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LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE



Guy's and St Thomas' Hospital **NHS**  
NHS Trust

## **Neuropsychological Effects of Low Level Exposure to Indoor Carbon Monoxide**

Final Report on carbon monoxide monitoring to Department of Health

October 2005

## PROJECT TEAM

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## EXECUTIVE SUMMARY

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This report presents findings from the monitoring campaign part of a project examining the association between neuropsychological function and chronic exposure to carbon monoxide (CO) in indoor air. The neuropsychological part of the study aims to determine if a relationship exists between exposure to CO, and objectively measured neuropsychological function. This campaign is the extension of a project started in September 2002. During the first campaign (winter 2002/3) a total of 56 homes were monitored; this report includes data gathered during the most recent winter of 2004/5, where 278 homes in total were monitored.

The study addresses the problem found with most health studies examining neuropsychological functioning, which is that the subjects are self-selected, i.e. they turn up complaining of psychological effects because they believe they have been exposed to high CO levels. This study aimed to use patients selected from the population solely on the basis of their CO exposure (to minimize potential selection bias).

The winter 2004/5 campaign was based on dwellings selected from the WarmZone pilot study project<sup>1</sup> in East London. Carbon monoxide concentrations were monitored by the Bartlett using a novel CO monitor based on technology developed by one of the team, Ben Croxford, in a previous study of external CO levels. The design of the second campaign was aimed at avoiding some logistical problems encountered during the first campaign (Winter 2002/3).

It was found that of the 270 homes with valid datasets, these 50 dwellings (18.0% of the total) had CO concentrations that exceeded World Health Organisation 8-hour average guideline levels for outdoor ambient air (8.6 ppm), of these, 26 (9.4%) exceeded WHO 1 hour levels of 26 ppm and 10 (3.6%) of these exceeded 30 minute guideline values of 52 ppm.

Initial reports from gas engineers visiting these “exceedance homes” indicate similar results to the gas engineers’ report from Winter 2002/3 campaign; namely that old, poorly maintained gas fires and gas cookers were found to be the most common source of high CO emissions. Other exceedances could be explained by poor installation and also user behaviour (long periods of use of gas appliances without adequate ventilation).

The numbers of vulnerable people exposed to CO levels exceeding WHO guidelines could be considered a cause for concern as some of the appliances discovered were in themselves dangerous. The results from the neuropsychometric testing will indicate whether there are further causes for concern regarding the neuropsychological effects of exposure to the concentrations of carbon monoxide encountered.

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<sup>1</sup> WarmZone project is a government and private funded initiative to reduce fuel poverty, further information to be found here [www.warmzone.co.uk](http://www.warmzone.co.uk).