

IAF MICROGRAVITY SCIENCES AND PROCESSES SYMPOSIUM (A2)
Microgravity Experiments from Sub-Orbital to Orbital Platforms (3)

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HUMAN REPRODUCTION SYSTEMS IN SPACE

Abstract

We report on the current status of human reproduction research in space, and in particular the likelihood of preserving and transporting human sperm banks outside Earth. Past and present experiments regarding animal models and human gametes exposed to microgravity are reviewed regarding this challenging topic.

Our research group has reported the first experimental results published while exposing human frozen sperm to microgravity in a controlled parabolic flight experiment. A total of 3 parabolic flights were completed during 2018-19 with 20 parabolas conducted in each flight. The parabolic flights allowed for up to 8.5 seconds of microgravity periods, using a CAP10B aerobatic plane operated by Barcelona-Sabadell Aviation Club, with UPC BarcelonaTech and Hospital Universitari Dexeus, a leading Institute in Assisted Reproduction Technologies (ART), in charge of the research. The CAP10B aircraft has successfully proven in the last decade to perform optimal parabolas for both education and research purposes. Sperm motility in frozen sperm samples was evaluated by using a Makler counting chamber and SCA CASA System as a computerized semen motility analyser. Sperm vitality was also assessed as well as concentration; and later compared to a control sample on ground. No significant differences were found between the frozen samples exposed to microgravity and those on ground. We will update on the ongoing experiments conducted by our research group in 2020-21 following this line of research of parabolic flights with fresh human sperm samples. These experimental results have found to be compatible with the previous ones obtained with frozen sperm samples; and with the initial results reported by the Micro-11 experiment at the ISS from Nasa.

More in-flight short-term and long-term studies are still needed to verify the viability of transporting human sperm samples outside Earth, and to continue advancing the possibility of human reproduction in space.