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Biomarker Concentration Acting as the Indicators for Chemicals Health Risk Assessment: The Case Study in Thailand

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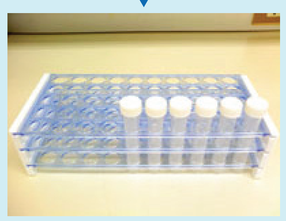
Introduction:

In the field of prevention and control of occupational and environmental diseases has been used to use the biological exposure indices of workers recommended by ACGIH to be the safety value of biomarker acting as indicators for people's risk exposure to chemicals pollution. Therefore, this study was aimed to compare the BEIs of urinary t,t-muconic acid (TTMA), metabolite of benzene [an volatile organic compound (VOC)], with baseline urinary TTMA of people in community to adjust risk people for health risk assessment in case of chemicals incident.

Methods:

The study of average urinary TTMA, an metabolite of benzene, to set the baseline metabolite concentration of general population who had no exposure to chemicals in the workplace with the informed consent form in Rayong Province, the chemicals risk area in Thailand, was proceeded during the year 2012 - 2014. Therefore, the selected 402 volunteers in the range of age 15 years old to 60 years old were collected urine accompanied with in-depth interviewed for identification of interference of metabolite concentration caused by behavior and other chemicals exposure. The urine samples were analyzed by HPLC - analysis. The average concentration of urinary TTMA obtained result was 191 µg/g Cr. The urinary TTMA of the 300 people who exposed to benzene surrounding the area of incident of oil spill leak out at Samet Island, Rayong Province, in the year 2014, were also analyzed by HPLC - analysis by laboratory of Rayong Occupational Health and Environmental Development Center. In the year 2015 - 2016, the comparative adjustment of risk people between usage of baseline urinary TTMA and usage of BEIs of ACGIH were studied. The percentage of number of risk people was presented.

Exposed People



Urine Sample

HPLC – analysis

Comparative adjustment of risk people
- **Usage of baseline urinary TTMA**
- **Usage of BEIs of ACGIH**

Results:

The obtained results of urinary TTMA concentration of 300 samples were in the range between N/A to 459 µg/gCr. The 16 exposed people had higher urinary TTMA concentration than 191 µg/gCr. The range of urinary TTMA concentration then of 16 exposed people was 193 µg/gCr - 459 µg/g Cr. Because of higher BEIs concentration of TTMA (500 µg/gCr) than baseline TTMA concentration (191 µg/gCr), none of risk people was shown. The usage of baseline TTMA concentration adjusted 5.33% (n= 16) of exposed people to be the risk people (as details in the table below).

Table of the different number of risk people caused by the different health risk assessment

Range of urinary TTMA concentration of 300 exposed people	Number of risk people [adjusted by workers' TTMA BEIs (500 µg/gCr)]	Number of risk people [adjusted by baseline TTMA concentration of general population (191 µg/gCr)]
8 µg/g Cr - 459 µg/gCr	0 (0%)	16 (5.33%)

Conclusion:

Because of the important of chemicals concentration for biomonitoring on the health surveillance program for risk group, the baseline concentration of general population should play role on planning of health surveillance of risk group. Therefore, the risk group should be taken care of chemicals concentration level in their body even less amount of concentration for health risk assessment and health surveillance system.

Discussion & Suggestion:

The workers' BEIs should not be the indicators for being the reference value for adjustment the risk group exposed to chemicals exposure in the community. It is necessary to establish the reference value of general people in community.

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