

Interview with Dr. Arnold S. Barer, a Soviet Space Medicine Pioneer

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In 2010, a contract between the National Library of Medicine and the University of Cincinnati was awarded to collect oral histories with pioneers in space medicine. This article is a summary of an interview conducted by Charles Doarn with Dr. Arnold Semenovich Barer, a Soviet/Russian physician and researcher with Zvezda. The Russian/English translation was performed by Dr. Oleg Knowingkov, a former Institute of Biomedical Problems flight surgeon. The interview was conducted in Moscow on November 4, 2011. Dr. Barer passed away in 2013.

At the time of this interview, Dr. Barer was employed by Zvezda—a research, development, and production enterprise in Russia that focused on portable life support systems for aircraft and spacecraft, including the International Space Station (ISS). Zvezda was the leading developer of Soviet and Russian space suits. These are still used on the ISS. Dr. Barer served as a physician researcher and collaborator with NASA and its extravehicular activity (EVA) group, which led to a variety of publications and a text book, “Limit of Human Endurance.”¹⁻⁵

Dr. Barer was born in 1927 and finished his medical training in 1951. Upon graduation, he entered the military service as a senior lieutenant and was appointed as the chief medical officer at an air base in the Far East during the Korean War. During his stint in the Far East, he learned of training opportunities for research pilots in Krasnodar near the Black Sea. In 1952, he was assigned to this post as the lead for medical services. This led to a transfer to Grozny in the Chechen Republic, where he served as the Head of the Aviation Medicine Fighter Division for Air Defense. In Grozny he had a trailer-mounted altitude test chamber. He also had an opportunity to design and build a centrifuge to evaluate centripetal radial acceleration and rectilinear acceleration. Dr. Barer's interest and passion for otolaryngology provided a sound foundation for this area of research.

During this time, a group of prominent doctors in Moscow, the majority of whom were Jewish, were accused of conspiring to commit assassination. Many were arrested, but after Stalin died, the doctors were exonerated. This affected many of Dr. Barer's colleagues, including Dr. Joseph Hazen, General Alexey Pavlovich Popov, and Dr. Lina Solomonovna Stern, a Swiss researcher who had immigrated to the Soviet Union. General Popov, head of the Medical Services for the Air Forces of the USSR, and Dr. Hazen, department head for Aviation Medicine and the Military Department of Advanced Studies Medical Institute in Moscow, had recruited Dr. Barer to work in a Ph.D. program.

In 1955, Barer's research focus was on how to better understand the impact of acceleration at 15 G on the physiology of animals. In order to obtain tissue exposed to 15 G, he devised a system that would deliver liquid nitrogen from a Dewar directly into the gondola of the centrifuge where the animals were located for the experiments. Once the centrifuge achieved 15 G, the

animal was exposed to liquid nitrogen and immediately euthanized and preserved.

General Popov had started his medical and military career in the Czar's Imperial Army before the revolution in 1917. This individual set in motion a career path for Dr. Barer where he was recommended for senior leadership and was named head of the laboratory in 1956. While serving in this role, Barer became interested in the vibrational stress caused by the rocket on the human. This appointment then led to the direct interaction with the selection of the first cosmonauts in March 1960. This group, which he helped select, USSR Air Force Group 1, included Gagarin, Titov, Popovich, and Leonov.

In 1959, an aircraft designer and manager at Zvezda, Alekseev Semen Mikhailovich, understood the need for an 'Aviation Medicine' department within his organization. In 1960, Mikhailovich invited Alexey Vasilyevich Pokrovsky, Chief of the Military Institute of Aviation Medicine, and General Popov to help develop this new department. These individuals were working directly with Sergei Pavlovich Korolev at Plant No. 918. Dr. Barer was brought in as the head of the department in June 1960.

In the early 1960s, most of this work was secret and little was known publicly. The world first became aware of his research at the 15th International Astronautical Congress, held in Warsaw in 1964. Barer attended this meeting and reported that they had conducted centrifuge tests with humans up to 30 G. There was interest in these results, especially since Gagarin and Titov had already flown in space. This knowledge helped Korolev and Zvezda create better designs for launch and entry seats for cosmonauts. This was especially important since there were significant G forces on landing, as the USSR spacecraft were designed for a hard landing on the ground and not on water. Since the Soviets participated in international scientific conferences, Dr. Barer was able to interact with Dr. John Paul Stapp and this interaction provided collaboration and a friendship that lasted the rest of their lives. This bilateral collaboration served human spaceflight well over the next 6 decades.

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