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宇宙環境下でのDeinococcus属細菌の生存可能性?ISSにおける「たんぽぽ」ミッションの宇宙曝露実験に向けて
Survivality of deinococci under space conditions ? Toward the space exposure experiment in ”TANPOPO” mission at ISS

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The ”panspermia hypothesis” has been proposed as one of the hypotheses on the origin of terrestrial life. In this hypothesis, possible interplanetary migration of microbes has been considered.

To address the question whether interplanetary migration of terrestrial microbes are possible, we have proposed and prepared the space capture and space exposure experiments of terrestrial microbes as two of six sub-themes of ”TANPOPO mission” on the Exposure Faculty of Japanese Experiment Module ”KIBO” of International Space Station (ISS) (Yamagishi et al., 2008). In this mission, we are going to expose microbes in space for one to three (or more) years. There are harsh environmental factors (vacuum, high UV irradiation, ionization radiation, and so on) in space. We have selected the species that show high tolerance to the space conditions.

We are going to use UV- and radiation-resistant deinococcal species: four stains of *Deinococcus radiodurans* (R1, KH311, rec30, and UVS78), *Deinococcus aerius* TR0125, and *Deinococcus aetherius* ST0316. D. aerius and D. aetherius were isolated from upper troposphere and lower stratosphere, respectively (Yang et al. 2009, 2010). They showed high tolerance to UV and radiation, similar to or higher than *D. radiodurans* R1. In addition, since the DNA repair systems are known to be the keys of high tolerance to UV and radiation in deinococcal species, space survivability of *D. radiodurans* R1 (wild type strain) will be compared with those of the DNA repair deficient mutant strains of *D. radiodurans*, KH311 (deficient mutant strain of *pprA* gene for non-homologous end-joining (NHEJ) repair), rec30 (deficient mutant strain of *recA* gene for homologous recombination), and UVS78 (deficient mutant strain of *uvdE* and *uvrA1* genes for nucleotide excision repair).

In this paper, we sumarize survivability of deinococcal species for UV-irradiation, heavy ion-irradiation, high vacuum, and periodical change of temperature. Then, we evaluate survivability of deinococcal species in space after one year.

References
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