Cardiovascular and pulmonary health effects of air pollution – long-term effects in Sweden and effects of wood smoke

Akademisk avhandling

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av

Leo Stockfelt

Fakultetsopponent:
Professor Per Gustavsson
Institutet för miljömedicin,
Karolinska Institutet, Stockholm

Avhandlingen baseras på följande arbeten:


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Leo Stockfelt

Department of Occupational and Environmental Medicine
Institute of Medicine
Sahlgrenska Academy at University of Gothenburg

ABSTRACT
Exposure to air pollution is associated with increased morbidity and mortality in cardiovascular and pulmonary diseases. Main suggested mechanisms are airway and systemic inflammation, affecting hemostasis in the short term and atherosclerosis in the long term. Few studies have investigated the effects over decades, or which time-windows of exposure are the most relevant. In Sweden and many other countries wood burning is one of the largest sources of air pollution. The main aims of this thesis are to increase the knowledge of the mechanisms through which wood smoke causes respiratory and cardiovascular diseases, and the effects of long-term exposure to air pollution in a Swedish cohort.

In an experimental chamber study in healthy adults, short term exposure to two types of wood smoke was associated with symptoms and biomarkers of airway effects, but not with biomarkers of systemic inflammation or coagulation. This indicated that relatively low doses of wood smoke induce effects on airway epithelial permeability and possibly airway inflammation. In a long-term cohort study of residential exposure to nitric oxides (NO\textsubscript{x}) in Gothenburg, we observed a time trend of decreasing exposure. Back extrapolation of exposure was fairly correct for 5-7 years but not for longer time spans, showing that historical dispersion models and residential history are important for accurate long-term exposure estimations. Total non-accidental mortality was associated with residential NO\textsubscript{x} exposure. The effect estimates were similar for NO\textsubscript{x} exposure the last year, the mean NO\textsubscript{x} exposure the last 5 years, and the mean NO\textsubscript{x} exposure since enrolment. The effect estimates for cause-specific cardiovascular mortality were similar to those for total mortality. The effect was near linear with no evidence of any threshold, and only marginally affected by confounders and effect modifiers.

Keywords: Air pollution, wood smoke, human exposure studies, dispersion modelling, cohort studies, cardiovascular disease

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