

## **Passive Hyperthermia Therapy Similarly Reduces Arterial Blood Pressure in Obese Type 2 Diabetic and Healthy Individuals**

Rivas E<sup>1,2</sup>, Newmire D<sup>1</sup>, Crandall CG<sup>2</sup>, and Ben-Ezra V<sup>1</sup>

<sup>1</sup> Department of Kinesiology; Texas Woman's University; Denton, TX

<sup>2</sup> Thermal and Vascular Physiology Laboratory; Institute for Exercise and Environmental Medicine; Texas Health Presbyterian Hospital of Dallas; TX and the University of Texas Southwestern Medical Center; Dallas, TX

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*Category: / Doctoral*

*Advisor / Mentor: Vic Ben-Ezra*

### ABSTRACT

Diabetes which is associated with poor glycemic control, can damage macro and microvasculature, and impair vascular relaxation (i.e., endothelial dysfunction). The high thermal conductance of hot water will cause thermoregulatory adjustments that increase cardiac output, heart rate and stroke volume while reducing central venous pressure. This project tested the hypothesis that an acute bout of hot water hyperthermia will reduce arterial blood pressure during and following the exposure, but the response will be attenuated in obese type 2 diabetics. Eleven obese type 2 diabetics (T2D) (50.1 ± 12 y, 45 ± 7.1% fat mass, 7.5 ± 1.8% HbA1C) and nine similarly aged healthy controls (HC) (41.1 ± 13.7y; P=0.185, 33.4 ± 7.8% fat mass; P=0.009, 5.3 ± 0.4%, HbA1C; P=0.007) with similar resting blood pressures (T2D: 125 ± 27 / 77 ± 14, HC: 122 ± 14 / 81 ± 10, P>0.05) were assessed. Subjects underwent a whole body passive heated stress (1 hour resting in 39.4 ± 0.4°C water) followed by 1 hour post immersion sitting recovery under normal ambient temperatures. Both groups were similarly heat stressed ( $\Delta T_{re}$ , 1.4 ± 0.4°;  $\Delta T_{sk}$ , 6.5 ± 0.8; and  $\Delta HR$  from rest, 33.5 ± 8.3 bpm) at the end of hot water immersion. In comparison to pre-immersion values, there was no interactive effect for mean arterial blood pressure (MAP, time x group; P=0.145). In both groups MAP was reduced (P<0.01) from minute 10 ( $\Delta MAP$ , T2D: 10.2 ± 5.5, HC: 14.8 ± 8.4) through minute 60 of immersion (T2D: 12.8 ± 8.1, HC: 13.9 ± 11.2) and remained below pre-immersion values (P=0.004) up to 20 minutes post immersion (T2D: 10.8 ± 9.6, HC 7.6 ± 6.8 mmHg). These data indicate that passive hyperthermia therapy results in similar hypotensive responses between groups. Thus, passive heat stress may offer a therapeutic benefit to both healthy and diabetic populations.