

## **Effects of Partial Hot Water Immersion on Postprandial Blood Glucose and Heart Rate Variability**

JEFF MOORE, & MICHAEL BUONO

San Diego State University; San Diego, CA  
The Lundquist Institute for Biomedical Innovation at Harbor UCLA Medical Center;  
Torrance, CA

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*Advisor / Mentor: Buono, Michael (mbuono@sdsu.edu)*

### **ABSTRACT**

The acute effects of heat therapy on glycemic markers oppose those of the chronic effects. While the postprandial glucose response is exaggerated during whole body heat exposure, chronic heat exposure lowers HbA1c. Additionally, the acute effects of heat therapy differ depending on the amount of body exposed to heat. Heating a single hand does not increase fasting glucose and lowers postprandial glucose. The opposing effects of partial and whole body heat exposure could be mediated in part from increased sympathetic nervous system (SNS) activity following heat stress. While heating the body increases muscular blood flow and glucose uptake, SNS activation via heat exposure increases catecholamines which inhibit insulin-mediated glycogenesis, increase glycogenolysis, and increase gluconeogenesis elevating blood glucose. **PURPOSE:** In this experiment we compare glucose tolerance during partial heat exposure to either the feet only or up to the calves via hot water (40°C) to a thermoneutral control condition while monitoring SNS activation via heart rate variability (HRV) in healthy subjects (N=28). **METHODS:** Participants consumed 75 grams of dextrose with glucose measurements at baseline and every 30 minutes for 2 hours with heat exposure throughout. We expect decreased PBG with no change in HRV following feet heating and increased PBG with an increase in HRV following calf heating compared to the thermoneutral control condition. **RESULTS:** There was no interaction between time or condition for blood glucose ( $F(8, 252) = 1.567, p=.135$ ). There was an interaction between time and condition for HRV ( $F(8, 239) = 6.760, p<.0001$ ). HRV was lower during calf heating versus control at 30 (-12%,  $p=0.014$ ), 60 (-17%,  $p=.0009$ ), 90 (-21%,  $p<.0001$ ) and 120 min (-20%,  $p<.0001$ ). **CONCLUSION:** Partial heat exposure to the feet or calves did not affect blood glucose but calf heating did decrease HRV.