HUMAN RISK ASSESSMENT FOR IN-SITU LUNAR DUST MEASUREMENT. T. Miki[1,2] and S. Aoki[3], Y. Morimoto[4], K. Tanaka[1],K. Shimada[2], C. Mukai[1 1] Japan Space Biomedical Research Office/ JAXA (2-1-1 Sengen, Tsukuba 305-8505 Japan miki.takeo@jaxa.jp), [2]Astronaut Medical Operations Group/ JAXA, [3]Shimizu Corporation, [4]University of Occupational and Environmental Health, Japan.

Introduction: Only acute exposure result to Apollo astronauts is known about lunar dust effects on the human body. Before we will start a Lunar base construction under international cooperation from 2020, we should collect as much information about primary lunar dust as possible. We think that the property of lunar dust contribute to the high percentage of human risk.

We present our risk assessment for in-situ lunar dust measurement.

Approach: J-SBRO (Japan Space Biomedical Research Office), JAXA has promoted Lunar Exploration Medical Research to utilize ISS as a lunar test bed. Research interest of Lunar Exploration Medical Research includes remote medical care, radiation hazard, exercise physiology, gait kinematics and lunar dust toxicology. J-SBRO set up lunar dust medical assessment group and started research of lunar dust human risk to develop strategies of dust mitigation.

Meanwhile, JSPEC (JAXA Space Exploration Center) is planning SELENE-2 robotic lunar Lander and current status is in phase-A. SELENE-2 is planned to carry technology demonstrations as well as science instruments [1].

In-situ measure of lunar dust will contribute to define effects of lunar dust on not only systemic but focal organs through lunar habitation, space suit, pressurized rover and lunar orbital module.

J-SBRO and the lunar dust medical risk assessment group is proposing lunar dust measurement mission for SELENE-2 to investigate unknown lunar dust toxic properties. In the process of finding candidates of lunar dust measurement apparatus, lunar dust human risk assessment and lunar dust property assessment has been conducted.

Following sections briefly describe the lunar dust assessments.

1) **Lunar Dust Human Risk Assessment:** Risk assessment of lunar dust human effects is the first step toward SELENE-2 dust measurement mission.

The scope of the risk assessment is acute and chronic symptoms of pulmonologist, ophthalmology, dermatology and cardiology. Characteristic symptoms and associated segments were figured out and evaluated by risk.

We prioritized the estimated symptoms by lunar dust coupled with life hazard, the mission impacts and so on.

As a result, we found that the respiratory organ symptom: cough, induced sputum, and etc, the eye-symptom: the conjunctivitis, the dermatitis, etc will have influence to the mission in the acute period. In the chronic phase, the malignant-mesothelioma and the cardiovascular disease will had a strong influence on the life hazard of crew.

2) **Lunar Dust Property Assessment:** Lunar dust property assessment is the second step. Result of the risk assessment is correlated with lunar dust properties, such as particle size distribution, particle shape, chemical reactivity and so on. in-situ measurement needs are also evaluated in the dust property assessment.

the particle size distribution and the chemical reactivity should be note in these properties. And particle behavior on the moon is another factor that should not be overlooked.

We are evaluating dust measurement apparatus candidates in the light of the results of the assessments and SELENE-2 resource.

Conclusion: J-SBRO and the lunar dust medical risk assessment group proposed lunar dust measurement mission to SELENE-2. In-situ measure of lunar dust will contribute to define lunar dust contamination level. And, the goal of the lunar dust medical risk assessment group is to mitigate lunar dust under specified contamination level for astronaut occupational safety and health.

We hope this approach is a good start for us to review how we can make a global effort in the investigation of the effects of lunar dust on human beings and we can initiate several research collaborations to accelerate lunar dust research.

References:

[1]J. Kawaguchi (2008) “Japan’s Lunar Exploration Program”, LEAG presentation.