Presenter

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CARDIOVASCULAR DISEASE, THE ENVIRONMENT, AND CLIMATE CHANGE
Environmental Cardiology

- Cardiovascular disease is an inherently environmental disease
- Environmental influences play major roles in CVD
- Risk is imparted from the natural, built, personal, and community environments
- The cardiovascular system is particularly vulnerable to environmental air pollutants
Global Burden of Disease Attributable to Leading Risk Factors

CVD and Air Pollution

Lancet 380, 2224-60, 2012
Particulate Air Pollution

PM is derived from many different sources

- Wood-Burning Stoves
- Forest Fires
- Heavy Duty Diesel Engines
- Natural Sources
- Cars and Trucks
- Non-Road Vehicles
- Leaf Burning
- Industrial Sources
PM sources vary by geographic location

Sources of PM in Midtown Manhattan

- Diesel (52%)
- Automobile (63%)
- Sea Salt (5%)
- Residual (1%)
- Iron (4%)
- Road Dust (3%)
- Ammonium Sulfates (3%)
- Ammonium Nitrate (13%)

Bar charts for different locations:
- Boston
- St Louis
- Knoxville
- Portage
- Steubenville
- Topaka

- **Residual**
- **Mn**
- **Salt**
- **Mobile**
- **Crustal**
- **Coal**

Percentage bars for each location.
Geographic Distribution of PM

Modeled Fine Particle Surface

Summary Figure 1: Spatial distribution of fine particles.
Premature Mortality Risk Attributable to PM$_{2.5}$

Deaths per 100,000 adults

Do Environmental Exposures Affect CAC Levels?

Primary End Points: Circulating CACs and urinary acrolein metabolite HPMA
Early Progenitor Cell levels are Increased With Road Way Proximity

### Adjusted Association between roadway proximity and CAC levels

<table>
<thead>
<tr>
<th>CAC population</th>
<th>Total population, n=151</th>
<th>6-month residential duration, n=73</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>p-value</td>
</tr>
<tr>
<td>CAC-4 (CD31+/34+/45+/AC133+)</td>
<td>-0.705</td>
<td>0.029*</td>
</tr>
<tr>
<td>CAC-5 (CD31+/AC133+)</td>
<td>-0.730</td>
<td>0.001*</td>
</tr>
<tr>
<td>CAC-11 (AC133+)</td>
<td>-0.620</td>
<td>0.005*</td>
</tr>
<tr>
<td>CAC-14 (CD34+/45+/AC133+)</td>
<td>-1.260</td>
<td>0.007*</td>
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The Green Heart Project: Assess the impact of urban vegetation on air pollution and cardiovascular health.
INCREASE IN CVD MORTALITY

YEARS OF ASH BORER INFESTATION

Hypothesis
Exposure to neighborhood greenspace diminishes cardiovascular disease risk by decreasing levels of ambient air pollution

Study Aims
• Examine baseline cardiovascular health in two demographically-matched neighborhoods with low greenspace

• Determine how increasing greenspace affects neighborhood characteristics

• Assess the impact of increasing neighborhood greenspace on cardiovascular health
Green for Good Project
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ENVIRONMENTAL CARDIOLOGY