

**Report 30:** Traffic-related air pollution and human disease

**Convener:** Rob McConnell

**Brief History:** Important because:

Increasingly strong evidence that causal role in childhood respiratory disease, important unaddressed uncertainties in relationship to other health outcomes with major population impact. Near-source pollution associated with traffic proximity almost certainly different than currently regulated regional pollutants.

Common and increasing exposure, especially in developing countries, largely unregulated source pollutants, therefore potentially large public health impact might result from better understanding and development of interventions.

**Discussion Highlights:** Understudied outcomes, relevant pollutants, susceptibility, interactions with other exposures, mechanism, EJ implications:

There are plausible associations with multiple outcomes for which research could reduce uncertainties. Examples include neurodevelopmental outcomes such as autism, other neuroperformance outcomes; neurodegenerative outcomes such as accelerated cognitive decline, Alzheimer's disease; cardiovascular disease such as stroke, ASHD; respiratory outcomes such as lung function growth (in childhood) and decline in adult life leading to COPD, asthma in childhood and adult life; cancer, including lung, childhood leukemia, breast; perhaps metabolic disease including diabetes and obesity.

Multipollutant mixture a major challenge, both in identifying relevant chemicals and in assessing exposure. Exposure characterization of ultrafine particles, re-entrained road dust, largely understudied vapor components of the mixture are important research topics that need to be linked to toxicological study.

Potentially susceptible groups include large segments of the population, such as children, the elderly, pregnant women, the poor (for unknown reasons), some identified and likely many unidentified genetic variants.

Co-exposures may play important role in toxicity, including social factors and psychosocial stress, bioaerosols such as allergens and endotoxin, ozone.

Opportunities for mechanistic research to better understand likely causal mediators in inflammatory pathways and likely in other less well studied pathways, especially for less studied neuro outcomes.

Need to understand the distributions of these exposures to resource deprived populations that may also be more susceptible.

Implications for “healthy cities” and “smart growth” policies that promote development friendly to walking; caution is needed to mitigate increased exposure to near-traffic pollutants that may result from these policies.

**Recommendations:**

RFA (or series) on near-source traffic pollution?

Refinement of substantial uncertainty of association with less-studied outcomes;

Toxicity studies to identify relevant species, well integrated with better characterization of exposure markers for epidemiological studies;

Better understanding of mechanisms of effects, e.g. gene expression, epigenetic effects, linked with clinical and epidemiologic outcomes;

Better characterization of what makes people susceptible;

Interventions to reduce and mitigate exposures could be quite broad, including clinical dietary interventions (e.g. antioxidants); development and evaluation of commercial filters; urban design such as trees, barriers, partnering with traffic engineers and land use planners.

Opportunities for studies of inequities in exposure of susceptible populations could be linked to intervention studies.

Opportunities for better understanding of effects by examining exposures in other countries that are higher or have different source mixtures (ethanol, diesel, for example)

**Discussion Participants:**

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