IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

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IMMUNOLAB: A NEW TOOL FOR THE LIFE SCIENCE EXPERIMENTS AND MEDICAL CONTROL IN MANNED SPACE MISSIONS.

Abstract

It is well-known that the human immune system is impaired during space missions, as the result there is a high risk of development of different immune pathologies. In order to create the efficient countermeasures we should brightly understand the mechanisms of the influence of the space flight factors on the human immunity. Alas up to the present moment the mechanisms are not well understood including the fact that most of the investigations are performed on samples taken on Earth prior to launch and after the space flight. In addition we have information from samples taken on board of the International Space Station (ISS) and processed for storage in freezer or cooler on board of the ISS until return to Earth for analysis. However, very often the parameter of interest cannot be stored as some of them are very sensitive to freezing or it can degrade in the course of storage time. Also the capacity of the descent ship is very limited, especially for cooled or frozen samples and with reference to the deep space missions samples returning is impossible. For all those reasons we still do not understand well the immunity condition directly in the space mission. These obstacles will be overcome by IMMUNOLAB, a German/Russian Blood, Saliva and Urine Analyzer being developed for the Russian Segment of the ISS under DLR's management and financial support. IMMUNOLAB conducts an automatic liquid handling of samples with subsequent fluorescence measurements directly on the board of ISS or other space shuttle. Instead of downloading samples to Earth, only the acquired data have to be transmitted for analysis, thus providing near time results and giving the possibility to react with countermeasures to maintain the good health of the crew in the long-term space mission. One great advantage of IMMUNOLAB's technology and design is the possibility of implementation of new parameters, not limited to the immunology sector. Future experiments from other sections like bone or muscle parameters can be also processed with the equipment. IMMUNOLAB could be not only the instrument for the scientific research in space or other extreme conditions but a device for the laboratory control of human health. IMMUNOLAB is currently in the final phase of the development. The paper presents the facility design and summarizes the aim and tasks of the first planned experiments.