

---

## RESEARCH COMMUNICATION

---

# Cancer Risk for Thai Traffic Police Exposed to Traffic Benzene Vapor

Viroj Wiwanitkit<sup>1</sup>, Jamsai Suwansaksri<sup>2</sup>, Suphan Soogarun<sup>3</sup>

### Abstract

Benzene exposure is of particular concern because recent research indicates that it can result in chronic toxicity, with an elevated risk of carcinogenesis. Exposure to benzene from automobile exhaust can be an important occupational problem for police. The present study was conducted to estimate risk of Thai traffic police developing cancer due to contact with traffic benzene vapor during daily work. According to the data obtained, the estimated predicted cancer incidence for traffic police is 0.05 case per 70 - year period, simply translated as 1.8 cancer cases per 100,000 traffic police per year. This is clearly a cause of concern and annual check up and monitoring for benzene exposure among traffic police should be set up as part of a program for primary prevention of occupational – related cancer.

**Key Words:** Police - benzene - cancer - risk

*Asian Pacific J Cancer Prev*, 6, 219-220

### Introduction

Benzene is of particular concern because recent research indicates that benzene exposure can result in chronic toxicity including induction of hematological cancers (Chocheo, 2000). At present, work with benzene is subject to the Control of Substances Hazardous to Health (COSHH) Regulations 1999. Apart from the industrial workers, there are other occupations with high risk of benzene exposure, including traffic police. Crebelli et al studied the police in Rome and found that the exposure to traffic fumes during working activities might give a relatively greater contribution to general personal exposure to benzene than indoor sources (Crebelli et al., 2001).

According to a recent study of Wiwanitkit et al, the Thai police suffer highly exposure to traffic benzene vapor (Wiwanitkit et al., 2003). The same authors also noted possible leukemogenesis from exposure to benzene vapor in police (Wiwanitkit et al., 2004). To continue from the previous report, the present study was performed to estimate the risk of Thai traffic police developing cancer due to contact with benzene vapor during their daily work directing traffic.

### Materials and Methods

#### *Detection of Environmental Benzene Levels and Focused Subjects*

This study is focused in an area of Bangkok, namely Pathumwan District. The subjects were 39 healthy male traffic police in the Pathumwon Police Station, Bangkok. These subjects were proven to have high exposure to benzene, presenting with high urine levels of a benzene biomarker, in a previous study (Wiwanitkit et al., 2003). The study was performed in 2001. Detection of environmental benzene levels in the working area of the subjects was performed. The authors had a reference laboratory (Life and Environment Company, Bangkok) to perform air sampling and analysis. Environmental benzene levels of the subjects were detected by standard method (Gravimetric Method: NIOSH 0500).

#### *Calculation for Predicted Cancer Incidence*

In this study, the predicted cancer incidence of cancer for the police subjects who contact with traffic benzene vapor during daily practice was determined. The formula to determine the predicted cancer incidence was described as

<sup>1</sup>Department of Laboratory Medicine, Faculty of Medicine; <sup>2</sup>Department of Clinical Chemistry, Faculty of Allied Health Sciences;

<sup>3</sup>Department of Clinical Microscopy, Faculty of Allied Health Sciences, Chulalongkorn University, Bangkok Thailand 10330

Corresponding author: Viroj Wiwanitkit, M.D., Department of Laboratory Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok Thailand 10330 Email: [wviroj@pioneer.netserv.chula.ac.th](mailto:wviroj@pioneer.netserv.chula.ac.th) Phone: 669-2348832

the following “predicted cancer incidence = individual lifetime cancer risk x population”. The individual lifetime cancer risk can be determined as the following “individual lifetime cancer risk = concentration of emission benzene in ambient air x lifetime unit risk factor”. The reported lifetime unit risk factor, an estimate of the probability that an individual will develop cancer when exposed to a pollutant at an ambient concentration for 70 years, of benzene is equal to 0.0000083 m<sup>3</sup>/μg (Airport Noise).

## Results

The concentration of emission of benzene level for the police was 150 μg /m<sup>3</sup>. As previously mentioned the reported life time unit risk factor is equal to 0.0000083 m<sup>3</sup>/μg. Therefore, individual lifetime cancer risk in this study is equal to “150 μg /m<sup>3</sup> x 0.0000083 m<sup>3</sup>/μg” or “0.001245”. The number of focused traffic police exposed to the benzene in this study is 39. Hence, the estimated predicted cancer incidence for these traffic police is equal to “0.001245 x 39” or “0.05”. This implies that there will be 0.05 cancerous cases in our 39 traffic policeman over a 70 - year period.

## Discussion

Benzene is a common toxic volatile substance, found in many industrial processes in the present day (Chocheo, 2000). It is classified as a carcinogen and can cause serious health problems. The toxicity includes genotoxicity, neurotoxicity, hematotoxicity and carcinogenesis. Epidemiological evidence indicates a relationship between exposure to benzene and the occurrence of acute non-lymphocytic leukaemia in humans (Golding and Watson, 1999). Golding and Watson said that the significance of DNA adduct formation in respect of human leukaemia was uncertain (Golding and Watson, 1999). They noted that the lack of significant DNA reactivity was reflected in the lack of activity of benzene in short-term tests for genotoxicity; however, benzene caused oxidative stress, which could be detected as oxidative damage to DNA (Golding and Watson, 1999). They concluded that mechanisms other than DNA damage might play a role in benzene-related toxicity, such as reactions of benzene metabolites with essential enzymes such as topoisomerase II (Golding and Watson, 1999).

High benzene exposure among the police working in the road was earlier noted by Leong and Laortanakul (2003). The study of Verma et al of Indian police also presented similar results (Verma et al., 2003). Therefore, working in the air pollution in the urban area can be health hazard for police, with exposure to benzene in automobile exhaust as a potential important occupational problem (Priante et al., 1996). However, there is no study concerning the risk estimation for the traffic police. Here, the author perform a risk assessment for cancer development among a sample of Thai traffic police who exposed to traffic benzene vapor.

According to this study, it can be shown that there will be 0.05 cancer case for traffic police over a 70 - year period.

This rate can be more simplified presented as 1.8 cancerous case per 100,000 traffic police per year. Of interest, this rate is considerable important and should be concern. Annual check up and monitoring for benzene exposure among the traffic police should be set as primary prevention of occupational - related cancer for them.

## Acknowledgement

This study was supported by the Rajchadapisakesompote Fund, Chulalongkorn University. The authors would like to thank all subjects participating to this study and all health care workers who helped perform laboratory analyses.

## References

- Airport noise - Estimation of cancer risk. Available at [www.nonoise.org/resource/trans/air/cancer/cancer.htm](http://www.nonoise.org/resource/trans/air/cancer/cancer.htm)
- Chocheo V (2000). Polluting agents and sources of urban air pollution. *Ann Ist Super Sanita*, **36**, 267-74.
- Crebelli R, Tomei F, Zijno A, et al (2001). Exposure to benzene in urban workers: environmental and biological monitoring of traffic police in Rome. *Occup Environ Med*, **58**, 165-71.
- Golding BT, Watson WP (1999). Possible mechanisms of carcinogenesis after exposure to benzene. *IARC Sci Publ*, **150**, 75-88.
- Leong ST, Laortanakul P (2003). Indicators of benzene emissions and exposure in Bangkok street. *Environ Res*, **92**, 173-81.
- Priante E, Schiavon I, Boschi G, et al (1996). Urban air pollutant exposure among traffic policemen. *Med Lav*, **87**, 314-22.
- Verma Y, Kumar A, Rana SV (2003). Biological monitoring of exposure to benzene in traffic policemen of north India. *Ind Health*, **41**, 260-4.
- Wiwanitkit V, Suwansaksri J, Soogarun S (2003). A note on urine trans, trans muconic acid level among a sample of Thai police: implication for an occupational health issue. *Yale J Biol Med*, **76**, 103-8.
- Wiwanitkit V, Soogarun S, Suwansaksri J (2004). Urine phenol and myeloperoxidase index: an observation in benzene exposed subjects. *Leuk Lymphoma*, **45**, 1643-5.