

## **Effects of Acute Cold Exposure on Plasma Biomarkers Associated with Cardiovascular Disease Risk.**

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### ABSTRACT

**Background and Aims:** The underlying cause of the majority of the cases of CVD is atherosclerosis, which is a condition initiated and progressed by chronic inflammation and hyperlipidemia. We are interested in evaluating the efficacy of cold-exposure to increase shivering- and non-shivering thermogenesis energy expenditure (RMR) as a non-pharmaceutical weight loss tool analogous to low intensity exercise.

Naturally, we are concurrently evaluating the possible effects of cold exposure on risk factors associated with CVD risk. Inflammatory cytokines and lipid mediators are used as biomarkers for CVD risk. This proposed study aims to measure cardiovascular inflammatory and lipid biomarkers to expand our knowledge of cold exposure and CVD risk. The two biomarkers collected during this study were Interleukin-1 Beta (IL- $\beta$ ) and Chemokine Ligand 2 (CCL2). The hypothesis was that there would be no change in biomarker values before and after cold exposure.

**Methods:** Twenty subjects were recruited and subjected to a 30-min cold exposure test while a metabolic cart collected metabolic data via indirect calorimetry. Venous plasma collected at: pre cold exposure, immediately after cold exposure, and 2 hours post cold exposure was centrifuged for subsequent biomarkers analysis.

**Results:** RMR increases dramatically during acute cold exposure during shivering and remains increased 5 minutes after the cessation of shivering. Five minutes post-cold exposure, RMR rapidly decreases to pre-cold exposure RMR and is maintained for up to 120 minutes. There was no change in CCL2 values when comparing the three stages. IL- $\beta$  values increased between blood draws immediately after cold exposure and 2 hours post cold exposure, however this increase was not statistically significant.

**Conclusions:** With these pilot results, we conclude that cold exposure has no effect on biomarkers for CVD risk. However, this study was limited by 1) accuracy of analysis techniques, 2) cold exposure protocol, 3) analysis of only two representative biomarkers. Further biomarker analysis is underway for a more comprehensive picture of the purported cold exposure effects.

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