Paper ID: 44876
oral
student

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Biology in Space (8)

Author: Mr. Sascha Kopp
University Clinic of Magdeburg, Germany, sascha.kopp@med.ovgu.de

Dr. Marcus Krüger
Germany, marcus.krueger@med.ovgu.de
Dr. Hergen Oltmann
Airbus Defence and Space, Germany, hergen.oltmann@airbus.com
Mr. Andreas Schütte
Astrium Space Transportation, Germany, Andreas.Schuette@airbus.com
Mr. Burkhard Schmitz
Astrium Space Transportation, Germany, Burkhard.Schmitz@airbus.com
Dr. Johann Bauer
Max-Planck Institute, Germany, jbauer@biochem.mpg.de
Dr. Markus Wehland
Germany, markus.wehland@med.ovgu.de
Mr. Mohamed Zakaria Nassef
Germany, mohamed.nassef@med.ovgu.de
Mrs. Daniela Melnik
Otto von Guericke University of Magdeburg, Germany, daniela.melnik@med.ovgu.de
Prof. Manfred Infanger
Germany, manfred.infanger@med.ovgu.de
Prof.Dr. Daniela Grimm
Denmark, dgg@biomed.au.dk

THYROID CANCER CELLS IN MICROGRAVITY: RESULTS OF THE TEXUS 53 MISSION

Abstract

Purpose Thyroid cancer is the most abundant tumour of the endocrine organs. While most types can be treated effectively, low-differentiated thyroid cancer is difficult to handle and has a high mortality. Microgravity is a unique environment to study fundamental cell behaviour. We found during earlier experiments at parabolic flight missions and during space missions that thyroid cancer cells of the low-differentiated cell line FTC-133 tend to change their malignancy. While short-term microgravity (μg) during parabolic flights triggered gene expression changes pointing in a more malignant behaviour, long-term microgravity conditions during the SimBox/Shenzhou-8 mission changed cell behaviour into a less malignant way. The purpose of the TEXUS 53 mission was to determine if the switch between the described cell behaviour is happening within the first minutes of microgravity. **Methodology** Prior to the mission it was necessary to test the hardware for biocompatibility. FTC-133 cells were exposed to a sounding rocket flight and were automatically fixed shortly before re-entry into the Earth atmosphere. Due to a variety of different accelerations during the flight, various controls had to be taken into account to extract the influence of microgravity on gene expression changes. Besides the μg-samples, ground controls, hyper-g-samples and simulations were investigated. A gene array analysis along with quantitative PCR was performed to compare the results to previous experiments. **Results** Gene array analyses did not give any significant gene expression changes, which however, was due to the loss of two μg-samples. qPCR

analyses were performed on genes which came into our attention in earlier missions. These belong to the biological processes of cytoskeleton, cell adhesion, tumor growth, angiogenesis and apoptosis. While all investigated genes showed no remarkable changes in any of the controls and the hyper-g-samples, μg-samples presented a down-regulation in most of the cases. In contrast, the investigated gene expression presented a significant up-regulation in most cases during the hyper-g worst case simulation. **Conclusions** As the gene array did not present any expression changes between controls and hyper-g-samples, we might can conclude that any expression changes measured would be due to the influence of microgravity. In addition, we were able to show that only worst case hyper-g would lead to significant gene expression changes. This enables us to reduce the number of controls in favour of microgravity samples in a possible upcoming re-flight of the experiment.