INTERPLANETARY MIGRATION OF EUCARYOTIC CELL, SPORE OF *Schizosaccharomyces pombe*. N. Hayashi[1], J. Nosaka[1], R. Ando[1], H. Hashimoto[2], S. Yokobori[3], I. Narumi[4], K. Nakagawa[5], A. Yamagishi[3] and H. Tohda[6,7], *[1]Grad. Sch. Biosci. Bioeng., Tokyo Inst. Tech., Yokohama, Kanagawa, Japan, [2]JAXA/ISAS, Sagamihara, Kanagawa, Japan, [3]Sch. Life Sci., Tokyo Univ. Pharm. Life Sci., Hachioji, Tokyo, Japan, [4]JAEA/QuBS, Takasaki, Gunma, Japan, [5]Grad. Sch. Human Develop. Environ., Kobe Univ., Kobe, Japan, [6]Asahi Glass Co. LTD.,Tokyo, Japan, [7]ACLS Tokyo Inst. Tech., Yokohama, Kanagawa, Japan*

Introduction: The TANPOPO mission to examine possible interplanetary migration of microbes, and organic compounds at the Exposure Faculty of Japan Experimental Module (JEM) of the International Space Station (ISS) is progressing [1]. Some microbes are considered as the exposured samples, and spore of *Schizosaccharomyces pombe* (*S.pombe*) is put on the list of the exposured eukaryotic cell because the spore is supposed to be one of the most tolerant organic form toward extreme environments. *S.pombe* (Fig.1) is a kind of yeast isolated originally from beer made in East Africa in 1980s. In this paper, results of preliminary experiments for the exposure are shown.

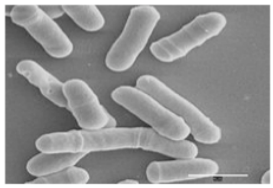

Fig.1 Microscopy of *S.pombe*

Materials and methods: Spores of *S.pombe* strain JY1 were prepared by the conventional and usual method.

Tolerance toward heat and vacume of *S.pombe* was examined on the assumption of severe temperature change in earth orbit. Under a pressure of 1.0 pascal, the temperature was heated to 80 degrees, and cooled to -80 degrees in 90 minutes.

Tolerance toward heavy particle irradiation was examined by argon beam.

Examination of γ ray irradiation was performed at JAEA, Japan.

UV tolerances were examined using ultraviolet light of wavelength 172 nm (1.01 mW/cm^2) and 254 nm (1.19 mW/cm^2),

Results: Spores of *S.pombe* showed tolerance for the thermal cycle under the vacume. Colony formation rate of the spore in exposure duration of 14 days (224 heat cycles)(95.8 %) was almost same as that of 1 cycle (97.8 %), and estimated at fewer decreasing in long term of one year.

Even in case of the heavy particle irradiation supposed to be extremely severer than that simulated for condition in earth orbit, the spores showed the strong resistance. After the irradiation of 538 Gy, 98.0 % of the spore survived.

As for the γ ray irradiation supposed to be extremely severer than the condition in earth orbit (20 Gy), the survival rate (87.8 %) was also high enough to survive aftere the exposure in space. Nevertheless, stronger irradiation of γ ray (500 Gy) reduced the survival rate (51.5 %).

On the other hand, UV affected the survival rate severely. Although the spore showed tolerance toward UV irradiation of wavelength 172 nm (36.4 kJ/m^2) to some extent, UV irradiation of wavelength 254 nm (42.8 kJ/m^2) dramatically reduced the survival rate (1.0 %). This result showed that the spores can't survive after one year under the UV condition in space.

Discussions: Besides UV irradiations, Spores of *S.pombe* showed tolerances for the survival after the exposure in space for one year. Biologically considering, spores have their roles to bear sufferings and survive. And, these results for spores of *S.pombe* this time showed the possible survival in space and the possibility of interplanetary migration.

Recently, it was found that spores of *S.pombe* are coated by Isp3, one of the unique gene products of *S.pombe*, and peculiar resistance of the spores toward extreme environments is assumed [2]. Results this time support the assumption, and the limit of protection ability of Isp3 is of great interest from the perspective of interplanetary migration.

References: [1] A. Yamagishi, H. Yano, K. Kobayashi, S. Yokobori, M. Tabata, H. Kawai, M. Yamashita, H. Hashimoto, H. Naraoka and H. Mita, *International Symposium on Space Technology and Science (ISTS) Web Paper Archives*. 2008-k-05 (2008), [2]K. Fukunishi K., et al. (2013) *Yeast Genetics Society of Japan*, Abstract #P14.