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IMPACT OF MICROGRAVITY ENVIRONMENT ON GUT BACTERIAL METABOLITES

Abstract

It is well established that gut bacteria have a significant role in regulating health and behaviour of their host, affecting immunity, metabolism, changes in muscles, angiogenesis, the brain, and many more. Gut bacteria exact their effects by synthesis of molecules, their absorption, and physiological effects on the host but the impact of microgravity environment on gut bacterial metabolites is incompletely understood. Given the increased space missions planned in the upcoming years, it is necessary to understand the impact of microgravity environment on gut bacteria and their metabolites. Using a hind-limb unloaded (HU) model, mimicking spaceflight-associated microgravity in rodents, 4 month old mice were suspended for almost 22 days and compared with control group. Tissues from various parts of the gastro-intestinal tract and faecal samples were examined to determine the differences in gut bacterial metabolites under microgravity versus normal environments. Our preliminary results revealed a plethora of gram-positive and gram-negative bacterial species under both environments, with some differences observed under microgravity condition. Bacterial conditioned media were prepared containing metabolites. Using liquid chromatography-mass spectrometry (LC-MS), samples are being analysed to elucidate and characterise molecules produced by the gut bacteria. Once we determine the changes in the metabolites of microbiome due to microgravity environment, we will be able to propose countermeasures including prebiotics, probiotics and post-biotics that eventually will result in improving the health and performance of astronauts.