Evidence suggests **air pollution is linked to cognitive decline and dementia**: mechanisms unknown

Polluted air exposure might **increase brain amyloid-β (Aβ)** deposition

**Homocysteine/methionine** imbalance → oxidative stress, vascular damage → implications for brain health

How do tHcy and methionine influence the air pollution-dementia pathway? What is the role of CV diseases?

Work is grounded on a cohort study with extensive air pollution data and dementia evaluations
Population: Stockholm  

Visits at research center, interviews, clinical evaluation, lab exams, occupation history/retirement

3-step procedure, testing (CDT, MMSE, story, counting); senior neurologists' final say, DSM-IV criteria

Cardiovascular diseases included (ICD-10 coding): ischemic heart disease, heart failure, stroke, AF

Air pollution: PM$_{2.5}$ and NO$_x$ levels, dispersion modeling emission inventory (years: 1990, ‘95, 2000, ‘05, ‘11)

Serum analysis: nonfasting blood samples, tHcy and methionine levels (mass spectrometry)

Statistical analyses: Cox models for dementia risk, 5-year PM$_{2.5}$ and NO$_x$ averages
Developed dementia (376 cases): less educated, likely to be male, retired less than 65 years old, higher THcy

70% elevated hazard of dementia for each unit increase in PM$_{2.5}$ exposure over 5 years

Higher homocysteine levels: mediated/interacted ± 50% of PM$_{2.5}$ total effect on dementia

Elevated methionine: ± 30% reduction in the dementia hazard (associated w/ PM$_{2.5}$ exposure, excluding CV risk)

The findings related to dementia risk were less relevant for NO$_x$ compared to PM$_{2.5}$

Even when excluding incident cardiovascular conditions: interactions remain
What the paper mainly adds?
Highlights association between long-term PM$_{2.5}$ air pollutant exposure and higher dementia risk. Homocysteine and methionine play a role in modulating the effects of air pollution on dementia.

Limitations
Potential limitations in assessing air pollution exposure, especially for participants who relocated. Observational study with no biological characterization of dementia subtypes.

Implications for clinicians
Environmental factors should be considered in dementia risk assessments. Elevated homocysteine may serve as a potential biomarker for dementia risk if the exposure exist.

What comes next?
Understand mechanisms and explore interventions: ↓ air pollution to ↑ brain health.