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REVIEW

Evaluation of the carcinogenicity of gallium arsenide

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Abstract

Gallium arsenide (GaAs) is an important semiconductor material. In 2-year inhalation studies, GaAs increased the incidence of lung tumors in female rats, but not in male rats or male and female mice. Alveolar proteinosis followed by chronic active inflammation was the predominant non-neoplastic pulmonary findings. IARC classified GaAs as carcinogenic to humans (group 1) based on the assumption that As and Ga ions are bioavailable. The European Chemical Agency Risk Assessment Committee concluded that GaAs should be classified into Carcinogenicity Category 1B (presumed to have carcinogenic potential for humans; ECHA). We evaluate whether these classifications are justified. Physico-chemical properties of GaAs particles and the degree of mechanical treatment are critical in this evaluation. The available data on mode of action (MOA), genotoxicity and bioavailability do not support the contribution of As or Ga ions to the lung tumors in female rats. Most toxicological studies utilized small particles produced by strong mechanical treatment, destroying the crystalline structure. The resulting amorphous GaAs is not relevant to crystalline GaAs at production and processing sites. The likely tumorigenic MOA is lung toxicity related to particulate-induced inflammation and increased proliferation. It is concluded that there is no evidence for a primary carcinogenic effect of GaAs.

Keywords

Alveolar proteinosis, bioavailability, chronic lung inflammation, gallium arsenide, semiconductor, solubility, threshold of arsenic carcinogenicity

History

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Introduction

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