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The sub-millimeter-sized aggregated deinococcal cells could be shield from solar UV

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To investigate the interplanetary transfer of life, numerous exposure experiments have been carried out on various microbes in space since 1960s. The results suggested that microbe spores might survive for a long period if the spores are shielded from intense solar radiation [1]. In the Tanpopo mission, we have proposed to carry out the experiments on capture and space exposure of microbes at International Space Station (ISS) [2]. Microbial candidates for the exposure experiments in space include *Deinococcus radiodurans*, *D. aerius* and *D. aetherius*. We have examined the survivability of *Deinococcus* spp. under the environmental conditions on ISS in orbit (i.e., long exposure to heavy-ion beams, temperature cycles, vacuum and UV irradiation). Among the space environmental factors, solar UV is most lethal to microbes, and damage is caused by the absorption of UV by DNA [3].

In this report, we examined the effect of solar UV radiation (172 nm, 254 nm and 280?315 nm respectively) on the deinococcal cell aggregates with different thicknesses to determine whether the size of the cell aggregate influences the cell survivability. Though the cells in thin layers of aggregates were killed by UV radiation, large number of cells survived the radiation when the cell layer was thick. The similar trend of survivability was observed for other UV range. Supposing that the aggregates are sphere, the diameter of the aggregate that is sufficient to shield the cells in the inner layer from solar UV radiation is 200 micrometer for *D. radiodurans*, 850 micrometer for *D. aerius*, and 700 micrometer for *D. aetherius*. We propose the microbial cell aggregate as an ark for the interplanetary transfer of microbes, and name it the 'masspanspermia' hypothesis.

[References]
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