

Evidence for Methyl Nitrate as an Exhaust Component from Engines with Certain Fuels – Peter M. Joseph

Summary

In some areas of the United States (US), asthma prevalence has reached historically unprecedented highs. Three peer-reviewed studies in New York City found prevalence rates among children from 25% to 39%. That is not true in all places. For example, prevalence in Miami, Florida, was estimated to be only 6–10%. A recent study in major cities in Georgia found only 8.5%. One study in California found asthma prevalence was unrelated to local concentrations of criterion pollutants. In the US, all criterion pollutants, including PM_{2.5}, show a downward trend over the last two decades. These facts argue against any significant influence of criterion pollutants in this crisis. These facts suggest that an unrecognized ambient pollutant may be the cause. One important study in southern California in mid-summer measured pulmonary function in children as it was related to outdoor ozone pollution. They found a negative association; higher levels of ozone were associated with improved respiratory function. We call this a “Paradoxical Ozone Association” (POA). Further evidence for a POA appears in seven other studies in Los Angeles, London, Scotland, and southeastern Canada. One plausible explanation for these observations would be the production of methyl nitrite (MN) as an exhaust product of MTBE in gasoline. Unlike ozone, MN is rapidly destroyed by sunlight. All of the POA studies were done in regions with significant methyl ether in gasoline. This explanation is strengthened by the observation that a POA has not been seen in regions without ether in gasoline. A previous AWMA paper proposed a plausible chemical model predicting that MTBE in gasoline will create MN in the exhaust. MN is highly toxic and closely related alkyl nitrites are known to induce respiratory sensitivity in humans. Funding to measure MN has not been available.