

The Effect of Occupational Exposures to Aircraft Ultrafine Particles on Acute Cardiorespiratory Health, and Control Using Personal Protective Equipment

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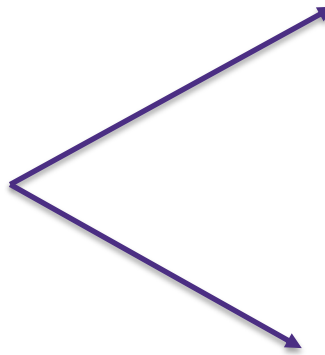
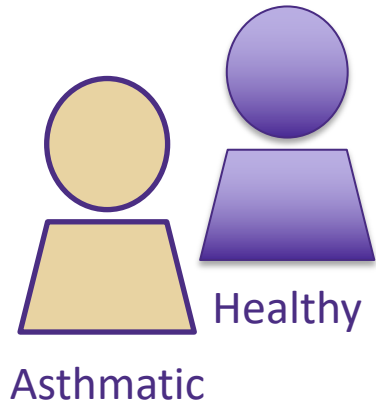
Research Question

- > **Are there short-term cardiorespiratory health effects related to exposure to aircraft-related ultrafine pollution at the concentrations present in the community?**

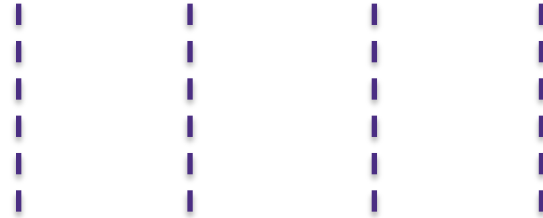
Evidence from previous studies

- > Habre, et al., 2018 study in LA compared asthmatic adults walking in an area affected by aircraft pollution vs walking in an area “not affected” by aircraft pollution.
- > Study found evidence of increased inflammatory marker (IL6) in blood when walking in the aircraft area
- > But roadway traffic contributed to different cardiorespiratory health risks (lower FEV1 and elevated sTNFrII)
- > But, some limitations of the study

Mariah's Pilot crossover study



Exposed to UFPs



Not-exposed to UFPs



Baseline 30m 60m 90m

Health measurements at different times

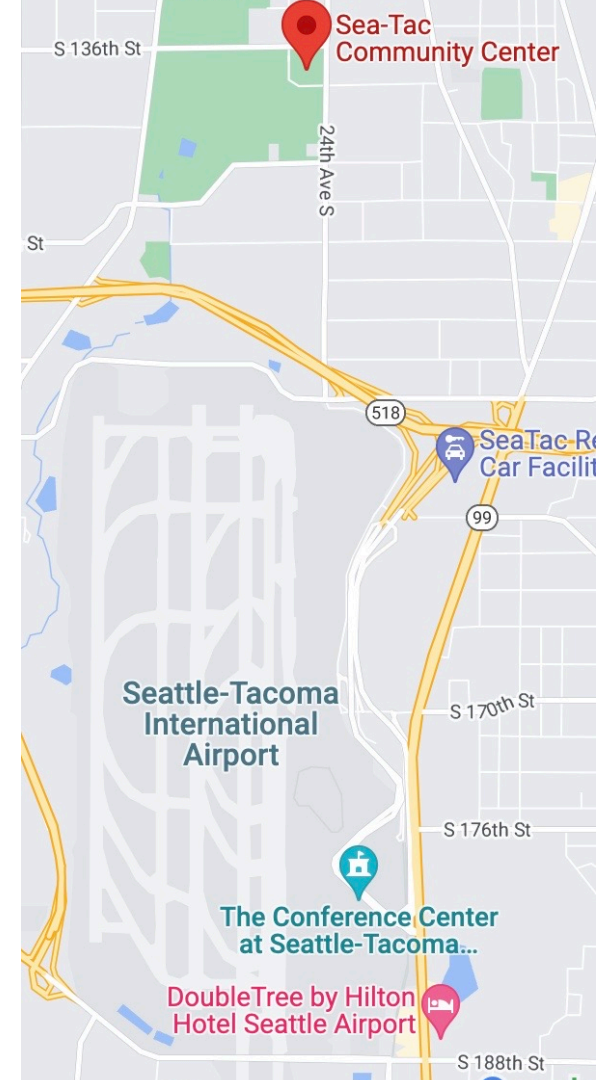
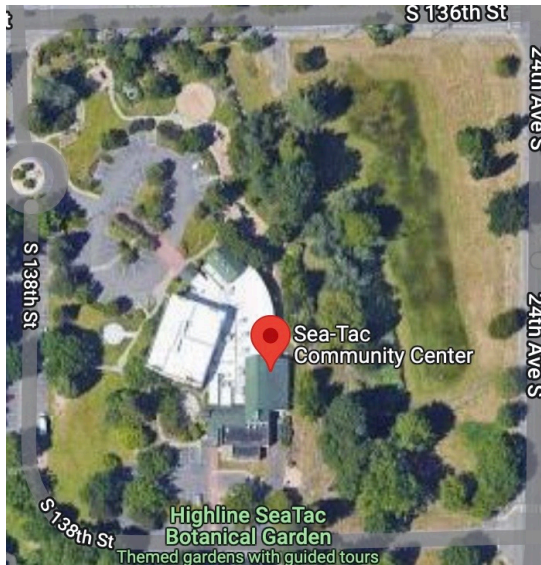
Method for Controlling Exposure



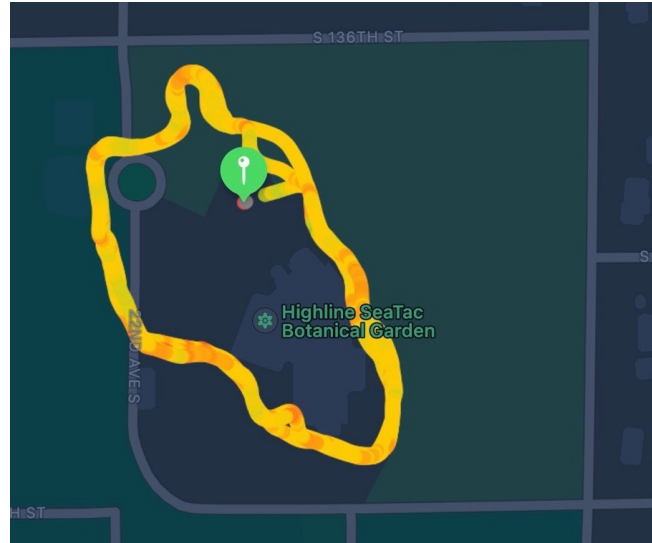
- > **Powered Air Purifying Respirator (PAPR)**
 - “Non-exposure” when installed with HEPA + VOC filter
 - “Exposure” when installed with a sham filter

Study Location

SeaTac Community Center: 13735
24th Ave S, SeaTac, WA



Study Design (cont.)



Baseline Health Measurements	15 Min Walk	2 Min Rest	15 Min Walk	2 Min Rest	30 Min Health Measurements	2 Min Rest	15 Min Walk	2 Min Rest	15 Min Walk	2 Min Rest	60 Min Health Measurements	2 Min Rest	15 Min Walk	2 Min Rest	15 Min Walk	2 Min Rest	90 Min Health Measurements
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Data Collection: Exposure Assessment



TSI OPS 3330: PM (#/cc)
TSI NanoScan SMPS: UFPs
(#/cc)
microAeth AE51: BC
(ng/cc)
Aerodyne CAPS: NO₂ (ppb)
3M SoundDetector SD-
200: Noise

Data Collection: Health Measurements



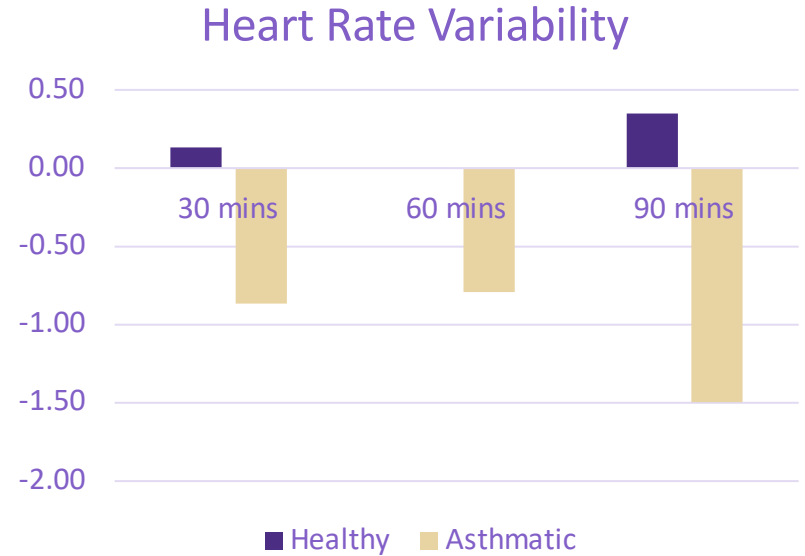
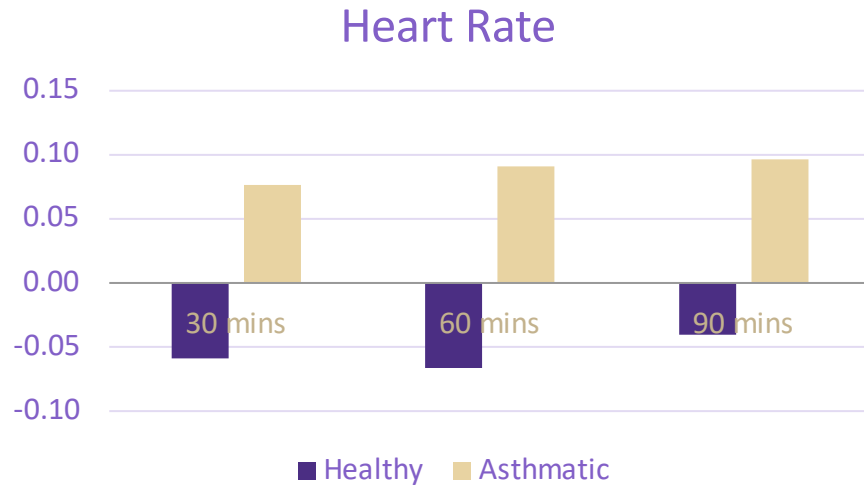
Instrument/M Measurement	Health Outcome
Stress EMA	tense/anxious, anger/hostility, depression, frustration, unhappiness
Stroop Test	Congruent, incongruent, Stroop effect
Pulse Oximeter	%SpO2, HR, PI
Omron BP	SBP, DBP, HR
Apple Watch	HR, HRV
Spirometer	FEV1, FVC, PEF, FEV1/FVC

For the Pilot Study:

- 2 asthmatics
- 2 non-asthmatics

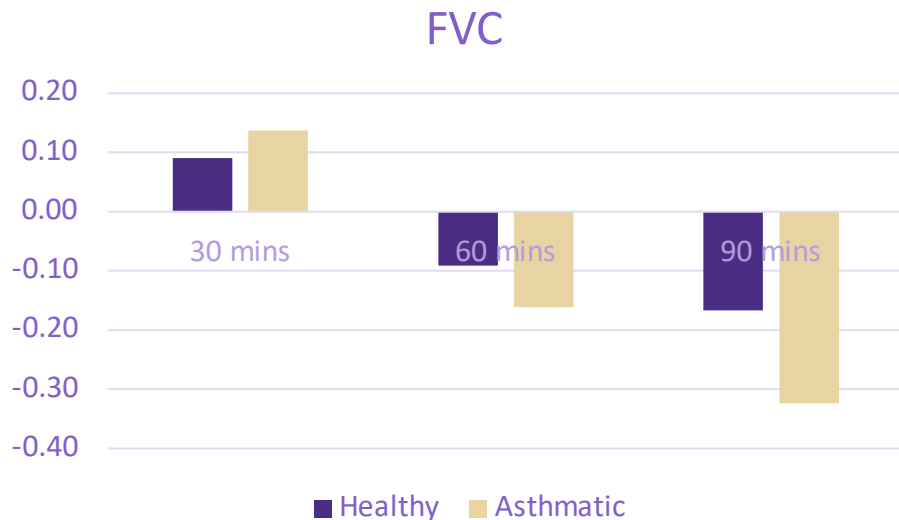
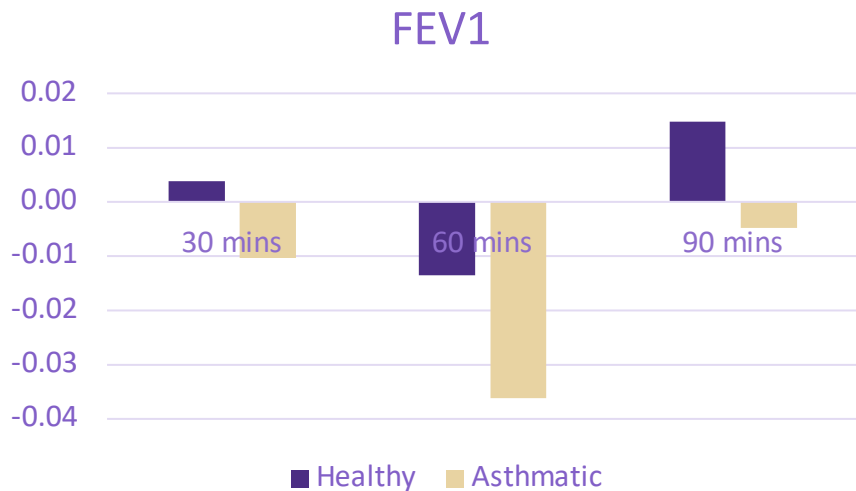
Short-term Cardiovascular Impacts

Baseline Adjusted Relative Differences



Short-term Respiratory Impacts

Baseline Adjusted Relative Differences



Findings of the pilot study

- > The PAPR was effective in assigning experimental exposures
- > Some evidence of potentially both short term cardiovascular and respiratory differences within exposure
- > However, the number of study participants was too small to make definitive conclusions. Preliminary findings suggest it would be worthwhile to conduct a larger study

Questions?