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# THE USE OF CATIONIC MICROEMULSIONS FOR THE PROCESS OF VIRAL PARTICLE REMOVAL

**Abstract**

Background: The zero-less gravity of space has many implications for the spread of infection. This is especially true considering the small compartmentalised environment of space-craft design. Research also shows that injuries take longer to heal in microgravity , increasing the likelihood of infection. Virus infections can spread rapidly and become uncontrolled in such environments, prophylactic measures and treatments are limited against many viruses. There are several means to inactivate viruses including: chlorine, hypochlorides, iodine, all aldehydes have virucidal activity. Heat is the most effective method of viral disinfection although some viruses can survive high temperatures for longer than others. Particles need to be of ¡5 um in order to reach the alveoli. Viruses being 10-300 nm can easily penetrate the alveoli of the lungs and leads to high infection rates if enter alveoli. Taking the common cold for example, Healthy people with normal immune systems are highly susceptible to cold virus infection once the virus enters the nose. In volunteer studies, approximately 95

Method and Results A means to remove viral particles was investigated through the production and removal of a mist of cationic iodine containing lipid microemulsions. Such lipids would inactivate the virus while also can be quiclky removed by charged filtration systems. The cationic lipids could be produced though spray chilling, hot/cold homogenization, and solvent extraction. The advantages to micro-emulsion are that they are: Thermodynamically Stable, low viscosity (due to small size), large interfacial area (due to small size), and capacity to solubilize both hydrophilic and hydrophobic compounds. The addition of a surfactant or amphiphile can be used to confer charge for the removal process. Iodine being a non-toxic substance is appropriate for this inactivation process. For delivery of microemulsions particles into the air, electrostatic nebulisers could be used to incorporate charge to enable removal by filtration systems such as electrostatic precipitator (by passing the air between highly charged surfaces).

Conclusion: This innovation reduces the viral count in microgravity quickly and effectively removing them.