

## 2007 AACR Annual Meeting

April 14-18, 2007

Los Angeles, CA

 [Print this Page for Your Records](#) [Close Window](#)**Abstract Number:** 833**Presentation Title:** Chromosome translocations and cosmic sources of ionizing radiation: The NIOSH-NCI airline pilot biomarker study**Presentation Start/End Time:** Sunday, Apr 15, 2007, 1:00 PM - 5:00 PM**Location:** Exhibit Hall, Los Angeles Convention Center**Poster Section:** 2**Poster Board Number:** 22**Author Block:** *Lee C. Yong, Alice J. Sigurdson, Elizabeth M. Ward, Martha A. Waters, Elizabeth A. Whelan, Martin R. Petersen, Elaine Ron, Marilyn J. Ramsey, Parveen Bhatti, James D. Tucker.* NIOSH/CDC, Cincinnati, OH, NCI/NIH, Bethesda, MD, American Cancer Society, Atlanta, GA, Lawrence Livermore National Laboratory, Livermore, CA, Wayne State University, Detroit, MI

Airline pilots are exposed to cosmic ionizing radiation, an efficient inducer of chromosome aberrations (CA). Increased CA have been shown to be associated with increased cancer risk. To date, most studies of CA among pilots were based on the overall group of CA or unstable CA, and there has been no large study among pilots on translocations which are a better biomarker of cumulative radiation exposure. We determined the frequency of translocations in peripheral blood lymphocytes of airline pilots and compared them to the frequency of translocations in a group of controls without a history of frequent airline travel. Male pilots were recruited from a major U.S. airline, and controls were recruited from male university faculty living in the same geographic area. All study subjects completed a self-administered questionnaire with information on demographics, health, medical and occupational history, and lifestyle factors. Translocations were scored in an average of 1039 cell equivalents (CE) per subject using fluorescence *in situ* hybridization with whole chromosome paints, and expressed as per 100 CE. Separate negative binomial regression models were used to assess the relationship between translocation frequency and i) group (pilots, controls) and ii) flight years (continuous and coded 0 for controls), adjusted for age, health, military service years, and estimated cumulative red bone marrow absorbed dose in cGy from personal radiographic procedures. Pilots (n=83) and controls (n=50) were comparable in age (mean  $\pm$  SD; 46.7  $\pm$  5.3, range 37-55 vs. 45.8  $\pm$  5.0, range 36-56 years, respectively), and were predominantly nonsmokers (81% vs. 86%, respectively) with very good to excellent self-reported health (94% vs. 90%, respectively). Pilots reported an average of 18.1  $\pm$  6.3 (range 1-37) years of flight experience. Although the difference was not statistically significant (p=0.13), the adjusted mean translocation frequency in a linear model, was higher in pilots than in controls (0.48  $\pm$  0.06 (SE) vs. 0.37  $\pm$  0.07 translocations/100 CE, respectively). However, translocation frequency was significantly associated with flight years (p= 0.038) with an increase of 9%, 19%, 41%, and 54% for each 5, 10, 20, and 25-year increase in flight years, respectively. Adjustment for smoking status and other potential confounders did not alter the results substantially. In conclusion, our results indicate that flight years was significantly associated with increased translocation frequency. Annual radiation doses for pilots range from 0.2-10 mSv with long-haul crew averaging 5-9 mSv per year. The computation of individual cumulative cosmic radiation doses from pilot flight records, which takes into account changes in altitude and latitude, and stage of the 11-year solar cycle at the time of flight, will permit analyses based on cosmic radiation exposure estimates rather than the exposure surrogate of flight years.

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