 2. Professor B.A. Petrov, Deputy Director on Science and Research, the Chief Surgeon of N.V. Sklifosovsky Research Institute for Emergency Medicine [From the Museum exposition of N.V. Sklifosovsky Research Institute for Emergency Medicine of Moscow Healthcare Department]

[2] B.A. Petrov worked as the Deputy Director for Science and Chief Surgeon of N.V. Sklifosovsky Research Institute for Emergency Medicine from 1949 (the arrest of S.S. Yudin) to 1953 (the return of S.S. Yudin from the exile), and later on, from 1954 (the death of S.S. Yudin) to 1964. In 1961, he was elected a Corresponding Member, and in 1966 a Full Member of the USSR Academy of Medical Sciences. At the same time and until the end of his life B.A. Petrov was in charge of the 2nd Surgical Clinic of the Institute, and from 1964 to 1973 he was in charge of the Hospital Surgery Department of the 2nd Medical Faculty of the 1st MOLMI named after I.M. Sechenov.

We imagine the purpose of V.P. Demikhov's transfer to work at Sklifosovsky Institute as follows: the Institute that had 4 Surgical Clinics with 8 surgical departments, the Trauma Clinic with a Craniocerebral Trauma Unit[3], Gynecology, and Therapy Clinics with a total capacity of more than 1000 beds, several research laboratories, including the Laboratory for Cadaveric Blood Transfusion daily admitted dozens of patients injuried in accidents, and having trauma, many of them were delivered in critical condition; and Vladimir Petrovich dreamed not only of continuing his previous studies at a new, thanatological level, but also to start clinical organ transplantations.

In addition, a year before the time described, on the order of N.A. Vinogradov, the Healthcare Minister of the RSFSR, No. 228 of May 6, 1959 "On the organization of the Department for collection, processing, and storage of transplants in the Moscow Institute of Emergency medicine named after N.V. Sklifosovsky ", a Department for Tissue Preservation and Storage was established in the Institute "to expand the range of medical care for patients requiring plastic surgery with using grafts after bone fractures, extensive burns, etc." [2]. We emphasize that the Minister's order implied only bone and skin grafting, including auto- and homoplasty. That order made no provisions for the issues of organ collection, preservation, or storage for transplantation purposes.

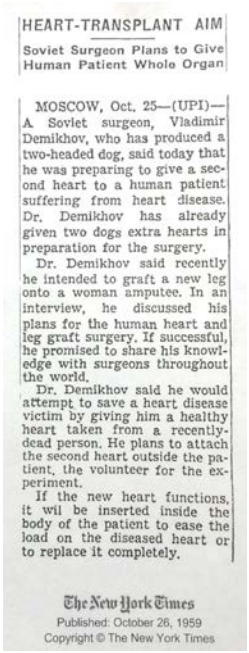
But V.P. Demikhov did not seem particularly worried about such formalities. It is not by chance that on October 26, 1959, i.e. just a month after his return from Munich, the newspaper The New York Times in an

[3] The department with the capacity of 200 beds was established in January 1960 to coordinate rendering medical care to casualties with craniocerebral trauma in Moscow and conduct research, organizational and methodological work on that topic.

item titled "The goal is the heart transplant: a Soviet surgeon plans to transplant organs to humans" (Fig. 3) reported that:

"Today (October 25 – supplied by S.G.), the Soviet surgeon Vladimir Demikhov, the creator of two-headed dogs, said that he is ready to transplant a second heart to a patient suffering from a heart disease and that this technique has long been worked out by him on dogs. Dr. Demikhov also said that recently he intended to transplant a new leg to an amputee woman. In an interview given to UPI (United Press International – supplied by S.G.), he confirmed his plans to begin heart and limb transplantations in clinic. And if they are successful, he promised to share his experience with surgeons around the world.

Dr. Demikhov stated that he will try to save patients suffering from heart disease by transplanting healthy organs taken from suddenly died people. He plans to initially implant the donor heart extracorporeally to those patients who will give consent to this. If the new heart will work normally, it can be placed in patient's thorax to assist the sick heart or completely replace it" [3].



HEART-TRANSPLANT AIM

Soviet Surgeon Plans to Give Human Patient Whole Organ

MOSCOW, Oct. 25—(UPI)—A Soviet surgeon, Vladimir Demikhov, who has produced a two-headed dog, said today that he was preparing to give a second heart to a human patient suffering from heart disease. Dr. Demikhov has already given two dogs extra hearts in preparation for the surgery.

Dr. Demikhov said recently he intended to graft a new leg onto a woman amputee. In an interview, he discussed his plans for the human heart and leg graft surgery. If successful, he promised to share his knowledge with surgeons throughout the world.

Dr. Demikhov said he would attempt to save a heart disease victim by giving him a healthy heart taken from a recently-dead person. He plans to attach the second heart outside the patient, the volunteer for the experiment.

If the new heart functions, it wil be inserted inside the body of the patient to ease the load on the diseased heart or to replace it completely.

The New York Times
Published: October 26, 1959

Fig. 3. Note from the newspaper "The New York Times" of October 26, 1959. [From the author's archive]

It was clearly impossible to embody those dreams while working at the Department of Operative Surgery and Topographic Anatomy of the 1st MOLMI, which did not have its own clinical base. But making that in the Sklifosovsky Institute, in V.P. Demikhov's opinion, was quite real.

V.P. Demikhov and his few associates were met friendly in the Sklifosovsky Institute. First, as we believe, because the decision to transfer the laboratory was sent "from higher-ups". And second, no one really knew what exactly he was doing and what he wanted to do at the Institute for emergency care. That can be seen from the transcript of the Institute Scientific Council Meeting[4] that took place on June 22, 1960, where the issue "On the tasks and working plan of the Laboratory for reviving the body" was discussed[5]. The agenda of the meeting was formulated by Prof. B.A. Petrov, the Chairman of the Council[6], who, addressing V.P. Demikhov, said:

> "I will ask you to briefly touch on your real achievements in your presentation and say, <...> what are you going to do in the future, using the base of the Sklifosovsky Institute?" [4, c. 100][7].

The questions were very clear, and V.P. Demikhov answered them also very clearly. Anticipating his results, he recalled that the Sklifosovsky had a vast experience in skin transplantation and cadaveric blood transfusion, but he believed that the Institute could achieve much more with

[4] Officially the Council was named "Scientific", but in everyday life it was often called "Academic".
[5] The name of the laboratory, obviously, was proposed by V.P. Demikhov, proceeding from the tasks it was facing.
[6] Formally, the Chairman of the Council was M.M. Tarasov, but the Council Meeting was often chaired by B.A. Petrov.
[7] The first digit in square brackets refers to the source; the second one means the page in it.

transplantation of vital organs. Moreover, from his words, the entire world had started kidney transplantation in clinic[8].

Further he went on to answer the questions on the topic:

"I. Our research has established that ***any organ can be transplanted within the species*** (here and below italics – supplied by S.G.), and it will fulfill its function for several weeks and months. In our experimental investigations, the transplanted heart and head functioned for up to a month; the kidneys did up to 2 weeks

The causes of graft's ceasing its function have been explained differently, but all scientists agree that these causes can be prevented and eliminated[9].

II. Experiments show that even when the graft terminates its vital activity, the recipient's body retains its viability. Consequently, a temporary (up to several weeks) connection of a lively and well-functioning organ on a vascular pedicle from the outside is safe.

Currently, clinics use artificial kidneys, heart, lungs. But the revitalized natural kidneys, hearts, and lungs are much more perfect than artificial ones and can be connected to the patient for several weeks rather than for several hours, as artificial ones. As a result, the therapeutic effect will be much greater.

If the temporarily connected organ shows the signs of worsening its activity, it can be removed. If the deterioration of its function does not occur and its adaptation to the new body takes place, then, the second stage can be the implantation of this organ inside. If the organ connected from the outside is removed, a new one can be connected in its place. When the antibodies to a certain organ connected from the outside accumulate in the body, the organ can be transferred to another patient in need. ***Multiple transfer of such an***

[8] The first in the history kidney transplantation from one twin to the other was performed by J. Murray in Peter Bent Brigham Hospital (Boston, USA) in 1954.

[9] The phrase was underlined in the document with a red pencil and 2 question marks were opposite on the margins. It was possibly done by B.A. Petrov when looking through the text of the report prior to the Council Meeting.

organ to different patients (considering the blood group) should lead to the loss of individual specificity in this organ and its acquiring the ability to engrafting

It has now been established that different animal species and humans have their own specificity. In other words, even if the question of the tissue compatibility for dogs had been finally solved, then for humans this question would have required special study. <...> Therefore, the immunological part of organ transplantation to humans can be solved only after this issue has been studied on humans. <...>

Consequently, the temporary connection of revitalized organs to the patients in need, taking into account the blood group, would facilitate their recovery and allow us to study in detail all the reactions (including immunological ones) that can occur in humans[10]. After studying these reactions, we will be able to find the ways for their prevention and elimination.

III. To organize a temporary connection of revitalized organs to treat patients, the following is required:

1. An available space(room) for the revitalization of organs in the corpses of the people delivered by ambulances within the initial tens of minutes after injury;

2. Available space(facilities) for patients who need organ transplantation (initially temporarily);

3. Both of the above-mentioned premises should be geographically close to the point where the ambulance vehicles deliver the casualties. Such a place in Moscow can only be the Sklifosovsky Institute;

4. The organ revitalization, their connection to the patients in need, and possible studies should be carried out jointly by the following specialists: surgeons, physiologists, immunologists, forensic experts, pathologists, therapists, bio chemists, radiologists, anesthesiologists, and etc.

[10] Here and further in the text, all the underscores (except for specially stipulated ones) were made by V.P. Demikhov.

5. It is necessary to allocate for this purpose paramedical personnel and nurses;

6. Qualified technical personnel are needed for the adjustment and maintenance of the devices and equipment;

7. For a concurrent collection, preservation, and storage of individual tissues, a special room, equipment, and additional staff are needed;

8. For parallel experimental studies, an experimental department with an operating theater, a clinic for postoperative animals, and a vivarium are necessary.

In the research-and-practical institution organized in this way (the word "institution" in the typewritten letter is crossed out, and it is written from above with a pencil: "department" - *S.G.*), the following organs can be temporarily connected:

1) Heart and lungs,

2) Kidneys,

3) Endocrine glands,

4) Hemopoietic organs for the treatment of radiation sickness. In this case, the hemopoietic organs can be transplanted on a vascular pedicle, which is much more effective than transplanting the bone marrow using a syringe. <...>

The sooner a special research-and-practical department (underlined in red pencil – S.G.) is organized for organ transplantation, the sooner comes the real possibility of using revitalized organs for prolonging a human life.

Head of the L laboratory for Organ Transplantation at the 1st MMI,
Honorary Doctor of the University of Leipzig

V.P. Demikhov" [4, p. 212-129].

What idea was the speaker trying to convey to the listeners? First, he clearly formulated the main goal of his further research: *to begin preparations for organ transplantation in humans*. Second, he outlined , as

they would say now, the "roadmap" for those preparations, namely: a) the revitalization of the cadaveric material with an unviable brain for the removal of organs or for using that body for implanting the revitalized human organs for their further transplantation to patients in need; b) the implantation of organs to a sick person for a while (with an auxiliary purpose) or permanently (with the replacement purpose), thus offering a solution to the problem of using organs in intensive or critical care; c) the study of immunological responses to implanted organs in humans. Third, he tried to prove that it was relatively safe. And fourth, he said that the organizational and intellectual efforts of a large working group are necessary for this, and that was the purpose for which he came to work in the Sklifosovsky Institute.

Concurrently, V.P. Demikhov formulated yet another way of overcoming the biological incompatibility of transplanted organs by using multiple transplant passages, with the loss of their specificity, and declared that everything that they had previously done on dogs should be checked on a revitalized human body, because those reactions in humans can proceed differently.

His saying about a "research-and-practical institution" was not accidental. It was clear that the program proposed by V.P. Demikhov could not be implemented in the format of his laboratory only, it required an entire institute or at least a department whose research activities would be scheduled for several years ahead; and all those required a large team of like-minded people whom he intended to find in the Sklifosovsky Institute.

We do not know the reaction to the absolutely fantastic, sounded in the report ideas on rejuvenating old people by connecting their circulatory system to young lively corpses, and on growing the organs from animated

stillbirth embryos for further transplantation. Obviously, the audience simply did not find what to ask, as Demikhov's projects were "not of this world". So, what had been said was enough for those present at the meeting to become extremely puzzled by the outlined prospects. The first to ask questions was Professor I.I. Shimanko, the Head of the Physiotherapy Department:

"Both the research and organizational issues have been touched upon. I'm not a specialist in them, but I would like to know in-detail:

A. Are the blood groups, tissues and organs compatible in humans?

B. What is the life expectancy of various pre-prepared organs?

Q. What should we do with antibodies?

G. What do you plan primarily to start with?" [4, p. 101].

V.P. Demikhov answered in a concise manner:

"A) Compatible;

B) We take fresh organs, which we are only planning to procure, but [A.G.] Lapchinsky transplanted limbs stored in the cold for 24-26 hours and the grafts adhered; a French Professor Ray froze an embryo heart of the chicken at minus 190 degrees for a year and a half, after that he warmed it, and it began to contract;

B) There is a lot of talk about antibodies, but most scientists who tried to find antibodies during organ transplants did not find them; if they are formed, it is not immediately, but for several days; if during this time to transfer, say, the kidney from one individual to another, then the antibodies are not formed; in experimental immunology this is called the "passage method", as a result of which a 100% adherence can be achieved;

D) It is necessary to begin with improving the technique of a cadaveric heart revitalization; we are already able to revive the heart after 2 hours of death; the next task is to maintain life throughout the whole body; we are not going to enliven the brain; afterwards, we are going to maintain the life of

such an organism for a long time and try to connect other organs to it, temporarily, at first ... " [4, p.101-105].

The second to take the floor was Professor P.L. Sukhinin, the Head of the Internal Medicine Department:

"Was there intoxication observed in case of organ adherence? How long did you follow-up the fate of the multiply transplanted organs?"

He did not have time to sit down, as remarks and questions rained down from the audience:

"It's not time to engage in discussions and find out scientific questions ...

I would like to know more specifically: what are you going to do at the Sklifosovsky Institute in the near future rather than in 20 years ahead[11]?

Will you do heart surgery?

How many corpses are you going to revive?

What new experiments on dogs are you going to make?

How do you explain the short life of the transplanted organs?

It will be a whole scientific institution rather than a scientific laboratory,

If all the corpses are transported to our Institute, what will the other morgues of Moscow do?

You say that you will not revive the brain? What then is the meaning of the revival?

How will the relatives of the deceased respond to your actions?" [4, p. 106-109].

Questions would have been poured out further, if the Chairman did not interrupt his colleagues and did not give the floor to the speaker to

[11] This slip of saying about 20 years was remarkable. Indeed, what kind of transplantation could be talked about in 1960? Here in 20 years, when communism comes ...

answer them. Judging from the fact that V.P. Demikhov *consistently* answered *all the* questions posed to him, sometimes with a sense of humor, he not only controlled himself, but he thought for a long time and perfectly imagined what and how he would do:

"We did not observe any intoxication ...

After removing the allogenic organ, the dog-recipients were quite viable...

The issue of repeated tissue transplants has been developed for a long time. We retransplanted only the kidneys and in a few isolated instances...

At the Sklifosovsky Institute we are still having an organizational period. But we will try to transplant the heart, kidneys, and other organs, as soon as this year, together with the surgeons and clinicians of the Institute...

I'm not going to do heart surgery...

Whom are we going to revive? It is important that they would be the corpses of healthy, young people dead as a result of a sudden accident with brain damage. We will also revitalize the hearts of people who died from a myocardial infarction...

New experiments? The main attention will be paid to the connection of the revived organs to a human. This is our main task for the near future...

Short life of the transplanted organs is associated with several reasons. For example, my monograph, which will soon be out of print[12], discusses 16 causes of transplanted heart death...

Immunologists say that they are not pathologists. How can they in absentia indicate the cause of death of animals or transplanted organs?

Fears of the fact that we leave other morgues without work are superfluous. We are interested in the people who died from injuries in the street or at the time of transportation. We are not interested in those who died in hospitals...

[12] Here he mentioned the book "Experimental transplantation of vital organs" that was about to be published.

Why should revitalize organs without a brain? In order they could be transplanted to those who have a brain still preserved...

As for the relatives, we will work with them in close contact with forensic experts...

In addition, the situation in our laboratory, where we plan to revive people, will be much better than in the morgue, where they make postmortem autopsies. And then, if we revive the heart, then how can one bury a man whose heart is working? I think that none of the relatives will then insist on a funeral... " [4, p. 110-113].

The discussion began to drag out. And the floor was taken by B.A. Petrov:

"Our time is running out, and we can not discuss the report further ... The task of Vladimir Petrovich was to inform the members of the Academic Council on the main topics of research planned in the laboratory that has been recently established at our Institute[13].

V.P. Demikhov's main virtue lies in the fact that he is a dreamer, but at the same time a realistically thinking person. He is a wonderful experimenter, and it is one of his merits. He showed the world what he had achieved.

These are the facts that no one can deny ... All that Vladimir Petrovich has done in the experiment, says that under certain situation much can be realized to some extent in clinic

I must say that Vladimir Petrovich has done so much in "canine surgery" that we can with good reason wish him to dare doing on a human.

Of course, we must create opportunities for him to conduct experiments. But these experiments do not obscure from us the importance of the problem, which many scientists consider insurmountable. This problem is not so much

[13] This, as well as V.P. Demikhov's words of the laboratory "passing the organizational period", suggest that the transfer of the laboratory began in spring 1960 and was still under way for several months, although officially its Head was appointed to work in the N.V. Sklifosovsky Research Institute on September 1, 1960.

technical, but biological one. This is the philosophy of the current state of the matter.

All we have heard today about the activities of Vladimir Petrovich undoubtedly has a full right to exist, and we must give him the opportunity to conduct these interesting experiments" [4, p. 113-115].

An astonishing speech! It looked a total carte blanche given from the Deputy Director and Head Surgeon to a newly arrived employee! There was everything: multiple addressing him by his name and patronymic, and a high evaluation of experiments with the recognition of their world level, and the characteristic of the experimenter himself as a "realistically thinking person", and, most importantly, the promise to create all conditions for the continuation of the work and even the desire to "dare on a human!"

Reading this, we, on the one hand, are obliged to remove any suspicions of B.A. Petrov's prejudicial attitude to V.P. Demikhov and his "dreams". But, on the other hand, we must admit that Boris A.Petrov had no idea what he was going to face in the very near future being the Head Surgeon and the Deputy Director on science and research in the Institute.

However, despite the speech, any academic meeting should make a decision or adopt a resolution on the issue under consideration, which would become the basis for further activities. Let's present this document completely:

" The Scientific Council, after hearing the report of V.P. Demikhov, has taken into consideration his plans and trends concerning scientific topics of research in the laboratory and decides:

1. To request him to submit a plan of work for the second half of 1960 by July 1.

2. To recommend to the Heads of Clinics and Departments to make plan of joint experimental and clinical research with the Laboratory for 1961.

3. To ask M.M. Tarasov, the Director of the Institute, to speed up the official approval through the Ministry of Health of the USSR and RSFSR, and Mosgorzdrav, of the Laboratory staffing, the transfer of funds for its maintenance, and purchase of equipment.

4. In order to enable further research on organ revival in the Laboratory headed by V.P. Demikhov, to request A.F. Shvedov, the Head of the Ambulance Station, of committing his ambulance staff to deliver all ambulance-transported corpses to the Sklifosovsky Institute

5. Propose that V.V. Lebedev, the Head of the Craniocerebral Trauma Department should immediately report on all deaths in his Department to the Laboratory of organ transplantation for testing the possibilities of revitalizing visceral organs" [4, p. 116].

For lack of time, the proposed document was not discussed. Though, Professor A.I. Smolyannikov, the Head of the Pathology and Morbid Anatomy Department, tried to object, "What means all the corpses?" To him B.A. Petrov replied: "Of course, not all, but only those that could be used ..." But A.I. Smolyannikov did not stop, "How can this be reconciled with the demand for the delivery of corpses to the Laboratory for the Cadaveric Blood Banking and Transfusion?" But B.A.Petrov even then responded in general, saying, "That must be combined ..." And it was all. Perhaps, he had to close the meeting urgently, and the precise definition of the adopted resolution written in advance, did not interest him. Especially, since V.P. Demikhov had not formally been the Institute employee yet.

This is surprising, but all 32 members of the Scientific Council, having voted for the proposed resolution, seemed to have agreed to tackle organ transplants directly from the following day, though they were far from

that topic. And although the cooperation with Demikhov's laboratory was only recommended to the Heads of Clinics and Departments, still that resolution could be called a small victory of V.P. Demikhov. For the first time, he was heard and supported, at least formally, in words. They supported and approved what he did; it was for the first time over many years. The resolution was adopted. The meeting was closed. Everyday life began.

In his extensive report, V.P. Demikhov also touched upon the problem of surgical treatment for coronary insufficiency using his original method:

> "Operations to prevent infarctions or in the first hours after the onset of a life-threatening heart attack by creating a coronary-mammary artery anastomosis[14] (according to V.P. Demikhov) can be arranged with using a lively heart and lungs (for the time of surgery). In this case, the operation on the coronary vessels will be safe." [4, p. 129].

And although that extremely interesting issue "drowned" in the problem of organ transplantation, still Professor P.L. Sukhinin asked the speaker about that:

> "How many coronary-mammary by-pass operations have you made, and what are their results?" [4, p. 106].

V.P. Demikhov answered:

> "As for the results of coronary-mammary bypass surgery, here is a photo of a dog that lives in the Sklifosovsky Institute. It has the coronary artery ligated in the initial part, and the mammary artery sutured into the descending portion. The dog has lived for 7 years (Fig. 4), while all dogs with ligated coronary arteries without bypass died on the operating table. Two

[14] V.P.Demikhov called his anastomosis just this way "coronary-mammary".

dogs were euthanized at 2 years after surgery. In Germany, Professor Kokkalis, has made such operations in the experiment, using our method, with a contrast study of anastomosis.

Thus, we have proved the appropriateness of the operation. The task is to implement it into practice. As for its further experimental developments, there is one more technique: we are trying to administer coronary drugs into the mammary artery connected to the coronary artery and observe their direct effects on the heart. We conducted such experiments together with the pharmacologists of the 1st MOLMI and found that, for example, strophanthin poses its effect only with the preserved innervation of the myocardium. Therefore, it is not a specific drug; it acts on the heart through the medulla oblongata..." [4, p. 110].

Fig. 4. The dog Doga that lived for 7 years with a ligated anterior interventricular artery and the mammary-coronary artery anastomosis placed distally to the ligation site. [From: Demikhov V.P. *Experimental Transplantation of Vital Organs*. Moscow: Medgiz Publ., 1960]

It was a very detailed and clear-cut explanation of more than one, but four issues: a) mammary-coronary anastomosis surgery on a heart-beating dog; b) mammary-coronary anastomosis surgery in humans using a cross-

circulation on a stopped heart; c) making coronary angiography to control the anastomosis patency; d) using the anastomosis of the coronary artery with the internal thoracic artery for the selective drug administration directly into the myocardium arterial channel. Meanwhile, the main idea for the clinic was making the anastomosis in the conditions of cross-circulation.

But in that case, it turned out that the staff of the Institute was quite ignorant of the fact that a dog with a mammary-coronary artery anastomosis had already lived "under their nose" for several years, and they were, as they said, neither a dream nor a spirit? Was it possible? It appeared possible.

The Sklifosovsky Institute's staff knew nothing on the dog and the unique operation performed on it, which was evidenced by the words of Professor I.M. Grigorovsky, the Head of the Organizational and Methodological Department of the Institute, who spoke, facing V.P. Demikhov, at the same meeting and told about his trip to Leningrad for the exchange of experience in rendering medical care to patients with myocardial infarction:

> "When I was in Leningrad, I accidentally (! – S.G.) learned that there, at the Institute of Emergency Medicine named after I.I. Dzhanelidze, they make the operation of the internal thoracic artery ligation, or the Fieschi surgery, named after the Italian surgeon who proposed this technique. <...>
>
> As for the evaluation of the feasibility of this operation, they believe in Leningrad that it needs to be done, but no one knows the mechanism of the action of the thoracic artery ligation. In any case, the question of the advisability of such an operation is not yet clear. Perhaps it would be more reasonable to make the operation proposed by Professor Reinberg?"[15] [4, p. 79].

[15] Here he spoke about the operation of heart "abdominalization" that had been proposed by G.A. Rheinberg from Gorky. Time showed that the operation was ineffective.

It is curious that V.P. Demikhov who was sitting in the hall and waiting for his presentation did not react to the words showing I.M. Grigorovsky's such "awareness" concerning the surgical treatment for coronary insufficiency. Though, V.P.Demikhov knew perfectly well that the internal thoracic artery ligation was, in fact, a placebo operation, and he had also checked that in his experiment. This example once again shows how far forward he went from doctors and surgeons in understanding the principles of myocardial revascularization that he developed in 1953.

But the most surprising thing was that he was not alone! As, two months earlier, on May 2, 1960, R. Goetz (Fig. 5), M. Rohman, J. Haller, and R. Dee performed the world's first mammary-coronary artery anastomosis in a patient with coronary heart disease in the surgical clinic of Albert Einstein College of Medicine in Bronx (New York, USA). Even more surprising was the fact that American surgeons used exactly the same technique to make it as V.P. Demikhov did. The anastomosis between coronary and mammary arteries was formed on the tube for 50 seconds using E.Payr's technique of vascular anastomosis. The patient lived for 9 months and died of myocardial infarction after thrombosis of the ostium of the internal thoracic artery used to make the anastomosis. But the anastomosis per se appeared patent!

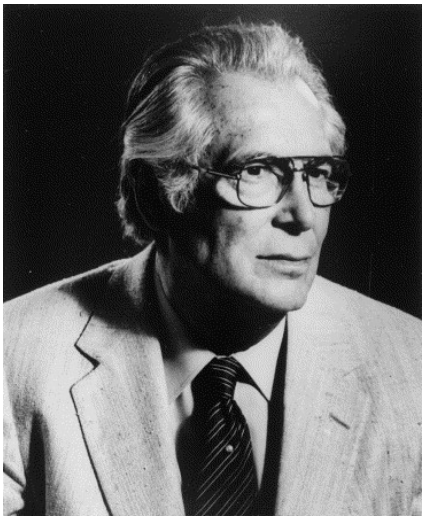


Fig. 5. Robert Hans Goetz (1910–2000) [From: Konstantinov I. Robert H. Goetz: the surgeon who performed the first successful clinical coronary artery bypass operation. *The Annals of Thoracic Surgery*. 2000;69(6):1966–1972]

Further on, we will still have an opportunity to make sure how much V.P. Demikhov was ahead of his time (when we shall describe the Institute Scientific Session of November 1960 in the next article). But for the time being, we summarize the main result of the first presentation on the results of his work and plans at a new place of work: while the staff of the Sklifosovsky Institute was mistrustful concerning his ideas, the Director of the Institute M.M. Tarasov and his Deputy B.A. Petrov initially showed loyalty towards a new employee and his "dreams"; but, to tell the truth, probably, because they were very little familiar with the trends in the work of the new Laboratory and with the "persistence" of its Head.

But did the surgeons in the Sklifosovsky Institute do cardiac and vascular surgery in the early 1960's? Maybe, V.P. Demikhov proposed something to them that they had never done and did not understand? This

question should be answered in the negative. For example, what was planned to be done at the Institute in 1961 on Topic No.30 "Surgery of the lungs, heart and large vessels, esophagus, and other organs":

> "Topic 1. Vulnerable areas of the heart in connection with its injuries. Coordinator: Prof. S.V. Lobachev, implementer: T.N. Bognitskaya-Panchenko.
>
> Purpose: writing a Ph.D. Thesis. <...>
>
> Topic 11. Mechanical device for suturing vessels. Coordinator and implementer: Prof. P.I. Androsov.
>
> Purpose: to continue the development of the mechanical device for suturing vessels. <...>
>
> Topic 12. Acute arterial obstruction. Coordinator and implementer: Prof. P.I. Androsov.
>
> Purpose: to develop the ways to restore the patency of arteries. <...>
>
> Topic 14. Treatment of obliterating endarteritis by means of bypass anastomosis using homograft and plastic materials. Coordinator: Prof. B.A. Petrov, implementer: V.R. Anakhasyan.
>
> Purpose: writing a Ph.D. thesis. <...>
>
> Topic 15. Restoring the blood flow after an acute vascular injury, using a vascular suturing device. Coordinator: Prof. B.A. Petrov, implementer: V.R. Anakhasyan. <...> » [4, p. 126].

In other words, in the Sklifosovsky Institute, they were also dealing with heart surgery, and vascular surgery. True was that the topic of heart surgery was the only one and it continued the topic of the monograph "Surgery of cardiac wounds" published by S.V. Lobachev in 1960, but P.I. Androsov perfectly mastered the technique of isolating the internal thoracic artery and making anastomoses between this artery and the arteries of the intestinal loop for the esophagoplasty; and B.A.Petrov knew, at least

theoretically, the bypass anastomoses of peripheral arteries. And this means that some surgeons of the Institute could have made the organ transplants and coronary surgery proposed by V.P. Demikhov. But, meanwhile, it meant that they would have had to abandon all other topics and be engaged in only those two. Was it real? Most likely, it was not.

V.P. Demikhov's dreams for his new colleagues were nothing more than dreams, fantasies, "windmills". And since their prospects were very vague, no one intended to implement them in life. Here is an example.

A month later, on October 5, 1960, the Sklifosovsky Institute Scientific Council discussed the possibility of including the topic of Bone Marrow Preservation and Transplantation into the programme of R & D topics of the Institute. The fact was that Professor A.A. Bagdasarov, the Director of the Central Institute of Blood Transfusion (CIBT), addressed the Sklifosovsky Research Institute administration with the request to unite the efforts of the two institutions in developing the method of obtaining the bone marrow from adult corpses for the treatment of radiation sickness and blood diseases.

In the debate, V.P. Demikhov took the floor and said that, in his opinion, the clinical effect can be expected if the sternum on a vascular pedicle is transplanted from a corpse to the neck or thigh of the patient with leukemia. "I have", said V.P. Demikhov, "3 dogs that live after such operations. To study hematopoiesis, the transportation and storage of the sternum, it can be connected to the cardiopulmonary bypass pump". (Fig. 6).

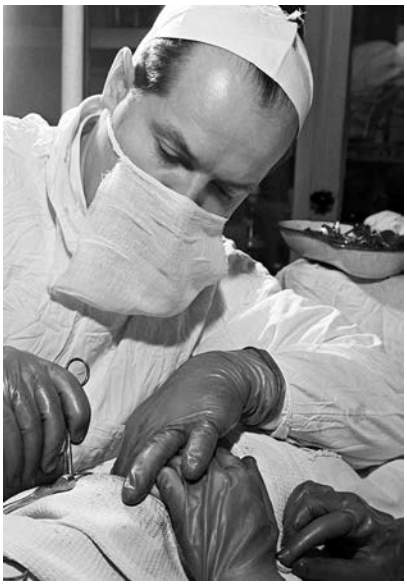


Fig. 6. V.P. Demikhov in N.V. Sklifosovsky Research Institute for Emergency Medicine. November 1, 1960. Photo by E. Tikhonov (RIAN)

A.A. Litvak, the CIBT Academic Secretary, who was present at the meeting objected saying that the experiments on sternum transplantation conducted at their Institute had not produced any effect. Other speakers supported the idea of bone marrow transplantation. Thus, there were two views: to study the bone marrow transplantation (advocated by the majority) or the sternum transplantation (proposed by V.P. Demikhov). The results were summed up by B.A. Petrov: "Demikhov's presentation little corresponds to the essence of the topic under consideration." As a result, it was decided to accept the CIBT proposal to work together, but to develop the topic of isolated bone marrow transplantation. Thus, V.P. Demikhov's proposal was regarded as unpromising, although nobody, but A.A. Litvak, had such an experience; and the implementation of sternum transplantation into clinic, as a result, was postponed indefinitely.

It so happened that the second issue considered at this meeting, was not in favor of V.P.Demikhov either. The report "On the state and prospects of the development of the Craniocerebral Trauma Department" (which was Demikhov's great hope for cooperation) was presented by V.V. Lebedev, the Head of the Department.

We will not quote his speech. We would just say that the state of affairs was far from favourable; and we quote here the words of B.A. Petrov:

> "The speaker presented a rather dull but objectively truthful picture of medical and diagnostic work in the Department. It does not meet the requirements for this important unit of the Institute clinical sector" [4, p. 148a].

And that is to say: the absence of an integrated space, the beds scattered over different units, dirt, problems with relatives, the lack of personnel and equipment, of bedclothes and medicines, the inability to apply new diagnosis and treatment techniques, organizational confusion, lack of cardiography equipment, typing machines for documentation, no X-ray room in the Department ("For 2 days, Doctors cannot see the case history records taken by radiologists"). And so on, and so forth.

As a result, a number of decisions were made aimed at improving the work of the Department, and the topics of its scientific research were approved. Did they include the topic of preserving the life of young human bodies with an irreversibly damaged brain, proposed by V.P. Demikhov at the Council Meeting on June 22 and supported by the Council? No, they did not. For, as one of its members said, "in the current state of affairs in the Department, neither scientific work nor the treatment of patients using new methods can be carried out" [4, p. 165].

Thus, the joint work of the Laboratory for the transplantation of revived organs (V.P. Demikhov) and the Craniocerebral Trauma Department (V.V. Lebedev) was given up for lost. But, was it, perhaps, the only Institute Department being under establishment stage? No, it was not the only one. The documents show that there were neither anesthesia nor intensive care services available at the Institute either. At the Council Meeting on November 2, 1960, B.G.Jilys, an anesthesiologist, reported "On the state of anesthesia service in the Institute and the tasks of its development":

> "Currently, the anesthesia service in the Institute does not keep up-to-date: there are no doctors, there is no permanent nursing and junior medical staff, there are no anesthesiologists on duty ... the attending staff stays in the duty room, and the patients are left to their destiny at this time... It is necessary to unite doctors and nurses, anesthesia specialists into a single anesthesia department ... When establishing it, the scope of responsibilities of each doctor and nurse should be defined, the accounting and reporting documentation should be outlined. <...> There were outrageous cases of tying patients to beds with ropes, so as not to be sitting next to them. One can give examples when patients died because of lack of observation... " [4, p. 179, 186].

We must note that we are talking here about the post-operative care of patients in one of the most advanced Soviet emergency care hospitals. However, there was still no intensive care service as such in the USSR. It was established later; and in 1960, the patients in a severe condition after surgery were followed-up by anesthesiologists and those operating surgeons or attending physicians who stayed on duty overnight. But this does not change things. Was it worth talking about the participation of anesthesiologists in round-the-clock monitoring of revitalized corpses from

V.P. Demikhov's project, if even living patients died because of a lack of proper care?

Thus, based on the analysis of that situation, we must draw a disappointing conclusion: despite of V.P. Demikhov's dreams to start organ transplantation in clinic and the support of his aspirations by the Institute administration, in autumn, 1960, the Sklifosovsky Research Institute was not ready for it either morally or organizationally.

(To be continued)

Conflict of interests. Authors declare no conflict of interest.

Financing. The study was performed without external funding.

References

1. The scientific archive of the N.V. Sklifosovsky Research Institute for Emergency Medicine. V.P. Demikhov personal file (1960–1986), l. 127 (rev. side). (In Russian).

2. TsGAMoskvy, TsAGM, f. R-656, reg. 1, stor. un. 238, l. 2, 6. (In Russian).

3. Heart-Transplant aim. Soviet Surgeon Plant to Give Human Patient Whole Organ. *The New York Times*. 1959, October 26.

4. TsGAMoskvy, TsAGM, f. R-656, reg. 1, stor. un. 171, l. 100. (In Russian).