

## Cumulative asbestos exposure for US automobile mechanics involved in brake repair (circa 1950s–2000)

BRENT L. FINLEY<sup>a</sup>, RICHARD O. RICHTER<sup>b</sup>, FIONNA S. MOWAT<sup>c</sup>, STEVE MLYNAREK<sup>d</sup>, DENNIS J. PAUSTENBACH<sup>a</sup>, JOHN M. WARMERDAM<sup>f</sup> AND PATRICK J. SHEEHAN<sup>e</sup>

<sup>a</sup>*ChemRisk, San Francisco, California, USA*

<sup>b</sup>*Exponent, Irvine, California, USA*

<sup>c</sup>*Exponent, Menlo Park, California, USA*

<sup>d</sup>*University of South Florida, Tampa, Florida, USA*

<sup>e</sup>*Exponent, Oakland, California, USA*

<sup>f</sup>*Tetra Tech EM Inc, San Francisco, California, USA*

---

We analyzed cumulative lifetime exposure to chrysotile asbestos experienced by brake mechanics in the US during the period 1950–2000. Using Monte Carlo methods, cumulative exposures were calculated using the distribution of 8-h time-weighted average exposure concentrations for brake mechanics and the distribution of job tenure data for automobile mechanics. The median estimated cumulative exposures for these mechanics, as predicted by three probabilistic models, ranged from 0.16 to 0.41 fibers per cubic centimeter (f/cm<sup>3</sup>) year for facilities with no dust-control procedures (1970s), and from 0.010 to 0.012 f/cm<sup>3</sup> year for those employing engineering controls (1980s). Upper-bound (95%) estimates for the 1970s and 1980s were 1.96 to 2.79 and 0.07–0.10 f/cm<sup>3</sup> year, respectively. These estimates for US brake mechanics are consistent with, but generally slightly lower than, those reported for European mechanics. The values are all substantially lower than the cumulative exposure of 4.5 f/cm<sup>3</sup> year associated with occupational exposure to 0.1 f/cm<sup>3</sup> of asbestos for 45 years that is currently permitted under the current occupational exposure limits in the US. Cumulative exposures were usually about 100- to 1,000-fold less than those of other occupational groups with asbestos exposure for similar time periods. The cumulative lifetime exposure estimates presented here, combined with the negative epidemiology data for brake mechanics, could be used to refine the risk assessments for chrysotile-exposed populations.

*Journal of Exposure Science and Environmental Epidemiology* (2007) 17, 644–655; doi:10.1038/sj.jes.7500553; published online 9 May 2007

**Keywords:** *chrysotile asbestos, brake wear debris, exposure assessment, auto mechanics.*