SKIN ABRASION EFFECTS OF LUNAR DUST RELEVANT TO ASTRONAUTS. L. Jones[1], S. Jacques[1], E. Tranfield[2], J. Rask[3], R. Kerschmann[2], D. Loftus[2], [1] Oregon Health & Science University, Mail Code CH13B, 3303 SW Bond Avenue, Portland Oregon 97239, [2]Space Biosciences Division, NASA Ames Research Center, Moffett Field, CA 94035, [3]Enterprise Advisory Services Incorporated, NASA Ames Research Center, Moffett Field, CA 94035.

Introduction: Future astronauts exploring the moon will need to consider the biological effects of lunar dust, including potential inhalation toxicity, ocular effects and skin effects. Previous experience from the Apollo era indicates that skin irritation may be an issue, although the effect has never been studied in detail. Other effects may include skin sensitization (an immunological response to one or more components of lunar dust) as well as skin abrasion effects, which may have important ramifications for astronauts. The most relevant concern for lunar dust abrasion effects relates to potential lunar dust entry into the space suit, where lunar dust could be trapped between the astronaut's skin and fabric materials immediately adjacent to the skin. The consequences of skin abrasion could include disruption of the barrier function of the skin with resultant increased water loss, risk of infection, and potential fouling of the suit. While qualitative skin abrasion is appreciated in the field of dermatology, there are few methods for quantification of these effects.

Methodology: We report here the development of a technique that uses simple transdermal impedance measurements to quantify the skin abrasion effects of lunar dust simulant and lunar dust. The technique involves application of particulate material to a skin specimen, followed by controlled rubbing of the skin under constant pressure with monitoring of changes in electrical resistance of the skin.

Results: To date, our results include a study of the abrasivity of lunar dust simulant as compared to commercial sandpaper, which we have tested using samples of pig skin and other models of human skin. The results indicate that lunar dust simulant (JSC1a) demonstrated abrasivity in the same range as commercial sandpaper. In addition, lunar dust simulant imbedded in cloth also exhibited a high level of abrasivity, whereas cloth in the absence of lunar dust simulant exhibited negligible abrasive effects.

Future Work: The next phase of work will evaluate the abrasivity of lunar dust samples from the Apollo era, and compare resuts to the abrasivity of lunar dust simulant in order to validate this method, and demonstrate the applicability of this technique. We believe that these studies of the abrasive effects of lunar dust are a key component of our overall program of understanding the dermal effects of lunar dust, which will have important implications for EVA suit design, and development of medical operations protocols pertinent to NASA's lunar exploration program.