

A study on Appropriate Biomarker for Biological Monitoring of 1,3-Butadiene Inhalation Exposure

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Abstract

1,3-butadiene (BD) is a rodent carcinogen, and also, a probable carcinogen to humans (IARC, group 2) or "known to be a human carcinogen" (Department of Health and Human Services, 2000). Workers and citizens could be exposed to BD at the petrochemical products and the general environment.

Adducts are biomarkers for biological monitoring of carcinogen exposure. This study investigated the hemoglobin adducts in blood after inhalation exposure to ICR female mice for 3 weeks (5 hr/day × 5 days/week.).

During the inhalation exposure, the body weights of mice were significantly lower from day 9 onward for the 500ppm BD group and from day 4 onward for the 1000ppm BD group. On the 1st, 2nd, and 3rd week after inhalation exposure, the concentrations of HB Val adducts were 1.8, 3.7 and 6.2 pmol/mg globin for the 500 ppm BD group, and 5.7, 7.4 and 16.0 pmol/mg globin for the 1000 ppm BD group. And the concentrations of THBVal adducts were 32.0, 42.0 and 55.0 pmol/mg globin for the 500 ppm BD group, and 67.8, 72.7 and 83.5 pmol/mg globin for the 1000 ppm BD group. Their define ratios were higher at earlier exposure period and lower concentration. They were 17.8, 11.4 and 8.87 for the 500 ppm BD group, and 11.9, 9.8 and 5.2 for the 1000 ppm BD group, on the 1st, 2nd, and 3rd week after inhalation exposure.

THB Val and HB Val adducts are the important hemoglobin adducts for monitoring of BD exposure, but the define proved to be a better biomarker than the other define.