BENCHMARK DOSE ESTIMATION OF HEMATOXICITY AND GENOTOXICITY AMONG CHINESE BENZENE EXPOSED WORKERS IN SHOE FACTORIES

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Objectives Benzene exposure can induce hematotoxicity and hematoxocity at occupational exposure level below 1 ppm according to previous reports. The purpose of this study was to calculate benchmark dose (BMD) for chromosomal damage and reduced white blood cell (WBC) induced by benzene among the exposed workers in Wenzhou, China.

Methods A group of 317 workers occupationally exposed to benzene and 102 unexposed workers were examined for hematotoxicity indicated by WBC count, and for genotoxicity measured by cytokinesis-blocked micronucleus (CBMN) assay with peripheral lymphocytes. The cumulative exposure dose (CED) of benzene was calculated basing on the job type and duration of each job and the benzene concentration in workplace. Benchmark Dose Software (BMDS) Version2.2.1 (US EPA) was used to calculate the BMD and its lower confidence limit, BMDL.

Results demonstrated that there was a strong dose-response relationship between benzene CED and the effect biomarkers (the MN frequency and WBC count). The BMDL10 by CBMN frequency were found to be 5.16, 1.84 and 2.35 ppm-year for benzene-exposed male, benzene-exposed female and total exposed workers, and 5.45, 3.94, and 10.25 ppm-year by WBC count, respectively.

Conclusions 2 ppm for chromosomal damage (CBMN) and 4 ppm for hematotoxicity (WBC) of occupational exposure limits of benzene were suggested according to our findings. Further studies need to be confirmed and validated.