TACSM Abstract

Acute Effect of Hyperglycemia on the Mechanoreflex and Metaboreflex

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ABSTRACT

Recent studies in both humans and rodents have shown that the mechanoreflex and metaboreflex are exaggerated in type 2 diabetes mellitus (T2DM). Hyperglycemia is a main characteristic of T2DM and is known to cause damage to both cardiovascular and nervous system structures. However, the acute effect of the presence of hyperglycemia on the mechanoreflex and metaboreflex are not known. **PURPOSE**: To determine the acute effect of hyperglycemia on the mechanoreflex and metaboreflex. **METHODS**: Experiments were conducted after an overnight fast in unanesthetized, decerebrated healthy male and female Sprague-Dawley rats. The mechanoreflex was evoked by stretching the Achilles tendon for 30 s whereas the metaboreflex was evoked by locally injecting lactic acid (0.2ml, 24mM) into the hindlimb. Time and dosage for glucose infusion were selected based on a preliminary study that showed infusing 250 mg/ml of glucose solution for 15 min into the hindlimb circulation, with blood flow to and from the hindlimb restricted, would elevate local blood glucose concentration to the same degree as that seen in T2DM rats with an exaggerated exercise pressor reflex. To elicit an acute local hyperglycemic environment, while preventing an endogenous insulin response, somatostatin (3.9 ug/100 ul) was infused systemically and simultaneously with the local glucose infusion. Changes in mean arterial pressure (ΔMAP) and heart rate (ΔHR) in response to tendon stretch and lactic acid injection were measured and compared before and after infusion. **RESULTS**: We found that the peak pressor and cardioaccelerator responses to tendon stretch were not significantly affected by hyperglycemia (ΔMAP before: 12 ± 2 mmHg, after: 12 ± 3 mmHg, n=6, $p>0.05$; ΔHR before: 10 ± 3 bpm; after: 10 ± 3 bpm, n=6, $p>0.05$). Likewise, the pressor and cardioaccelerator responses to lactic acid were not significantly affected by hyperglycemia (ΔMAP before: 13 ± 2 mmHg, after: 16 ± 3 mmHg, n=10, $p>0.05$; ΔHR before: 10 ± 2 bpm, after: 12 ± 5 bpm, n=10, $p>0.05$). **CONCLUSION**: The acute presence of hyperglycemia in the local circulation of the hindlimb likely does not contribute to the exaggerated mechanoreflex or metaboreflex.
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