

eOSTEO: bone cell function in microgravity assessed in unmanned missions.

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The Canadian OSTEO experiments on board the space shuttle in 1998 gave life scientists their first opportunity to examine bone cell cultures in space. Results showed that isolated bone cells in space take longer to regenerate than on Earth. This slower regeneration is aggravated by the hastened action of cells that cause bone deterioration. The Canadian Space Agency (CSA) supported Millenium Biologix for the design of the OSTEO mini-lab, which tested the growth of cells using a synthetic bone bio-material. Based on the success of the OSTEO mission, an automated version of the OSTEO mini-lab (eOSTEO) has been designed by Millenium Biologix and will be used to perform experimental studies on board of a FOTON recoverable satellite on orbit for 12 days. Several Canadian and European projects will allow to assess the influence of microgravity on bone cell survival, differentiation, metabolism, intracellular organization and gene expression. The function of various bone cell receptors in the space environment will be tested. The automated mini-lab allows stimulating, fixing and cooling of bone cells before satellite recovery and media samples can be stored for further analysis. Two modules containing four eOSTEO trays will be integrated in the FOTON satellite, along with other modules for scientific experiments in life and physical sciences. This pioneering study using automated cell culture on board a satellite will provide new technological expertise for space life sciences and produce crucial information on bone cell behavior in the space environment.