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# DNA adducts in hospital workers exposed to ethylene oxide

**Lee C. Yong, Paul A. Schulte, Chi-Yu Kao, Roger Giese, John K. Wiencke, Mark F. Boeniger, Martin R. Petersen, James T. Walker.** ***NIOSH/CDC, Cincinnati, OH, Northeastern University, Boston, MA, University of California, San Francisco, CA.***

Ethylene oxide (EtO), an important industrial chemical intermediate and sterilant, is a direct acting genotoxic carcinogen that forms DNA adducts. To date, there have been few reports on DNA adducts in humans with occupational EtO exposure. We studied the formation of N7-(2-hydroxyethyl)guanine (HEG), a major DNA adduct of EtO, in a group of 64 operators of sterilizers that used EtO and nonexposed workers from ten hospitals. Cumulative exposure to EtO was estimated during the 4-month period before the collection of blood samples. HEG was quantitated in granulocyte DNA (0.1-9 μg) using a highly specific and sensitive gas chromatography-electron capture-mass spectrometry (GC-EC-MS) technique. Results revealed a large interindividual variation in HEG adduct levels with a range of 1.6 to 38.5 adducts/$10^7$ nucleotides in the nonexposed (n=6), 1.6 to 109.8 adducts/$10^7$ nucleotides in the low (≤ 32 ppm-h, n=38) and 1.9 to 241.3 adducts/$10^7$ nucleotides in the high (> 32 ppm-h, n= 20) exposure group when categorized according to the 4-month cumulative EtO exposure. Although the mean HEG level of 22.7 ± 11.7(SE) adducts/$10^7$ nucleotides in the high exposure group was about 1½-fold higher than that of the low exposure group (13.6 ± 3.9 adducts/$10^7$ nucleotides), and 2-fold higher than that of the nonexposed group (9.6 ± 5.8 adducts/$10^7$ nucleotides), the differences were not statistically significant. These results remained essentially unchanged after adjusting for age, gender, race, education and smoking. There was no clear effect of the polymorphic detoxifying *glutathione S-transferase T1* (*GSTT1*) and *M1* (*GSTM1*) genes on HEG. We have previously reported that the level of hemoglobin adducts, N-(2-hydroxyethyl)valine (HEV) was significantly associated with EtO exposure, and the *GSTT1*-null genotype was significantly associated with increased formation of HEV. These differences may be due to the impact of DNA repair on HEG but not HEV. Our results demonstrate that HEG adducts can be detected and quantitated in relation to low level of occupational EtO exposure (< U.S. OSHA standard of 1 ppm 8-h TWA). Further studies which assess DNA repair variability are warranted.

Presenter: Lee C. Yong

Affiliation: NIOSH/CDC, Cincinnati, OH; E-mail: LAY7@CDC.GOV

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