

Summer 2015 Internship Abstract

Green fluorescent protein (GFP) visually shows the expression of proteins by fluorescing when exposed to certain wavelengths of light. The GFP in this experiment was used to identify cells actively releasing viruses. The experiment focused on the effect of microgravity on the GFP expression of Akata B-cells infected with Epstein Barr Virus (EBV). Two flasks were prepared with 30 million cells each and two bioreactors were prepared with 50 million cells each. All four cultures were incubated for 16 days and fed every four days. Cellometer readings were taken on the feeding days to find cell size, viability, and GFP expression. In addition, the cells were treated with Propidium monoazide (PMA) and run through real time PCR to determine viral load on the feeding days.

On the International Space Station air samples are taken to analyze the bacterial and fungal organisms in the air. The Sartorius Portable Airport is being investigated for potential use on the ISS to analyze for viral content in the air. Multiple samples were taken around Johnson Space Center building 37 and in Clear Lake Pediatric Clinic. The filter used was the gelatin membrane filter and the DNA was extracted directly from the filter. The DNA was then run through real time PCR for Varicella Zoster Virus (VZV) and EBV as well as GAPDH to test for the presence of DNA. The results so far have shown low DNA yield and no positive results for VZV or EBV. Further inquiry involves accurately replicating an atmosphere with high viral load from saliva as would be found on the ISS to run the air sampler in.

Another line of research is stress hormones that may be correlated to the reactivation of latent viruses. The stress hormones from saliva samples are analyzed rather than blood samples. The quantity found in saliva shows the quantity of the hormones actually attached to cells and causing a reaction, whereas in the blood the quantity of hormones is the total amount released to cause a reaction. The particular hormones tested for were cortisol, alpha-amylase, and DHEA. The DHEA was very high in the two control samples tested.

Regularly, samples came into the lab from local clinics to be tested for various viruses. Saliva, blood, body scrapes, and tears were received from the clinics and then run for VZV, EBV, and Human Simplex Virus 1 (HSV-1) with the results then reported back to the clinician. Blood, saliva, and urine from astronauts were also tested for viruses and logged. In addition, several cell cultures were brought up and grown, including adherent Human Lung Fibroblast (HFL) cells infected with VZV, and Akata B-cells infected with EBV.