

ABSTRACT FOR PRESENTATION TO THE 86th ASMA MEETING

“Making a Difference in Aerospace Medicine”

AsMA 2015

Challenges Encountered Using Ophthalmic Anesthetics in Space Medicine

T. Bayuse¹, J. Law², D. Alexander², S. Moynihan², C. LeBlanc³, K. Langford³, L. Magalhaes³

¹Wyle Integrated Science and Engineering, NASA Johnson Space Center, Houston TX

²NASA Johnson Space Center, Houston TX

³JES Tech, NASA Johnson Space Center, Houston TX

Introduction On orbit, ophthalmic anesthetics are used for tonometry and off-nominal corneal examinations. Proparacaine has been flown traditionally. However, the manufacturers recently changed its storage requirements from room temperature storage to refrigerated storage to preserve stability and prolong the shelf-life. Since refrigeration on orbit is not readily available and there were stability concerns about flying proparacaine unrefrigerated, tetracaine was selected as an alternative ophthalmic anesthetic in 2013. We will discuss the challenges encountered flying and using these anesthetics on the International Space Station.

Methods The NASA Johnson Space Center Pharmacy Team researched the stability of the proparacaine under room temperature conditions. A comparison between proparacaine and tetracaine was provided to the operational flight surgeons, who approved tetracaine for use in microgravity.

Results Tetracaine began flying in crewmembers' individual medical accessory kits before it was permanently incorporated into the standard medical kit. Tetracaine was used on 5 crewmembers as a topical anesthetic for tonometry testing during this timeframe. Two of the 5 experienced corneal flushing and scleral injection which interfered with interpretation of on-orbit surveillance testing results. Corneal flushing and scleral injection have not been noted with use of proparacaine. These findings required a switch back to proparacaine, necessitating a new process to be developed to supply the medication refrigerated.

Discussion Storage requirements of medications in spaceflight is an important factor to consider. In the absence of stability data, performance of the medication and/or the diagnostic testing may be affected. Selection of medications for future exploration missions will need to consider storage. Stability studies will need to be conducted to ascertain the safety and effectiveness of medications for medications if the necessary storage conditions will not be engineered into the spacecraft.