USE OF REMOTE SENSING ESTIMATES OF NO2 AND PM2.5 EXPOSURE IN A STUDY OF HOSPITAL AND EMERGENCY ROOM VISITS IN ONTARIO, CANADA

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Background and Aims: Remote sensing (RS) offers an alternative to ground based air pollution monitoring that provides broad, cost-effective coverage. However, the use of RS estimates in epidemiological studies has not been thoroughly studied, especially for acute health effects. We examine the use of RS to estimate exposure in a case-crossover study of acute myocardial infarction (MI) and asthma hospital visits in Ontario, Canada.

Methods: Daily estimates of NO_2 and $PM_{2.5}$ levels were developed by combining retrievals from the OMI, MODIS and MISR instruments with daily profiles from a chemical transport model for the summer of 2005 (June-September). For comparison, ground-based measurements were obtained from Environment Canada's National Air Pollution Surveillance (NAPS) network. Hospitalization and emergency room visit data, including individual level data on main cause of admission/visit (ICD-10 code), age, sex, and three-digit postal code of home residence, were obtained from databases maintained by the Canadian Institutes for Health Research. Individual exposure was estimated by linkage of residential postal code centroid to the RS estimate (at approximately 10 km resolution) and the nearest NAPS station within 40km. We will use a case-crossover analysis with full-stratum bidirectional control selection as well as a sensitivity analysis with two-week bidirectional control selection to examine the acute health effects of air pollution exposure as estimated by both RS and ground-based methods.

Results: There were 7,562 hospitalizations for MI and 26,962 emergency room visits for asthma in Ontario in the summer of 2005. Preliminary analyses show RS estimates were available for $PM_{2.5}$ on 36% of days and for NO_2 on 24% of days over this time period. RS estimates of $PM_{2.5}$ were highly correlated with daily-average ground-based NAPS measurements ($r=0.73$), while daily NO_2 measurements were moderately correlated ($r=0.48$).

Conclusions: RS estimates of $PM_{2.5}$ and NO_2 are well correlated with ground-based measurements and offer a promising alternative for estimating exposure in a study of acute health effects.