



Vascular Medicine

REDUCED ENDOTHELIAL PROGENITOR CELL NUMBER AND FUNCTION IN DIABETES AND OBESITY WITH IMPROVEMENT IN MIGRATION CAPACITY AND TUBULE FORMATION FROM THYMOSIN BETA-4 TREATMENT

Poster Contributions

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Background: Diabetes and obesity are associated with endothelial dysfunction. As mature endothelial cells have limited regenerative capacity, endothelial progenitor cells (EPCs) may contribute to endogenous vascular repair and thymosin beta-4 (TB-4) may enhance EPC function. We aim to determine the number and function of EPCs in Zucker Diabetic Fatty (ZDF) rats and examine the effect of TB-4, comparing to Zucker Lean (ZL) controls.

Methods: 8-10mL of blood was collected from 20 ZDF and 21 ZL rats. Mononuclear cells were isolated using Ficoll density gradient centrifugation and grown on fibronectin-coated plates. Enumeration of EPCs was performed using flow cytometry of CD34+ and KDR+ markers. Colony-forming, migration and tubule formation assays were conducted to determine EPC function. Cells were treated with TB-4 (10ng/mL) at day 7 for all experiments for 3 days.

Results: At baseline (pre-TB-4), there was significant increase in body weight ($641 \pm 37g$ vs $434 \pm 36g$, $p < 0.0001$) and blood glucose levels ($21.2 \pm 3.2mmol/L$ vs $9.4 \pm 1.4mmol/L$, $p < 0.0001$) in ZDF rats compared to their lean controls. Both EPC number and function were significantly reduced for ZDF rats compared to ZL rats ($p < 0.05$). TB-4 treatment significantly enhanced EPC migration in both ZDF and ZL animals and increased tubule length for ZDF rats.

Conclusions: EPC number and function of in ZDF model were significantly reduced and TB-4 may be a potential novel target in improving EPC migration and tubule formation in diabetes and obesity.

Effect of Thymosin Beta-4 Treatment on EPC Number and Function in ZDF and ZL Rats

	Zucker Diabetic Fatty (ZDF)	Zucker Diabetic Fatty (ZDF)		Zucker Lean (ZL)	Zucker Lean (ZL)	
	Pre-TB-4	Post-TB-4	p-value	Pre-TB-4	Post-TB-4	p-value
Average colony forming unit	1.5 ± 0.5	2.0 ± 0.1	0.45	2.2 ± 0.8	2.5 ± 0.5	0.13
% CD34+/KDR+	2×10^{-2} - 4×10^{-3}	2×10^{-2} - 7×10^{-3}	0.65	3×10^{-2} - 5×10^{-3}	3×10^{-2} - 4×10^{-3}	0.53
Migrated cell	6.0 ± 1.7	7.3 ± 1.5	0.002	9.2 ± 2.3	10.8 ± 2.4	0.015
Mean tubule length per mm ²	3.6 ± 0.5	4.8 ± 0.5	0.03	4.8 ± 0.9	5.2 ± 0.6	0.27