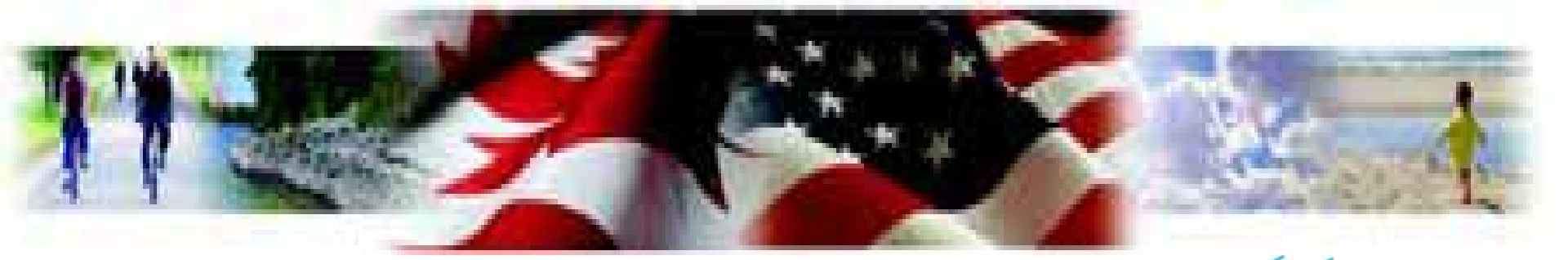
US EPA ARCHIVE DOCUMENT



Healthy Environments and Consumer Safety Branch

HEALTH EFFECTS OF WINDSOR AIR POLLUTION ON DIABETIC PATIENTS AND PREGNANT WOMEN

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Canada

WHY CONDUCT STUDY ON DIABETICS?

- Epidemiological evidence:
  - Air pollution increases the risk of cardiovascular mortality and morbidity, e.g. myocardial infarction
  - Diabetic patients appear to be more susceptible
    - Mortality study conducted in Montreal (Goldberg et al., 2000)
    - CVD hospitalizations in the U.S.
  - Diabetics: Cross-sectional association between PM2.5 and reduced vascular reactivity (O'Neill et al., 2005)
- Uncertainty: Mechanistic evidence is still limited

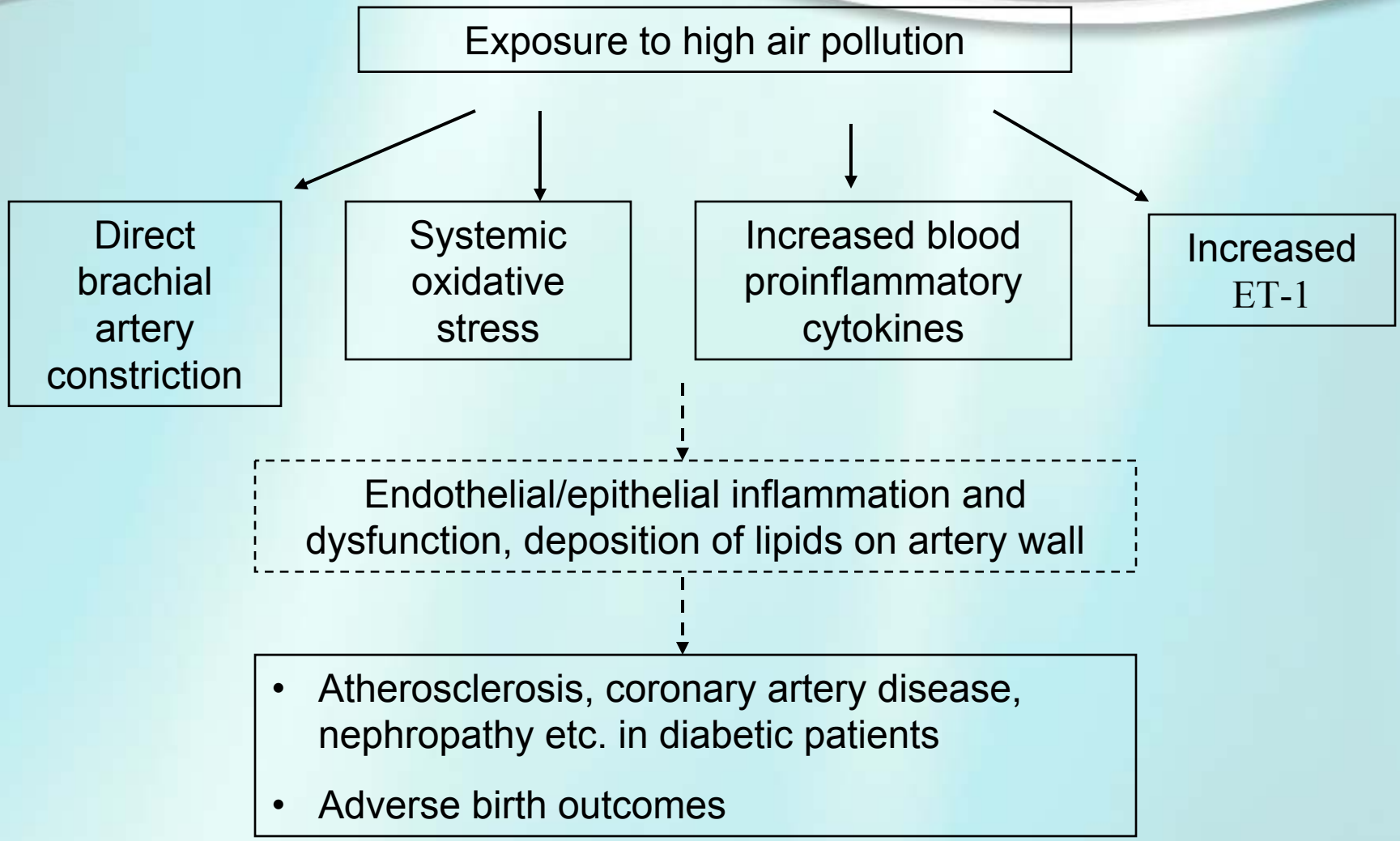
WHY CONDUCT STUDY ON BIRTH OUTCOMES?

- Epidemiological evidence:
  - Exposure to ambient PM is associated with low birth weight (LBW)
  - Exposure to PM is associated with infant mortality; the association was stronger for LBW infants than for normal-birth-weight infants
- Question: Does exposure to air pollution during pregnancy cause physiological/biochemical changes which subsequently result in adverse birth outcomes?

DIABETICS AND PREGNANT WOMEN ARE VULNERABLE

- Diabetic patients:
  - Diabetics tend to have higher blood levels of proinflammatory cytokines and oxidative stress - alter cardiovascular system
  - Cardiovascular disease, atherosclerosis and nephropathy are major complications of diabetes mellitus
- Pregnant women:
  - They experience rapid physiological changes during pregnancy
  - The developing embryo is sensitive to changes in environment
  - Biological changes in maternal blood, e.g. proinflammatory cytokine levels and reactive oxygen species, are associated with adverse birth outcomes
    - pre-term births
    - Low weight & length

HYPOTHESIS


Exposure to high air pollution
Direct brachial artery constriction
Systemic oxidative stress
Increased blood proinflammatory cytokines
Increased ET-1
Endothelial/epithelial inflammation and dysfunction, deposition of lipids on artery wall
• Atherosclerosis, coronary artery disease, nephropathy etc. in diabetic patients
• Adverse birth outcomes

DIABETES STUDY PROCEDURE

Recruitment:

- 25 patients
- 18-50 year old
- Type I/II diabetes
- No heart & lung conditions
- Non-smokers
- Visited a Windsor clinic once a week for 6-7 weeks, 0.5 hours each time

- Personal PM10
- EC pollution data
- Spatial pollution data

STUDY PROCEDURE
-Pregnant women pilot study

Recruitment:
- 10 pregnant women (6 patients so far)
- Non-smokers
- No heart & lung conditions
- Visit Ottawa Hospital once each trimester

•EC pollution data