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INVESTIGATING THE EFFECTS OF SPACE ON IN VITRO FERTILIZATION IN MICE CELLS

Abstract

Human imagination is powerful enough to capture the fantasy of becoming an interplanetary civilisation.In the hopes of establishing a permanent human settlement,studying human reproduction in the extreme space environment should be one of our preliminary objectives.This experiment is a reminder of the perspective of a futuristic approach in the medical world towards advancing the future of the human race.Understanding how the human body reproduces in a different environment is crucial to humanity's graceful evolution.The central significance of reproduction is to maintain the continuity of the species. Unravelling the pathways that result in successful procreation in altered gravity will enhance our understanding of responses and extreme physiological changes in human embryonic development. With the previous studies, it is evident that the developmental stages can take place in space.However, no mammalian or even vertebrate animal has completed its life cycle from conception to adulthood in the space environment. This scientific study took a step in the direction of answering that question. The development of IVF technology has transformed the field of obstetrics by providing a solution for pregnant women. It is used to treat a wide range of infertility issues, including women of advanced age and Fallopian tubes which are damaged or blocked (can be caused by pelvic inflammatory disease or prior reproductive surgery). Long-held ideologies about biological relations and the constraints of age and genetics on procreation are being countered by egg donation and surrogacy, embryo freezing, and techniques such as mitochondrial transfer and genome editing. The Assisted Reproductive Technology in Space (ARTIS) mission aimed to use this technology to fertilise the mice sperm and oocyte at the height of 230km above the earth's surface to examine the probability of embryonic development in space. Our team developed a disc-shaped microfluidic prototype to create a 1G artificial gravity environment. Male mice sperms and female mice oocytes culture undergo fertilisation process using invitro fertilisation technique.After completing this stage, the developed blastocyst stage embryos will be cryogenically preserved using liquid nitrogen and transported back to earth. The imaging system will allow us to observe the different stages of embryo development for five days.In this study, we will assess the quality and developmental competence of embryos. The results of this experiment will determine the embryo viability of space-fertilized sperms and eggs.Our results will most likely help facilitate the next stage of our reproductive research; the implantation of space-fertilized embryos in healthy mice in space.