

Particulate matter and NO₂ air pollution trigger ST-elevation myocardial infarction: A case cross-over study of the Belgian STEMI registry 2009-2013

ARGACHA J.F., UZ Brussel-Vrije Universiteit Brussel (VUB)

Disclosure: None

Collaborators:



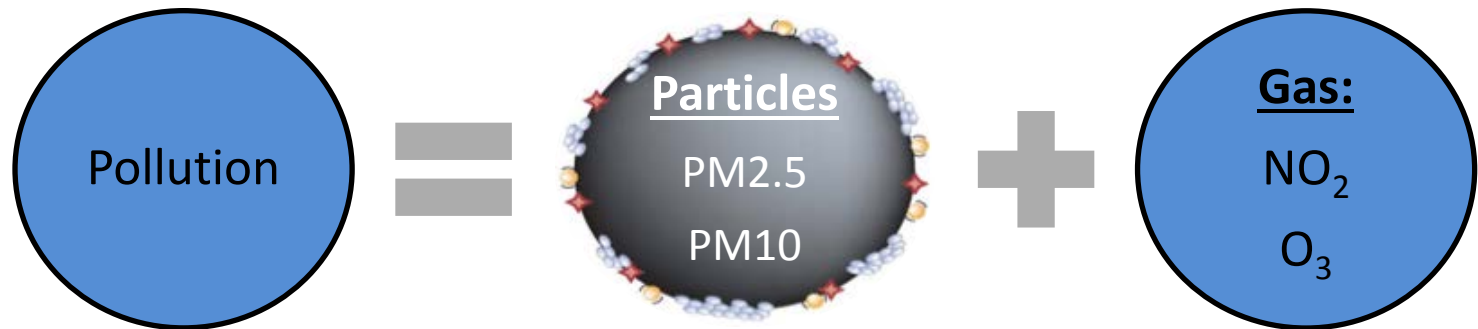
DECLARATION OF INTEREST

- I have nothing to declare



Background

- Definition of air pollution (AP)



- Global health effect of AP:

“Urban outdoor air pollution is estimated to cause 1.3 million deaths worldwide per year.” Air quality and health Fact sheet N° 313 W.H.O. September 2005 (updated 2011)

- Air pollution and acute myocardial infarction (AMI):

Previous studies have shown that AP increases the global incidence of AMI but:

ST elevation myocardial infarction (STEMI) is the most severe form of AMI

No clear demonstration of an influence of AP exposure on STEMI onset

Aims and methodology

- Aims:

- 1) Does air pollution affect the incidence of STEMI ?
- 2) Is this effect more related to particle or gaseous pollutant ?
- 3) Are there some vulnerable populations to the effect of AP ?

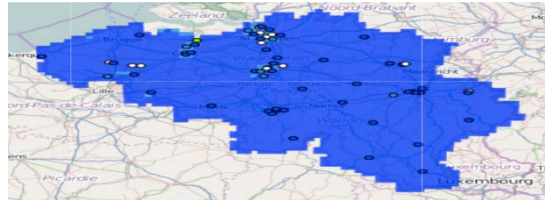
- Methodology:

- ✓ 11428 STEMI patients between 2009 and 2013 were included from the Belgian Interdisciplinary Working Group on Acute Cardiology (BIWAC) STEMI registry

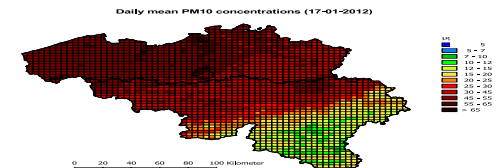
- ✓ Air pollution data were extracted from Belgian Interregional Environment Agency (IRCEL – CELINE) monitoring stations



Meuse Valley Fog Dec. 1930



Air pollution monitoring network



The RIO map

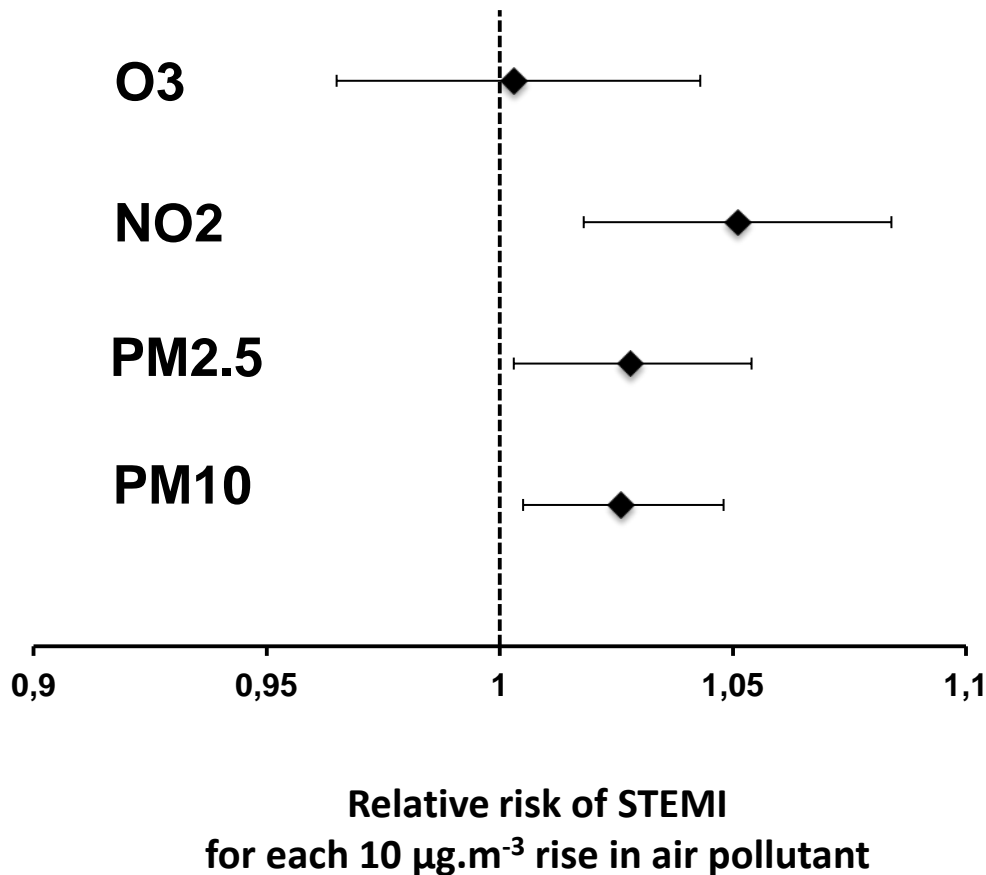
- ✓ Relation between AP and STEMI was addressed by a a case cross over statistical analysis (P.Collart, Research Centre in Epidemiology, ULB)



Results

Global population

Subgroup analysis



- Effect of air pollution on STEMI was only observed in men,
- Patients aged 75 years and above developed more STEMI in relation to PM10 exposure, while those 54 years and under were more susceptible to NO2,
- No clear predisposition to the effect of AP of diabetic, hypertense or coronary artery diseased populations,
- AP increased the incidence of STEMI but did not affect in-hospital STEMI mortality.

Results

Table 2. Temperature and air pollution levels in Belgium, 2009 – 2013.

	Percentiles					Mean ± sd	EU 2008 * Air Quality Standards (1 year Averaging period)
	5%	25%	50%	75%	95%		
Temperature (°C)	-1.1	6.0	11.0	15.7	20.8	10.6 ± 6.7	
PM ₁₀ (µg/m ³)	10.0	14.9	20.2	29.3	50.2	23.9 ± 13.2	→ 40 µg/m ³
PM _{2.5} (µg/m ³)	5.1	8.2	12.4	20.4	39.8	16.1 ± 11.4	→ 25 µg/m ³
NO ₂ (µg/m ³)	10.3	15.9	22.0	30.1	42.4	23.7 ± 10.2	→ 40 µg/m ³
O ₃ (µg/m ³)	10.9	28.8	42.0	54.2	71.3	10.6 ± 6.7	→ (N.A for 1 year)

Abbreviations: PM₁₀: particulate matter with aerodynamic diameter < 10µm; PM_{2.5}: particulate matter with aerodynamic diameter < 2.5µm; NO₂: nitrogen dioxide.

*: Directive 2008/50/EC



Conclusions

We observe for the first time at a national level, and despite clear observance of EU air quality guidelines, that:

- 1) Particulate and NO₂ air pollution are associated with an increased risk of STEMI of respectively 2.8 and 5.1% for each 10 µg.m⁻³ rise.**
- 2) The detrimental impact of NO₂ exceeds that of fine particles and this may be of particular concern in the younger population,**
- 3) Despite increased risk of occurrence, no association between air pollution and mortality of STEMI was observed.**

