New York State Department of Health
Center for Environmental Health

Information Sheet June 2010

Polychlorinated dibenzo-p-dioxins, dibenzofurans, biphenyls, and naphthalenes in plasma of workers deployed at the World Trade Center after the collapse

(Environ. Sci. Technol. 2010 July 1;44(13):5188-94)

Introduction

The collapse of the World Trade Center (WTC) on September 11, 2001 and subsequent fires released massive amounts of smoke and dust into the surrounding air. The smoke and dust contained many pollutants, including polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), and polychlorinated naphthalenes (PCNs). PCDDs, PCDFs, and PCNs are typically produced by the combustion of municipal solid waste and fossil fuels. PCBs were widely used in electrical equipment, and can be converted to PCDFs if burned. Most people in the United States have low levels of PCDDs, PCDFs, and PCBs in their bodies, primarily from eating food, including fish, meat, and dairy products, containing these chemicals. PCDDs, PCDFs, and PCBs have been associated with human health effects including non-cancer effects on the skin, liver, endocrine, nervous, immune, and reproductive systems, and cancers. One of the objectives of this pilot study was to determine if WTC responders had higher than normal levels of these pollutants in their blood.

Methods

Biological samples were collected from 1384 WTC responders who were either New York State (NYS) employees or National Guard personnel. Blood plasma samples from 43 responders were analyzed for PCDDs, PCDFs, PCBs and PCNs. All of these responders were assigned to work in the WTC area for at least some time between September 11 and December 23, 2001. Samples were collected 5-26 months after the exposures. Participants were grouped according to how much smoke and dust exposure they had relative to other responders [more smoke exposure (MSE), more dust exposure (MDE), less smoke exposure (LSE), and less dust exposure (LDE)].

Findings

The results of this pilot study indicate that:

- Levels of PCDFs for the MSE and MDE groups were significantly higher than levels for the LSE and LDE groups.
- Levels of total PCDFs were significantly higher than levels reported for the United States general population.
- Levels of PCDDs for most exposure groups were comparable to levels reported for the United States general population.
- Levels of PCBs were similar to levels reported for the United States general population.
- Levels of PCNs could not be compared to the general population because good data on human PCN levels are not available.

Conclusions

These preliminary results indicate that some NYS WTC responders had higher levels of PCDFs in their blood than other NYS WTC responders and the general population. Those responders also likely had more smoke and dust exposure than other NYS WTC responders. The results suggest that PCDFs were produced during the fires at the WTC site and were inhaled/ingested with smoke and dust by the responders. The results are consistent with limited data from some studies of PCDF levels in personnel responding to fires involving PCBs. However, these conclusions are tentative given the small number of samples (n=43) analyzed for this pilot study. Confirmation of suggested associations between WTC exposures and elevated blood PCDF levels will require analysis of additional samples. The NYS Department of Health has been seeking funds to analyze more samples.

The potential health effects of these chemicals at the levels measured in this study are unknown because good information on the relationship between levels in blood and health effects is not available Additional studies would be necessary to evaluate possible health effects related to PCDF exposure from the WTC collapse and fires.

If you have any questions regarding this study or the laboratory testing involved, you may contact Dr. Kurunthachalam Kannan at 1-518-474-0015. If you have any questions regarding your health as it may relate to these findings, you may contact Dr. Matthew Mauer at 1-800-458-1158, ext. 27900.