



Coffee and Cardiovascular Risk

in Patients with Uncontrolled Hypertension

Prin Vathesatogkit, Ramathibodi Hospital, August 2023



Declaration of Interest

None



วันนี้ คุณดื่มกาแฟ แล้วหรือยัง





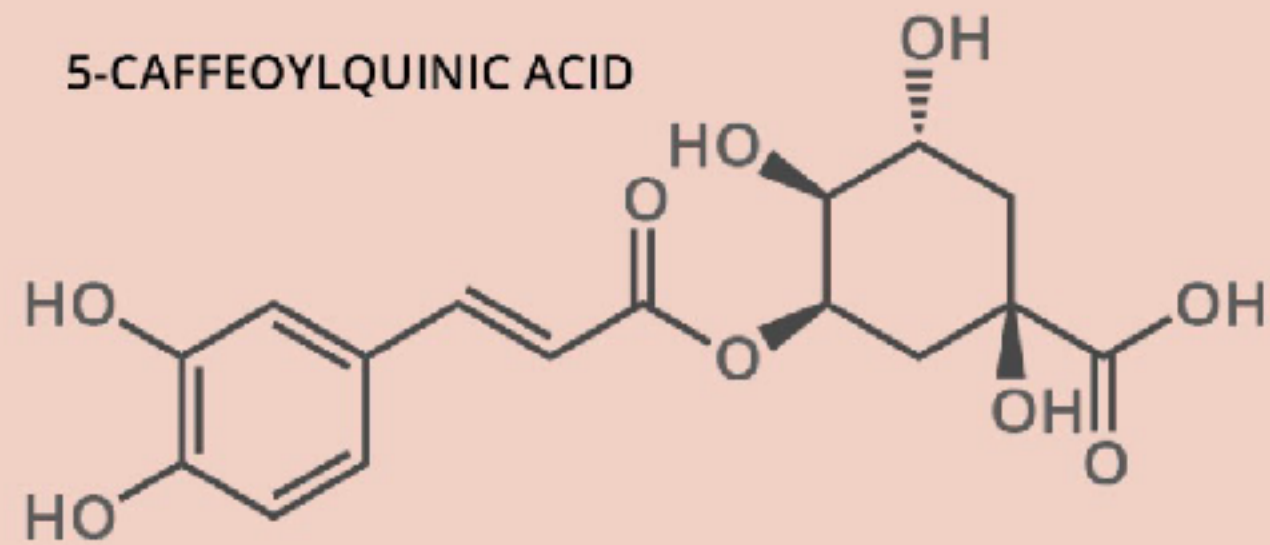
สารประกอบในกาแฟ



THE CHEMISTRY OF COFFEE

WHY IS COFFEE BITTER?

5-CAFFEYOYLQUINIC ACID



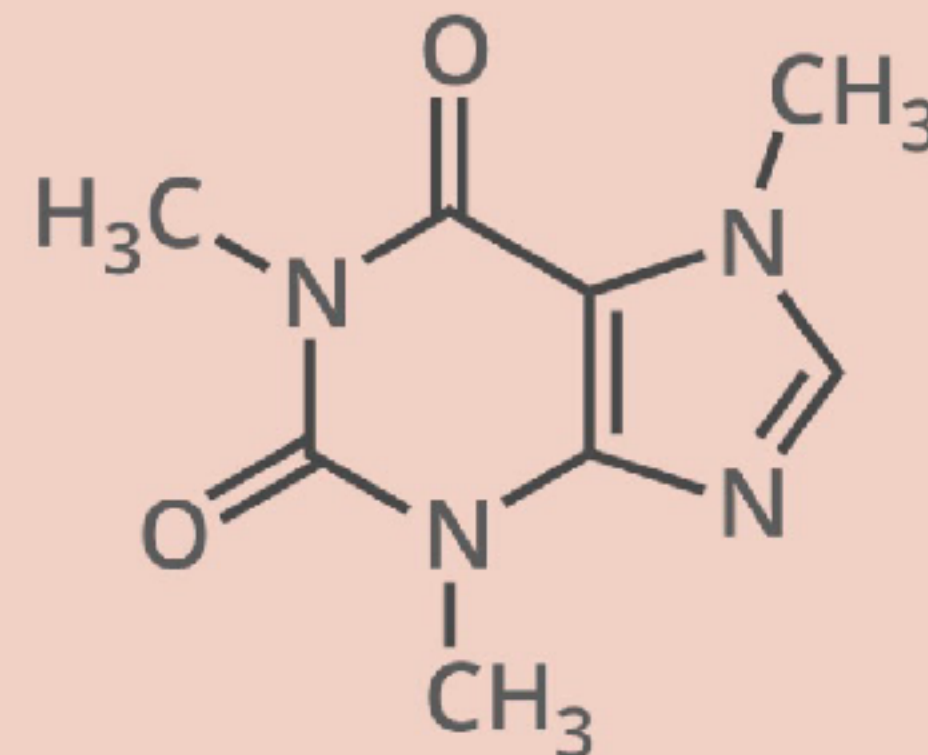
Chlorogenic acids account for up to 8% of the composition of unroasted coffee beans. More than 40 different varieties have been identified in green coffee beans, with 5-caffeoylquinic acid the most prevalent.

Chlorogenic acid content decreases when coffee beans are roasted, as they react to form quinolactones, phenylindanes & melanoidins. These contribute to flavour and bitterness.

3-CAFFEYOYLQUINIC-1,5-LACTONE



THE CAFFEINE CONTENT OF COFFEE



The caffeine content of coffee is variable but is approximately 100mg in a cup.

Caffeine works by blocking the action of a group of brain chemicals called adenosines, which work to naturally trigger tiredness.

The amount of caffeine in your bloodstream peaks 15 to 45 minutes after ingestion.

COFFEE CHEMISTRY: ARABICA VS ROBUSTA

ARABICA COFFEE BEANS



WORLD PRODUCTION



CAFFEINE CONTENT
1.2–1.5%

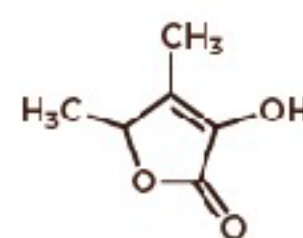


CHLOROGENIC ACID CONTENT 5.5–8.0%

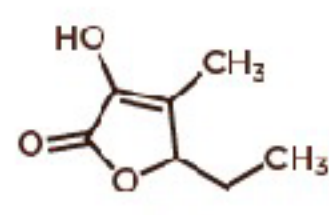
LIPID (FAT) CONTENT 15–17%

SUGAR (SUCROSE) CONTENT 6.0–9.0%

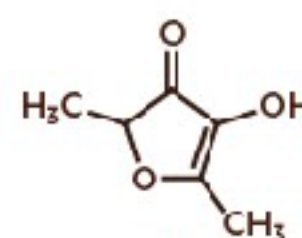
KEY FLAVOUR COMPOUNDS



SOTOLON



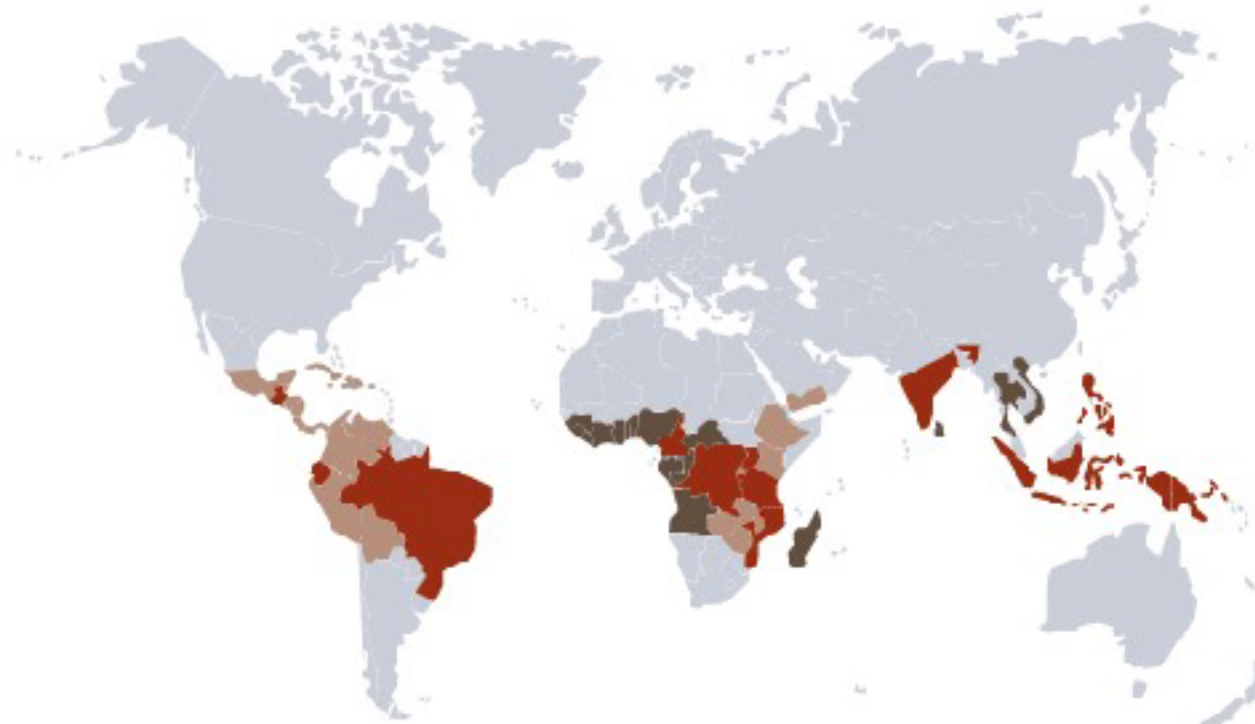
ABHEXON



FURANEOL

These compounds give the coffee sweet caramel notes

Arabica produces less coffee per hectare than robusta, and is consequently more expensive. It is also more susceptible to disease.



- Regions in which arabica is primarily grown
- Regions in which robusta is primarily grown
- Regions in which arabica and robusta are grown

ROBUSTA COFFEE BEANS

WORLD PRODUCTION



CAFFEINE CONTENT
2.2–2.7%

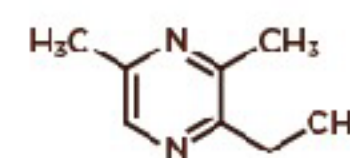


CHLOROGENIC ACID CONTENT 7.0–10.0%

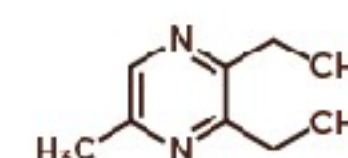
LIPID (FAT) CONTENT 10.5–11.0%

SUGAR (SUCROSE) CONTENT 3.0–7.0%

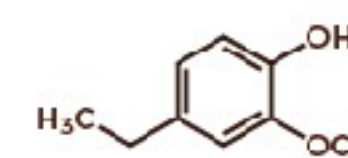
KEY FLAVOUR COMPOUNDS



3,5-DIMETHYL-2-ETHYLPYRAZINE



2,3-DIETHYL-5-METHYLPYRAZINE



4-ETHYLGUAIACOL

These compounds give the coffee spicy, earthy notes

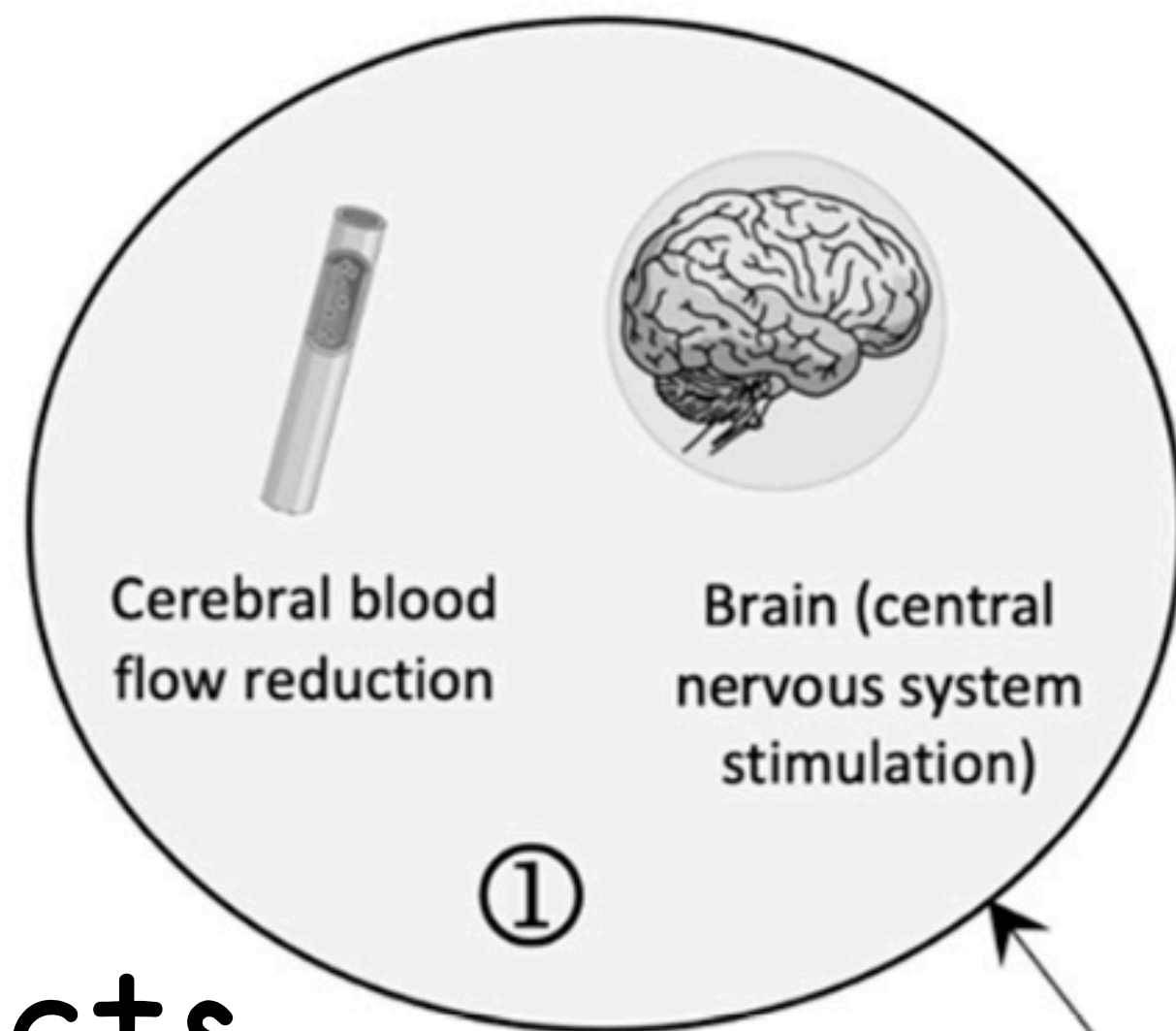
Robusta is considered to have a harsher, more bitter flavour compared to the smoother flavour of arabica. It is often used in blends.



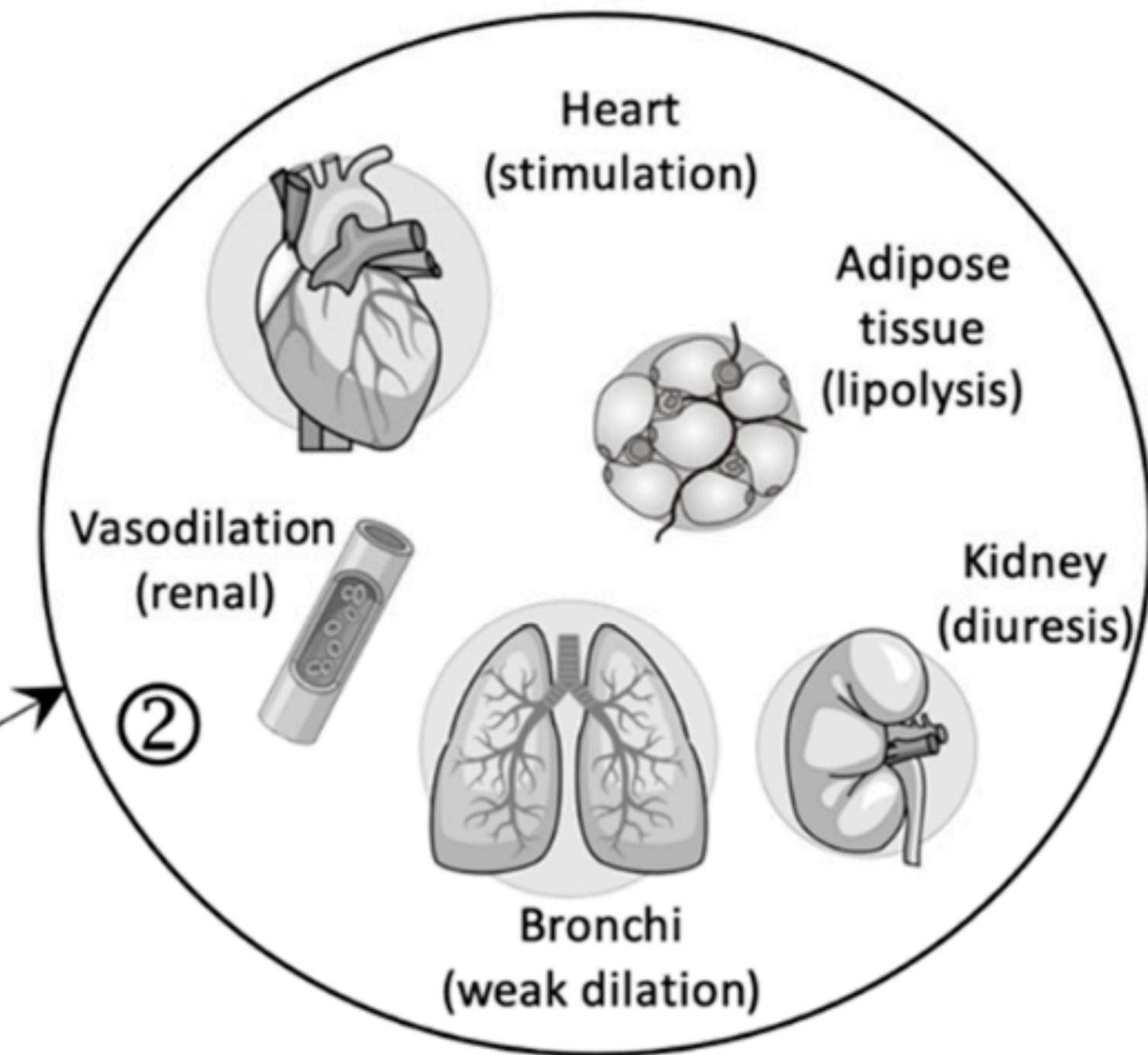
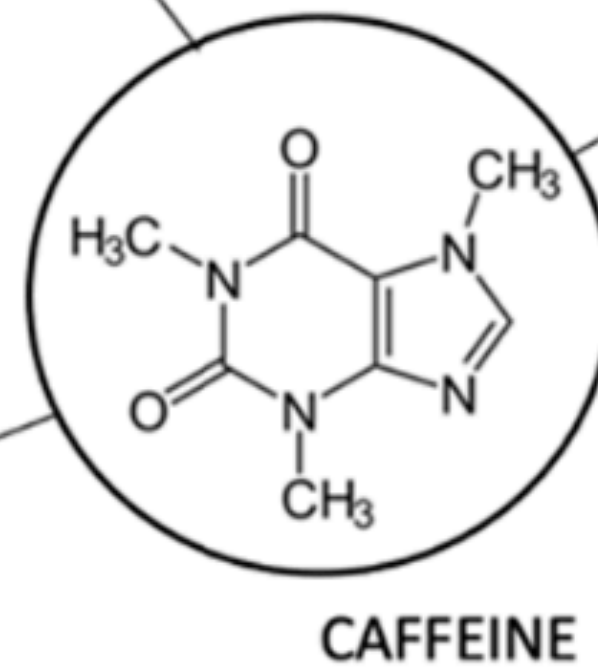


The pharmacological effects of caffeine

Central effects



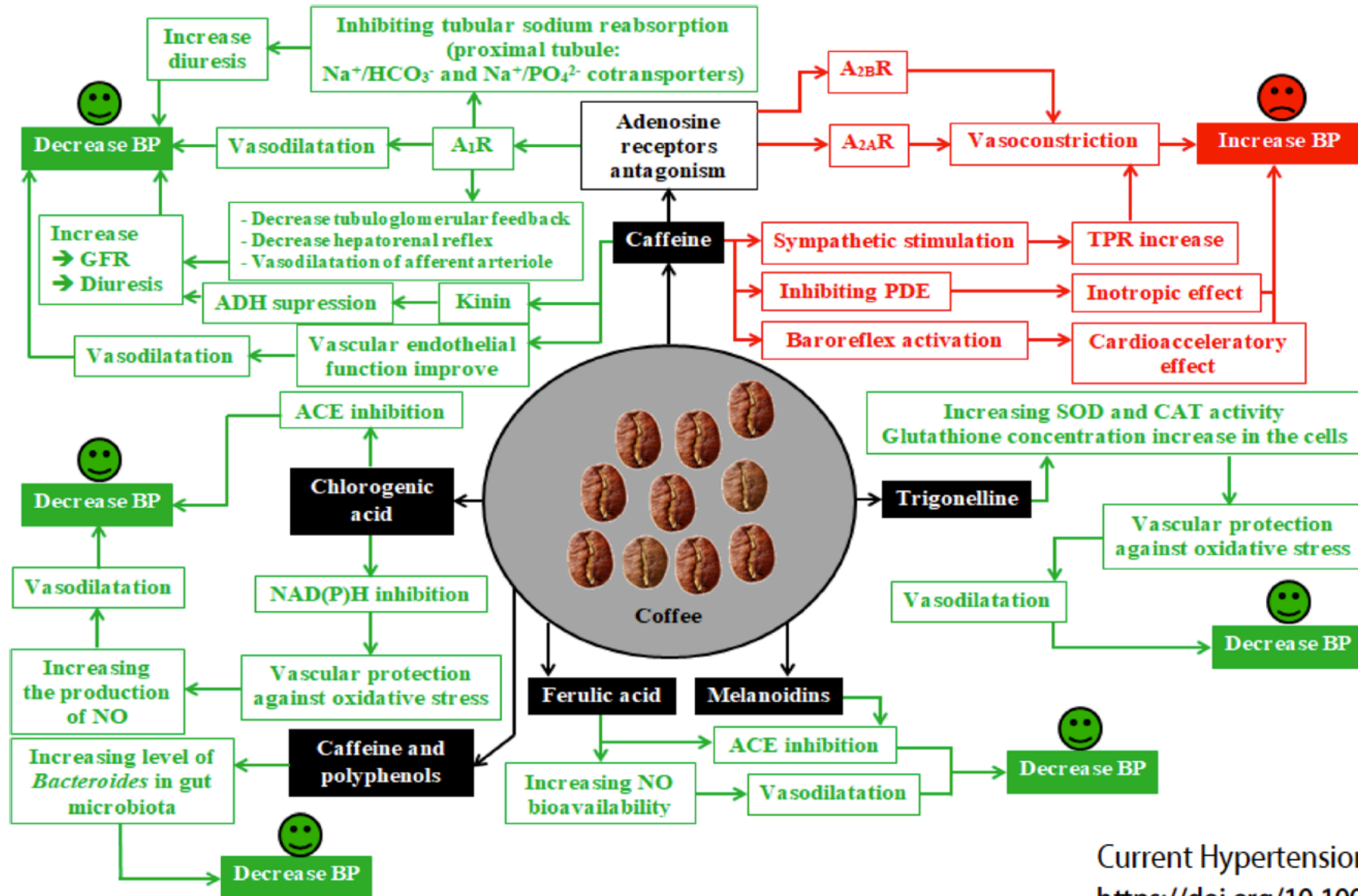
Contraction of muscles



Peripheral effects



The blood pressure effects of caffeine





Effect of Caffeine on Blood Pressure



A short-term effect of caffeinated beverages on blood pressure: A meta-analysis of RCTs

Short-term caffeinated beverages intake



An overall elevation of blood pressure
SBP: ↑ 3.04 mmHg
DBP: ↑ 2.45 mmHg

In adolescent population

SBP: ↑ 5.31 mmHg

DBP: ↑ 2.26 mmHg

In adult population

SBP: ↑ 2.67 mmHg

DBP: ↑ 2.55 mmHg

Caffeine consumption (≤1 week)

SBP: ↑ 5.23 mmHg

DBP: ↑ 2.14 mmHg

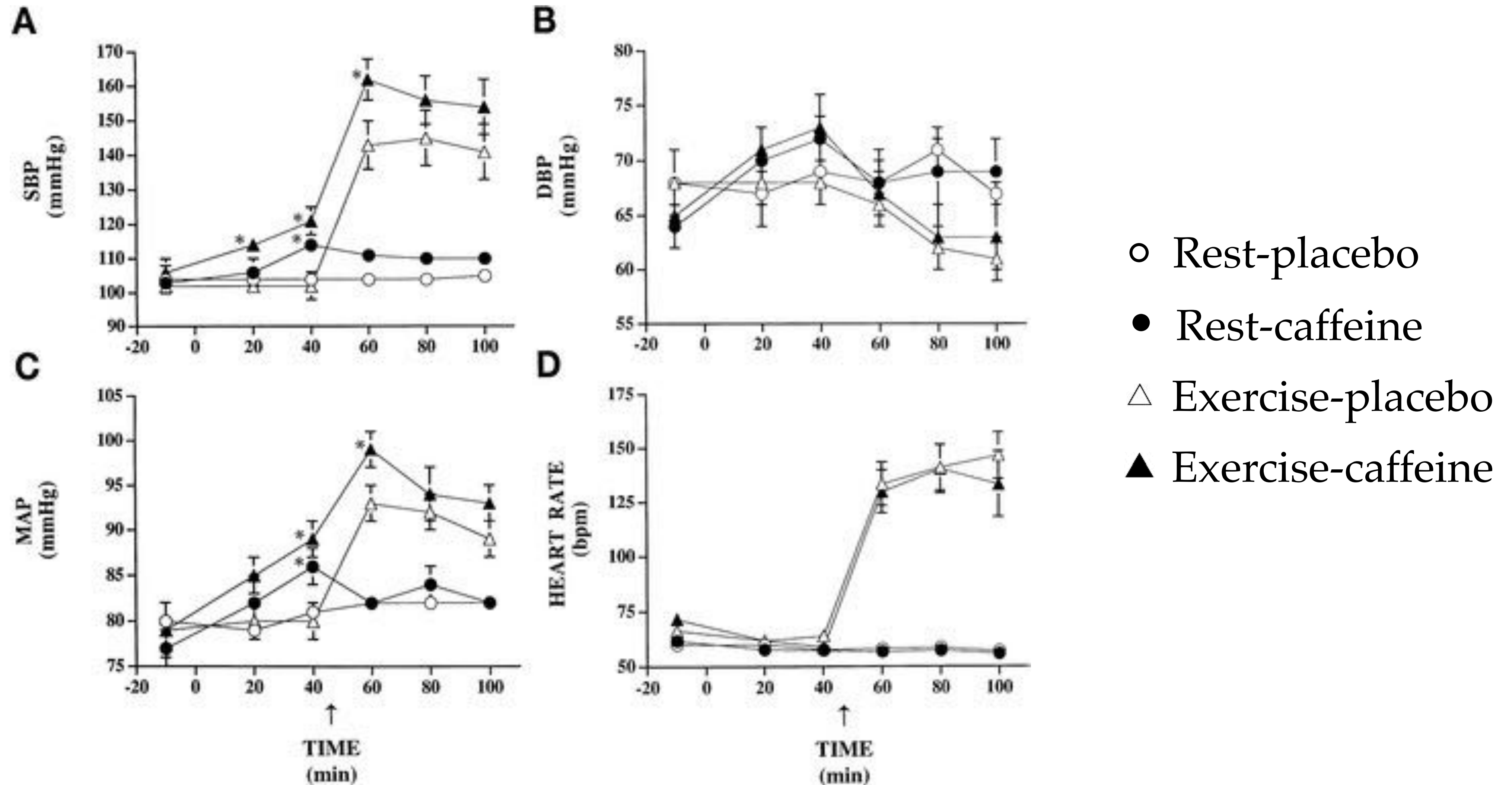
Caffeine consumption (>1 week)

SBP: ↑ 2.62 mmHg

DBP: ↑ 2.66 mmHg



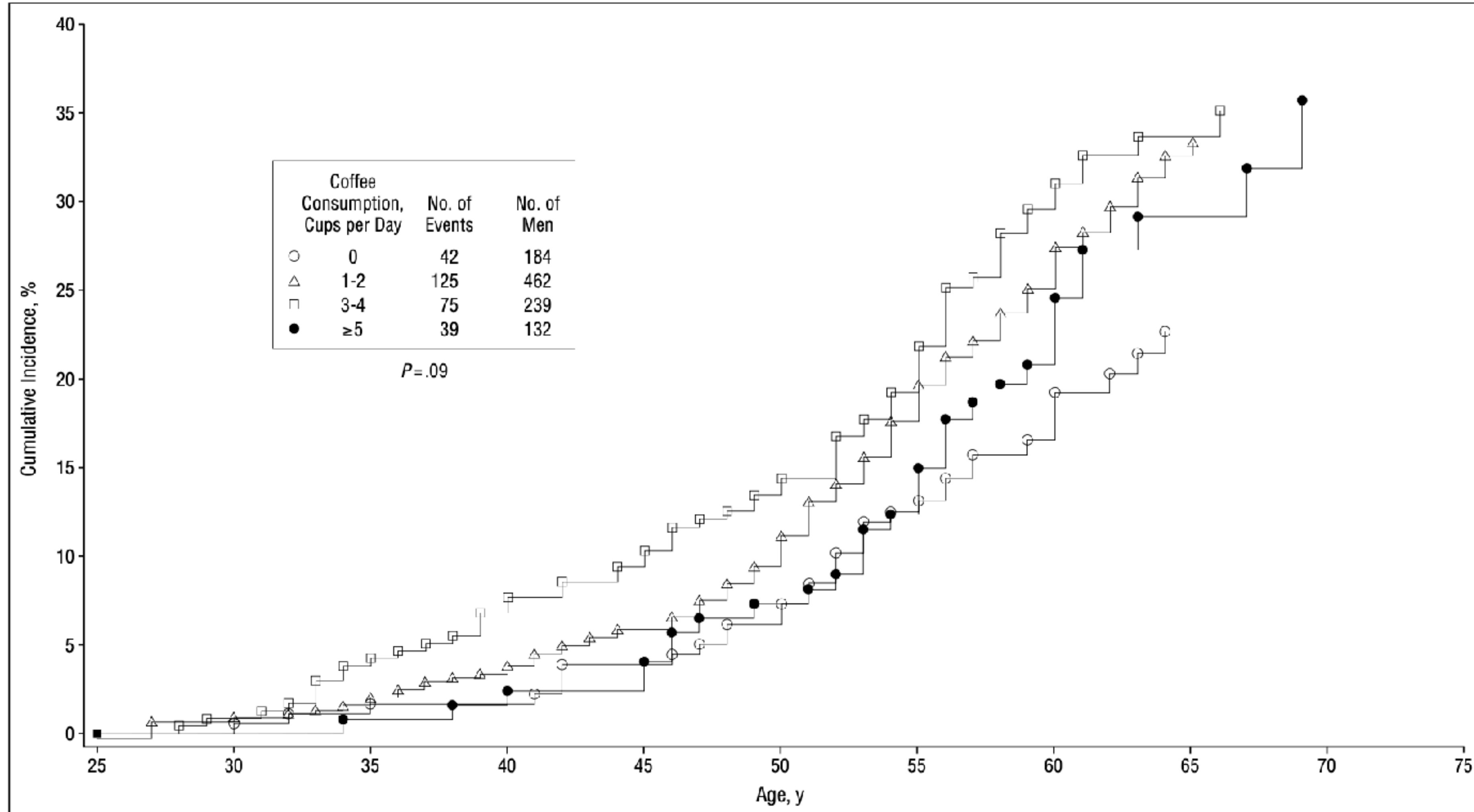
Effects of caffeine on blood pressure, and heart rate during dynamic leg exercise





Coffee intake (33 years) not increase risk of hypertension

the Johns Hopkins precursors study



Incidence of hypertension by level of coffee intake at baseline in 1017 white men during a median follow-up of 33 years.



Coffee intake and hypertension in Korean adults: results from KNHANES 2012–2016

Table 2 Logistic regression analysis of association of daily coffee consumption with hypertension

Model	Adjusted odds ratio (95% confidential interval)	
	≤ 2 Servings per day	> 2 Servings per day
Model 1 ^{a)}	1 (Reference)	0.85 (0.74–0.97)*
Model 2 ^{b)}	1 (Reference)	0.84 (0.72–0.98)*
Model 3 ^{c)}	1 (Reference)	0.84 (0.73–0.99)*
Propensity score-matched analysis ^{d)}	1 (Reference)	0.83 (0.69–0.98)*

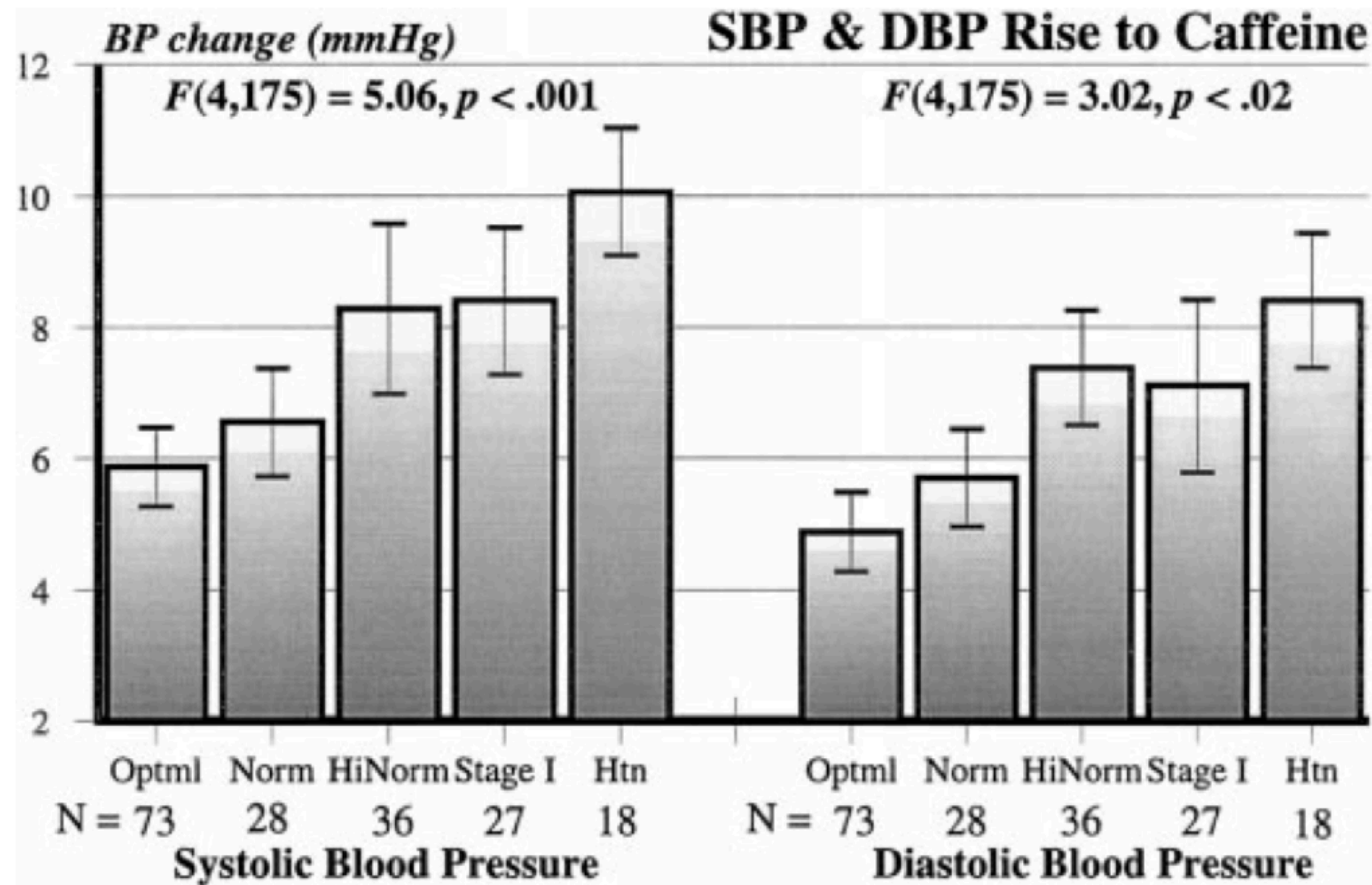


Effect of Coffee in Hypertensives



Hypertension Risk Status and Effect of Caffeine on Blood Pressure

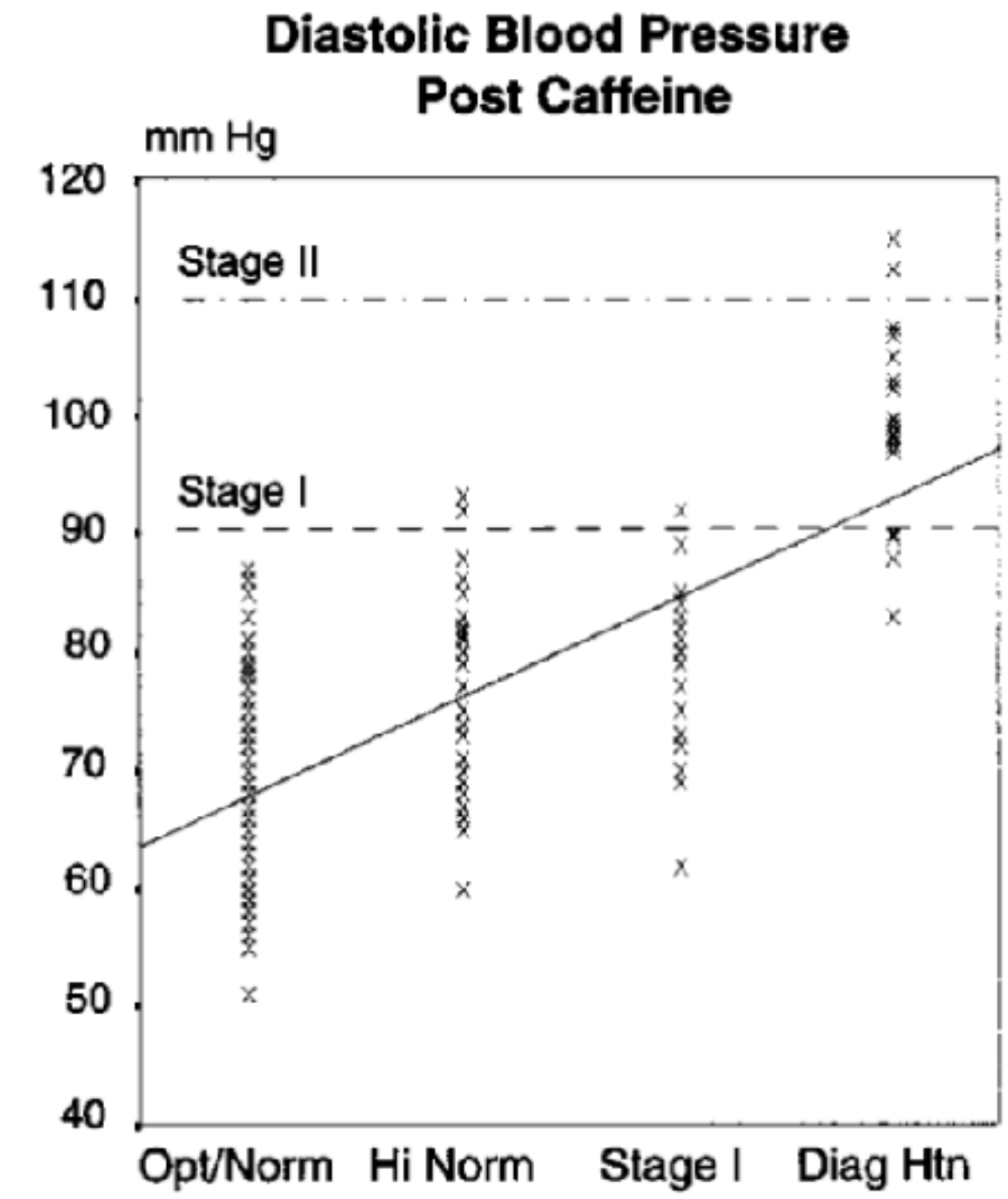
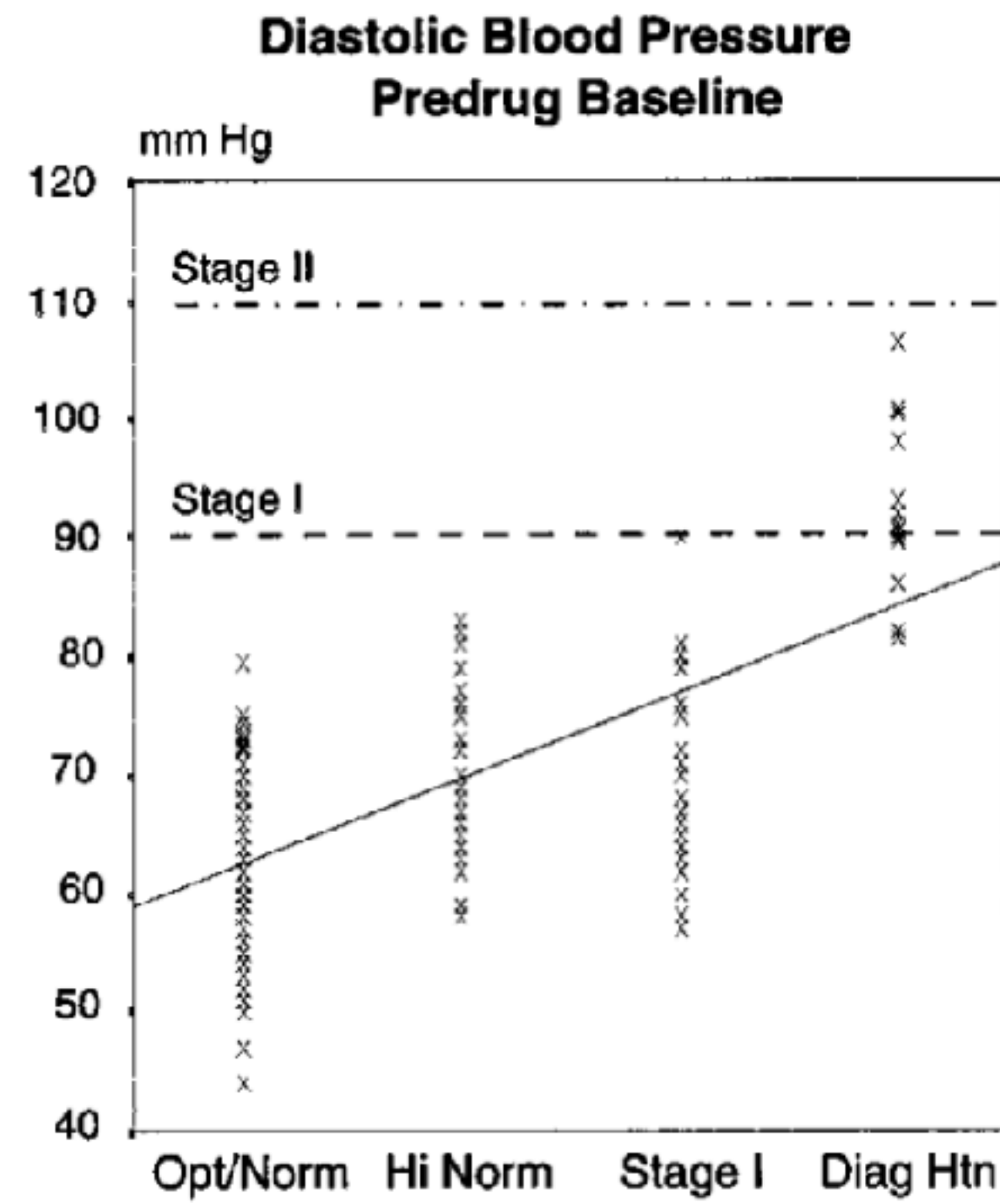
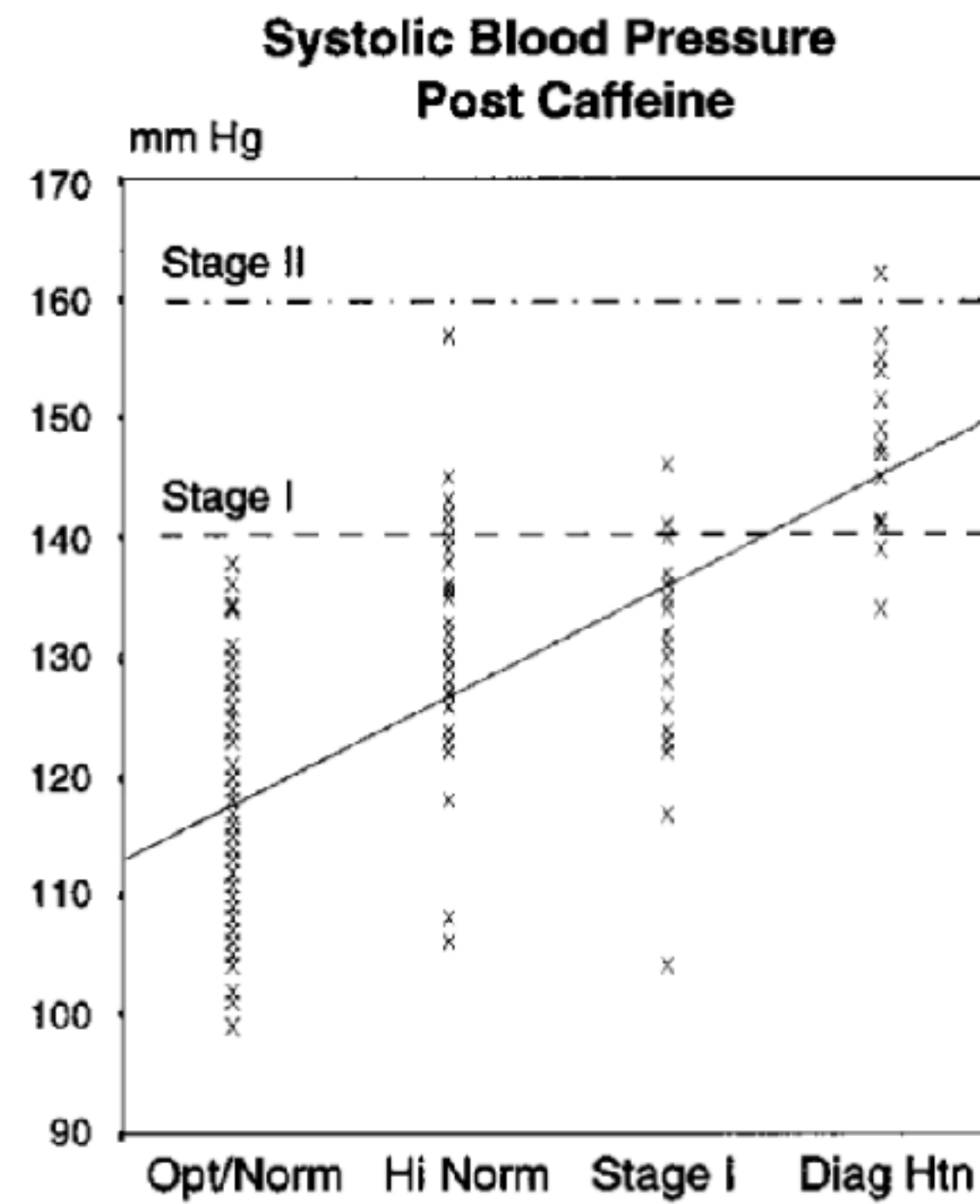
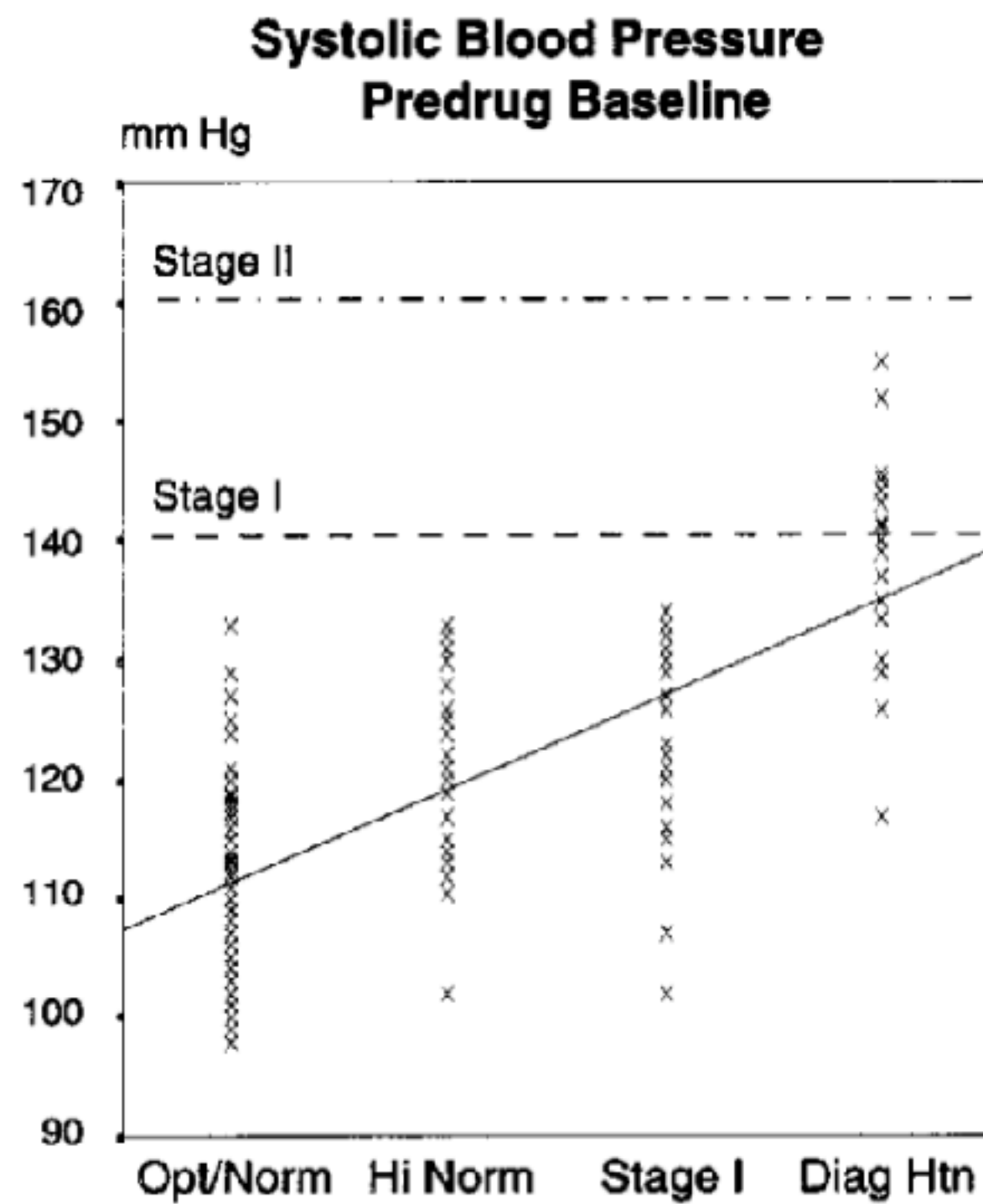
Terry R. Hartley, Bong Hee Sung, Gwendolyn A. Pincomb, Thomas L. Whitsett, Michael F. Wilson, William R. Lovallo





Hypertension Risk Status and Effect of Caffeine on Blood Pressure

Terry R. Hartley, Bong Hee Sung, Gwendolyn A. Pincomb, Thomas L. Whitsett, Michael F. Wilson, William R. Lavallo





Effect of coffee on BP and CVD in hypertensive individuals

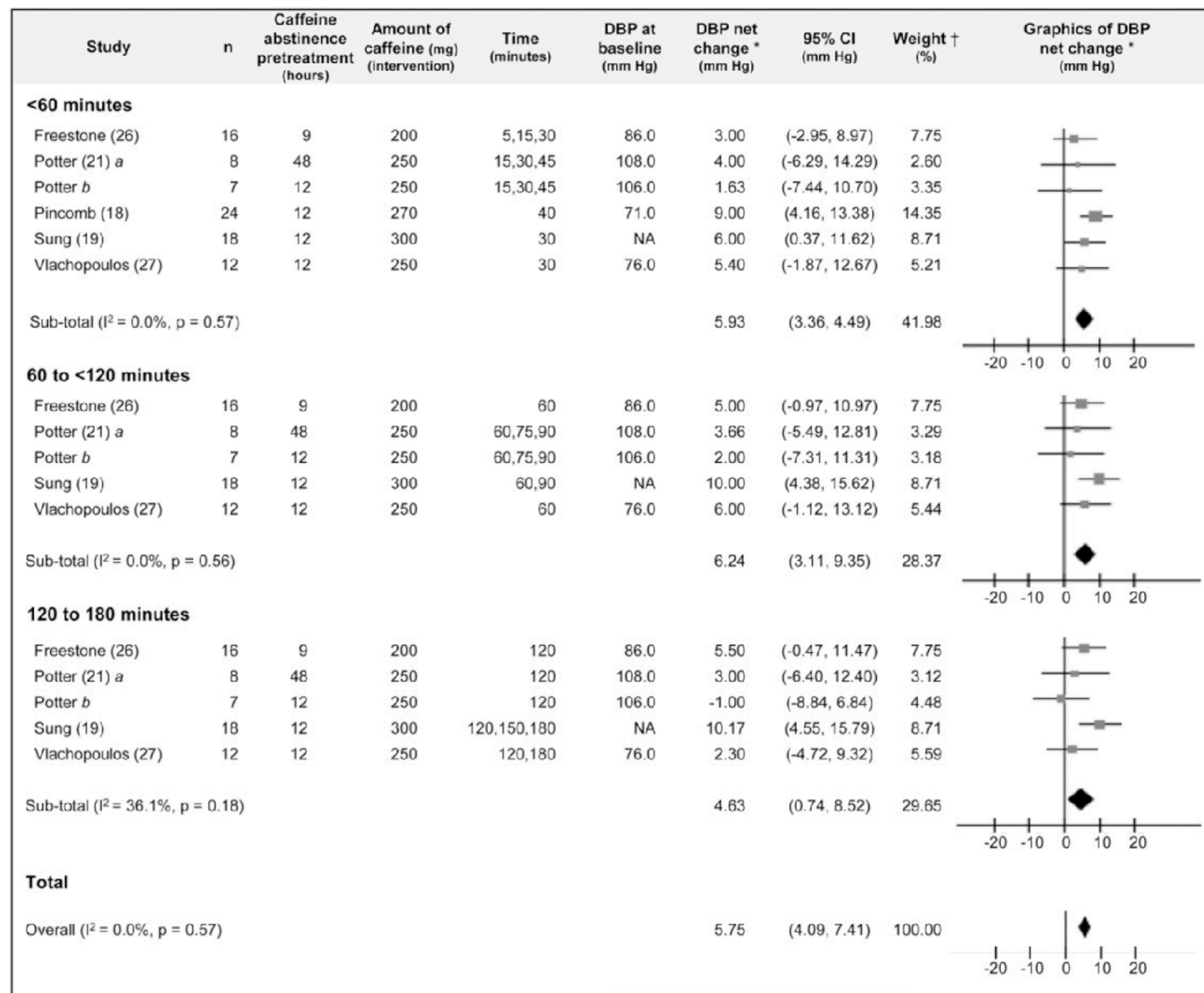
Acute effect on SBP

Study	n	Caffeine abstinence pretreatment (hours)	Amount of caffeine (mg) (intervention)	Time (minutes)	SBP at baseline (mm Hg)	SBP net change * (mm Hg)	95% CI (mm Hg)	Weight † (%)	Graphics of SBP net change * (mm Hg)
<60 minutes									
Freestone (26)	16	9	200	5,15,30	137.0	6.00	(-5.51, 17.51)	4.59	
Potter (21) <i>a</i>	8	48	250	15,30,45	183.0	17.00	(-3.91, 37.91)	1.39	
Potter <i>b</i>	7	12	250	15,30,45	188.0	4.33	(-15.15, 23.81)	1.60	
Pincomb (18)	24	12	270	40	124.5	7.00	(3.47, 10.53)	48.76	
Sung (19)	18	12	300	30	NA	6.00	(-4.86, 16.86)	5.17	
Vlachopoulos (27)	12	12	250	30	135.0	13.00	(1.65, 24.30)	4.73	
Sub-total ($I^2 = 0.0\%$, $p = 0.85$)						7.43	(4.39, 10.46)	66.25	
60 to <120 minutes									
Freestone (26)	16	9	200	60	137.0	8.00	(-3.51, 19.51)	4.59	
Potter (21) <i>a</i>	8	48	250	60,75,90	183.0	15.67	(-4.03, 35.37)	1.57	
Potter <i>b</i>	7	12	250	60,75,90	188.0	7.00	(-11.98, 25.98)	1.69	
Sung (19)	18	12	300	60,90	NA	8.00	(-2.86, 18.86)	5.17	
Vlachopoulos (27)	12	12	250	60	135.0	11.00	(-1.39, 23.39)	3.97	
Sub-total ($I^2 = 0.0\%$, $p = 0.96$)						9.31	(3.32, 15.30)	17.00	
120 to 180 minutes									
Freestone (26)	16	9	200	120	137.0	14.00	(2.48, 25.51)	4.59	
Potter (21) <i>a</i>	8	48	250	120	183.0	6.00	(-14.84, 26.84)	1.40	
Potter <i>b</i>	7	12	250	120	188.0	-3.00	(-25.50, 19.50)	1.20	
Sung (19)	18	12	300	120,150,180	NA	12.00	(1.15, 22.86)	5.17	
Vlachopoulos (27)	12	12	250	120,180	135.0	7.50	(-4.29, 19.29)	4.38	
Sub-total ($I^2 = 0.0\%$, $p = 0.70$)						9.79	(3.76, 15.82)	16.75	
Total									
Overall ($I^2 = 0.0\%$, $p = 0.99$)						8.14	(5.68, 10.61)	100.00	



Effect of coffee on BP and CVD in hypertensive individuals

Acute effect on SBP





Effect of coffee on BP and CVD in hypertensive individuals

Meta-analysis of the acute effects of caffeine on blood pressure in hypertensive individuals, stratified by caffeine intake, caffeine abstinence before the start of the trial, and use of antihypertensive medication

	Systolic blood pressure			Diastolic blood pressure		
	Net change ¹	95% CI	P value ²	Net change ¹	95% CI	P value ²
	<i>mm Hg</i>	<i>mm Hg</i>		<i>mm Hg</i>	<i>mm Hg</i>	
Amount of caffeine						
200 mg (26)	9.33	(2.69, 15.98)		4.50	(1.06, 7.94)	
250 mg (21, 27)	9.56	(4.30, 14.83)	0.958	3.11	(0.35, 5.87)	0.537
>250–300 mg (18, 19)	7.40	(4.32, 10.48)	0.605	8.82	(6.21, 11.43)	0.050
Caffeine abstinence before the trial						
9 h (26)	9.33	(2.69, 15.98)		4.50	(1.06, 7.94)	
12 h (18, 19, 21, 27)	7.68	(4.96, 10.41)	0.653	6.19	(3.87, 8.51)	0.353
48 h (21)	12.99	(1.18, 24.80)	0.597	3.53	(−2.00, 9.06)	0.770
Use of antihypertensive medication						
No (18, 19, 21)	7.49	(4.60, 10.37)		6.21	(3.77, 8.65)	
Yes (26, 27)	9.93	(5.16, 14.69)	0.391	4.51	(1.82, 7.16)	0.240

Conclusions: In hypertensive individuals, caffeine intake produces an acute increase in BP for ≥ 3 h. However, current evidence does not support an association between longer-term coffee consumption and increased BP or between habitual coffee consumption and an increased risk of CVD in hypertensive subjects.

Coffee Tied to Premature Death Risk in Some People With High Blood Pressure

People with severe hypertension should limit their coffee consumption to one cup a day, a new study suggests.



By [Lisa Rapaport](#)

December 27, 2022

[HOME](#) > [HEALTH](#)

Drinking coffee is healthy for some people — but may increase the risk of early death for those with hypertension, study finds

Alliana Akhtar Dec 24, 2022, 3:35 AM GMT+7



People with very high blood pressure may want to go easy on the coffee

By American Heart Association News

Coffee May Protect Heart Health — but Perhaps Not for People With Severe Hypertension

Some [previous research](#) has linked a daily cup of coffee to a lower risk of so-called “cardiac events” and deaths from cardiovascular disease among heart attack survivors. Iso and his team had expected, then, to see that people with severe hypertension would benefit from drinking coffee.

This was not the case. “Because people with severe hypertension are more susceptible to the effects of [caffeine](#), caffeine’s harmful effects may outweigh its protective effects and may increase the risk of death,” Iso said.



ORIGINAL RESEARCH

Coffee and Green Tea Consumption and Cardiovascular Disease Mortality Among People With and Without Hypertension

Table S1. Multivariable hazard ratios (95% confidence intervals) of cardiovascular disease mortality according to coffee consumption after missing values were imputed using multiple imputation.

	None	1-6 Cups/Week	Coffee consumption 1 Cup/d	≥ 2 Cups/d	<i>P</i> for trend
Optimal and Normal					
Multivariable HR (95%CI)	Ref	0.86 (0.63-1.17)	0.80 (0.49-1.31)	1.21 (0.79-1.87)	0.58
High normal					
Multivariable HR (95%CI)	Ref	0.77 (0.54-1.10)	0.80 (0.47-1.39)	0.77 (0.42-1.43)	0.33
Grade 1 hypertension					
Multivariable HR (95%CI)	Ref	0.89 (0.67-1.17)	1.15 (0.77-1.72)	1.05 (0.67-1.64)	0.61
Grade 2-3 hypertension					
Multivariable HR (95%CI)	Ref	0.93 (0.64-1.36)	0.73 (0.37-1.46)	2.05 (1.17-3.57)	0.09

HR, hazard ratio; CI, confidence interval.

Multivariable HR: adjusted for age, sex, green tea consumption, use of antihypertensive medication, total cholesterol levels, history of diabetes, body mass index, smoking status, alcohol consumption, hours of exercise, hours of walking, perceived mental stress, educational level, regular employment, and dietary intakes of vegetable, fish, fruits and soybeans.



ความเห็นส่วนตัว

Pro: Cohort study with a long F/U time (19 yr)

Strength; temporality; specificity; plausibility;
specificity

Con: Post-hoc, subgroup analysis, observational study

No dose response; not consistent (few studies)



What should we do?



Coffee and Cardiovascular Risk in Patients with Uncontrolled Hypertension



Coffee and Cardiovascular Risk in Patients with Uncontrolled Hypertension

1. คุณความดีให้ดี จะได้ไม่เป็นโรแห่งๆ



Coffee and Cardiovascular Risk in Patients with Uncontrolled Hypertension

1. คุณความดีให้ดี จะได้ไม่เป็นที่ไหน
2. ระมัดระวังการเปลี่ยนแปลงการวัดความดัน หลังเพิ่มกินกาแฟ



Coffee and Cardiovascular Risk in Patients with Uncontrolled Hypertension

1. คุณความดีให้ดี จะได้ไม่เป็นไรแน่ๆ
2. ระมัดระวังการแปลผลการวัดความดัน หลังเพิ่งกินกาแฟ
3. กาแฟ เพิ่มระดับความดันชั่วคราวในคนความดันสูงได้



Coffee and Cardiovascular Risk in Patients with Uncontrolled Hypertension

1. คุณความดีให้ดี จะได้ไม่เป็นไรแน่ๆ
2. ระเบิดระว่างการแปลผลการวัดความดัน หลังเพิ่มกินกาแฟ
3. กาแฟ เพิ่มระดับความดันชั่วคราวในคนความดันสูงได้
4. คนความดันสูงที่คุมได้ดี กินไประยะยาวความดันไม่เพิ่ม



Coffee and Cardiovascular Risk in Patients with Uncontrolled Hypertension

1. คุณความดันให้ดี จะได้ไม่เป็นโรน่แ่งๆ
2. ระมัดระวังการแปลผลการวัดความดัน หลังเพื่งกินกาแฟ
3. กาแฟ เพิ่มระดับความดันชั่วคราวในคนความดันสูงได้
4. คนความดันสูงที่คุมได้ดี กินไประยะยาวความดันไม่เพิ่ม
5. ในคนที่คุมความดันไม่ได้เลย การที่ความดันพุ่งสูงขึ้นไปอีก อาจทำให้เกิดอันตรายได้ ให้ดูเป็นรายๆไป ระมัดระวังการดื่มกาแฟมากเกิน 2 แก้วต่อวัน

วันนี้ คุณดื่มกาแฟ แล้วหรือยัง

