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SUBJECTING IMMUNE CELL CULTURE TO SIMULATED MICROGRAVITY USING A 2D CLINOSTAT

Abstract

Spaceflight has been shown to impact many aspects of human physiology, including the immune system. These effects have been further studied over the past few decades in the field of space biology. This field is rapidly expanding given our commitment to returning to the Moon and going all the way to Mars. To prepare for these future deep space missions, more research needs to be conducted to better understand the effects of spaceflight on human physiology. One component of the space environment that plays a role in modulating various aspects of biological function is microgravity. Microgravity describes the condition of "weightlessness" due to low gravitational forces in the space environment. Given the current limitations with facilitating biological research in space, several options exist to simulate microgravity on Earth. Here, I will present one such method for subjecting immune cell culture, or lymphocytes, to simulated microgravity. Specifically, this method employs the use of a 2D clinostat/Rotating Wall Vessel device, otherwise known as the Synthecon, Inc. Rotary Cell Culture System. In this presentation, I will outline how the device works on a physical basis to simulate microgravity, the general workflow for setting up the immune cell culture in the device, as well as key points of troubleshooting and optimization. Additionally, I will present results that depict a successful versus unsuccessful treatment setup. Lastly, I will briefly compare the use of this device to other methods of simulating microgravity. Of note, a detailed protocol for using this device was published by our group in the Journal of Visualized Experiments. However, this presentation aims to disseminate this information directly to the space biology community at IAC.