

GOALS OF COSMONAUT AT'KOV'S MEDICAL STUDIES ON 'SALYUT-7'

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[Article by IZVESTIYA special Correspondent A. Ivakhnov: "Stethoscope for the Cosmonaut. Report from the Flight Control Center"]

[Text] L. Kizim, V. Solov'yev, and O. At'kov have completed the third week of work in circumterrestrial space. The "Mayaki" are continuing to photograph the earth's surface, gradually transferring to the station the cargo brought from Earth, and conducting medical investigations and experiments. These were the main topic of discussion at the press conference held in the Flight Control Center. Why now, 20 years after the flight of B. Yegorov, has it become necessary to send a doctor into orbit? We directed this question to I. Komordin, chief of the USSR Ministry of Health Administration of Space Biology and Medicine.

"On 9 March," said Igor' Pavlovich, "we will celebrate the 50th anniversary of the birth of Yuriy Gagarin, and five weeks after that, the 23rd anniversary of the first space flight in history. Not a quarter of a century has passed since that historic April day, but cosmonautics has come a long way during that time. More than 100 people, representatives of 30 countries, have been in circumterrestrial orbits. The time spent working in space has increased from 108 minutes by Gagarin to seven months. Earthlings have been in open space for a total of about five days.

"Nevertheless, we cannot say that all questions relating to man's presence in a circumterrestrial orbit have been answered. Therefore, along with the manned flights, we have launched space equipment on board which there are bacteria and tissue cells, higher and lower plants, fish, rats, and monkeys--more than 30 different biological objects.

"Making space flight safe is the main task of space biology and medicine. In order to do this, we have developed a system of measures such as selecting and training the crew according to medical criteria, sanitary-hygienic monitoring of the living environment inside the space craft, medical monitoring of cosmonauts' health, and preventive measures to stabilize the health of the crew and preserve their work capacity.

"I have been asked why it is now that a doctor has gone into space. Since B. Yegorov's flight, space technology has been improved, and flight risk reduced to a minimum. But many new problems have arisen which can only be resolved by a doctor acting as a cosmonaut-researcher.

"The majority of people who have been in space have suffered to one degree or another from motion sickness, and the prolonged weightlessness had some effect on their health. The first of the tasks facing us is to investigate the forms of this sickness. The second task is to observe during the course of a flight the mechanisms of metabolism and the growth and propagation of blood cells. No less important is studying the psychoemotional state of the cosmonauts. And, finally, it is very important to make a sanitary-hygienic evaluation of the living environment: food systems, water supply, and means of personal hygiene.

"In addition, O. At'kov's work program calls for a number of medical-biological experiments.

"The important task, beyond the daily medical examinations, is observing the functioning of the cardiovascular systems of crew members using ultrasonic equipment and other modern equipment, and observing the processes of water-salt exchange. On this flight, venous blood will be taken from the cosmonauts. Physicians will analyze it on Earth. Taking blood from a vein is a relatively complicated procedure, and no specialist other than a physician can carry it out."

"The doctor's flight," continued A. Grigor'yev, first deputy director of the Institute of Medical-Biological Problems, "did not come about only because he has to carry out manipulations which cannot be done by other crew members. In a little over 20 years we have accumulated a great deal of data. In analyzing it, a number of hypotheses have arisen concerning the reasons for motion sickness, the redistribution of blood under flight conditions, and so forth. A physician is needed to check these hypotheses professionally. Every crew member can be taught to operate the equipment and conduct medical research and experiments. But the main thing that a doctor has is his experience--his ears, eyes, and hands. By listening and palpitation, and by sensing in himself the influence of these factors, a doctor, even if he is alone, can correctly evaluate the situation.

"Oleg will also carry out fundamentally new research. For example, there is the task of discovering the reserve capacities of the body, which are especially important on a lengthy flight. For this it is necessary to subject the body to increased stresses. It is dangerous to do this without a doctor. We are talking about the maximum physical load and increased negative pressure in the "Chibis" vacuum pants. Experiments with the "Chibis" have already been done, and Oleg has succeeded in getting a number of figures which we could not obtain previously. In order to do this, great professional skill is needed, which O. At'kov certainly commands.

"Metabolism. We are interested in many figures: the blood concentration of hormones and trace elements--sodium, potassium, calcium, and magnesium. It is very important to study the calcium-phosphorus exchange. During a long flight these substances leave the bone but increase their concentration in the blood, which may have an effect on the body's functional systems.

"Or take the psychoemotional state. We can judge some things by intonations during conversations and the external appearance of crew members. To this is now added the deeper scientific study of psychological capacity to work.

"Another question: on board the orbiting complex, physical exercise takes up more than two hours, although time is precious there and it might seem more worthwhile to use it for other needs. On this flight we have addressed the task of testing four regimes of physical exercises. The first is the one which has already been used, and the other three are experimental. They will be shorter in duration, but more intensive with regard to workloads and energy costs. But here it is impossible to rule out the development of undesirable changes in the body. A doctor is just what is needed to monitor this and choose for each crew member the regime best suited to him.

"The commander and flight engineer fully understand that the cosmonaut-researcher is doing a very important job. And they are doing everything they can to help him. Perhaps they don't enjoy giving blood from their veins, but without this, progress could not be made. And when it is a question of medical-biological research, they both support the doctor unconditionally."

...First Deputy Director of the All-Union Cardiological Scientific Center Yuriy Nikitich Belenkov arrived at our meeting after a communication session during which he spoke with O. At'kov.

"I am not a specialist in space medicine, but a scientist," he said, "so I urge you not to forget that Oleg Yur'yevich is a scientific worker. Without belittling the delights of carrying out his endeavors in space, we nevertheless think of the scientific results which his work in orbit is making it possible to obtain.

"Changes in the human body analogous to those which are observed in space occur even on Earth in certain human illnesses. We have approaches for treating these conditions which can suggest rough plans for preventing motion sickness during weightlessness. And here Oleg holds all the cards, because he has studied this particular pathology"

And the last question: will every crew now include a doctor?

"No, certainly not," replied deputy flight director V. Blagov. "Specialists of many fields are waiting for their chance to go into orbit. And the scientific data which O. At'kov brings back from space will, we believe, be extensive enough that medical workers on Earth will require years and years to evaluate it..."

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