DEPARTMENT OF THE AIR FORCE
AIR FORCE RESEARCH LABORATORY

9 Sep 2014

MEMORANDUM FOR 711 HPW/IR (AFRL IRB)

FROM: 711HPW/RHDR
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JBSA Fort Sam Houston, TX 78234-2644

SUBJECT: Interim report for Thermal and Behavioral Effects of Exposure to Moving Small-Diameter, 95-GHz Millimeter Wave Energy Spots, FWR-2012-0147H

1. Status of Study: Study is partially complete. Nothing unexpected has been encountered.

2. Status of Subjects:
   A. Subjects specified in protocol: 33
   B. Total # of subjects enrolled in study: 11 unique subjects (6 enrolled in experiment 1A, 10 enrolled in experiment 1B). 2 Female/9 male subjects. No adverse events were encountered.
   C. Total withdrawals: 0

3. Status of Subject Data: Data for experiments 1A and 1B have been summarized and analyzed. The informed consent documents, supplemental information forms, and interim/post exposure medical surveys are locked in a cabinet in the office of the principle investigator. No other links identifying which data came from which participants currently exists.

4. Objective: The research has several main objectives. Experiment 1A was conducted to empirically determine the smallest spot size that is sufficiently large enough to perform accurate, one-dimensional modeling of experiments on skin. Experiment 1B was necessary to acquire data for the empirical skin heating model RASTER-HEATER. Experiment 2 will be conducted to identify effective suprathreshold pain response levels for small moving and stationary 95-GHz millimeter wave spots on the human upper posterior skin surface.

5. Results: In Experiment #1A, we determined that a 2 cm full width at half maximum (FWHM) spot size was sufficiently large enough to perform accurate, one-dimensional modeling of experiments on skin. We found the heating and cooling of skin at the center of 2 cm and 3 cm FWHM spots were within 1 standard deviation for all cases, and that the radial thermal diffusion that occurred was negligible when compared to the spot size. In Experiment #1B, we confirmed our hypothesis that there was a strong dependency of the cooling rate on the time skin had been heated. We were then able to fit the data we obtained to the same formula we had developed for the cooling of carbon-loaded Teflon®. A detailed discussion of the results is attached.

(b) (6)
[redacted]

Attachment: Draft Publication