

## Is 4, 4'-Methylenebis (2-chloroaniline) (MBOCA) a highly toxic and a carcinogenic compound?

Hong-I Chen

Professor, College of Health Sciences,  
Chang Jung Christian University, No.1  
Changda Road, Gueiren District,  
Tainan City, 71101, Taiwan.

### Corresponding Author:

Hong-I Chen

✉ hong\_i@ndmctsggh.edu.tw

Professor, College of Health Sciences, Chang  
Jung Christian University, No.1 Changda  
Road, Gueiren District, Tainan City, 71101,  
Taiwan.

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Lower urinary tract cancer is associated with a number of occupational exposures. The first such association was found in England in 1895 [1], and subsequently the International Agency for Research on Cancer [2] and the U.S. Environmental Protection Agency have determined that MBOCA is a toxic substance (category 2A; Agency for Toxic Substances and Disease Registry, ATSDR, 1994) [3]. The studies of 70 workers had worked at four MBOCA manufacturing factories in Taiwan in 2004, the results of this study showed 1 worker with bladder carcinoma, 1 worker with suspected malignant cells on urine cytology and 1 worker with atypical cytology combined with gross hematuria [4]. An another research on an experimental study with mice in 2013, report showed that pathological changes in the liver, kidney and urinary bladder of MBOCA-treated mice revealed unusual lesions of inflammatory degeneration and malignant change; the plasma 8-hydroxydeoxyguanosine (8-OHdG) levels showed that the MBOCA-treated mice had significantly higher 8-OHdG levels than the control mice [5]. The findings of this study support the conclusions from other studies that MBOCA is potentially carcinogenic to humans [6]. Recent personally, not publicly analyzed the occupational history of 83 patients (40-70 years in age) with bladder cancer (2014-2016), finding 4 patients who used to work in chemical, metal or rubber factories, contacted with these synthetic aromatic amine materials were suspected. This information supported that occupational exposure to carcinogenic compounds found in dye, rubber, paint, plastics, metal, and motor vehicle exhaust significantly raises the risk of bladder cancer [7]. Workers may inhale small particles of MBOCA in the air or absorb MBOCA dust or vapor through the skin. There is no information either regarding the daily dose of MBOCA to which workers were exposed or the route of exposure. However, the mechanism remains unclear whether MBOCA causes malignancy.

**Keywords:** 4, 4'-Methylenebis (2-chloroaniline); MBOCA; Bladder cancer

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