Estimating Ambient Concentration and Cancer Risk for 1,3-Butadiene in Japan

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A detailed assessment of 1,3-butadiene exposure was performed for the purpose of risk assessment in Japan. The concentration of 1,3-butadiene and the 1,3-butadiene-exposure-related lifetime excess cancer risk in the general environment and in the vicinity of industrial point sources were estimated using two different types of diffusion models: the National Institute of Advanced Industrial Science and Technology-atmospheric dispersion model for exposure and risk assessment (AIST-ADMER) model ver. 1.0 for the estimation of regional scale concentrations and the Ministry of Economy, Trade and Industry - low rise industrial source dispersion (METI-LIS) model ver. 2.01 for the estimation of local concentrations near industrial sources. The calculated results indicate that the annual mean concentrations of 1,3-butadiene in residential areas are generally less than 0.5 µg/m³, but in a few area near industrial point sources they exceed 1.7 µg/m³, corresponding to a lifetime excess cancer risk of 10⁻⁵. Using data on exposure concentrations and cancer unit risk, the lifetime excess cancer risk for persons exposed to 1,3-butadiene in Japan was evaluated. The results indicate that an extremely small number of people have a risk of developing 1,3-butadiene-exposure-related cancer that is greater than 10⁻², while that of most of the population in Japan is between 10⁻⁴ and 10⁻⁶. The total 1,3-butadiene-exposure-related cancer risk in Japan was calculated as 2.0 cases/year. A large proportion of the cancer risk was associated with general environmental areas. However, the individual risks of the population living in the vicinity of industrial point sources were significantly higher than those of the population living in the general environment.

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