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Benzene-Induced Changes in Hematological Parameters and Urinary Trans, Trans-Muconic Acid among Gasoline Station Workers

Dear Editor,

The recent report on benzene exposure among Thai gas station attendants is very interesting.[1] However, this work is a simple study on an out of date biomarker with some problems to be considered. There is a previous report from the same setting among the same population.[2] The present redundant work, without citation of the previous study,[2] has many interesting findings. First, the average level of the t, t-MA measured in the present report is significantly different from that of the previous report. This might reflect either the significant changes in the study pollution in this area or a problem in the laboratory analysis of the samples. Of interest, the reference given for the technique of measurement of t, t-MA is really not corresponding to the textual description—the authors mention a modified technique, but the citation is an original method developed by Lee, *et al*.[3] It is therefore questionable what technique was exactly used by the authors in their study.

Second, the authors additionally investigated the relationship between urinary t, t-MA level and hematological parameters. Tunsaringkarn, *et al*, noted that there was an inverse correlation between urinary t, t-MA concentration and hemoglobin level and hematocrit.[1] Indeed, there is a previous report indicating no significant correlation between urinary t, t-MA level and any of the studied red cell parameters.[3] An important point to be considered in the present report[1] is the failure to exclude other possible causes of anemia including thalassemia, which is very common in the study region, Thailand. A more interesting conclusion was also made by Tunsaringkarn, *et al*,[1] that "exposure to benzene would cause bone marrow depression presenting as drop in hemoglobin, hematocrit and eosinophil counts." The conclusion about bone marrow depression might not be rational based on the present study findings. There is no effect on white blood cell and platelet series, hence, the conclusion seems not be of clinical importance.

In conclusion, the published work has several problems and might be a kind of redundant conceptual plagiarism and lacks novelty.

Conflicts of Interest: None declared.

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Authors' Reply

Dear Editor,

Regarding the comments of Joob, *et al*, that the biomarker we used is out of date, we would like to insist that t, t-MA is currently used as a standard marker in many research studies. We did not mention the article of Wiwanitkit, *et al*, as our setting was very different with the setting of that article—we studied the Pathumwan district, central part of Bangkok, in more 10 years later.[1] Since 2009, following the policy of Ministry of Energy, there is a rapidly increasing trend for consumption of gasohol in Thailand, especially in large cities like Bangkok. Gasohol, an oxygenated gasoline, is a fuel consisting of a blend usually of ethanol and gasoline which used as an alternative fuel for gasoline. The composition of gasoline used in Thailand nowadays would be completely different from that used to be 10 years ago.

About the modified technique we used and its reliability/validity, we would like to clarify that the biomarker analysis was performed under a strictly quality control condition the exact protocol of which was published elsewhere.[2]

About failure to exclude other causes of anemia, e.g., thalassemia, we studied hemoglobin abnormalities as well as red cell morphology in all study participants. The hematological parameters including hemoglobin level, hematocrit, MCV, WBC, RBC, WBC differential counts, and urinary t, t-MA level did not significantly different between carriers of thalassemia and those with normal hemoglobin.

Finally, about our conclusion that benzene may cause bone marrow suppression: that is a speculation we made based on our observations and we still think it is reasonable—we did everything properly. This hypothesis, nonetheless, needs to be studied more.

Conflicts of Interest: None declared.

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Editorial Note: The Editorial Office did not find any instances of plagiarism in the above-mentioned article [Ref 1].