

EANA16, 27.09.-30.09.2016, Athens, Greek

Poster, presented by Elke Rabbow

MASE isolates refute the supposed correlation between desiccation and radiation tolerance of microorganisms

Kristina Beblo-Vranesevic¹, Maria Bohmeier¹, Elke Rabbow¹, Petra Rettberg¹ and the MASE-team²

1 German Aerospace Center (DLR e.V.), Institute for Aerospace Medicine, Department Radiation Biology

2 MASE team: Schwendner P, Cockell CS (Coordinator), Perras A, Moissl-Eichinger C, Gaboyer F, Westall F, Walter N, Garcia-Descalzo L, Gomez F, Malki M, Amils R, Monaghan E, Ehrenfreund P, Vannier P, Marteinson V

During the project MASE (Mars Analogues for Space Exploration) several isolates were obtained and these strains were subjected to Mars relevant environmental stress factors in the laboratory under controlled conditions; e.g. radiation, low water activity, high salt concentrations, oxidizing compounds. First screening steps were always the microorganisms' tolerance to survive times of desiccation and exposure to ionizing radiation. Both treatments were performed under anoxic conditions.

So far, six only distantly related microorganisms are under detailed investigation: *Yersinia* sp. MASE-LG-1 DSM 102845, *Acidiphilium* sp., *Clostridium* sp. MASE-IM-4, *Trichococcus* sp. MASE-IM-5, *Desulfovibrio* sp., and *Halanaerobium* sp. It could be shown that for these microorganisms a correlation between desiccation and radiation tolerance was not observed. Unexpectedly, the named *Yersinia* strain, as a fresh water bacterium, showed an outstanding desiccation tolerance (reduction of survival rate about 5 orders of magnitude after 6 month of dryness). But in comparison to the other tested model organisms, the radiation tolerance of *Yersinia* sp. was very low. For comparison, the most tolerant strains to exposure to ionizing radiation were *Desulfovibrio* sp. and *Halanaerobium* sp. In both cases, cultivable cells were still detectable after an exposure to 3000 Gy.

Since decades of research on desiccation and radiation tolerance of *Deinococcus radiodurans*, it has been proposed that they are correlated and that desiccation tolerance is the cause of radiation tolerance. At least for the tested strains in this study, this correlation does not hold and it seems that other cellular factors play a crucial role if an organism is tolerant or resistant to extreme damaging treatments, like desiccation or ionizing radiation.