

Influence of Perivascular Adipose Tissue and High Fat Diet on Vascular Tone

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Introduction

Atherosclerosis is a multifactorial disease process that is the leading cause of worldwide mortality. Perivascular Adipose Tissue (PVAT) has been identified to release a variety of adipokines that may influence this disease process. However, it is yet to be understood exactly how PVAT influences vascular reactivity and the influence a high fat diet might have on this relationship.

Hypothesis

We will test the hypothesis that normal PVAT in healthy individuals and low fat-fed mice has anti-contractile and pro-relaxation effects on the vessel wall. In contrast, vascular tone is significantly diminished or even reversed under obesity conditions in PVAT-dependent and PVAT-independent manner.

Methods

Wild type C57BL/6J male mice were split into two diet groups: control (n = 8) and high fat/western (n = 8). The aortas were harvested and split into thoracic and abdominal segments and each segment was further split into one with PVAT still attached and one with PVAT removed. These aortic ring segments were suspended on steel triangles attached to a force transducer while being submerged in a PSS bath. The segments were given challenges of KCl, Phenylepinephrine, and Acetylcholine and the data subsequently recorded.

Results

Mice on control diets had a statistically significant ($p < 0.05$) increase in average normalized force when stimulated by phenylepinephrine when the PVAT was removed than when the PVAT was retained. This was observed in both the thoracic and abdominal segments. Additionally, there was a statistically significant ($p < 0.05$) decrease in average relaxation in control mice thoracic aortas when PVAT was removed. There was no significant difference observed of average contractility between western diet mice and control diet mice.

Conclusions

Based on our data it seems PVAT has a protective role in aortic reactivity when fed a control low fat fed. However, high fat diet compromises the vascular protective properties of PVAT resulting in a vessel that is less compliant.

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