

# INFLAMMATORY RESPONSES TO AMBIENT ULTRAFINE AND FINE PARTICLES IN PATIENTS UNDERGOING CARDIAC REHABILITATION

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**Background:** Airborne particle concentrations have been associated with myocardial infarction and cardiac arrhythmia, but the mechanisms underlying these associations are not completely understood. Therefore, we examined associations between markers of inflammation and ambient concentrations of fine and ultrafine particles in a panel of exercising patients with recent acute cardiovascular events.

**Methods:** We enrolled 75 patients from the Cardiac Rehabilitation program at the University of Rochester Medical Center, who had a recent coronary event (myocardial infarction or unstable angina). Ninety percent had undergone stenting or bypass. Counts of particles 10 to 500 nm were measured continuously outdoors at the site. Fine particle concentrations (PM<sub>2.5</sub>) were measured continuously ~5km from the site. The exercise program involved supervised, graded twice weekly exercise sessions for 10 weeks, with fibrinogen, white blood cell count (WBC), and C-reactive protein (CRP) concentrations measured in blood samples taken once/week. Using mixed models, we examined changes in fibrinogen, CRP, and WBC associated with interquartile range (IQR) increases in mean ambient concentrations/counts of PM<sub>2.5</sub> and particles 10-500nm (UFP) over the previous five 24 hour periods (lag hours 0-23, 24-47, 48-71, 72-95, and 96-119).

**Results:** Each IQR increase in UFP was associated with significant increases in CRP (lag hours 0-23; 0.067 mg/L; 95% CI = 0.000-0.133 mg/L) and fibrinogen (lag hours 24-47; 0.13 g/L; 95% CI = 0.05-0.21 g/L), while each IQR increase in PM<sub>2.5</sub> concentration was associated with a significant increase in fibrinogen (lag hours 24-47; 0.09 g/L; 95% CI = 0.01-0.16 g/L). Smaller non-significant increases in fibrinogen and CRP were observed at other lag times. WBC was not associated with UFP or PM<sub>2.5</sub> at any lag time.

**Conclusions:** In patients undergoing cardiac rehabilitation, ultrafine/fine particles were associated with increases in inflammation markers, factors predisposing to increased risk of cardiovascular events in post-infarction patients.