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Perivascular Adipose Tissue Growth and the Impact of Adrenergic Stimulation in Rats With and Without Heart Failure

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Perivascular adipose tissue (PVAT) is a type of fatty tissue that surrounds and interacts with blood vessels and consists of both brown and white adipose tissue depots (BAT, WAT). BAT is responsible for thermoregulation and energy expenditure while WAT stores energy in the form of triglycerides. Excessive accumulation of WAT has been correlated with obesity – a comorbidity for cardiovascular disease (CVD). Also, WAT adipocytes are able to release inflammatory adipokines which cause inter-arterial inflammation in the form of atherosclerotic depots leading to CVD. **PURPOSE:** The goal of the present study was to assess the expansion of WAT and BAT in aortal PVAT isolated from rats with and without heart failure in the presence and absence of β-adrenergic stimulation (isoproterenol). **METHODS:** Heart failure was induced via transverse aortic constriction (TAC). PVAT was harvested from SHAM and TAC rats and placed in Matrigel with growth media with and without isoproterenol. PVAT expansion was analyzed using Zeiss and ImageJ. **RESULTS:** After 7 days, WAT from TAC rats grew more compared to SHAM (783±129 vs 519±202 mm^3; n=4). Conversely, BAT from SHAM rats expanded more compared to TAC (755±187 vs 523±61 mm^3; n=4). In the presence of isoproterenol, angiogenesis decreases in BAT and WAT from both SHAM (from 755±187 to 5±5 and from 519±202 to 370±224 mm^3, n=4,2) and TAC (from 523±61 to 29 and from 783±129 to 86 mm^3, n=4,1) rats, demonstrating β-adrenergic stimulation blunted the expansion of WAT from TAC rats (89% decrease) more than SHAM rats (29% decrease). **CONCLUSION:** WAT from TAC rats expands more than in tissue from SHAM rats but is more responsive to β-adrenergic stimulation. Studying different interventions in the future will provide a greater biological understanding of PVAT expansion and lead to potential therapies for obesity as a result of heart disease.