

Correlates of Endothelial Function and the Peak Systolic Blood Pressure Response to a Graded Maximal Exercise Test

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Introduction

- **Subjects:**
 - 239 men with high-normal BP (aged 42.3 years)
- **Methods:**
 - symptom-limited bicycle ergometer exercise
 - followed for 5.1 years.
- **Results:**
 - Upper Quartile of BP response > Middle and Lower Quartiles response

Introduction

- **Subjects:**
 - 73 males exhibited Exaggerated Blood Pressure Response
 - control group of 117 subjects
- **Methods:**
 - treadmill exercise testing
- **Results:**
 - healthy subjects with ExBPR have almost a six fold chance of developing overt hypertension
- Sharabi et al. 2001. *Journal of Human Hypertension*.

Introduction

- **What we know:**
 - Exaggerated SBP response can be used as a marker for future hypertension
 - Markers of endothelial function can be used to predict future hypertension
- **Where Research is Limited:**
 - If there is a relationship between exaggerated SBP response and markers of endothelial function

Purpose

To examine the associations among the peak SBP response to a graded exercise stress test (GEST) and correlates of endothelial function among men with high BP.

Hypothesis

- Correlates of endothelial function would relate to peak systolic blood pressure response to a Graded Exercise Stress Test.

Methods

- 48 Healthy Men
- Caucasian
- 18-55 years
- High normal to Stage 1 hypertension
(SBP 130-159 mmHg and/or DBP 85-99 mmHg)

Study Design

- #1 Baseline BP



#3 Blood Draw



#2 Ultrasound

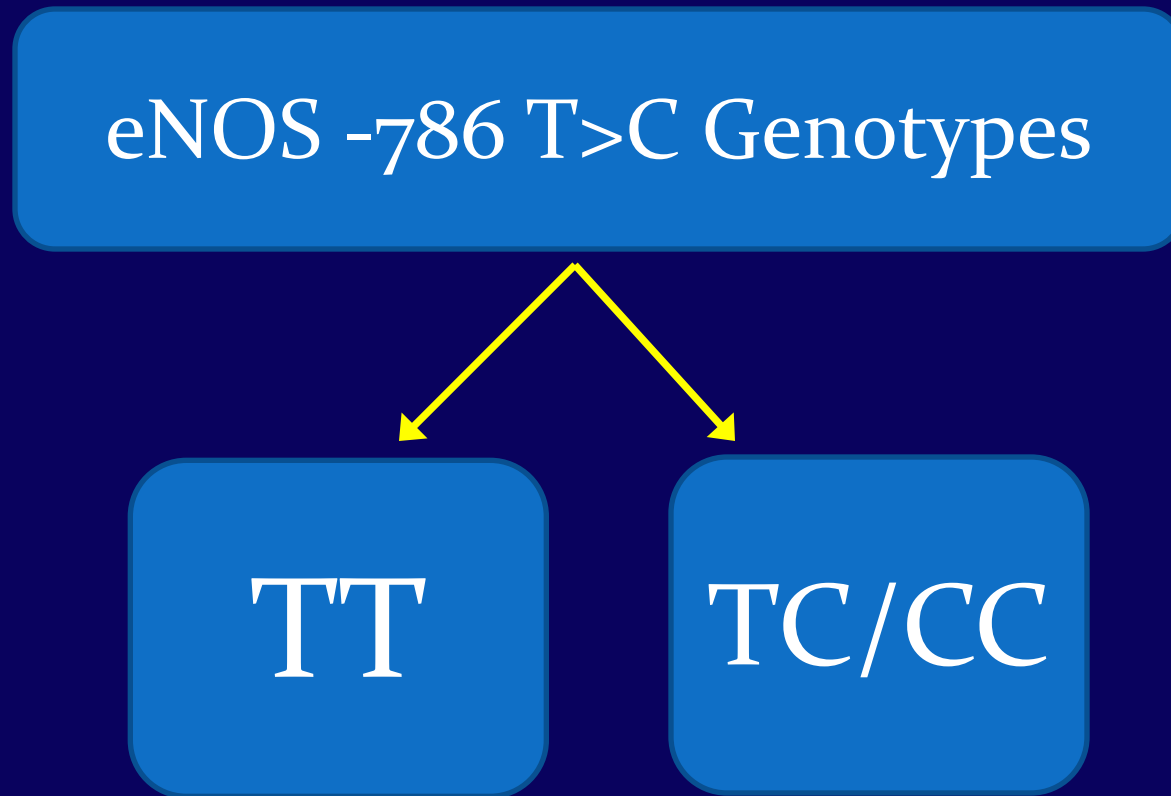


#4 Exercise Stress Test



Methods

Dominant Model



Endothelial Nitric Oxide Synthase Genotype was determined by polymerase chain reaction and restriction enzyme digestion

Results



- Means SEM
- Simple Linear Regressions
- Multiple Regressions
- SPSS 14.0 for Windows
- $p < 0.05$

Results

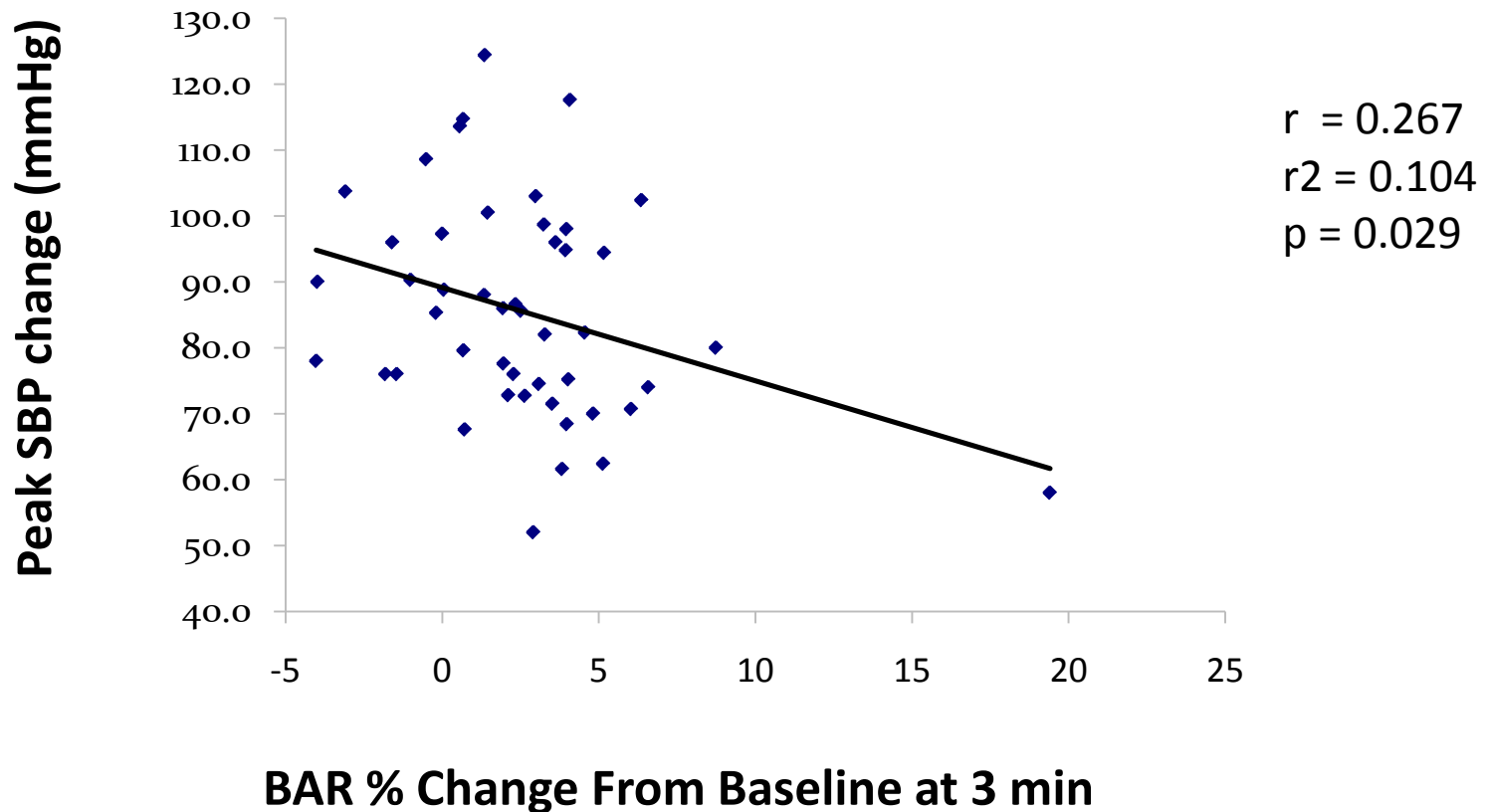
- BAR baseline @ 3 minutes
- ENOS
- Age
- VO₂ Max
- Blood Glucose
- Baseline Nitric Oxide
- Baseline SBP

Results

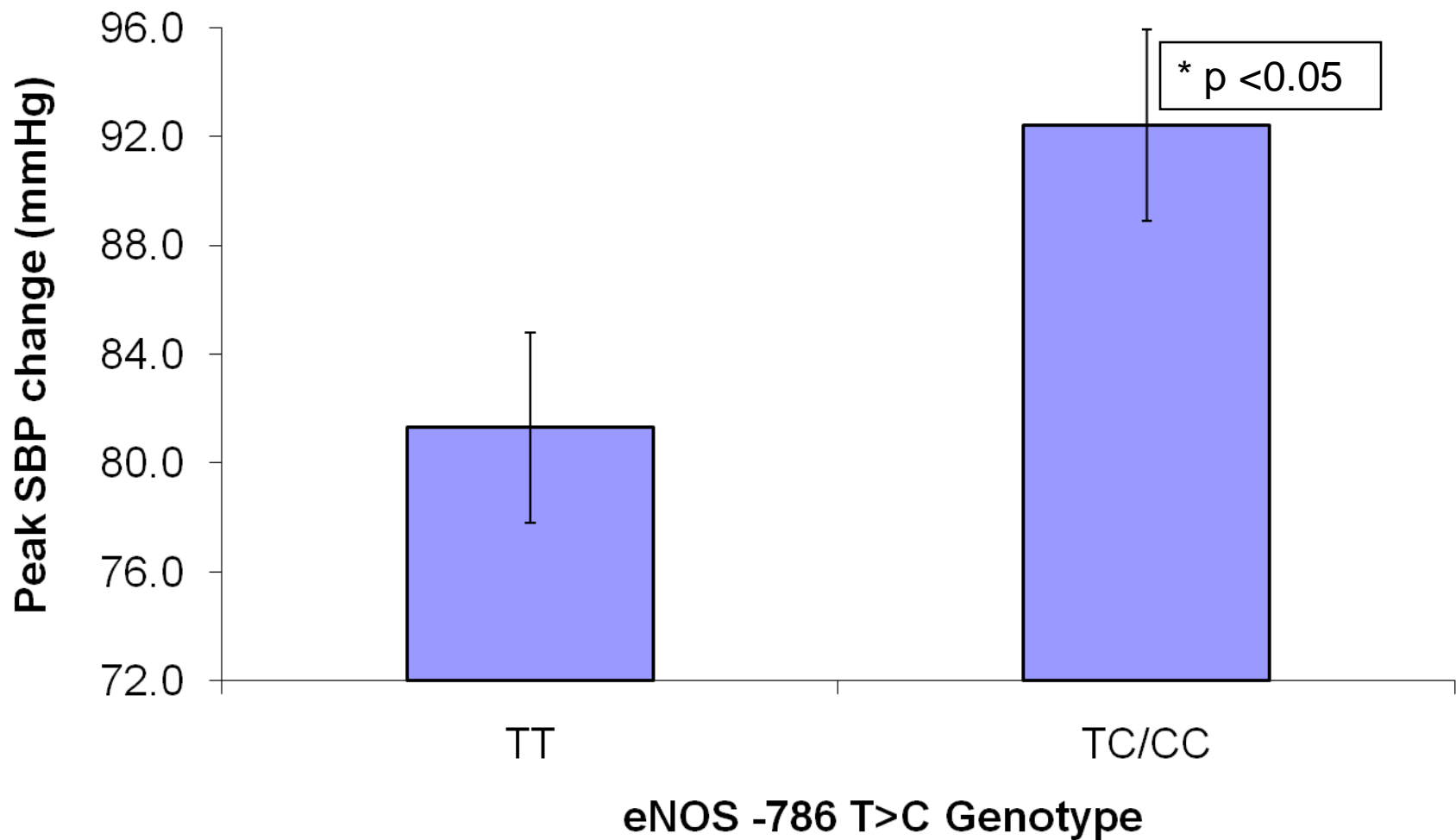
Mean (\pm SEM) Subject Characteristics (n = 48)

Characteristics	Total	ENOS TT	ENOS TC/CC
	(n=48)	(n=24)	(n=24)
Baseline NO(μ M)	0.028 0.002	0.025 0.002	0.030 0.004
Age (yr)	43.7 1.4	40.2 2.3	47.2 1.3
SBP Baseline (mmHg)	134.0 1.7	133.7 2.2	136.3 2.5
Relative Max VO ₂ (ml/kg/min)	31.1 0.1	30.4 1.3	31.8 1.3
SBP Peak (mmHg)	221.9 3.1	215.0 3.9	228.8 4.6
Brachial Artery Diameter Baseline (mm)	4.3 0.1 (n=46)	4.3 0.1 (n=23)	4.3 0.1 (n=23)

GEST Peak SBP Change from Baseline vs. BAR % Change



Average GEST Peak SBP Change from Baseline among ENOS genotype



Results

Predictors of the Peak SBP Change following a GEST

Correlates of Endothelial Function	Univariate p	Multivariate p	r ²
BAR%Δ from baseline @3min	0.029	0.170	0.104
eNOS gene (-786 T>C)	0.026	0.477	0.051
Venous Blood Glucose	0.015	0.146	0.063
Age	0.024	0.261	0.016
Relative Max VO ₂	0.037	0.369	0.014
Baseline NO	0.053	0.354	0.013
Baseline SBP	0.084	0.598	0.005
			0.267

Discussion

• ENOS gene +

• Age +

• VO₂ Max +

• Blood Glucose +

• Baseline NO +

• Baseline SBP +

• BAR % Change
at 3 min -

BAR % Change
10%
0.029



Peak SBP Change



Fasting Blood
Glucose
6%
0.015



ENOS gene
5%
0.026

Conclusion

Surrogate measures of endothelial function appear to explain a clinically significant portion of the peak SBP response to a GEST.

Further work is needed to investigate how interactions among clinical and genetic correlates of endothelial function explain the variability in the peak SBP response to a GEST.

Questions?

