THE INFLUENCE OF LOW LEVEL EXPOSURE TO BENZENE ON WHITE BLOOD CELL COUNTS

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PLAINTIFF'S EXHIBIT 1466

It is generally reported in the literature that exposure to benzene levels below 10 ppm has no hepatotoxic effects. This conclusion does not seem to be based upon an epidemiological study designed to discover any such potential effect.

In a retrospective study, the white blood cell counts were used of 17404 blood samples taken since 1968 or since starting employment from 484 persons, representing all employees under preventive medical surveillance and still employed in one petrochemical plant at the end of 1989, whether they were benzene exposed or not.

General exposure data were derived from stationary air samples (n=3876), collected from 1978 onwards. The P90 value for benzene concentration vaned from 2.3 ppm in 1978 to 0.7 ppm in 1988. Although exposure was probably higher before 1978, exposure to levels above 2 ppm on a time-weighted average is unlikely after 1971.

As a reference, we used the hematological data (n–13796 WBC counts from 1984 to 1988) of a control group of 2589 people employed in one chemical industry, in which benzene exposure was extremely rare.

A markedly higher proportion of WBC counts under 4000 per ml was found in the petrochemical plant as compared to the reference population. The difference reduced progressively over time, as benzene exposure did. This apparent association could of course also be explained by a possible laboratory bias: two differentlaboratories were involved and the laboratory methods in the petrochemical plant changed over time.

Although laboratory bias cannot be excluded in a direct way, it cannot explain all differences: when subdividing the petrochemical workers into groups, according to their frequency of benzene exposure, abnormal results were relatively more frequent among the more exposed group, whichever time period was compared. Also, the number of persons showing multiple abnormal results was relatively higher among the benzene exposed.

Since smoking is associated with an increase in white blood cells, differences in smoking history between the exposure categories were also considered, but seem to have no bearings on the findings.

The study offers forceful arguments against the continuing assumption that exposure to levels of benzene well below 10 ppm has no hematotoxic effects.

Presented at:
9th International Symposium
Epidemiology in Occupational Health
U.S. Department of Health and Human Services
NIOSH/CDC
Cincinnati, Ohio
September 23-25, 1992