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# 国際宇宙ステーション上での微生物捕集実験(たんぽぽ計画); 捕集微生物の分子生物学的解析方法の確立
# Microbes-capturing experiment in ”Tanpopo” mission on ISS -Toward the detection of captured microbes in space by microbi

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Terrestrial life may fly off into outer space by volcanic eruption meteorological impacts, and so on. Microbes have been collected from high altitude up to 70 km since 1936 [1]. We also isolated microbes at high altitude up to 35 km using an airplane and balloons. The two isolates of these microbes are new deinococcal species, one of which shows higher UV ray tolerance than Deinococcus radiodurans [2,3]. On the other hand, panspermia hypothesis for origin of life on Earth suggests that the life or precursor materials of life came from space [4,5]. But this hypothesis can be subjected to several criticisms [6,7]. If microbes were to exist at the high altitude of low earth orbit (400 km), it would endorse the possibility of interplanetary migration of terrestrial life. We proposed the ”Tanpopo” mission to examine interplanetary migration of microbes and organic compounds on Japan Experimental Module (JEM) of the International Space Station (ISS) [8]. We will capture micro-particles including microbes and micro-meteoroids at the altitude of ISS orbit (400 km) with ultra low-density aerogel exposed to space for a given period of time.

After retrieving the aerogel, we will investigate captured microparticles and tracks followed by microbiological, organic chemical and mineralogical analyses. Captured particles will be analyzed after the initial curation of the aerogel and tracks. Particles potentially containing microbes will be used for PCR amplification of small subunit (SSU) rRNA gene followed by DNA sequencing. Comparison between the determined sequences and known SSU rRNA gene sequences of terrestrial organisms will suggest the origin and properties of the organism. The density of microbes at the ISS altitude might be quite low, and microbe cell number on each captured particle may be quite limited. Therefore, it is necessary to establish the effective PCR procedure for quite small amount of DNA template in the presence of other materials such as clay and aerogel. We will report current status of the PCR identification of microbes from test samples. The PCR conditions to amplify SSU rRNA gene from quite small number of cells and quite low concentration of genomic DNA with/without clay and aerogel are examined.

References.

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