

Experiment Units to investigate biological systems for Space Life Sciences

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Biology experiments have been performed in space since the beginning of the space era. Presently, experiments take place in confined environments (i.e. on-board spacecrafts) where biological systems are exposed to microgravity and complex radiation spectra. Although less frequent, experiments are also performed in the outer space.

The more extreme is the environment the higher is the technological needs required to properly operate. In the last decade, Kayser Italia has developed a fleet of Experiment Units, i.e. electromechanical devices which allow the autonomous execution of a scientific protocol in microgravity.

Among others biological systems, *Rhodospirillum rubrum*, *Chlamydomonas reinhardtii*, *Saccharomices cerevisiae*, *Arabidopsis thaliana*, *Xenopus Laevis*, and *Rodentia* and different *Homo sapiens* cell types were exposed to microgravity and treated accordingly to dedicated protocols tuned for the maintenance, treatment, and fixation of samples for re-entry and analyses on Earth.

On-board incubator facilities allow the environmental control, to quote a few, of liquid and solid cell cultures, seeds germination, yeast colonies, and small metazoan supported by Experiment Units.

Both scientifically and technologically, the adaptation to an extreme environment of biological systems, as well as the possibility to exploit these systems as resources for life support, has been investigated on-board the ISS [1], [2], [3].

This heritage grants for an effective experiment design and controlled execution in space.

[1] Versari et al., 2013, The FASEB Journal, Vol. 27, First Page 1

[2] Van Mulders et al, 2011, Astrobiology, Vol 11, First Page 45

[3] Willaert, 2013, Current Biotechnology, Vol 2, First Page 1

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