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DESIGN OF CELL CULTURE CONTAINER TO EXPERIMENTATION OF SIMULATED
MICROGRAVITY BY VACUUM FREE FALLING

Abstract

Biological research in microgravity environments will broaden our understanding of molecular cell biology, in particular, the discovery of new molecules and mechanisms impossible to discover under the effect of terrestrial gravity.

Our main objective is design a prototype of cell culture container for vacuum free fall experiments. The container can be placed in a vacuum tower to freeze the cells immediately at the end of the fall and in this way, evaluate the cellular transcriptome and/or proteome in order to explore the nuclear and mitochondrial genome expression under the effect of microgravity.

The design of the container consists of a hermetic vessel protected by an aluminum frame and with liquid nitrogen pressurized at 1 Atm, with a mechanism that allows to release the cryotube where the cells in culture are located and an electronic device with a thermistor that allows to maintain the temperature of the cryotube constant at 36 degree Celsius until the moment of the fall.

The device is currently in patent processing for intellectual property protection and is expected to be evaluated in microgravity conditions at the DropTower at the Center of Applied Space Technology and Microgravity (ZARM) at the University of Bremen in the next United Nations Human Space Technology Initiative (UN-HSTI) to Drop Tower Experiment Series (DropTES) calling.