

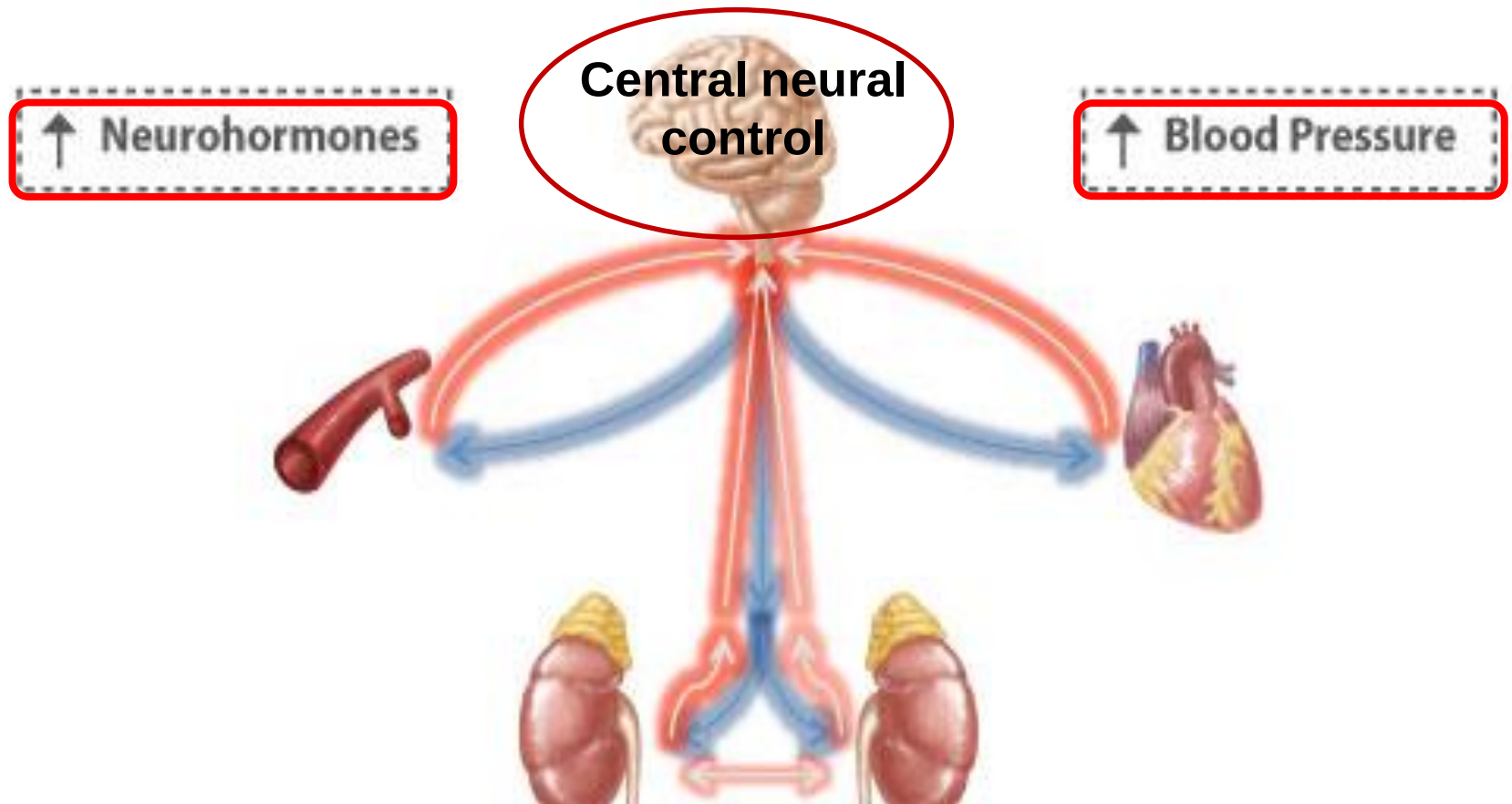
Oral Session V – Brain

Chair: A Scuteri, C McEniery



Stress-induced sympathetic activity and the retinal vasculature: the SABPA prospective study

Malan L, Smith W, Malan NT



No oxygen & glucose storage

Brain up-/down-regulates activity (homeostasis**) preventing pathology (Claude Bernard, 1878)**



Botswana

Madikwe Game Reserve

SABPA STUDY
2008-2017

bi

Pilanesberg Nat

Rustenburg

N4

Mafikeng

Mmbatho

Lichtenburg

Gauteng

North West

Potchefstroom

Klerksdorp

Vryburg

N14

Wolmaransstad

N12

Free State

Northern Cape



Exclusion criteria: Pregnancy,
Lactation, Users of α and β -
blockers, Psychotropic
substance abuse, Blood
donors / Vaccinated in
previous 3 months,
Tympanum temperature $>$
 37.5°C

2170 invited
471 Teachers assessed for eligibility
Aged 20-65 years

Baseline
409 enrolled

200 Blacks

209 Whites

3 year follow-up
N=359

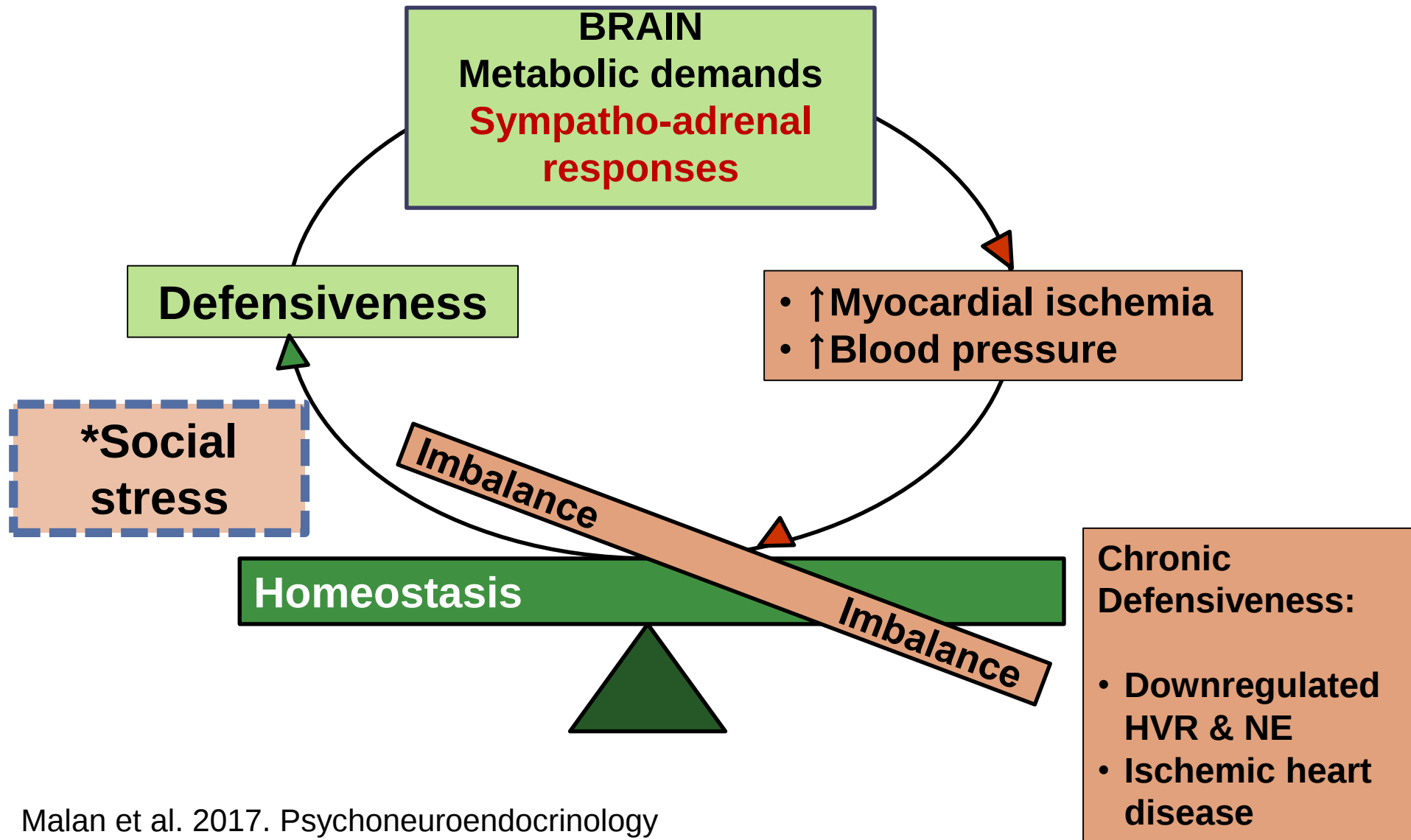
7 Deceased; 20 Losses
173 Blacks

Excluded:
65 unusable optical images
and missing data;
1 stroke case;
15 HIV infected

2 Deceased; 21 Losses
186 Whites

N=342, 40-54yrs

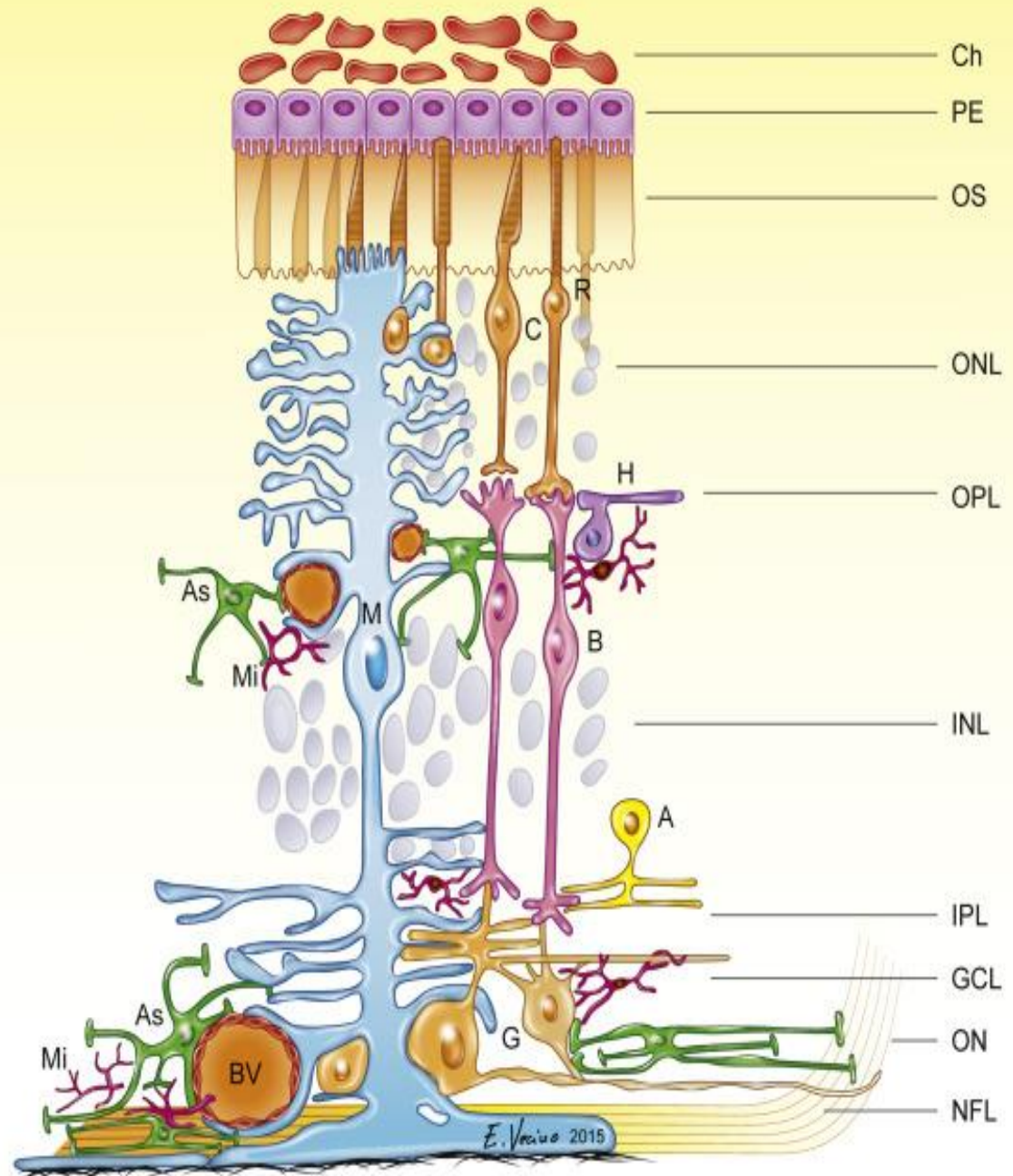
Cardiac injury and perfusion



Retina

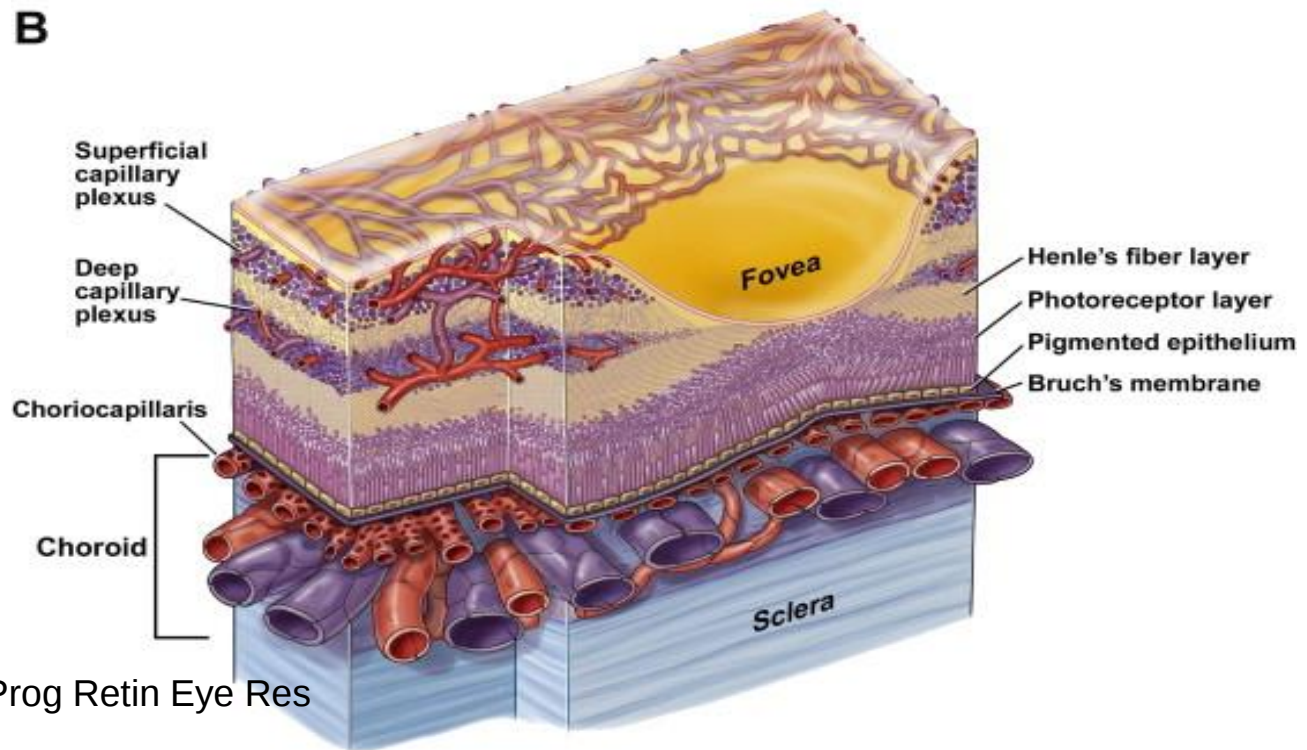
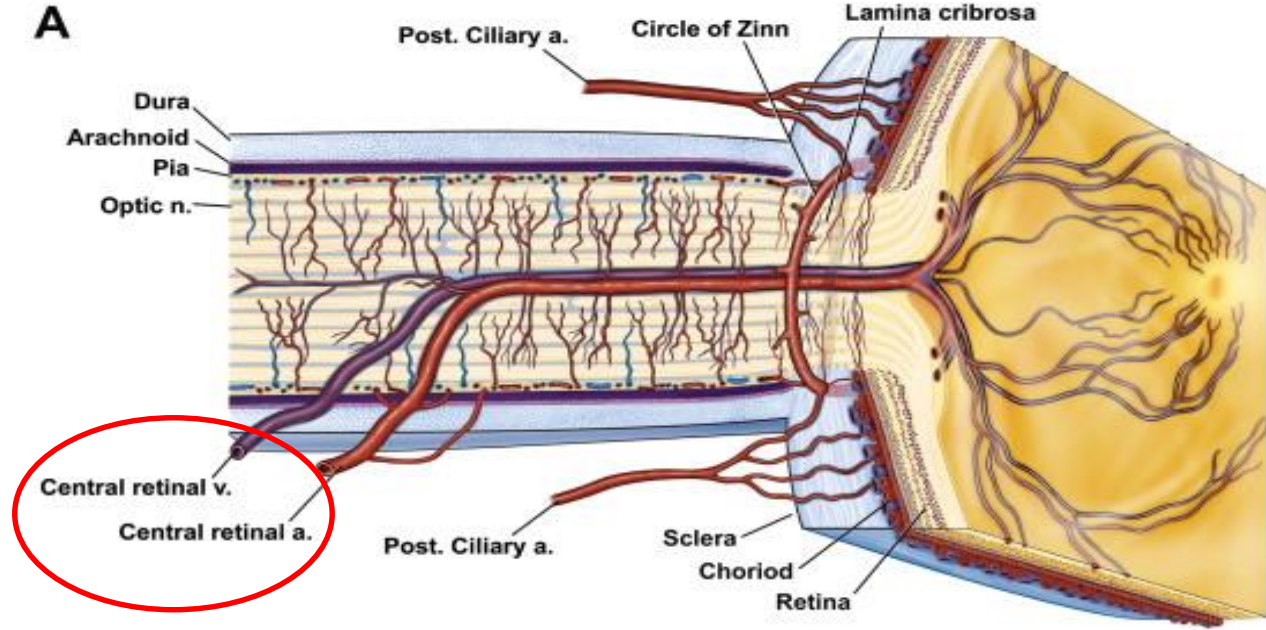
**Blood-F
similar to B**

Microvascular end
glial cells & blood
'neurovascular uni



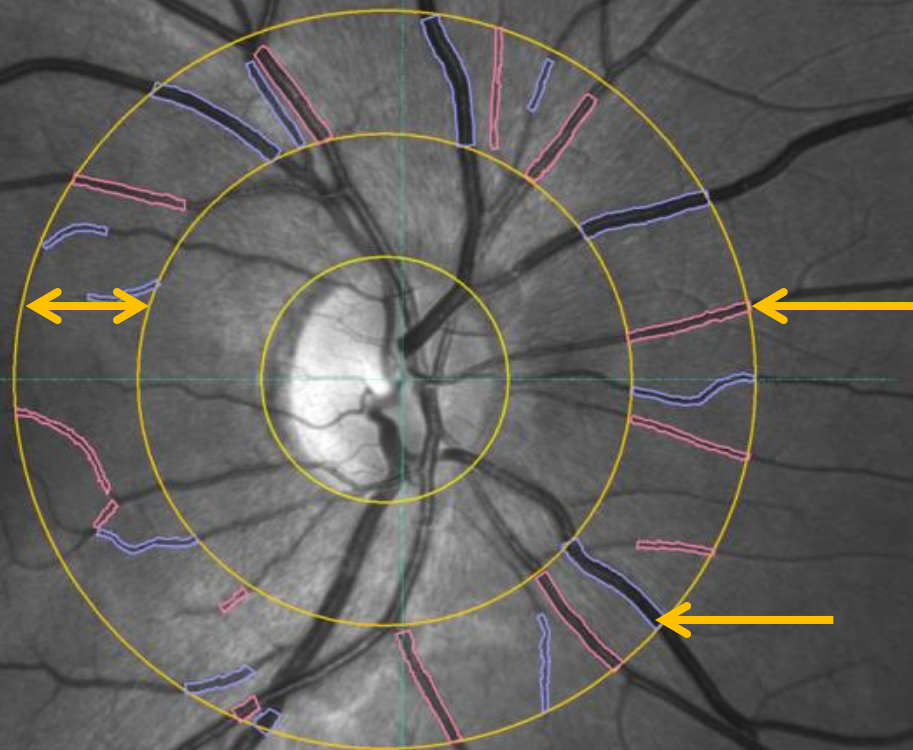


Mydriatic eye & Retinopathy signs
(Ophthalmologist)



AVR: 0.87

0.5-1.0 optic disc
diameter



Endothelial dysfunction reflected in:

Arteriolar narrowing

Hypertension

Venular widening

Hyperglycaemia, *stroke risk marker*

Next challenge? Quantify stress hormone levels (Norepinephrine and Cortisol) - retina

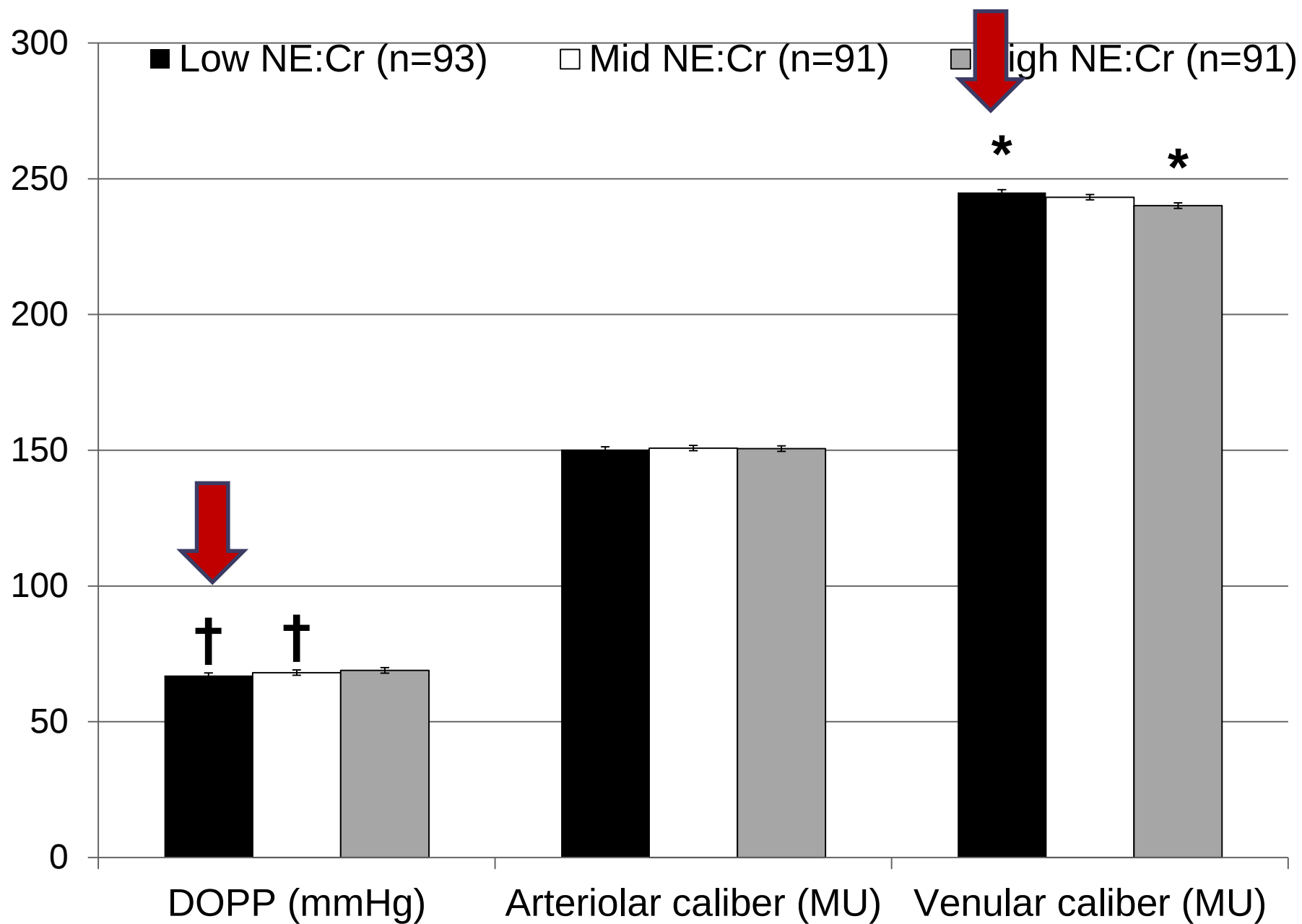
Interaction term (stress hormones)

fitted for

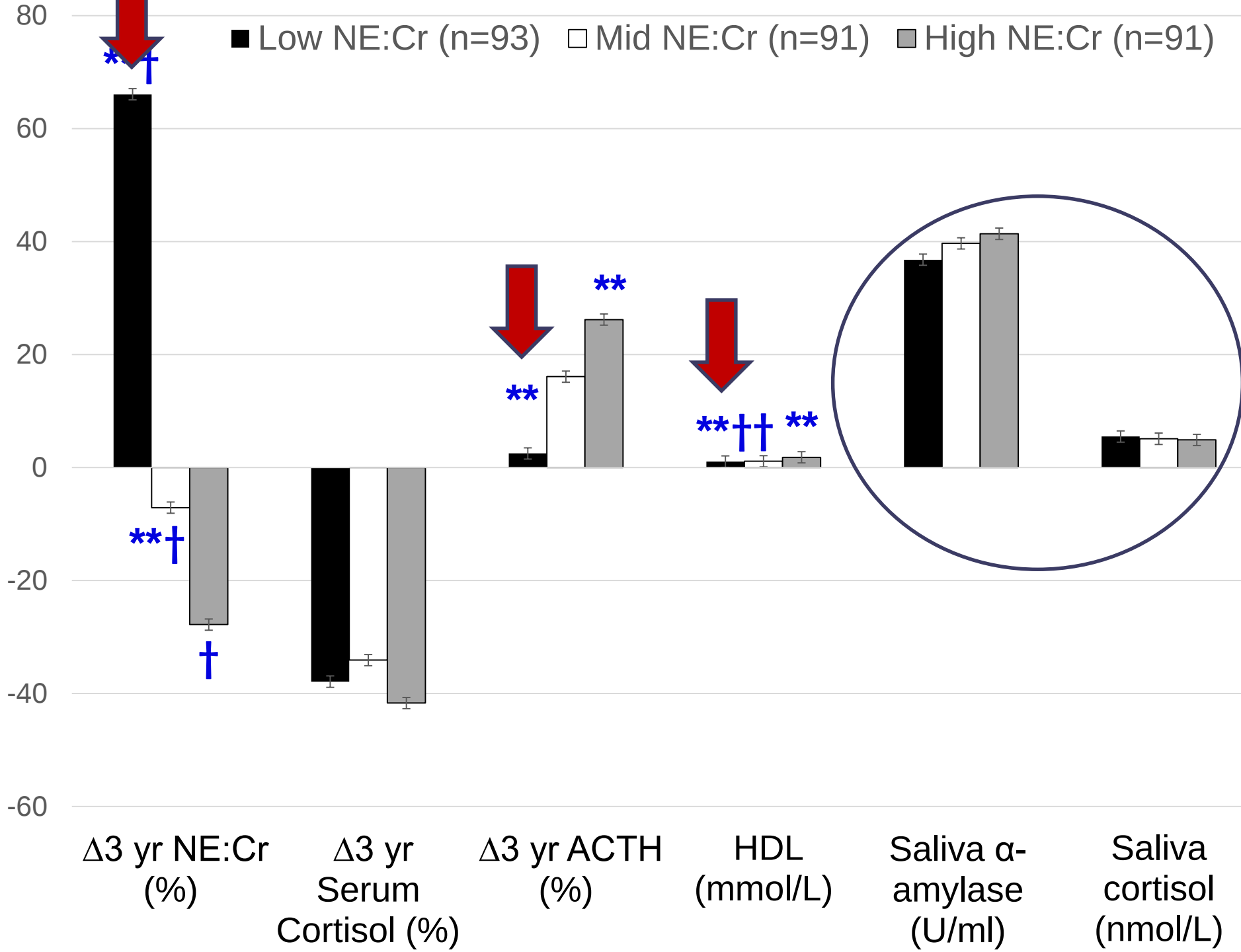
NE:Cr tertiles ($p \leq 0.05$)

NE:Cr 1 (44% Blacks; 64% Men)

...chronic 24h hypertension...

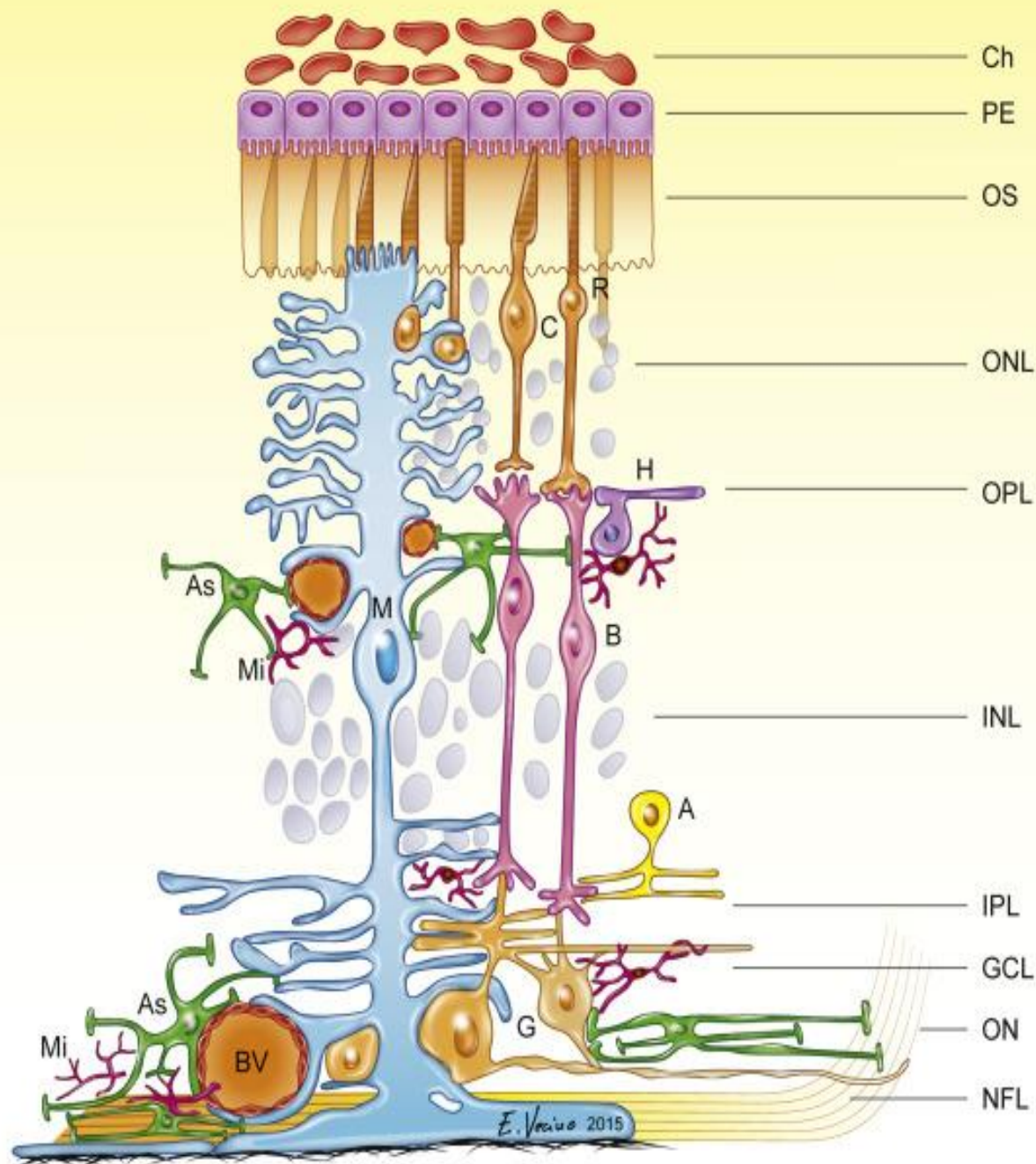


■ Low NE:Cr (n=93) □ Mid NE:Cr (n=91) ■ High NE:Cr (n=91)



Low NE:Cr tertile (N=93)

	Retinal Arterioles (MU)	Retinal Venules (MU)
<i>Adjusted R²</i>	0.28	0.33
<i>Log-transformed</i>	<i>β (95% CI)</i>	<i>β (95% CI)</i>
Saliva Cortisol (nmol/L)	-	-0.23 (-0.1, -0.5)*
Saliva α-amylase (U/ml)	-0.30 (-0.1, -0.5)*	-
HDL (mmol/L)	-	-0.19 (-0.1, -0.5)*
	*P ≤ 0.05	



NE: $\alpha_{2a}R$

D_2R

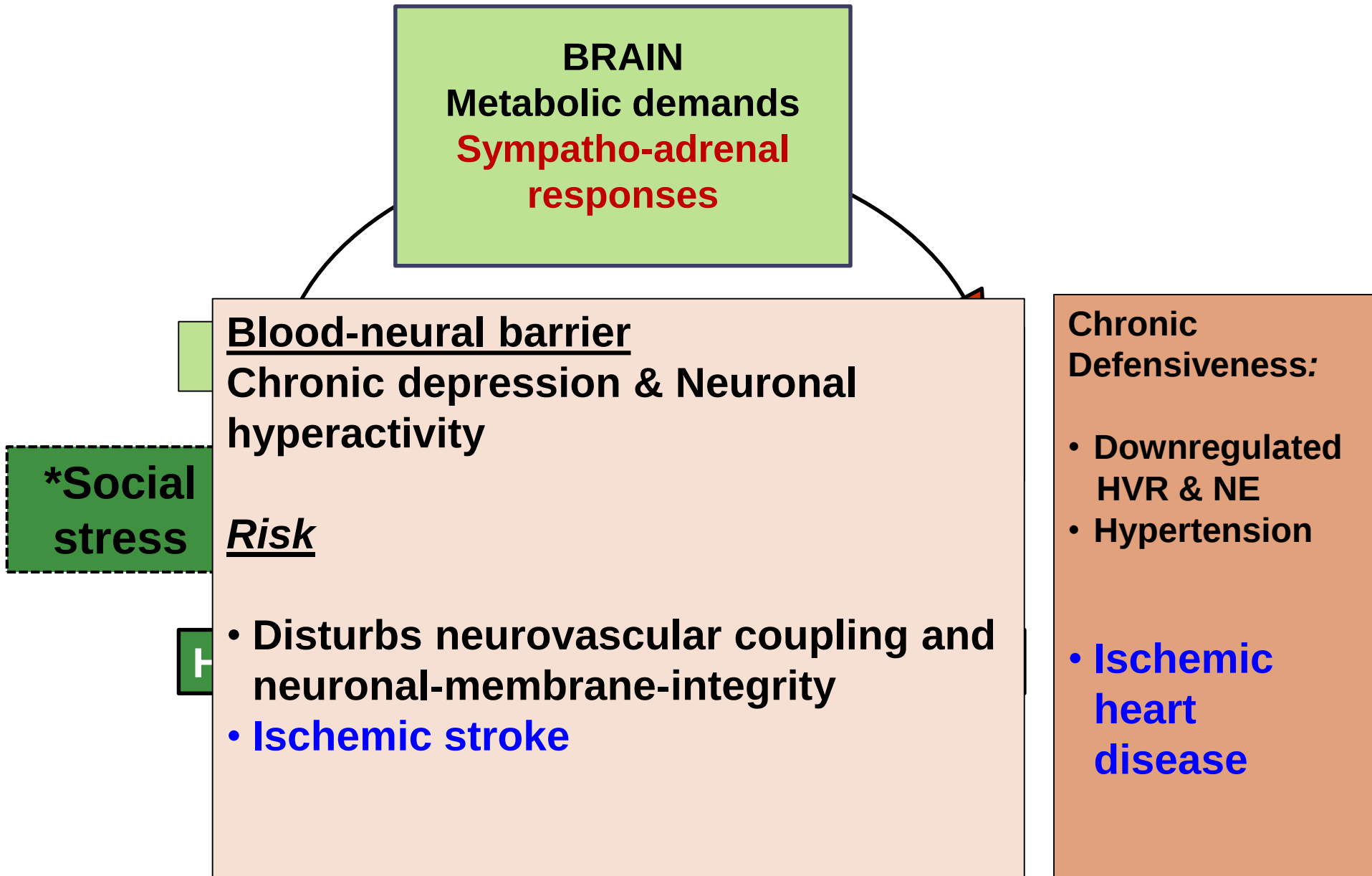
Central
control

Chronic depression (DMS-IV criteria)

associated with:

- **△ Stress hormones [OR 0.9-1.2; $P \leq 0.001$]**
- **Wider venules [OR 1.7; $P = 0.03$]**
- **Low HDL [OR 4.8; $P = 0.04$]**

Central neural control: Heart and Retina



Clinical implications?

- **Social Support systems**
- **Screening - Perfusion deficits (Ischemic stroke risk):**
 1. **Heart** - ECG (ST-segment depression)
 2. **Retina** – Diastolic Ocular Perfusion Pressure
 $(DBP - IOP \geq 50 \text{ mmHg})$
 3. **Signs of depression**



Thank you