

DIABETES MELLITUS AND HYPERTENSION AS MAJOR RISK FACTORS FOR THE DEVELOPMENT OF CARDIAC AND RENAL DISEASE

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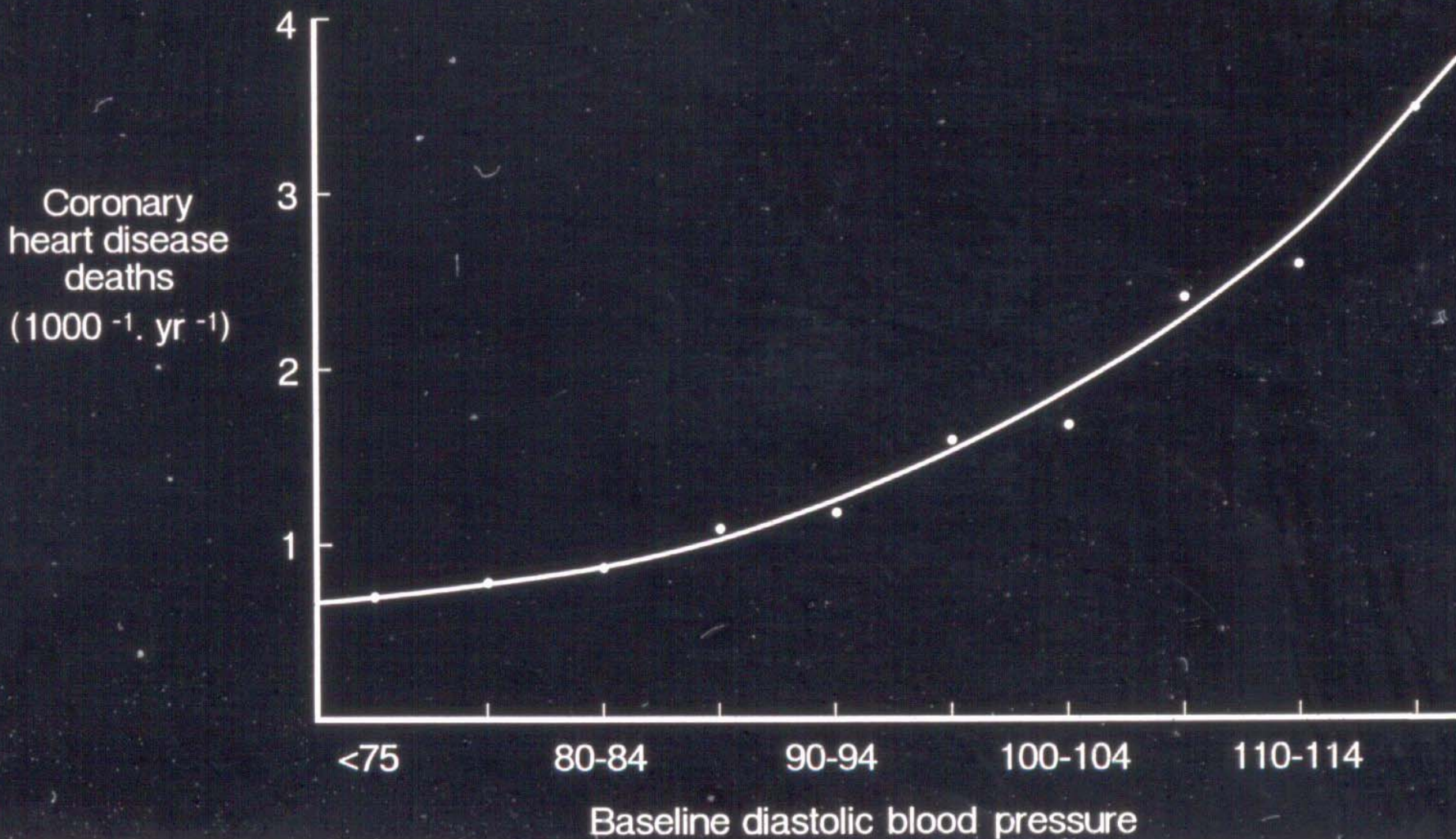
**Vth International Symposium
on Hypertension and Renal Disease
in the Diabetic Patient
21 September 2000, Dead Sea, Israel.**

INTRODUCTION

- Blood pressure and risk - diastolic, systolic, or pulse pressure?
- The high risk phenotype
- The obesity paradox
- The renin/sodium paradox
- The treatment paradox
- Where does diabetes fit in?

6 year coronary heart disease mortality - MRFIT

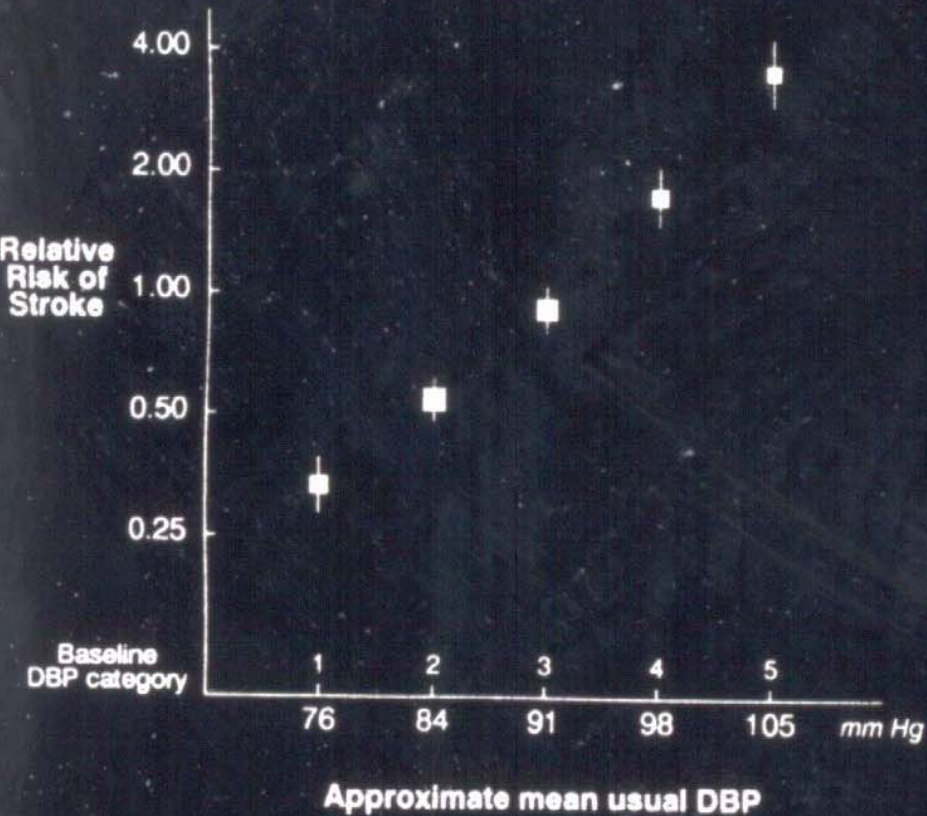
Stamler et al (1989)



Stroke and usual DBP

(in 5 categories defined by baseline DBP)

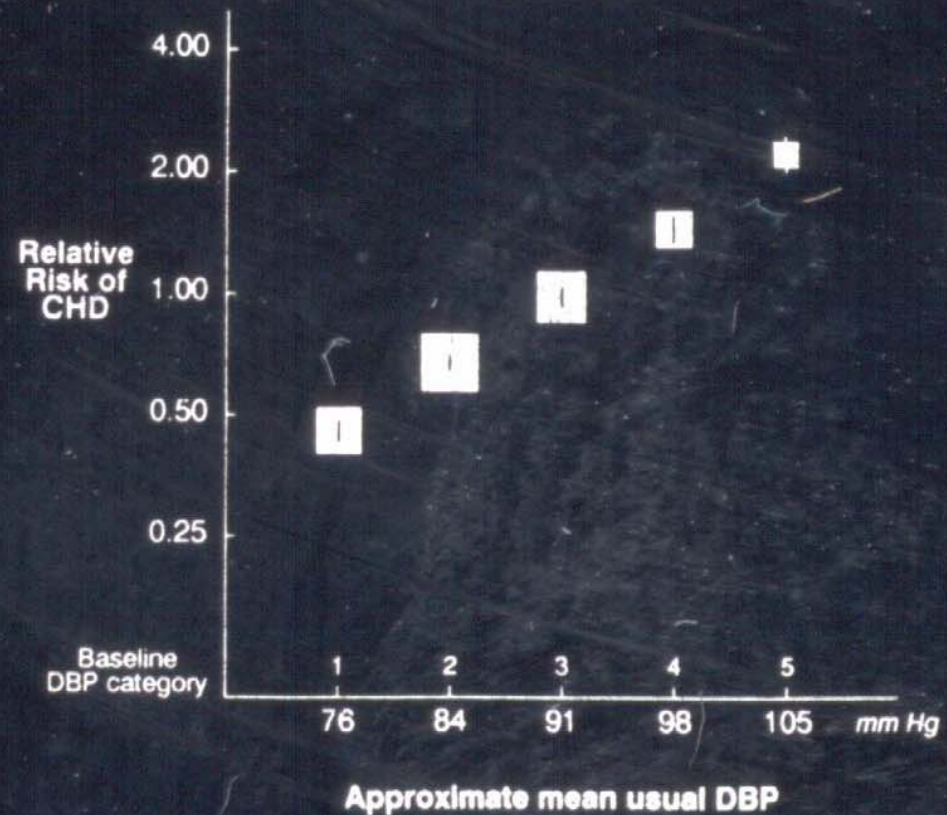
7 prospective observational studies: 843 events



Coronary Heart Disease and usual DBP

(in 5 categories defined by baseline DBP)

9 prospective observational studies: 4856 events



Relative risks of stroke and of coronary heart disease, estimated from combined results.

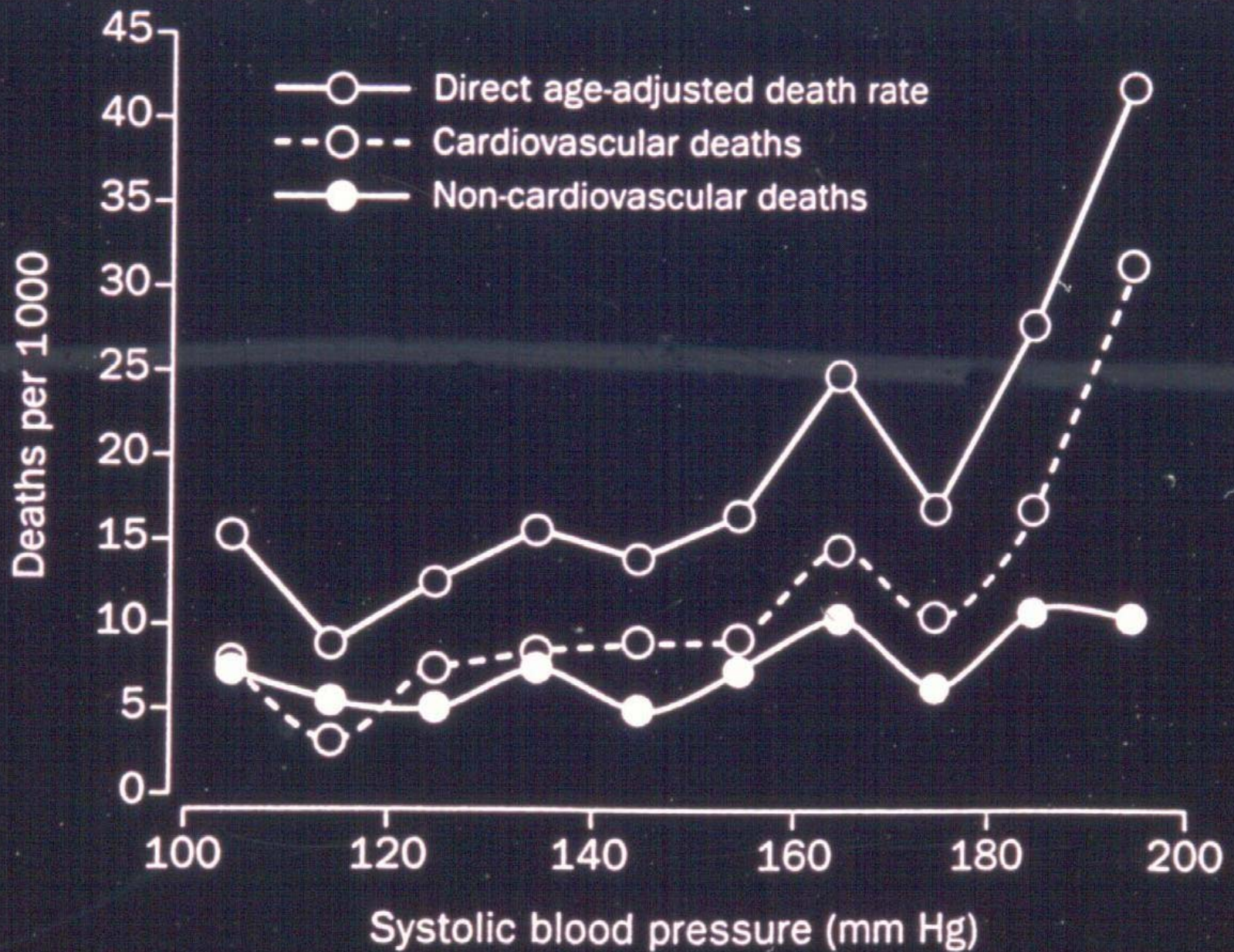
MacMahon (1990)

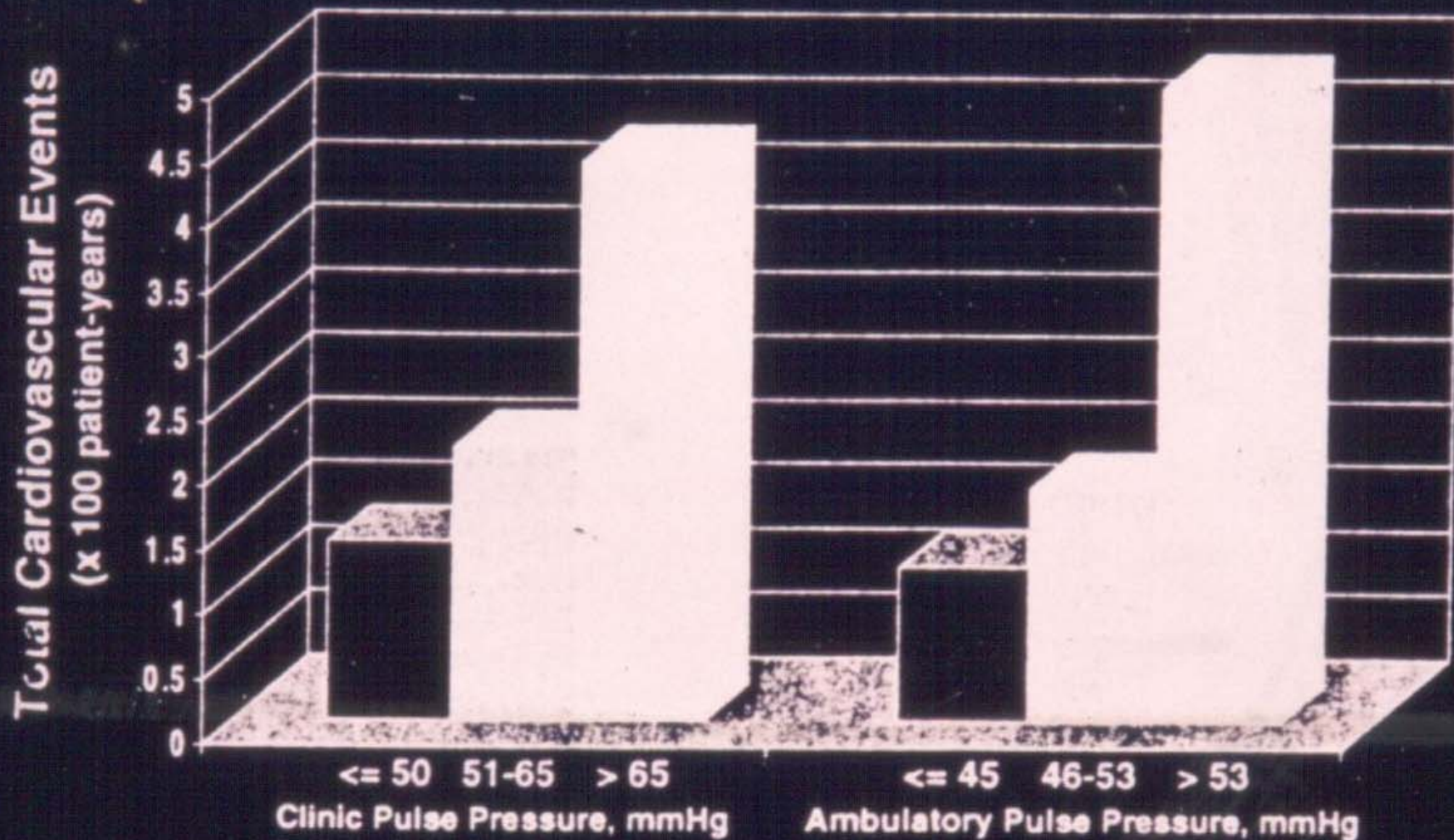
Mean blood pressure

Systolic blood pressure

Diastolic blood pressure

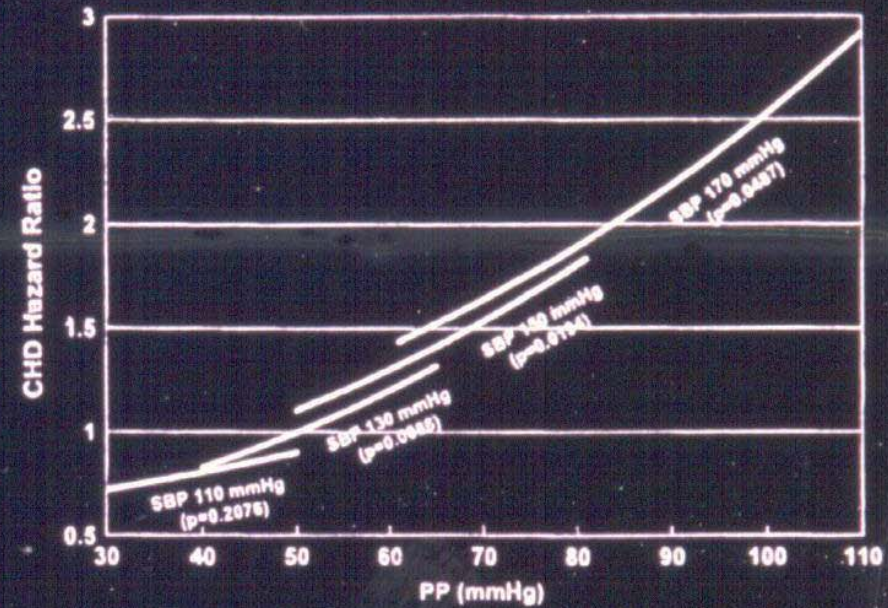
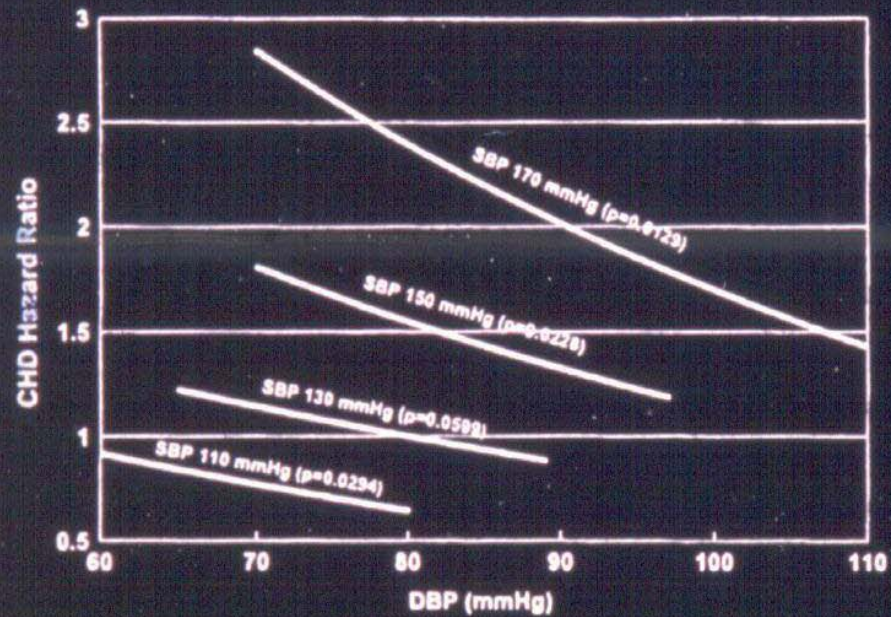
Pulse pressure





n=2010

Verdecchia et al, 1998



Franklin et al., 1999

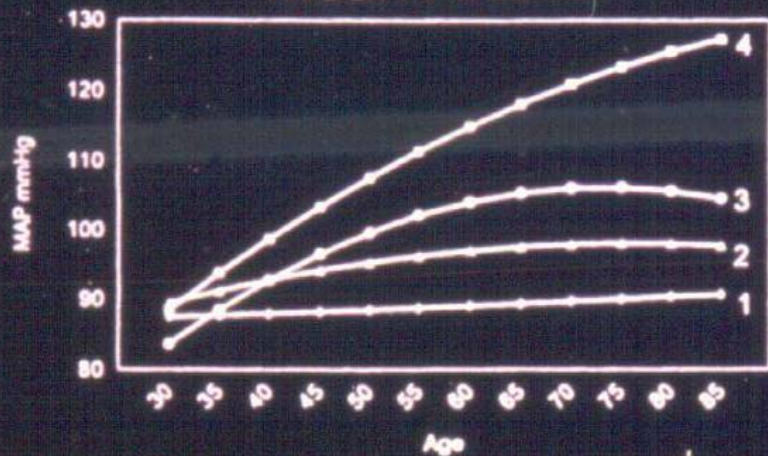
Determinants of an Individual's Blood Pressure

- Cardiac output
 - stroke volume
 - pulse rate
- Peripheral resistance
 - structural
 - functional
- Conduit vessel elasticity

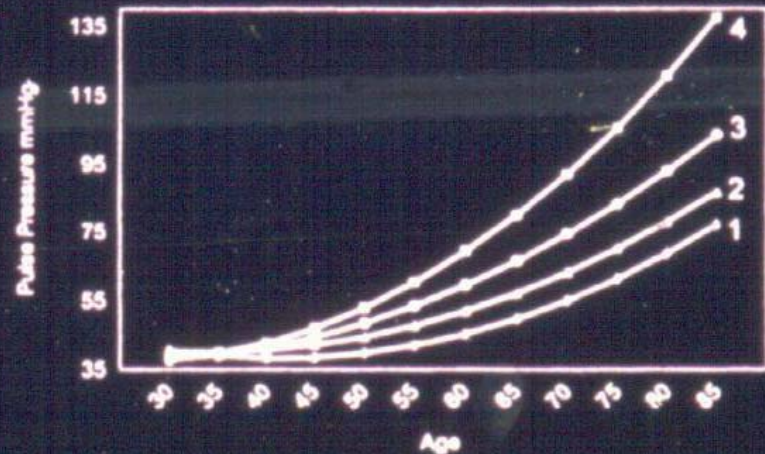
Groups Determined at Index Examination

- Group 1 SBP <120
- Group 2 SBP 120-139
- Group 3 SBP 140-159
- Group 4 SBP 160+

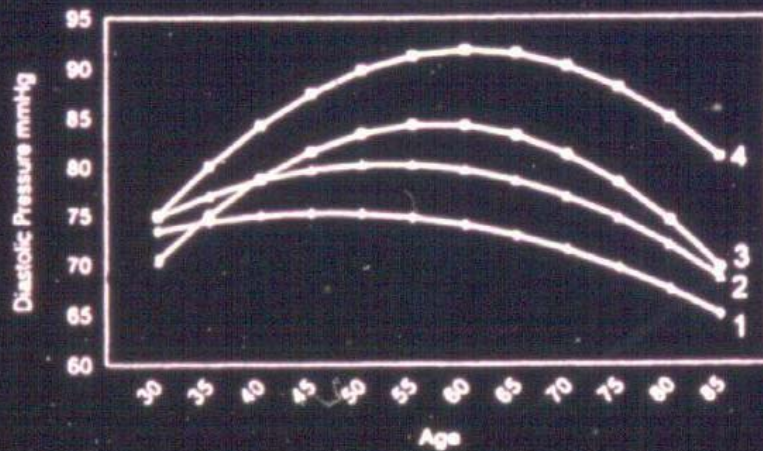
Mean Arterial



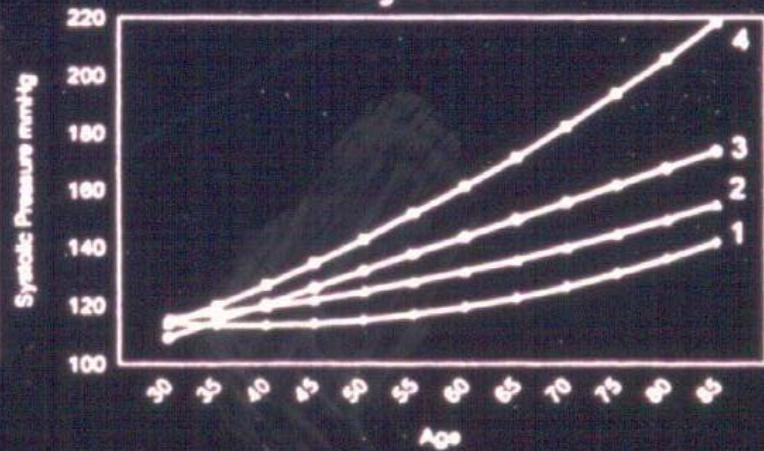
Pulse



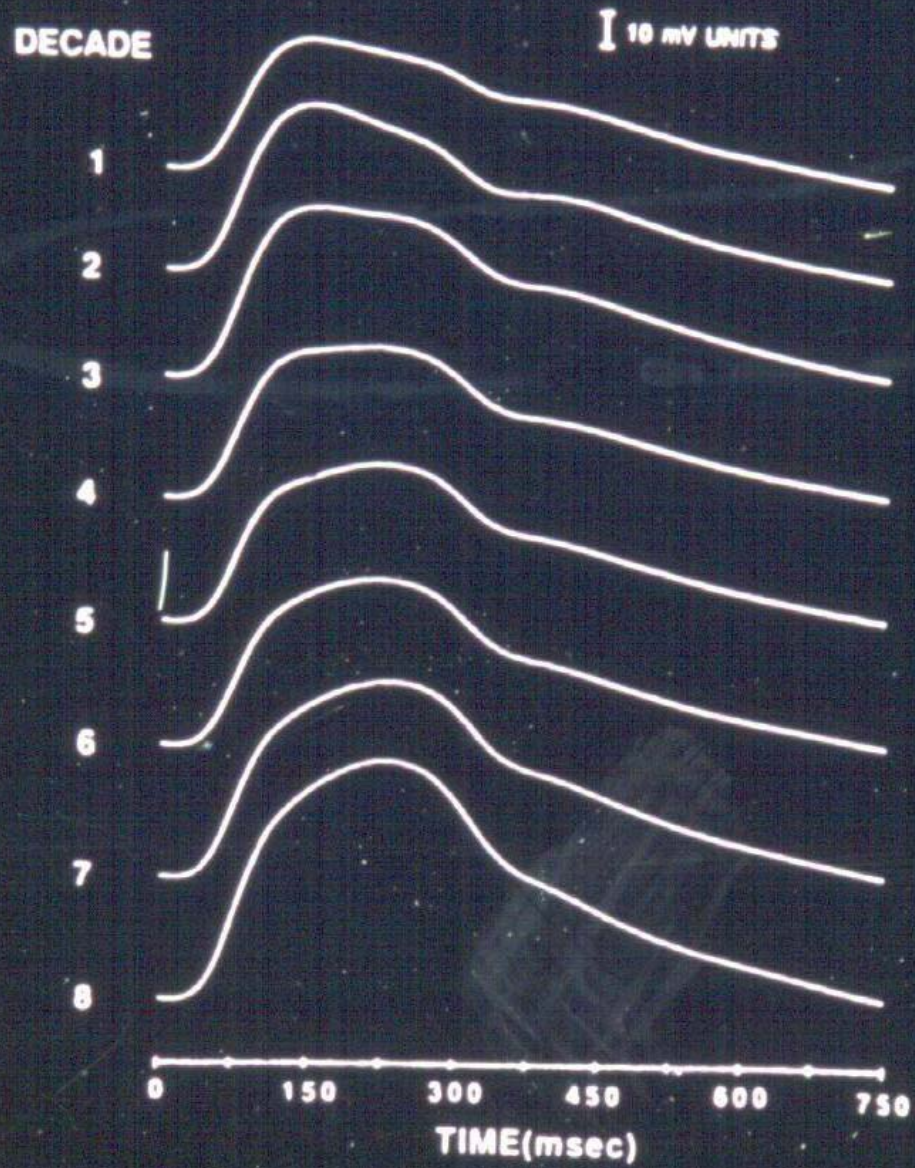
Diastolic



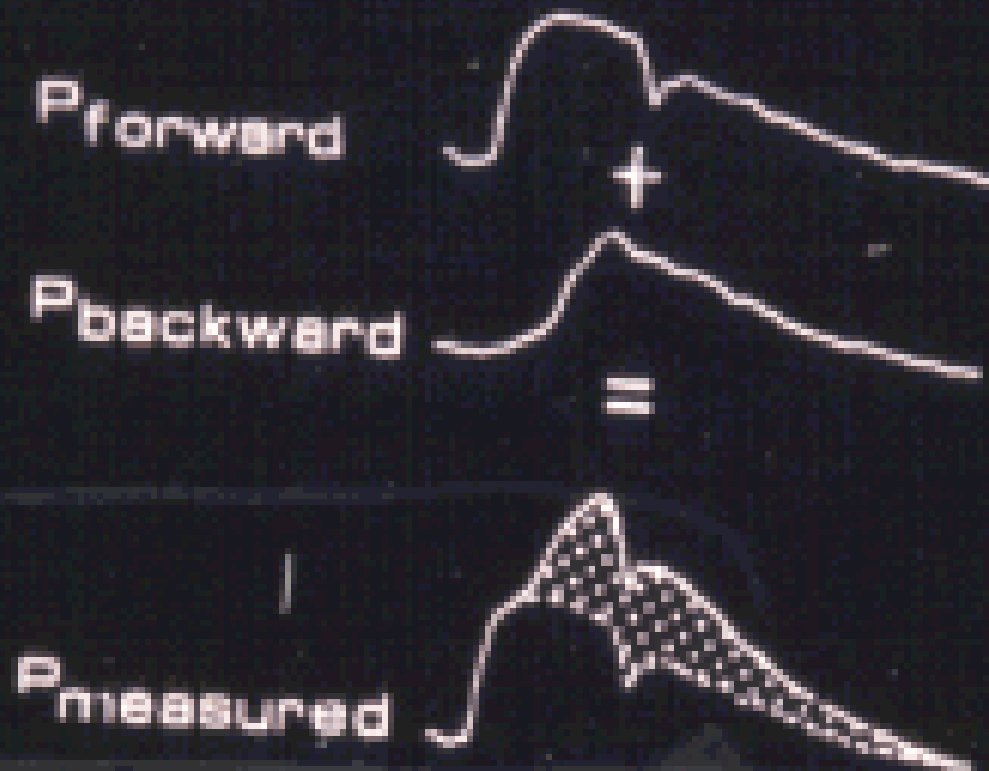
Systolic



CAROTID PULSE CONTOUR



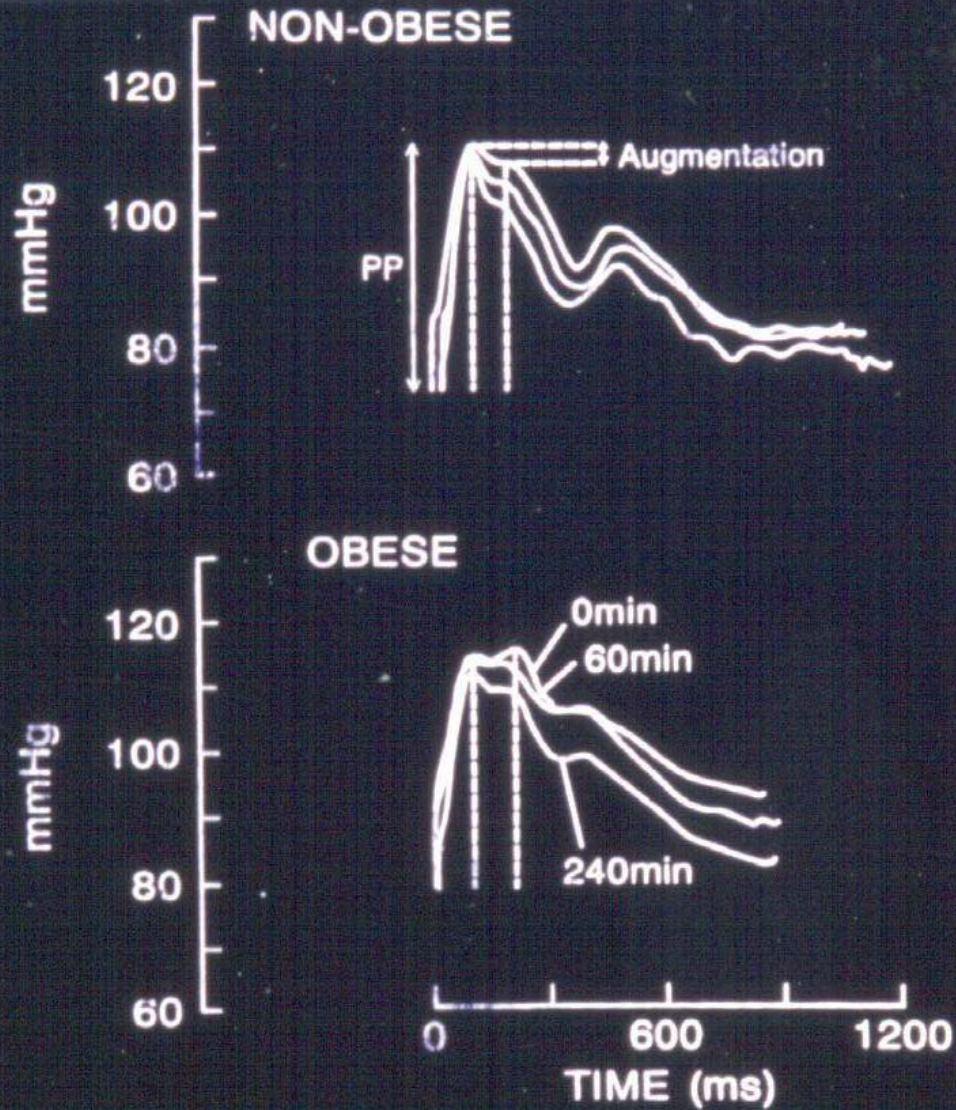
Kelly et al,



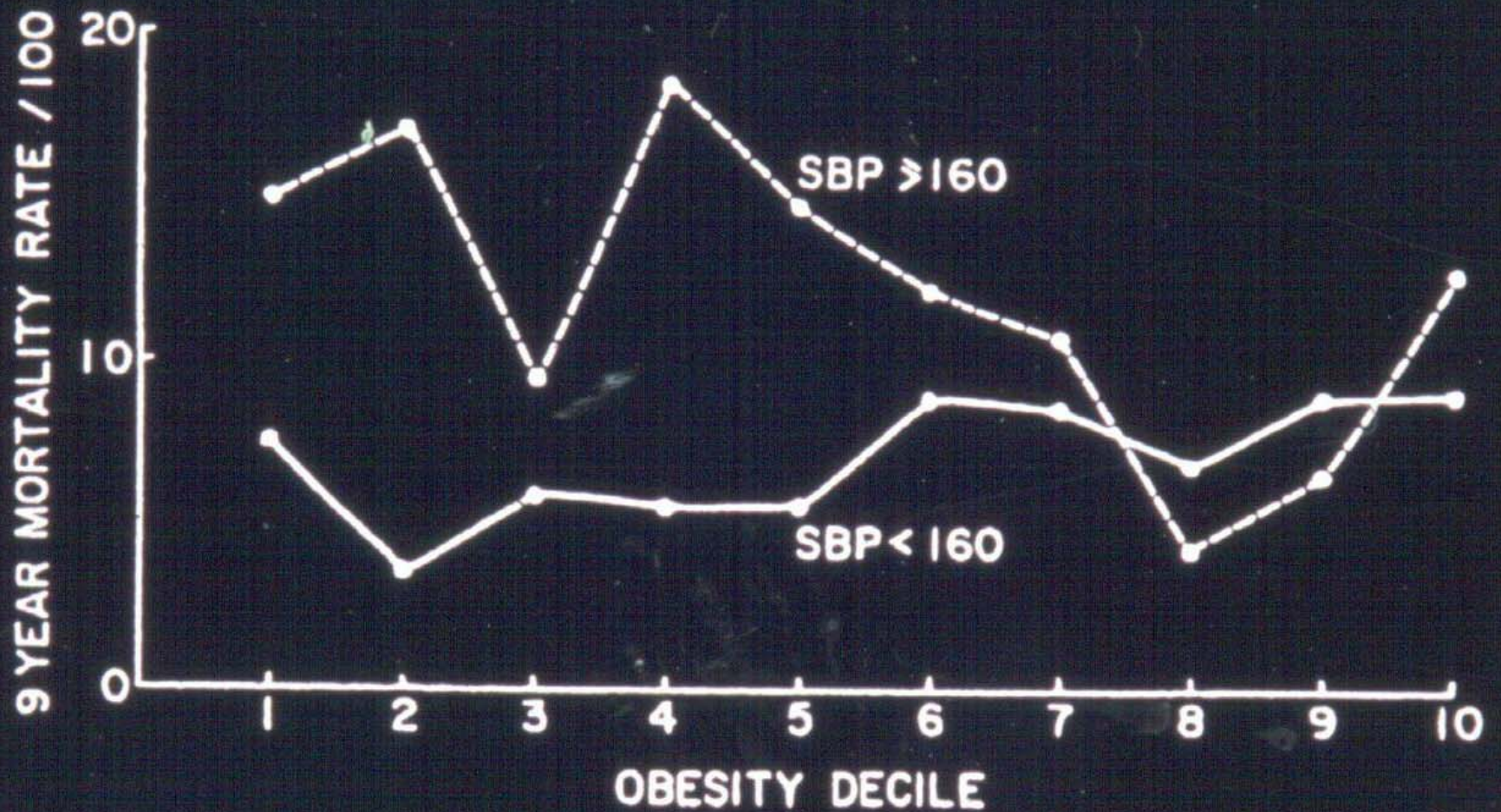
$$P_m = P_f + P_b$$

Westerhof and O'Rourke, 1995

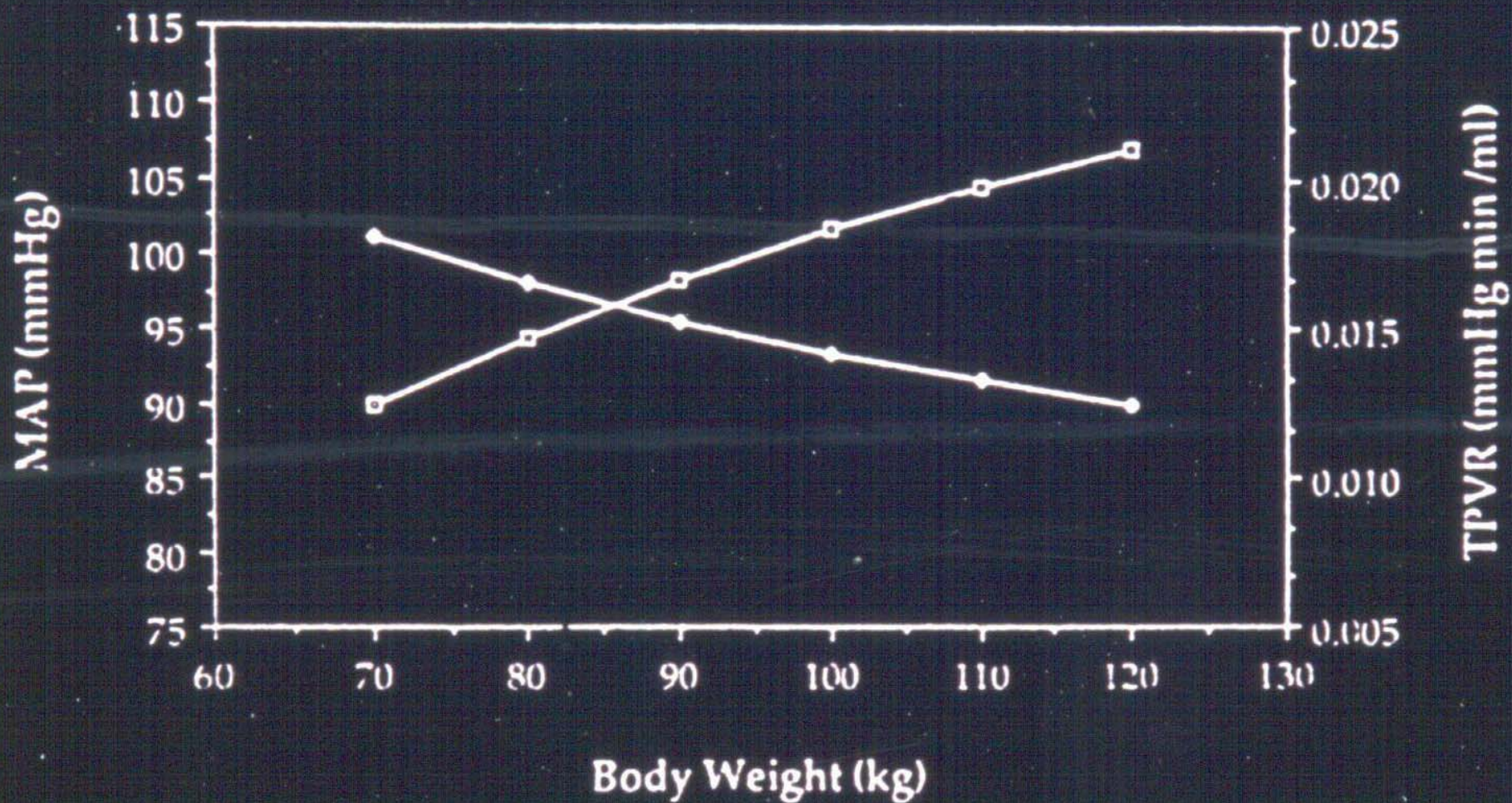
AORTIC PULSE WAVEFORM



Westerbacka et al, 1999



Barrett-Connor et al., 1985



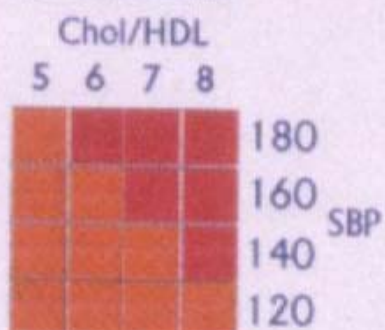
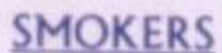
Ferrannini, 1992

Determinants of Cardiovascular Risk

- Peripheral vascular resistance
- Vessel stiffness

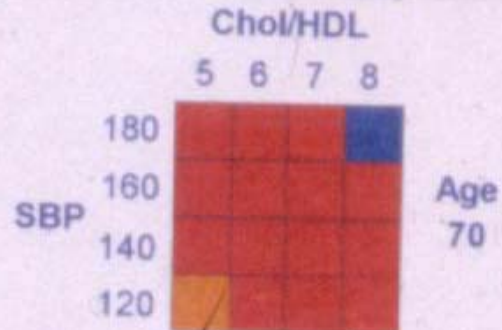
NON-DIABETIC MEN

NON-SMOKERS

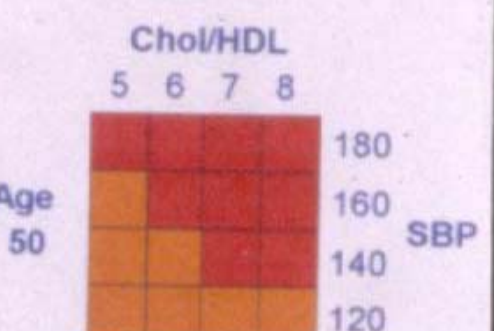
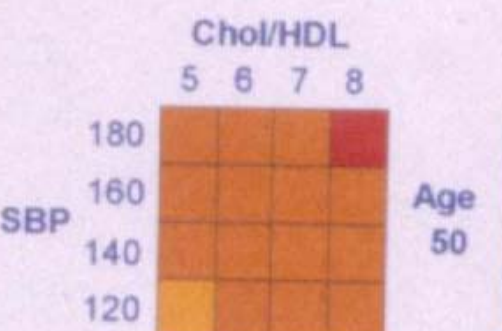
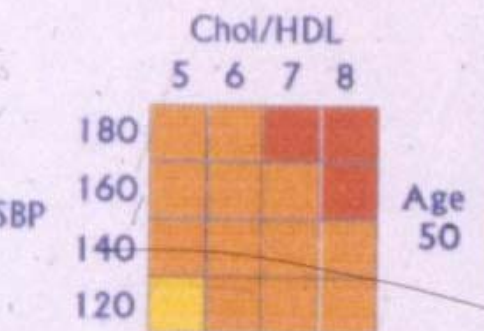
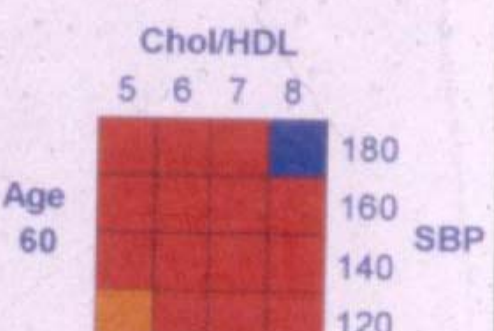
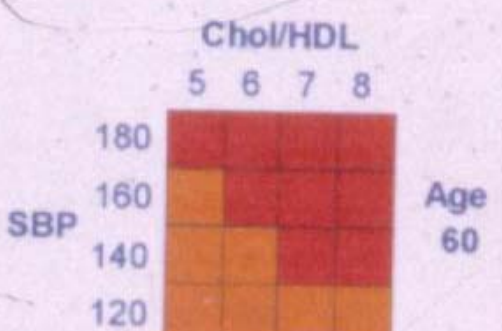
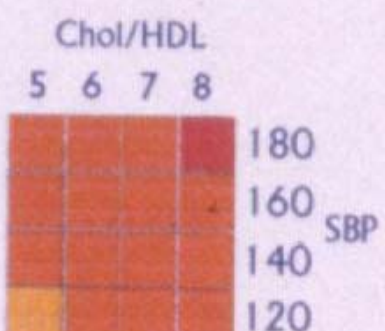
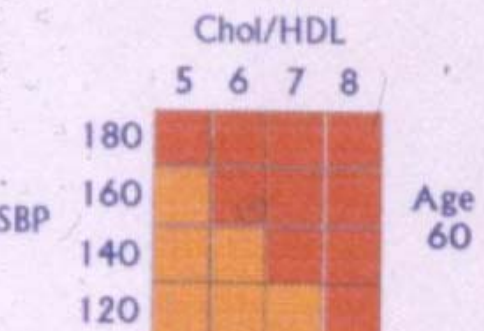
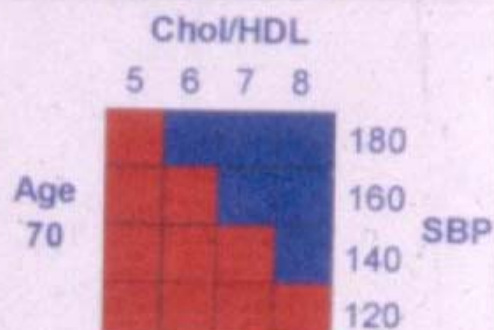


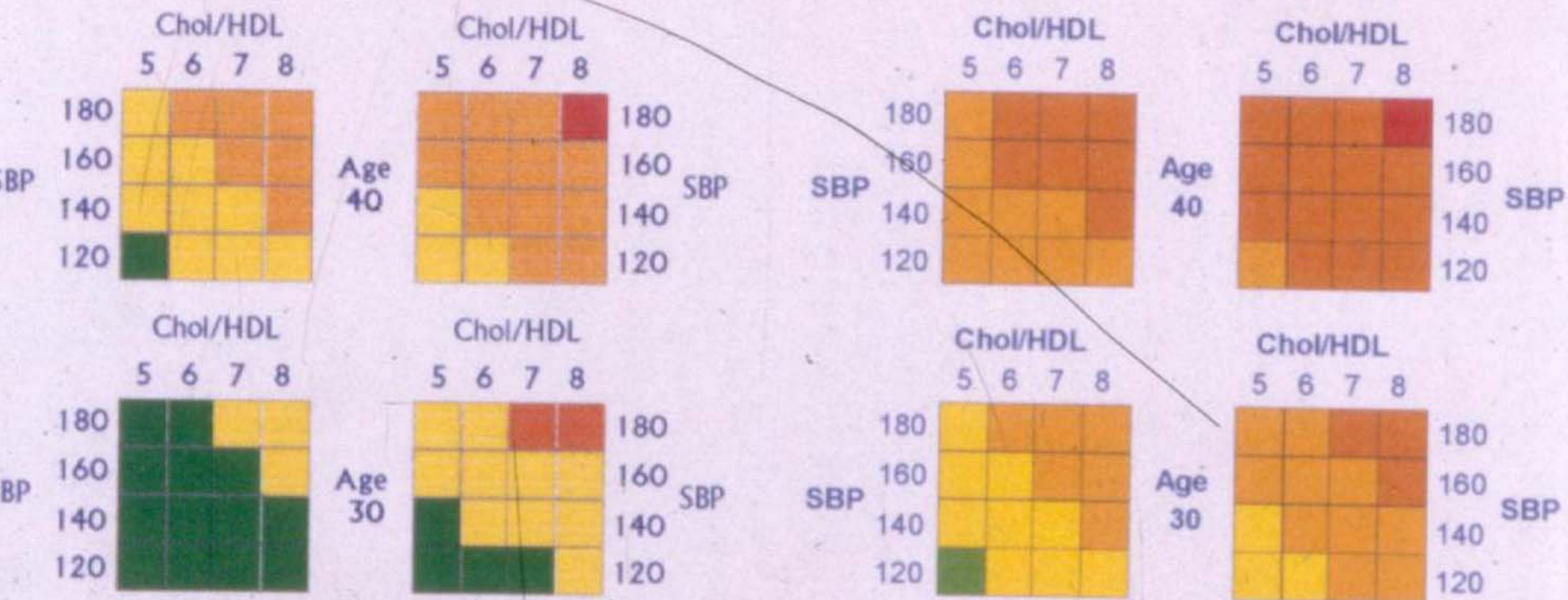
MICROALBUMINURIC DIABETIC MEN

NON-SMOKERS



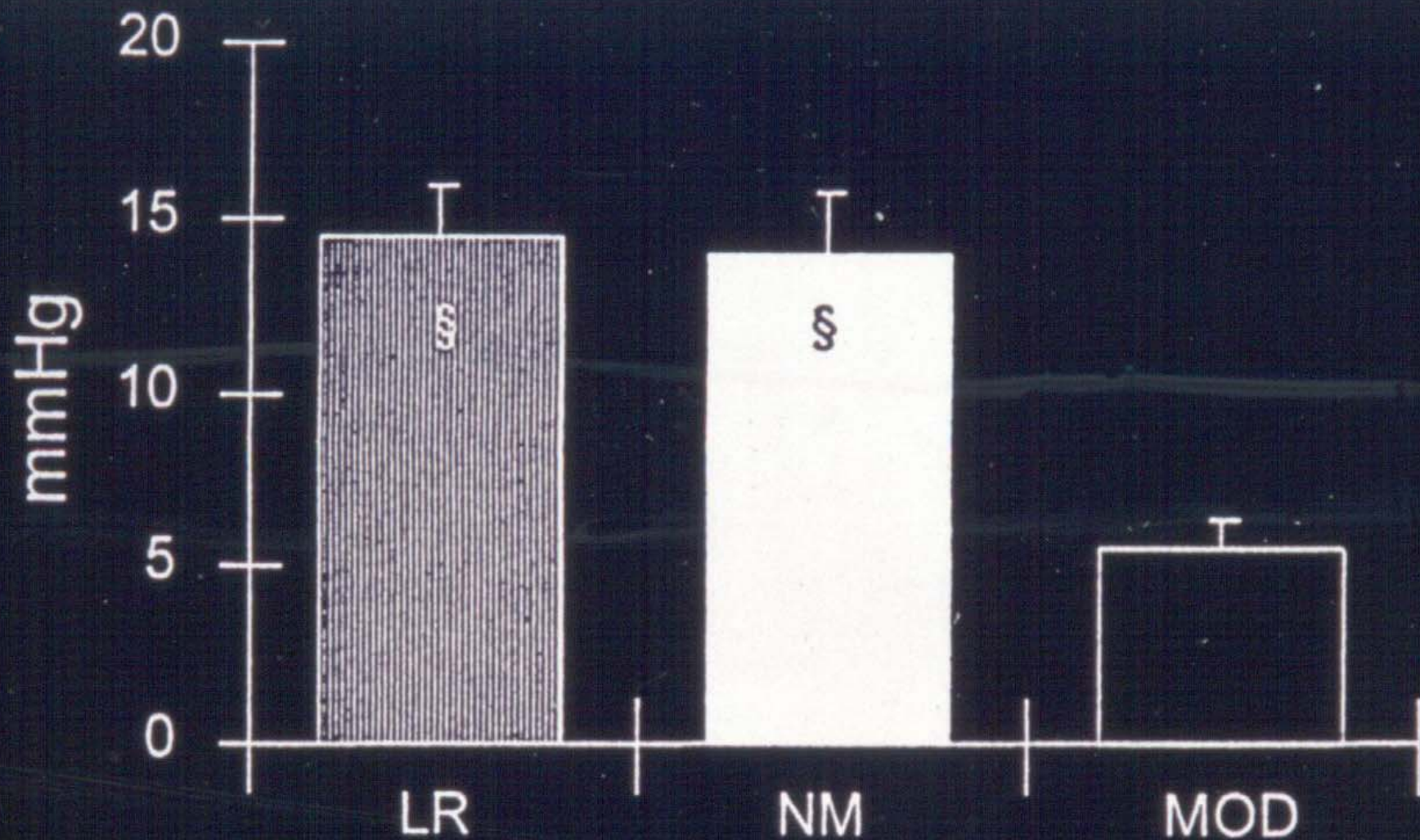
SMOKERS





High Cardiovascular Risk in Hypertension

- **high renin**
- **non-modulating**
- **non-dipping**
- **salt-sensitive**
- **insulin resistant**
- **left ventricular hypertrophy**
- **microalbuminuria**
- **\uparrow Na^+ / Li^+ countertransport**



Ferri et al., 1999

Characteristics of Low Renin, Non-Modulating and Modulating Hypertensives

	Low renin (n=18)	Non-modulating (n=23)	Modulating (n=21)
Low sodium PRA	0.17*	1.29	1.38
SBP	146	141	145
DBP	92	92	97
LDL-Cholesterol	3.3	4.8*	3.1
Triglyceride	1.3	1.7*	1.5
Insulin	65	104*	82
Subscapular-to-triceps ratio	1.22	2.58*	1.49
Na/Li countertransport	345	577*	386

*P<0.05 vs other groups

Ferri et al, 1999

TABLE 3

Familial occurrence of hypertension, myocardial infarction, and stroke in the three hypertensive subgroups

	Hypertensive subgroups		
	Low-renin	Nonmodulating	Modulating
<i>n</i>	18	23	21
Hypertension	14	19*	7
Myocardial infarction	2	11†	3
Stroke	2	5	2

Data are *n*. * $P < 0.001$ vs. modulating hypertensive subjects, † $P < 0.02$ vs. low-renin and modulating hypertensive subjects.

