

DISTINGUISHING THE POSSIBLE INDEPENDENT HEALTH EFFECTS OF EXPOSURE TO AMBIENT NITROGEN DIOXIDE FROM THOSE OF PARTICULATE MATTER AND OTHER FACTORS

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Background: It has been suggested that the epidemiological associations between ambient concentrations of nitrogen dioxide (NO₂) and health outcomes might not be due to NO₂ *per se* but to other air pollutants, mainly fine particulate matter (PM), within the urban mixture of air pollutants. Furthermore, the heterogeneity in those estimates has added to the uncertainties regarding a possible independent effect for NO₂.

Aim: To assess systematically ecological time-series studies on NO₂, which simultaneously incorporated concentrations of PM in two- or multi-pollutant statistical models, to identify adverse health effects that are independent from those of PM and other factors, and, if so, to suggest concentration-response functions for NO₂ for use in health impact assessments.

Methods: A Microsoft Access relational database is being constructed by assembling data from the literature; the Air Pollution Epidemiology Database (APED) (managed by St George's); and, a range of other sources. The database will include quantitative estimates pertaining to NO₂ and PM: all relevant two-/multi-pollutant model, seasonal model and lagged model results reported in the literature; data on possible confounders and effect modifiers, i.e. various study-level characteristics; Pearson correlations among the concentrations of pollutants. Analyses will use meta-analytical techniques, including meta-regression. Exploratory analyses will test for and investigate sources of heterogeneity and effect-modification. Tests for evidence of publication bias will also be conducted.

(Preliminary) Results: Work to date has focused on constructing the database. Data extracted from APED (for time-series studies published up to the year 2006 (2007 for studies conducted in Asia)) have been interrogated: 185 papers are available for 11 categories of health outcomes linked to NO₂. Of the 185 studies, 70 examined associations between NO₂ and health (hospital admissions; mortality; GP consultations; emergency room visits; GP house calls) using two-/multi-pollutant statistical models, with mortality and hospital admissions being the most common endpoints examined. The corresponding 336 estimates were produced largely from studies conducted in Europe, the USA and Canada using mainly 1-hour and 24-hour measures of exposure to NO₂. Less than 25% of the estimates from two-/multi-pollutant analyses are based on studies using a multi-city design. The final database will include time-series studies published up to May 2009.

Conclusions: Investigating heterogeneity in NO₂-effect estimates by way of systematic review is not common place in air pollution epidemiology. It is hoped that the final results will add to the evidence on whether there is an independent effect of NO₂.