

*Janik DS: Conversation with Dr (Col.) Tarasov, Chief Medical Officer of the Gagarin Cosmonaut Training Center, In Austin FH and Marc DA (Eds): Journal of the Citizen Ambassador Program Aerospace Medicine Delegation to the Soviet Union April 1-18, 1990 (Citizen Ambassador Program, Washington DC, 1991).*

requirement; five Gs, 2-minute requirement. There is a five percent washout rate. The centrifuge can go up to 30 Gs at 38 RPM. The centrifuge is 18 meters long from cockpit to axis. It can perform a G-gradient of up to 5 Gs per second. It requires 40 megawatts of power to operate its single motor drive. It weighs 200 tons. At 8 Gs the cosmonaut is required to put tension on his legs, mid-section, and neck muscles to combat "grey out" or "black out." They test cosmonauts at a 35,000 feet cabin equivalent at normal temperature. Oxygen and nitrogen are also controlled. Mir cosmonauts re-entering earth's atmosphere go to about 6 Gs for five to ten minutes. This centrifuge can be used to simulate Buran. It began operation in 1980. It was built by the Swiss and took six years to complete.

Reporter: Mr. Jon A. Jungquist

The following is a summary of my [Dr. Janik] conversation with Dr. Tarasov, chief medical officer of the Gagarin Cosmonaut Training Center.

**Question:** Are prospective cosmonauts screened and selected for decreased susceptibility to calcium loss? If so, how?

**Answer:** No. Calcium loss (greater than 10 percent) has not been observed in cosmonauts who fly; therefore, it is not regarded as a special problem for which screening is necessary before flight. This may be because prospective cosmonauts are carefully screened for good health before they become cosmonauts. Calcium loss continues to be studied by the usual means by

American and Soviet medical researchers during and after flights. The Institute of Biomedical Problems (IBMP) is involved in investigating the unusually large person-to-person variation in unusually large person-to-person variation in susceptibility to calcium loss seen with some bed rest experiments. Apparently present medical screening is sufficient to eliminate the more susceptible, and their susceptibility is due to poor health or conditioning. (Note by reporter: It is likely that the number of cosmonauts who have flown is an insufficient number to support this conjecture epidemiologically.)

**Question:** Do Soviet space stations develop a "grease" coating intentionally? If so, what is done about it? Are there any medical problems associated with this grease?

**Answer:** Yes. The surfaces of Mir are periodically wiped. Before a new crew enters a station, testing (of the air) is done, and the cosmonauts are allowed to enter only if it is safe. They may have to wipe the walls (with disinfectant?) first. Using this technique, there have been no specific health problems. Problems with bacterial simplification, growth, persistence, and possible human infection are, however, considered to

be of great importance and are currently under investigation.

**Question:** What microbes are considered especially important? Why?

**Answer:** Conditional pathogens, and of course pseudomonads. Aside from obvious infection, plasmid transfer from (environmental) pseudomonads to human gut flora and its association with changes in human gut flora in space are of interest.

**Question:** Are cosmonauts screened for sensitivity to environmental and life support contaminants?

**Answer:** Not specifically. However, individuals can be (or have been found to be?) sensitive to air contaminants, and surface contaminants especially. It is assumed that the current air revitalization system sufficiently controls the presence of air contaminants to minimize these effects. This work is the province of IBMP. On longer-duration missions, such as interplanetary flight (to Mars) and planetary habitation, this problem may become extremely important.

**Question:** Have any female cosmonauts conceived or been pregnant during a flight?

**Answer:** No. Also female cosmonauts' periodic cycles are closely recorded before flights and, when necessary, chemically adjusted so that (initial) flight is timed to coincide with menopause (directly after menstruation?). The question of the effects of microgravity and spacecraft environmental conditions on conception, pregnancy, embryogenesis, and early development are of great importance and interest. However, it would be the opinion of this medical group that the initial Mars mission should consist entirely of males, primarily for interpersonal societal reasons. The question, however, must still be answered before humankind can truly leave the cradle of the earth.

**Question:** Have any medical effects due to use of silver disinfectant in drinking water been noted?

**Answer:** No. However, the question of the effects of docking with U.S. spacecraft where iodine is used as the primary water disinfectant and the inter-effects of these two different systems upon the docked single

habitat should be considered. The general question of the effects of environmental/life support factors and contaminants on cosmonauts on long-duration flights deserves further consideration by both countries.

Reporter: Dr. Daniel S. Janik

#### Meeting with Psychologist Ms. Makarova

The majority of Ms. Ludmilla Makarova's work has involved the use of isolation chambers. In general, my [Ms. Bleck] questions to her were answered in general terms, rather than with specific examples. The following question-and-answer session took place.

**Question:** What techniques are used to adapt to stress?

**Answer:** Training.

**Question:** Is there a high correlation between ground observations of human behavior and on-orbit observations?

**Answer:** Yes, differences have been observed in decision-making behavior as well as responses to stress.

**Question:** What coping techniques are taught to the cosmonauts?