ELSEVIER

THE LANCET

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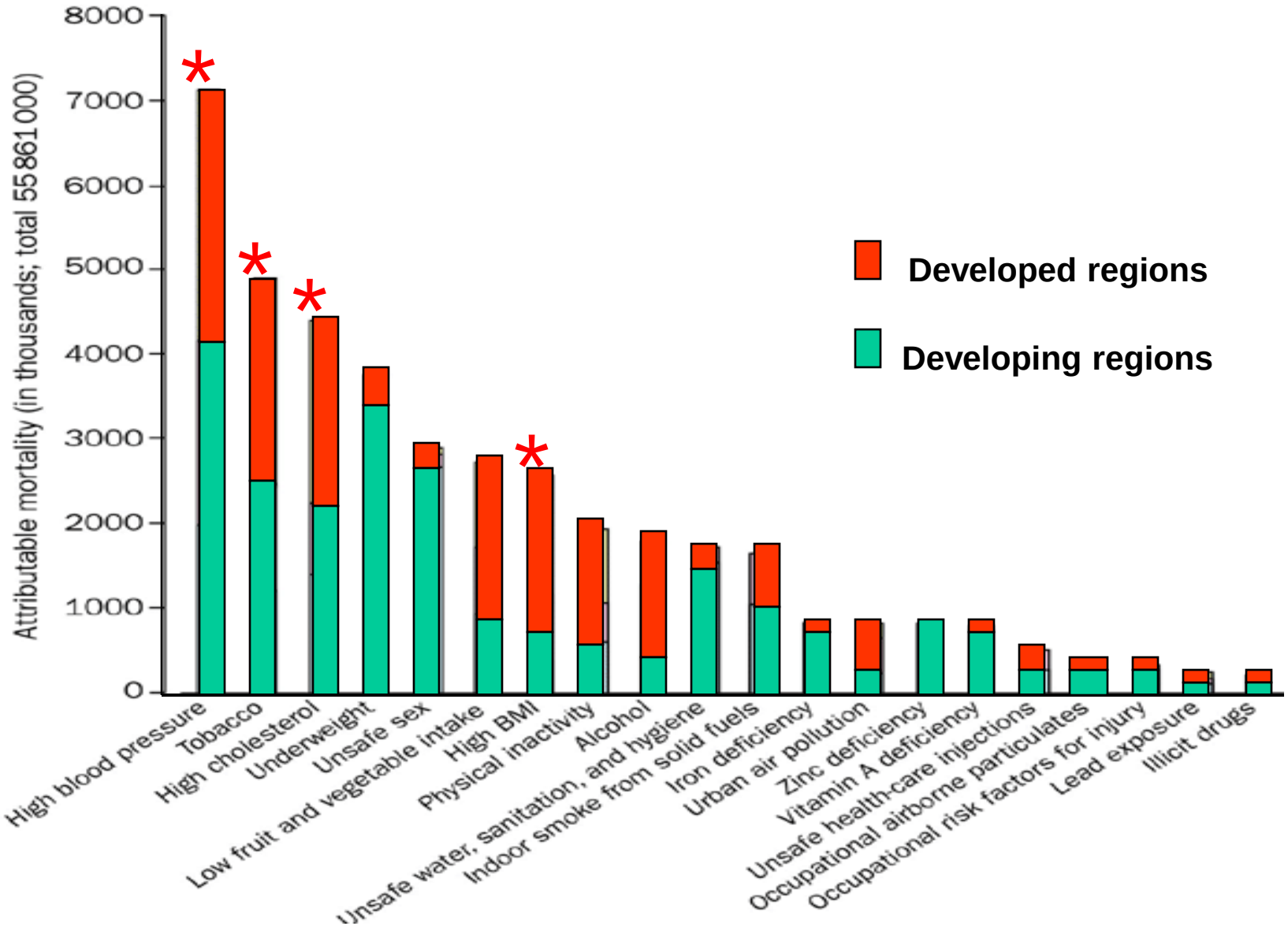
"More than a quarter of the world's adult population—totalling nearly one billion—had hypertension in 2000, and . . . this proportion will increase to 29%—1·56 billion—by 2025."

See **Articles** page 217

Mortality due to leading global risk factors



World Health Report 2002

Cardiovascular risk factors (modifiable)

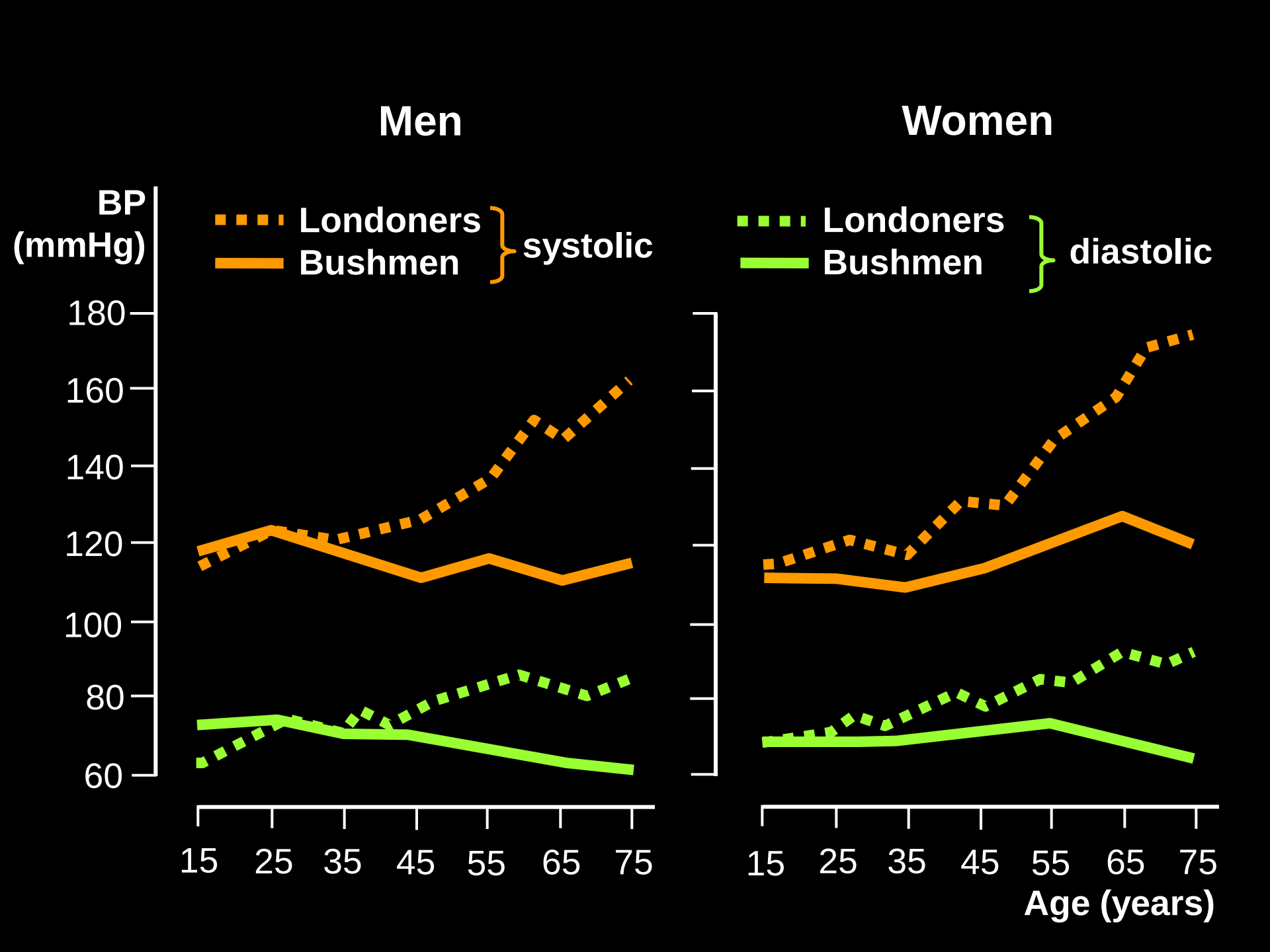
Blood pressure

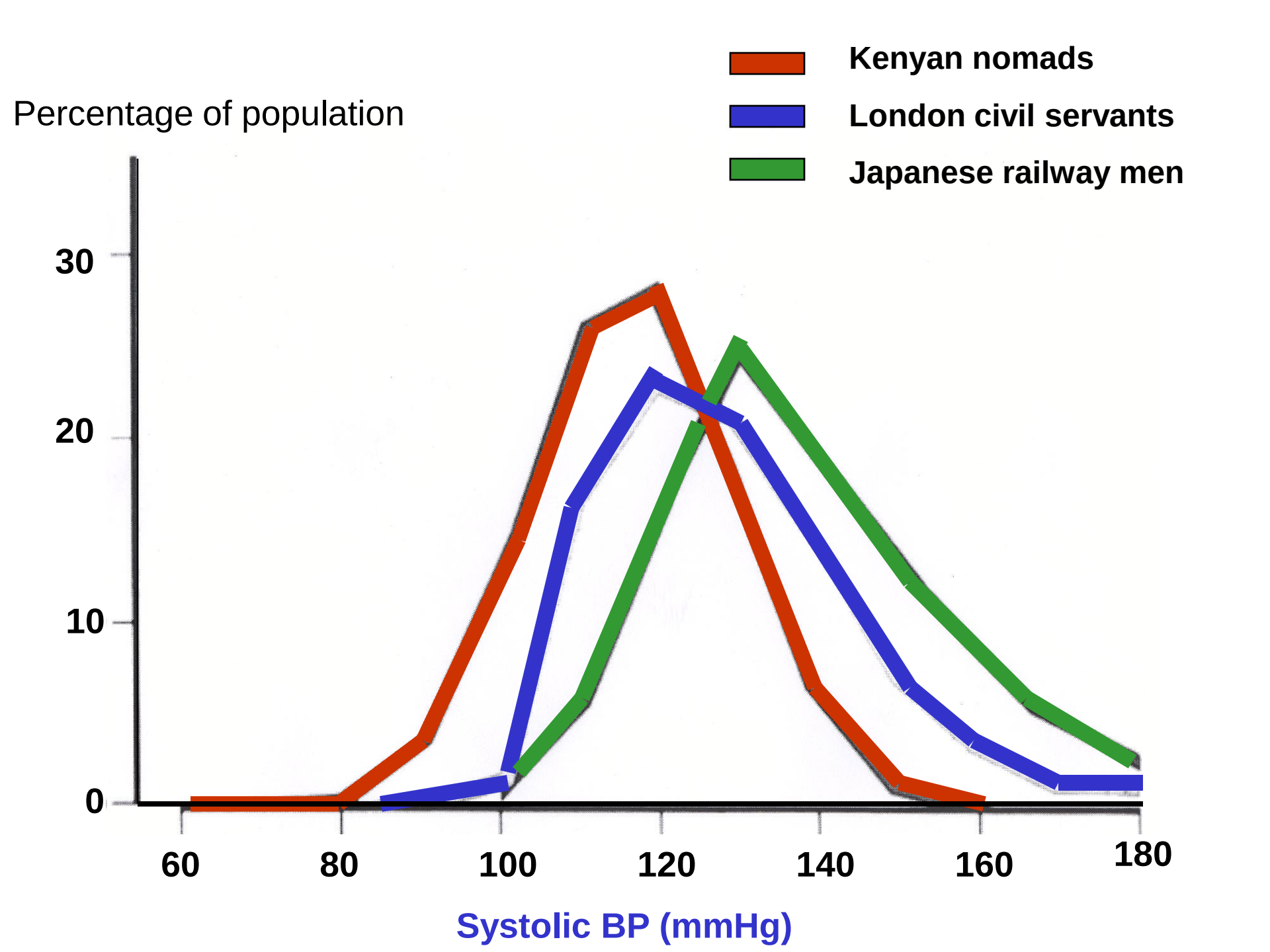
Lipids

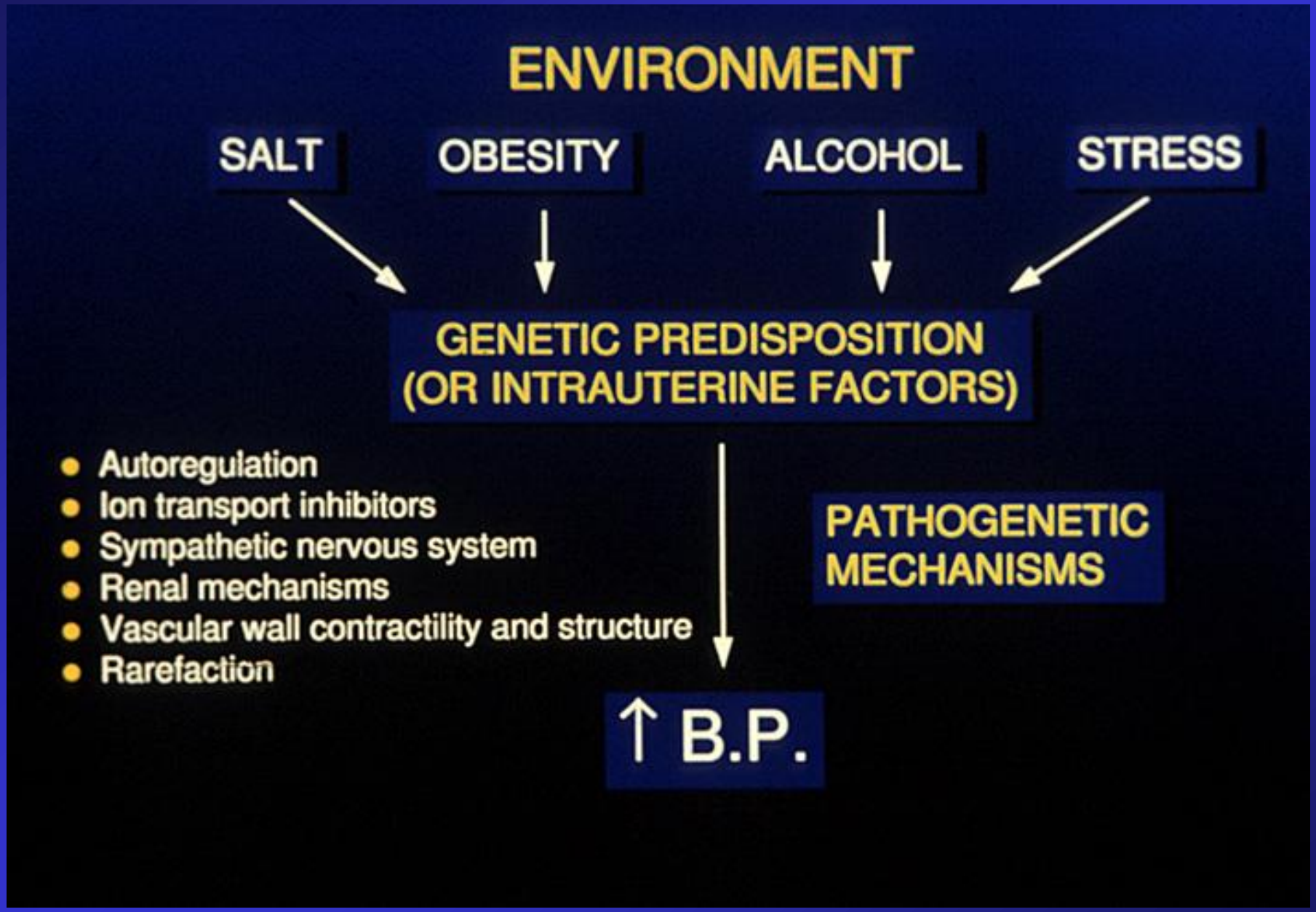
Diabetes

Smoking

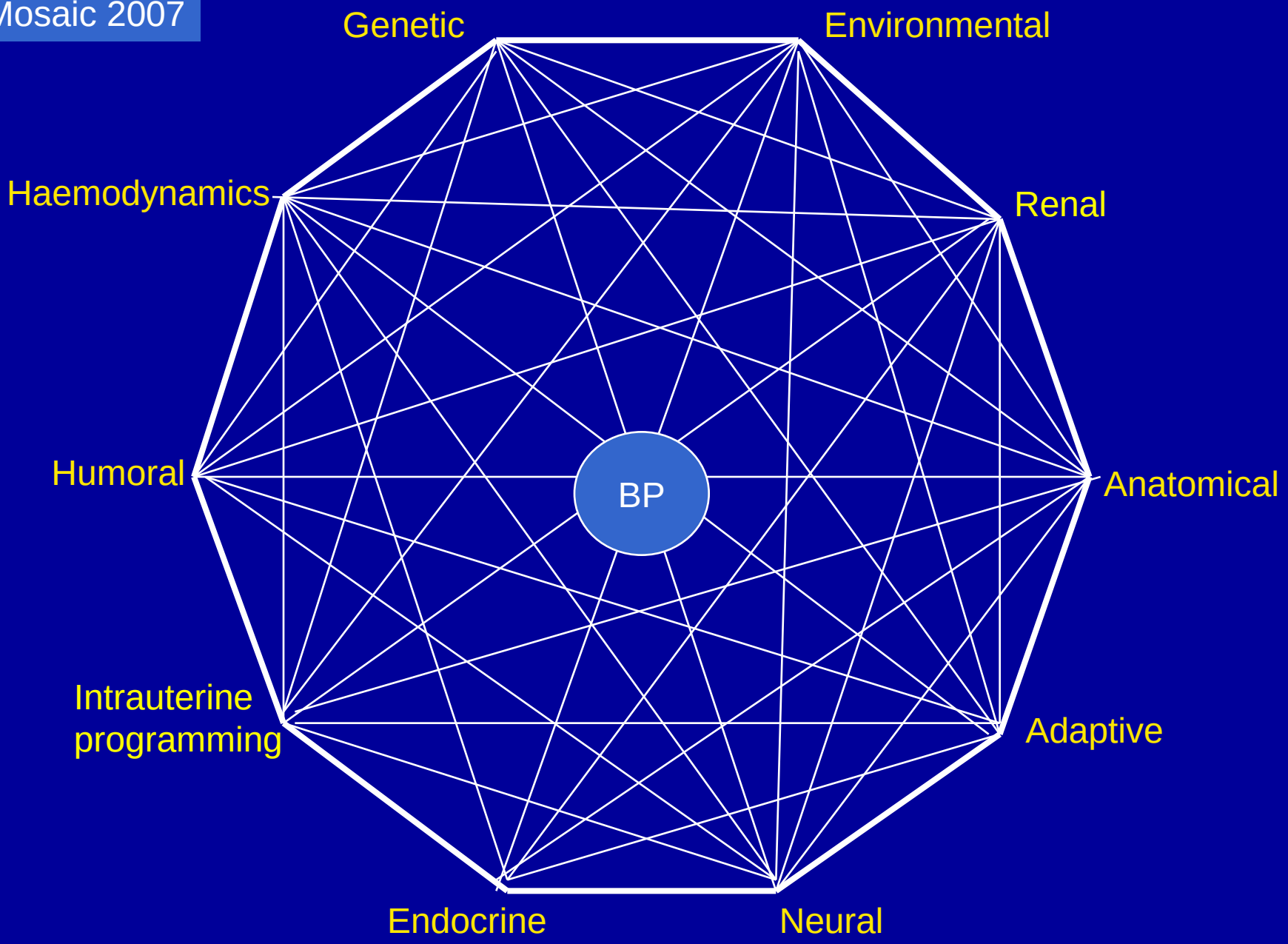
Obesity


Men
Women
BP
(mmHg)
Londoners
Bushmen
systolic
Londoners
Bushmen
diastolic
180
160
140
120
100
80
60
15
25
35
45
55
65
75
15
25
35
45
55
65
75
Age (years)


Kenyan nomads
London civil servants
Japanese railway men
Percentage of population
30
20
10
0
60
80
100
120
140
160
180
Systolic BP (mmHg)


ENVIRONMENT
SALT
OBESITY
ALCOHOL
STRESS
GENETIC PREDISPOSITION
(OR INTRAUTERINE FACTORS)
Autoregulation
Ion transport inhibitors
Sympathetic nervous system
Renal mechanisms
Vascular wall contractility and structure
Rarefaction
PATHOGENETIC
MECHANISMS
↑ B.P.

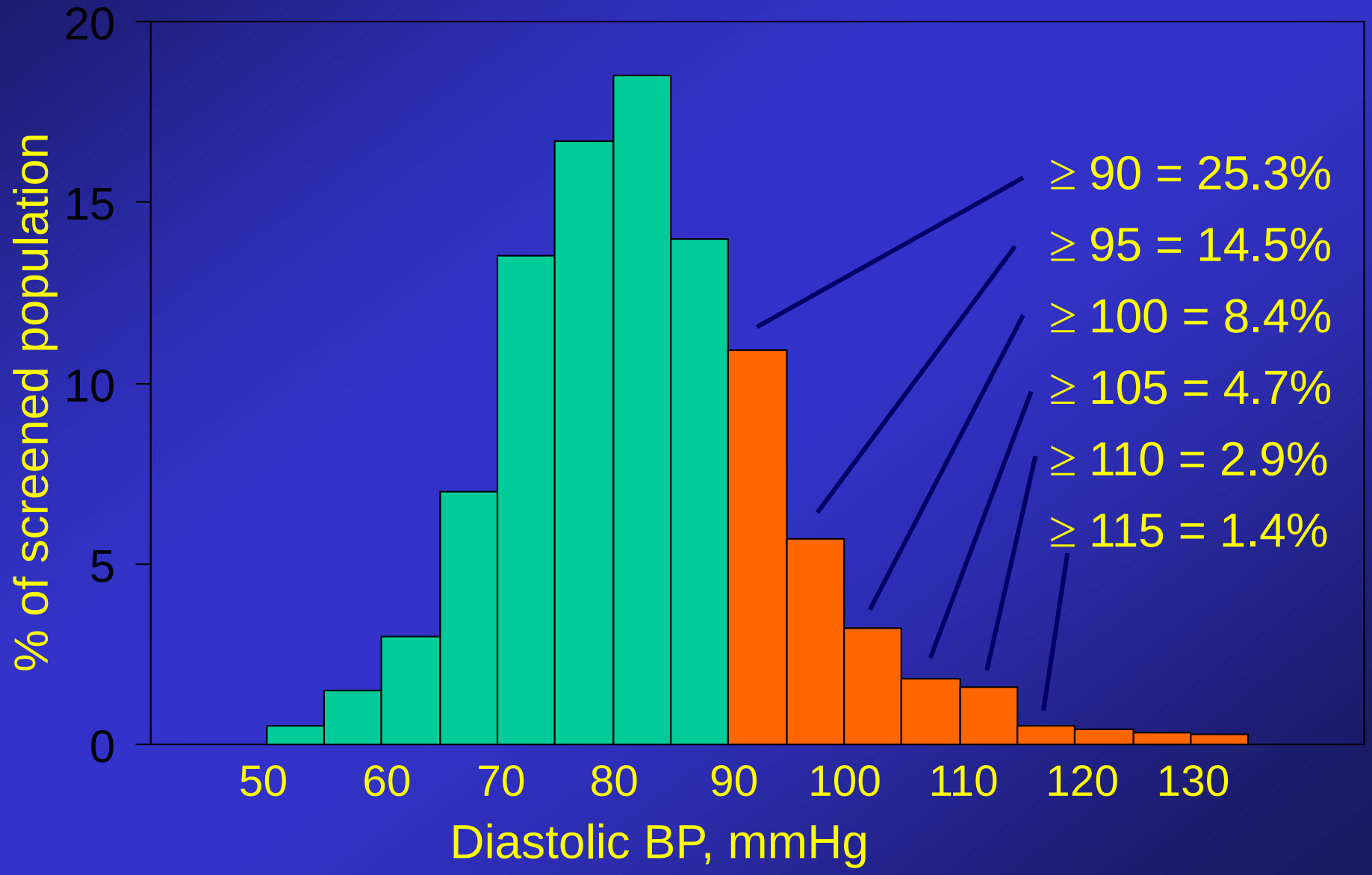
Mosaic 2007

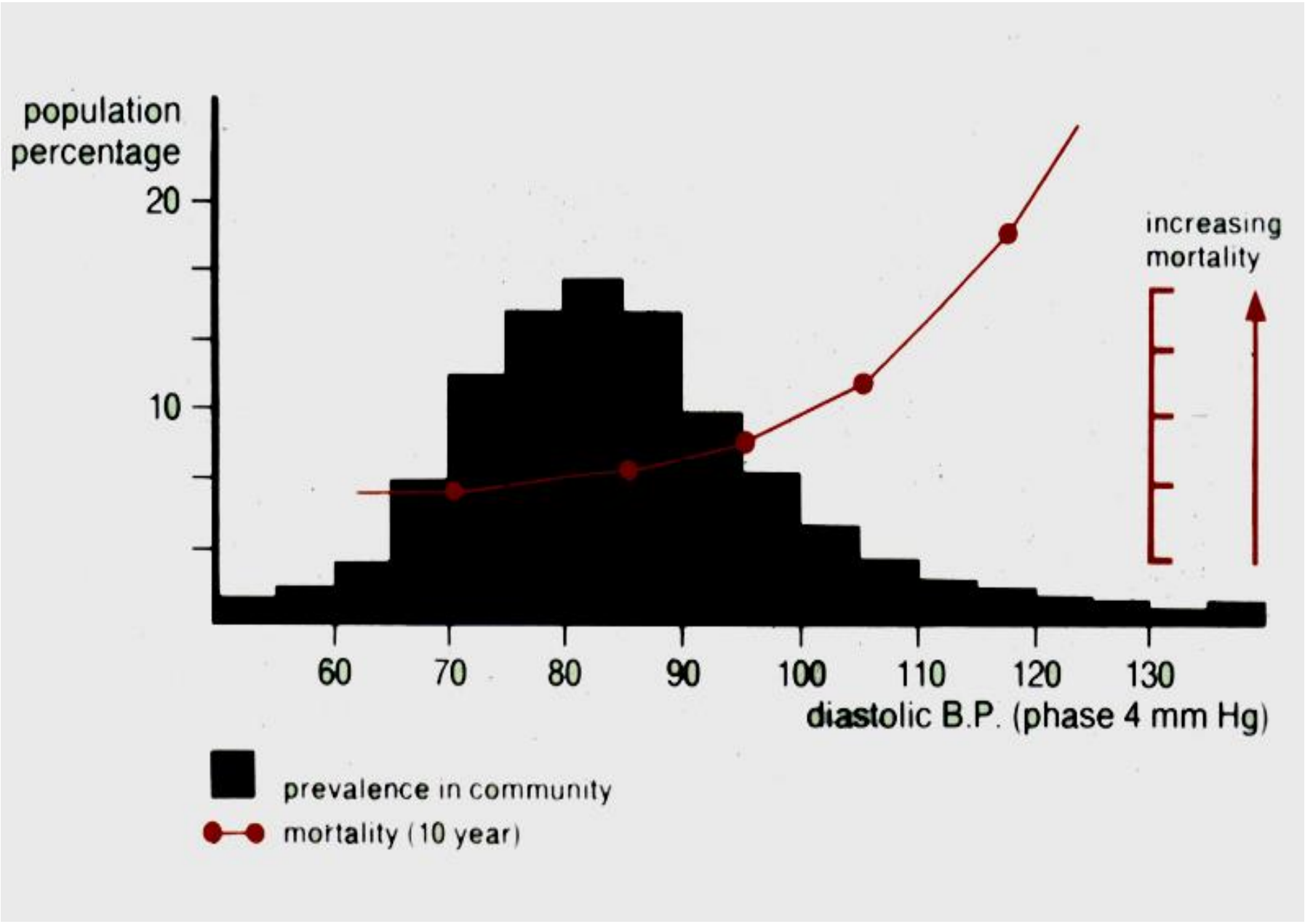

Genetic
Environmental
Haemodynamics
Renal
Humoral
BP
Anatomical
Intrauterine programming
Adaptive
Endocrine
Neural

Classification of blood pressure levels of the British Hypertension Society

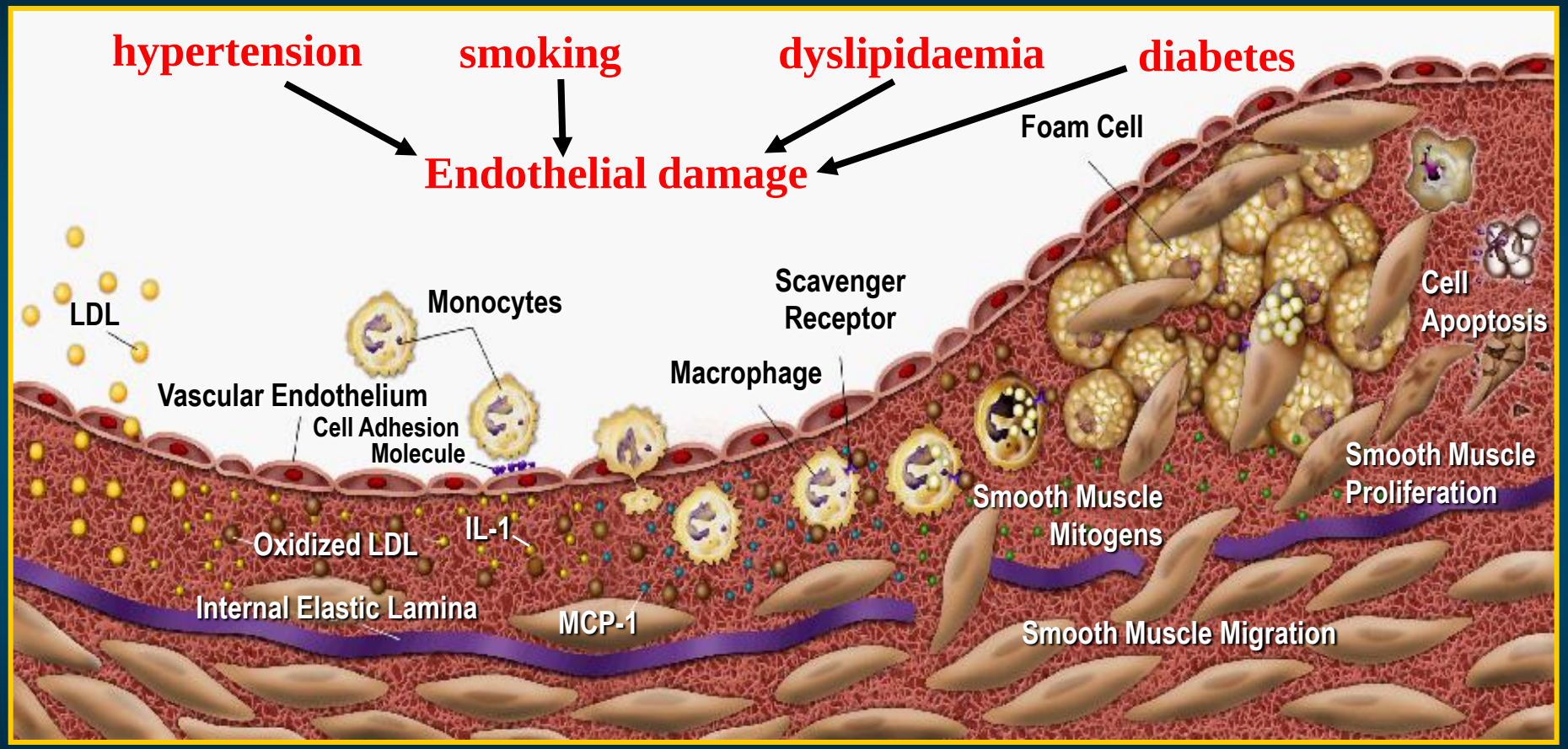
Category	Systolic blood pressure (mmHg)	Diastolic blood pressure (mmHg)
Blood Pressure		
Optimal	<120	<80
Normal	<130	<85
High normal	130-139	85-89
Hypertension		
Grade 1 (mild)	140-159	90-99
Grade 2 (moderate)	160-179	100-109
Grade 3 (severe)	≥180	≥110
Isolated systolic hypertension		
Grade 1	140-159	<90
Grade 2	≥160	<90

Prevalence of ‘Hypertension’ by different cut points

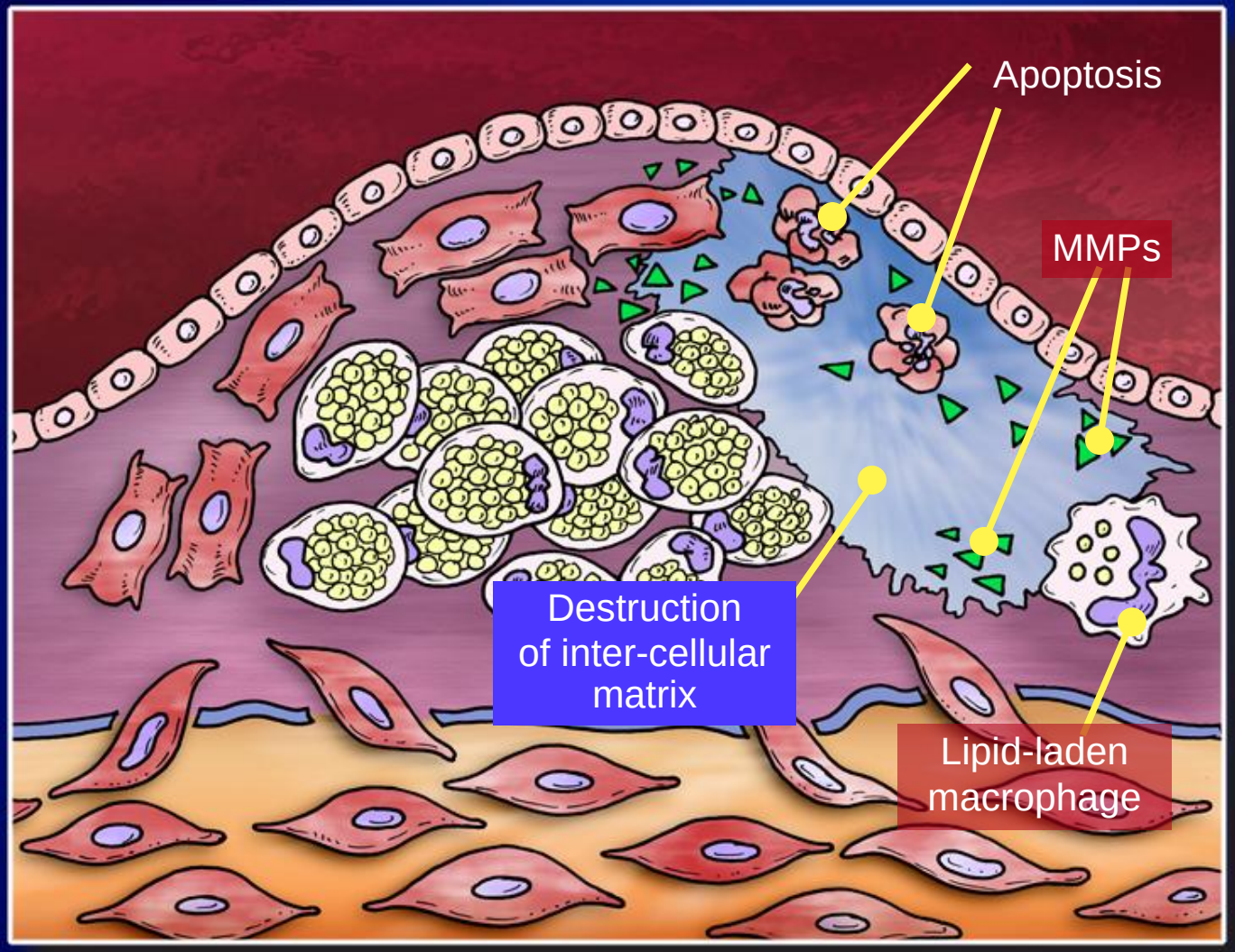


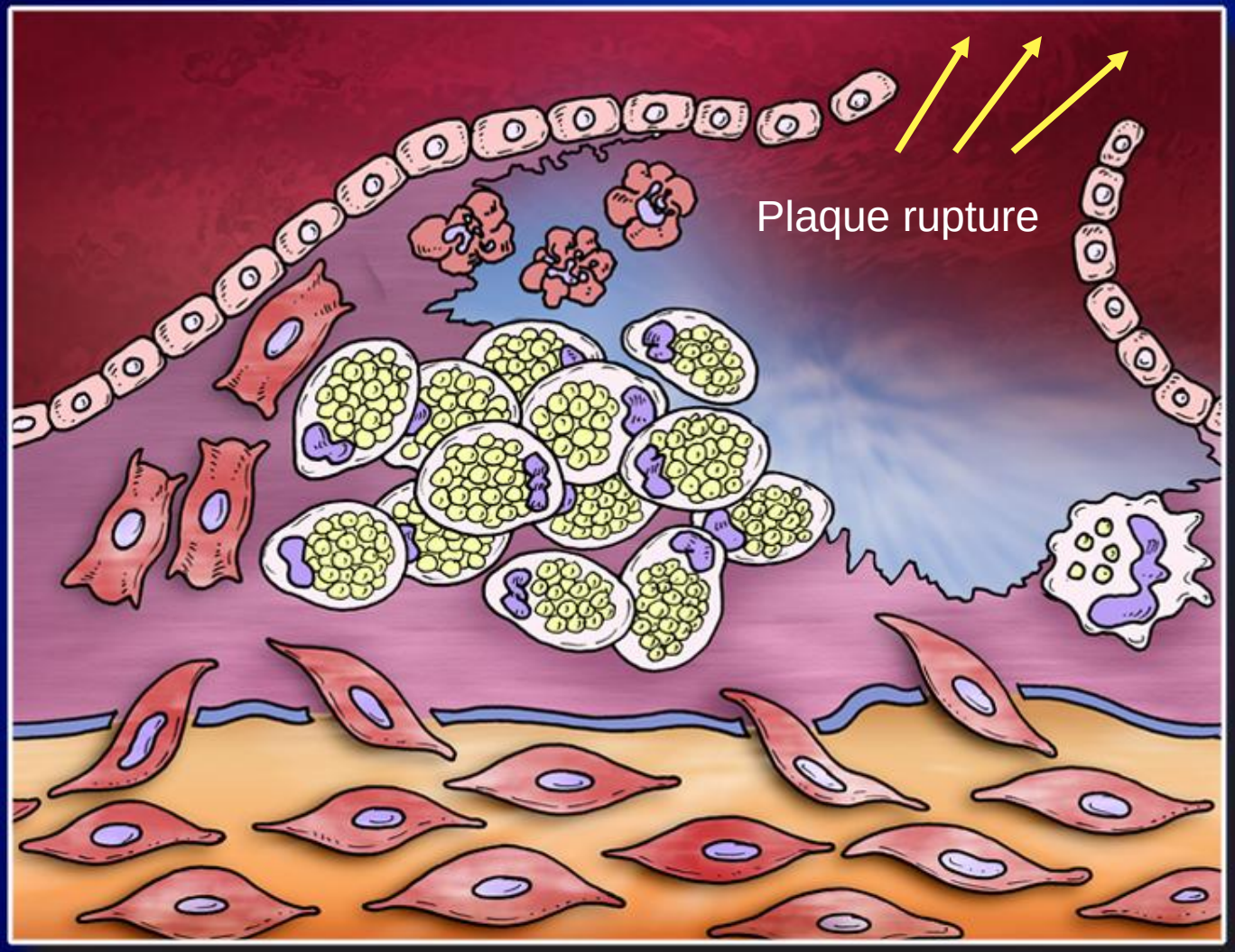

population percentage
20
10
increasing mortality
60
70
80
90
100
110
120
130
diastolic B.P. (phase 4 mm Hg)
prevalence in community
mortality (10 year)

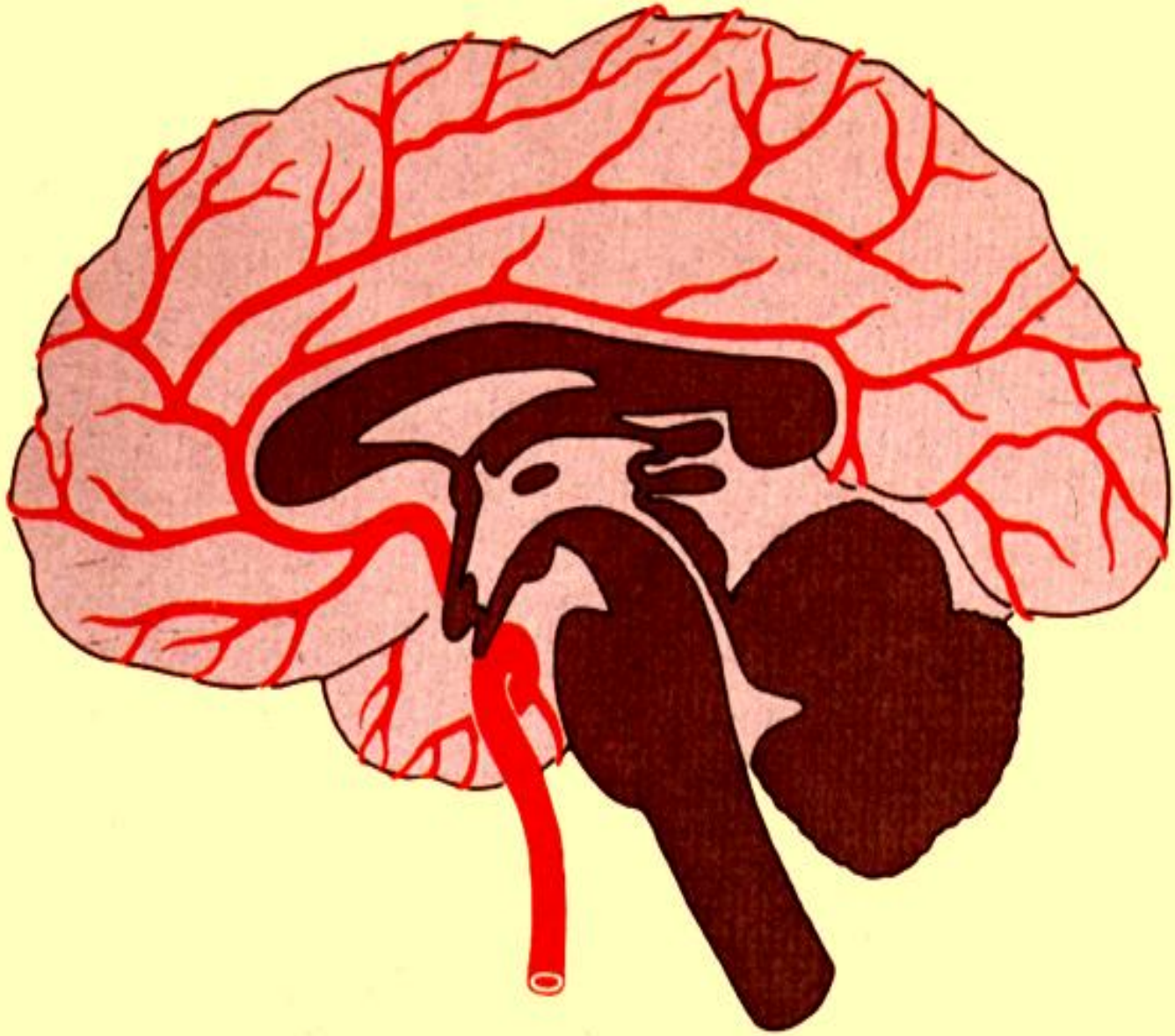
Progression of Atherosclerosis



Libby P. In: Braunwald, Zipes, Libby, eds. *Heart Disease.* 2001:995-1006.


Apoptosis
MMPs
Destruction of inter-cellular matrix
Lipid-laden macrophage


Plaque rupture



encephalopathy

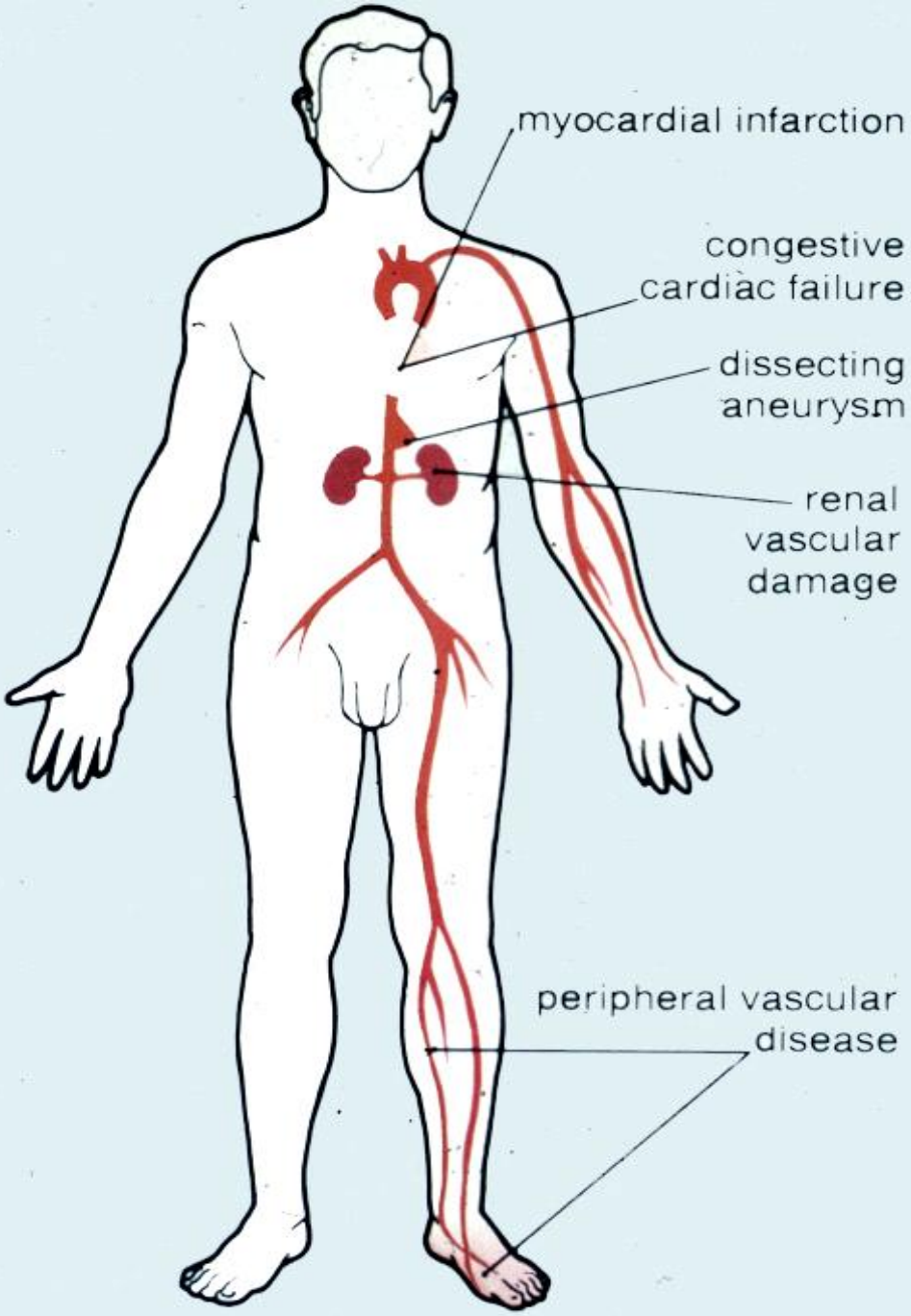
cerebral haemorrhage

cerebral thrombosis

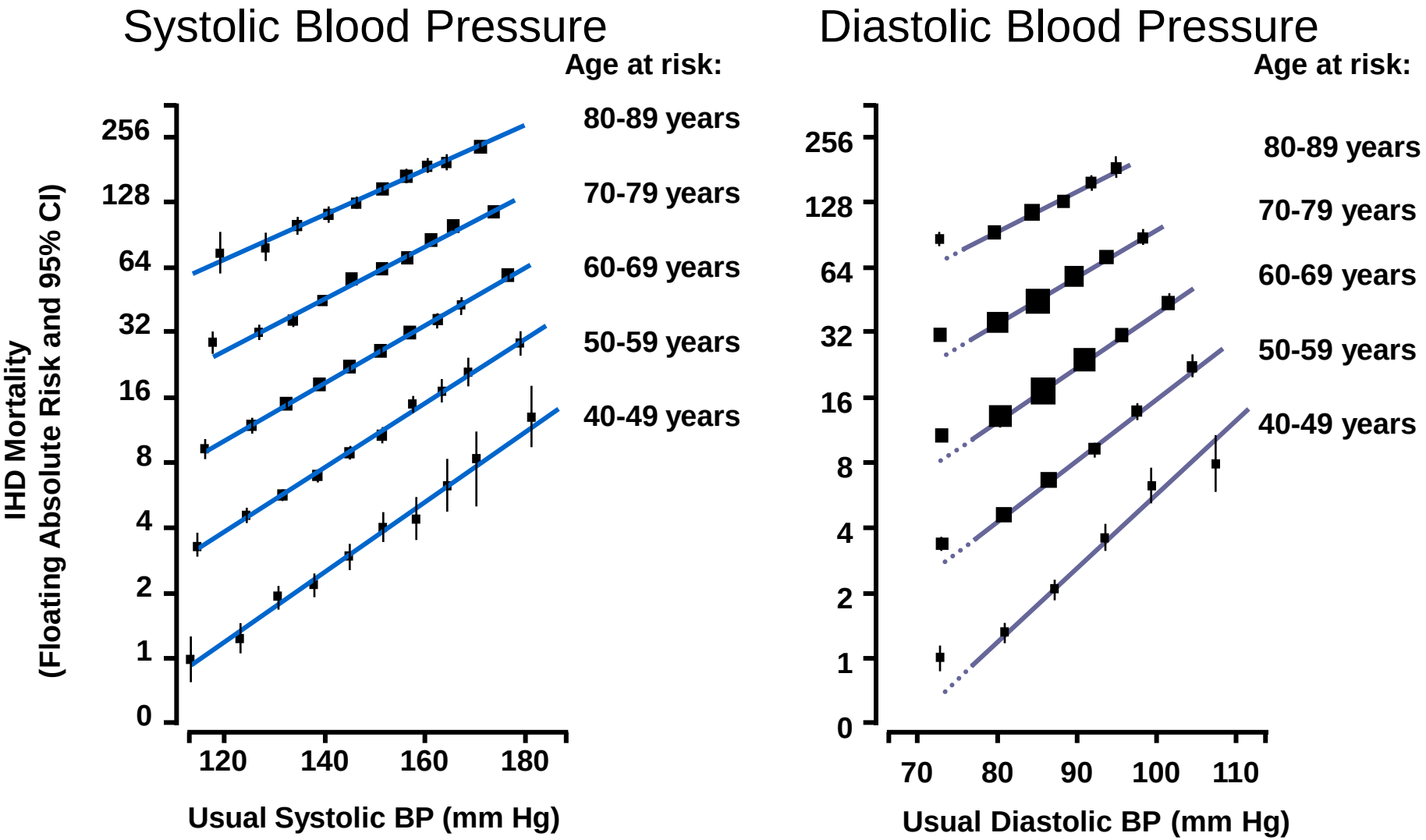
lacunar stroke

embolism

transient ischaemic attacks

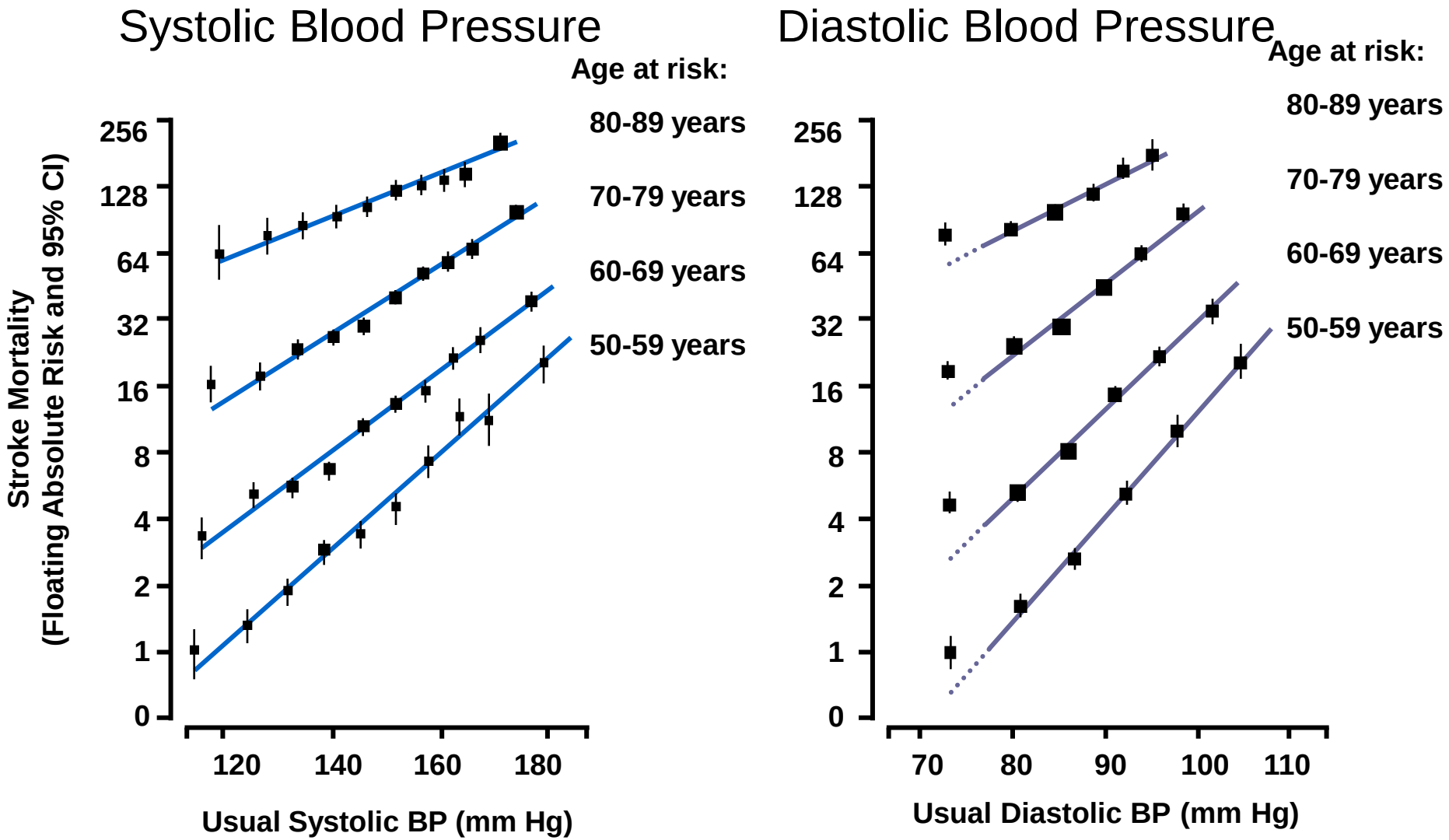

myocardial infarction
congestive cardiac failure
dissecting aneurysm
renal vascular damage
peripheral vascular disease

Ischaemic heart disease mortality linked to BP levels



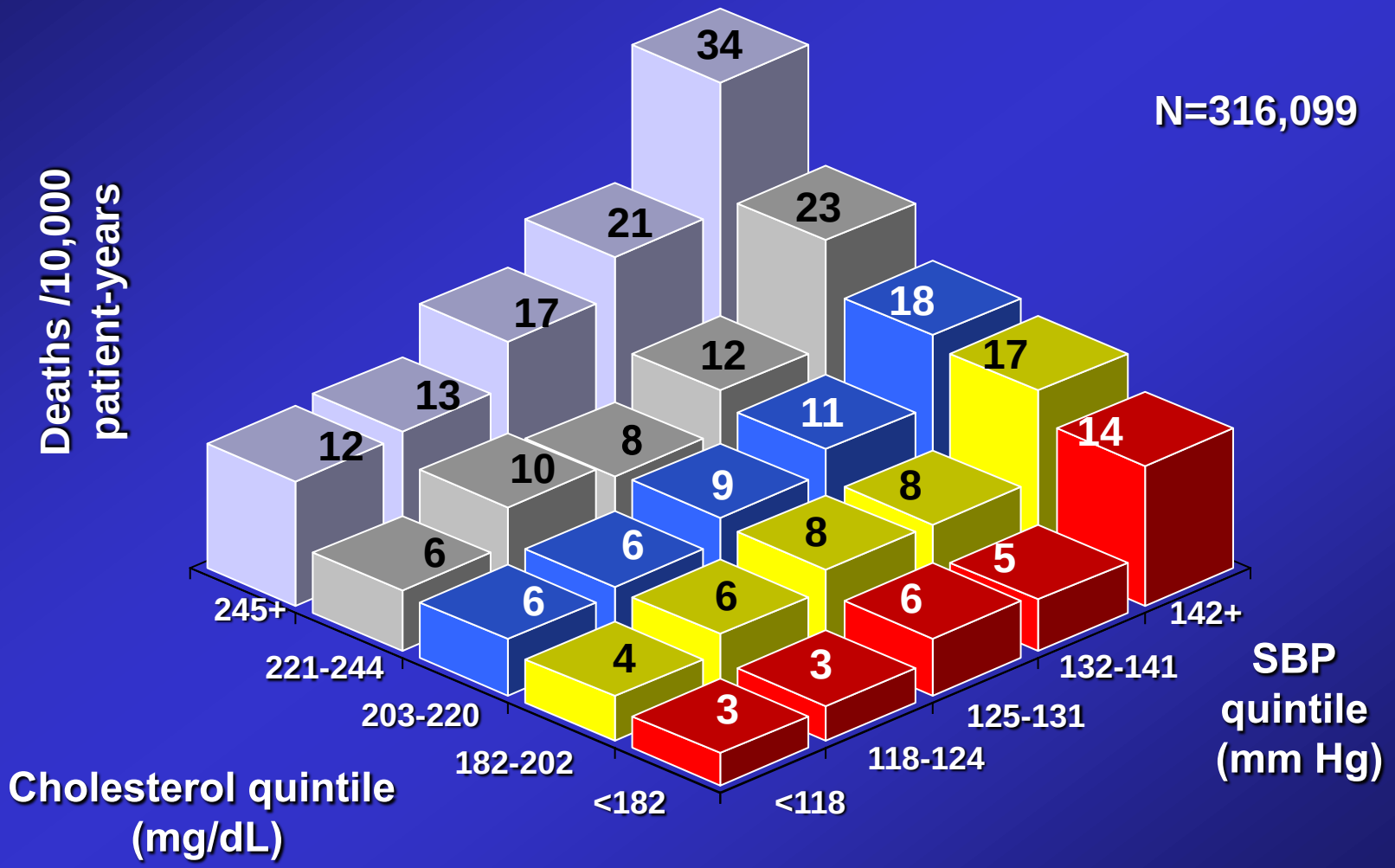
Prospective Studies Collaboration. Lancet. 2002;360:1903-1913.

Stroke mortality linked to BP levels



Prospective Studies Collaboration. Lancet. 2002;360:1903-1913.

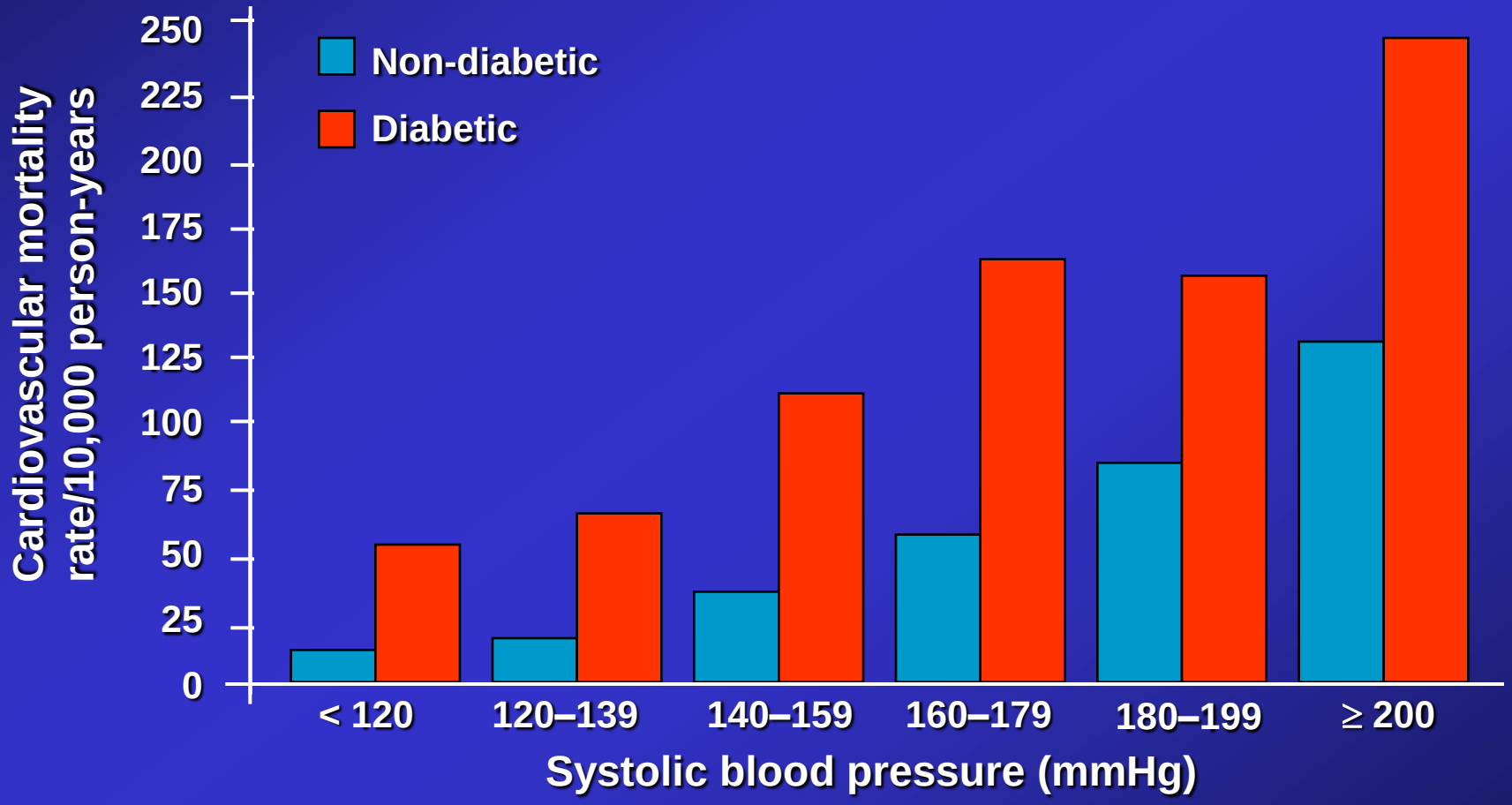
Additive Effect of Cholesterol and Systolic BP on Risk of CHD Death



Neaton JD, Wentworth D. Arch Intern Med. 1992;152:56-64.

Systolic Blood Pressure and Cardiovascular Death

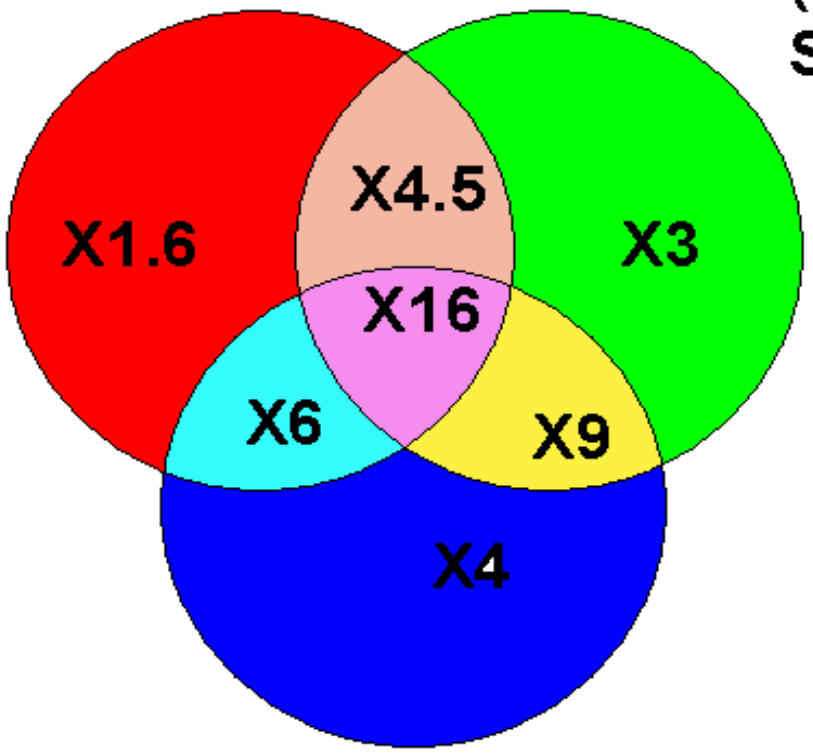
Association in type 2 diabetes



Stamler et al. 1993

Smoking

Hypertension (195mm SBP)



Elevated Cholesterol 330mg/dl

BHS Guidelines 2004

Blood pressure measurement by standard mercury sphygmomanometer or semiautomated device

- Use of properly maintain, calibrated, and validated device
- Measure sitting blood pressure routinely: standing blood pressure should be recorded at least at the initial estimation in elderly or diabetic patients
- Remove tight clothing, support arm at heart level, ensure arm relaxed and avoid talking during the measurement procedure
- Use of cuff of appropriate size

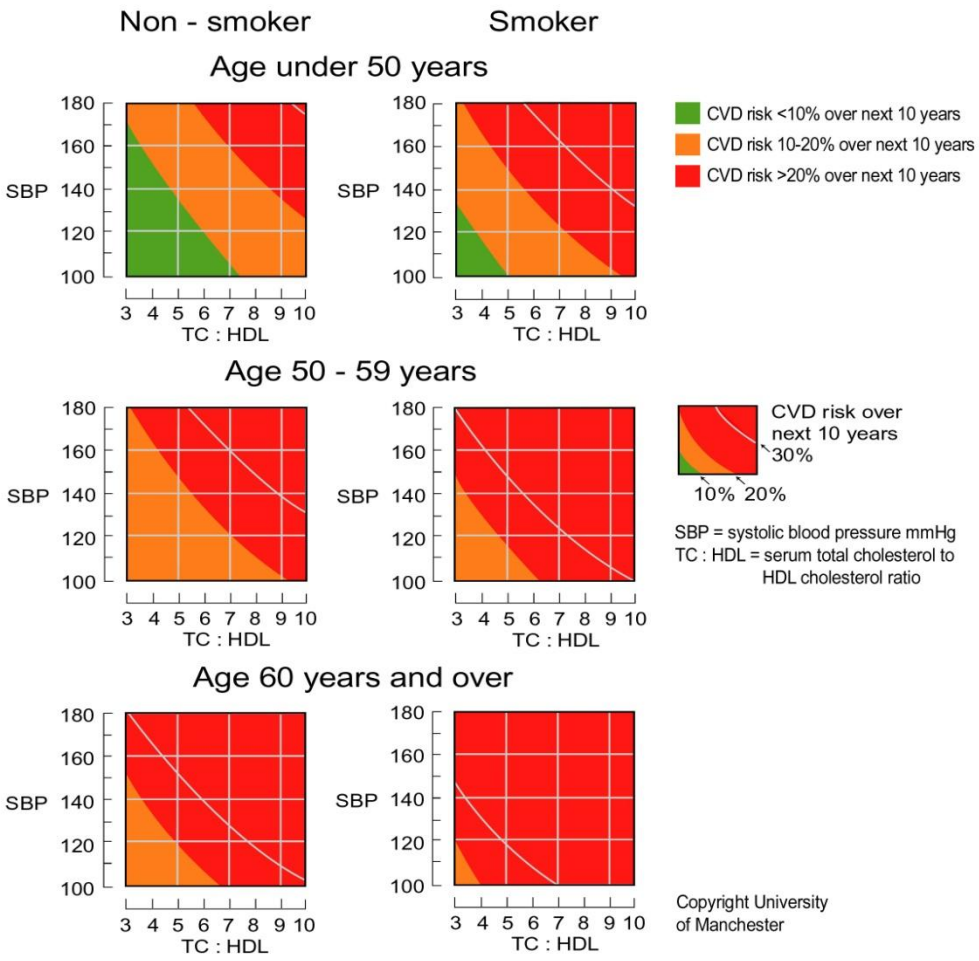
Continued

Blood pressure measurement by standard mercury sphygmomanometer or semiautomated device

- Take the mean of at least two readings, more recordings are needed if marked differences between initial measurements are found
- Do not treat on the basis of an isolated reading
- Consider ABPM or home monitoring

Cardiovascular risk assessment

Nondiabetic Men



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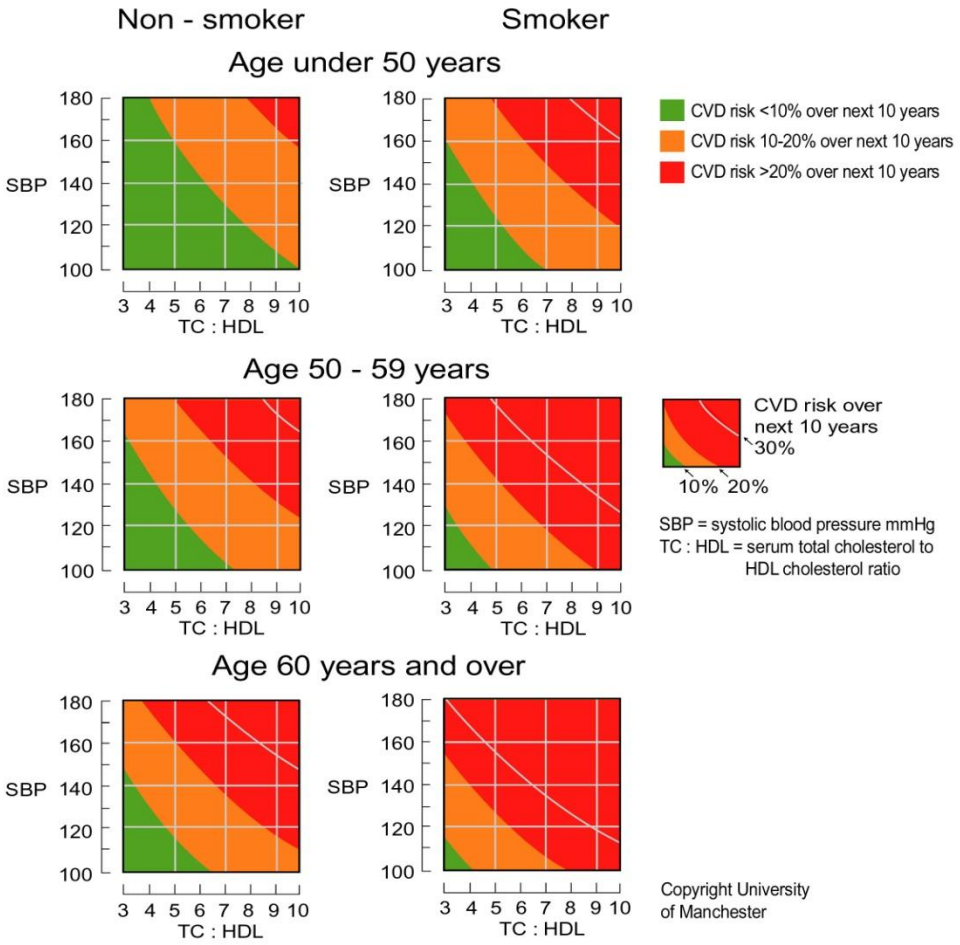
Nondiabetic Women



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Intervention

Lifestyle measures and drug treatment

Lifestyle measures

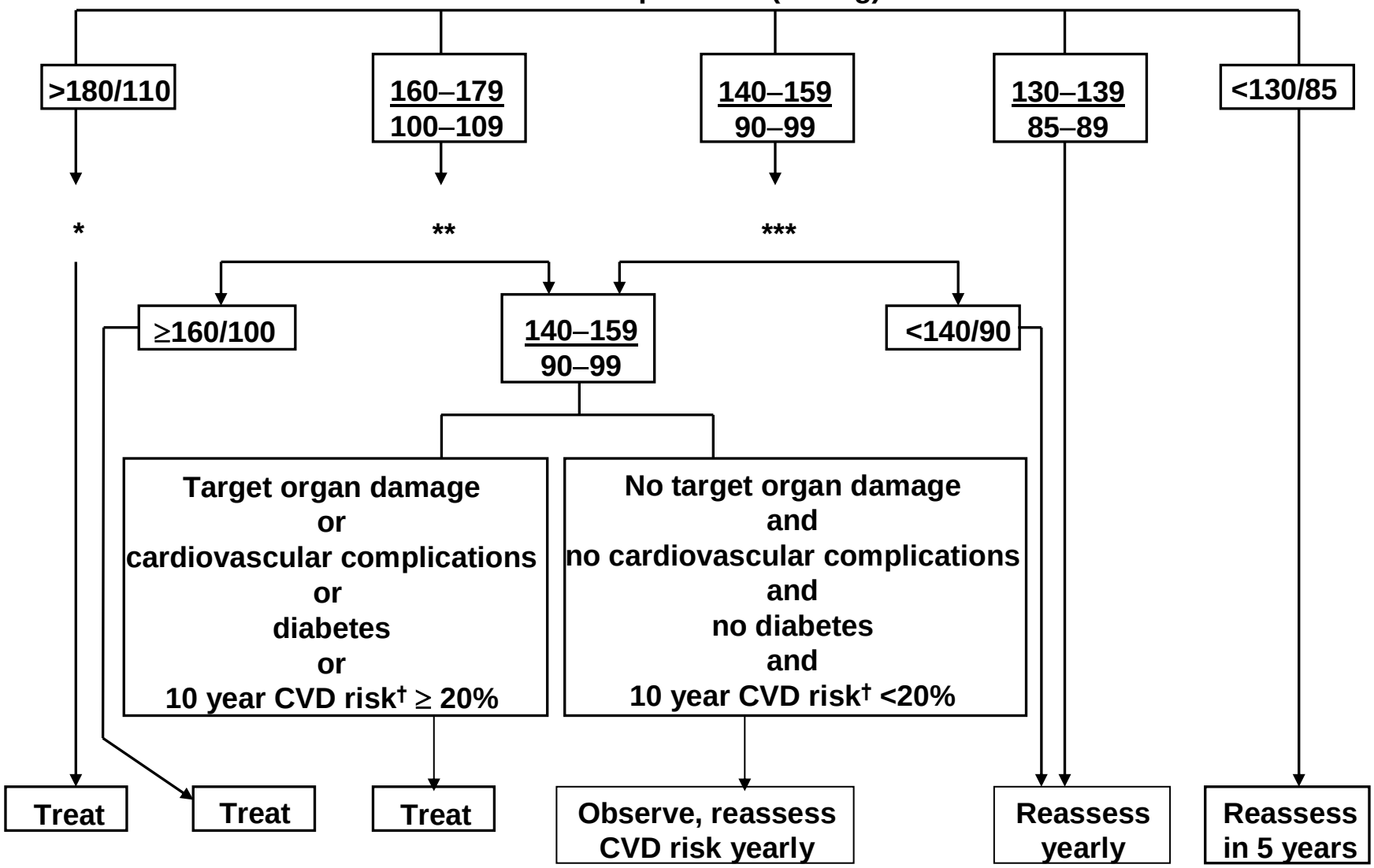
- Maintain normal weight for adults (body mass index 20-25kg/m^2)
- Reduce salt intake to < 100mmol/day (<6g NaCl or < 2.4 g Na+/day)
- Limit alcohol consumption to $\leq$ 3 units/day for men and $\leq$ 2 units/day for women)
- Regular physical exercise (brisk walking rather than weightlifting) for $\geq$ 30 minutes per day, ideally on most days of the week but at least on three days of the week.
- Consume at least five portions/day of fresh fruit and vegetables
- Reduce the intake of total and saturated fat

Thresholds and treatment for antihypertensive drug treatment

- **Drug treatment should be started in all patients with sustained systolic blood pressures ≥ 160mmHg or sustained diastolic blood pressures ≥ 100mmHg despite non-pharmacological measures**

- **Drug treatment is also indicated in patients with sustained systolic blood pressures 140-159mmHg or diastolic blood pressures 90-99mmHg if target organ damage is present, or there is evidence of established cardiovascular disease or diabetes, or if there is a 10 year cardiovascular disease risk of ≥ 20%**

continued



* Unless malignant phase of hypertensive emergency confirm over 1–2 weeks then treat

** If cardiovascular complications, target organ damage or diabetes is present, confirm over 3–4 weeks then treat; if absent re-measure weekly and treat if blood pressure persists at these levels over 4–12

*** If cardiovascular complications, target organ damage, or diabetes is present, confirm over 12 weeks then treat: if absent re-measure monthly and treat if these levels are maintained and if estimated 10 year CVD risk is ≥20%

† Assessed with CVD risk chart

Suggested target blood pressures during antihypertensive treatment. Systolic and diastolic blood pressures should *both* be attained, e.g. <140/85 mmHg means *less than* 140 mmHg for systolic blood pressure and *less than* 85 mmHg for diastolic blood pressure

	Clinic BP (mmHg)	
	No diabetes	Diabetes
Optimal treated BP pressure	<140/85	<130/80
Audit Standard	<150/90	<140/80

Audit standard reflects the minimum recommended levels of blood pressure control.

Despite best practice, the Audit Standard will not be achievable in all treated hypertensives.

For ambulatory (mean daytime) or home blood pressure monitoring - reducing these targets by ~10/5 is recommended.

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Drug treatment of hypertension

Diuretic

ACE-inhibitor

Calcium-channel blocker

Angiotensin receptor blocker

Beta-blocker

(Alpha-blocker)

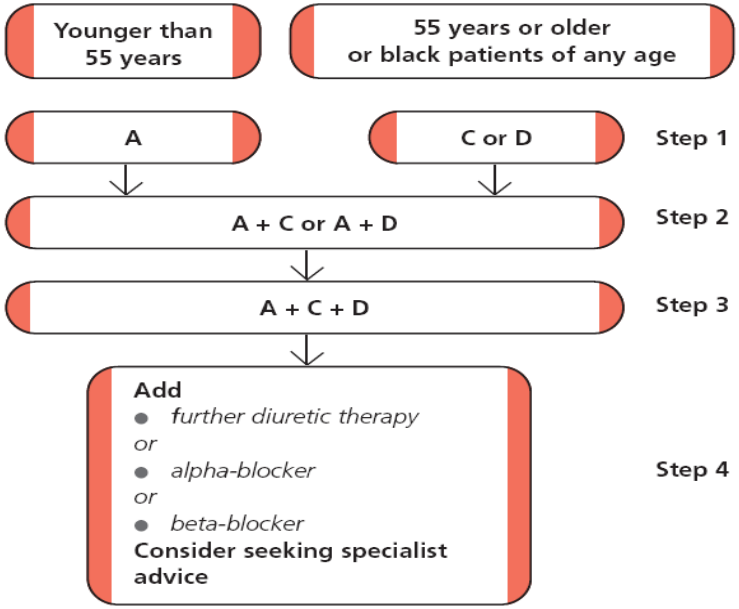
Most hypertensives will need ≥ 2 drugs to control BP

Drug combinations may be synergistic

Choosing drugs for patients newly diagnosed with hypertension

Abbreviations:
A = ACE inhibitor
(consider angiotensin-II receptor antagonist if ACE intolerant)
C = calcium-channel blocker
D = thiazide-type diuretic

Black patients are those of African or Caribbean descent, and not mixed-race, Asian or Chinese patients



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NHS
National Institute for Health and Clinical Excellence

BHS

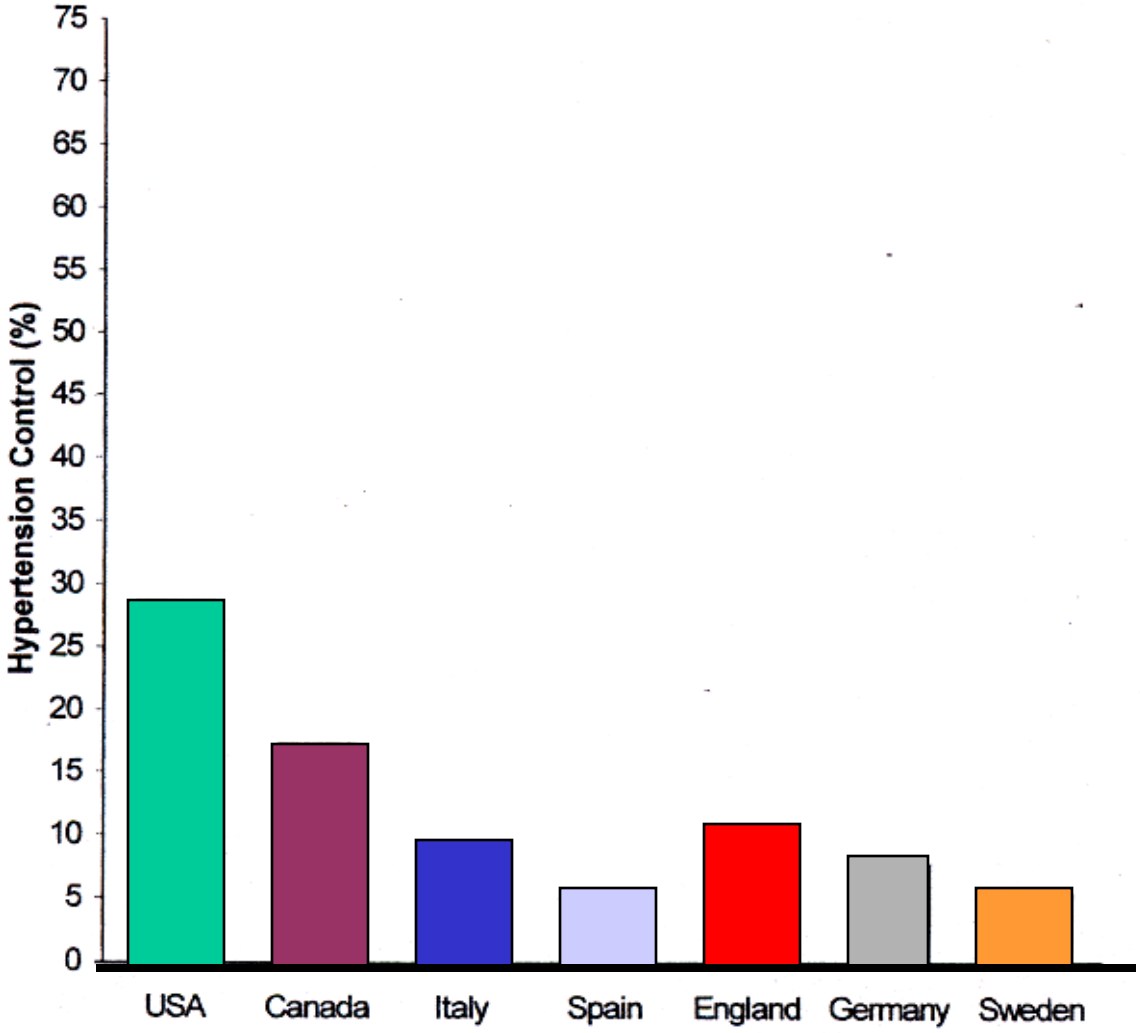
Blood Pressure Reduction

Implication from trial results that greater reduction in blood pressure will produce greater benefit e.g.

Diastolic BP	Stroke	CHD
5-6 mmHg	38%	16%
8-10 mmHg	50%	20% *
6-18 mmHg	75	?

*** Longer term therapy may reduce risk by 33%**

Age- and gender adjusted hypertension control by country (35-64 years); 140/90 mmHg (2000)



Cardiovascular risk factors

Blood pressure

Lipids

Diabetes

Smoking

Other medications for hypertensive patients

(*1*) Aspirin: use 75mg daily if patient is aged ≥50 years with blood pressure controlled to <150/90 mm Hg and either; target organ damage, diabetes mellitus, or 10 year risk of cardiovascular disease of ≥20% (measured by using the new Joint British Societies' cardiovascular disease risk chart)

(*2*) Statin: use sufficient doses to reach targets if patient is aged up to at least 80 years, with a 10 year risk of cardiovascular disease of ≥20% (measured by using the new Joint British Societies' cardiovascular disease risk chart) and with total cholesterol concentration ≥3.5mmol/l

(*3*) Vitamins—no benefit shown, do not prescribe

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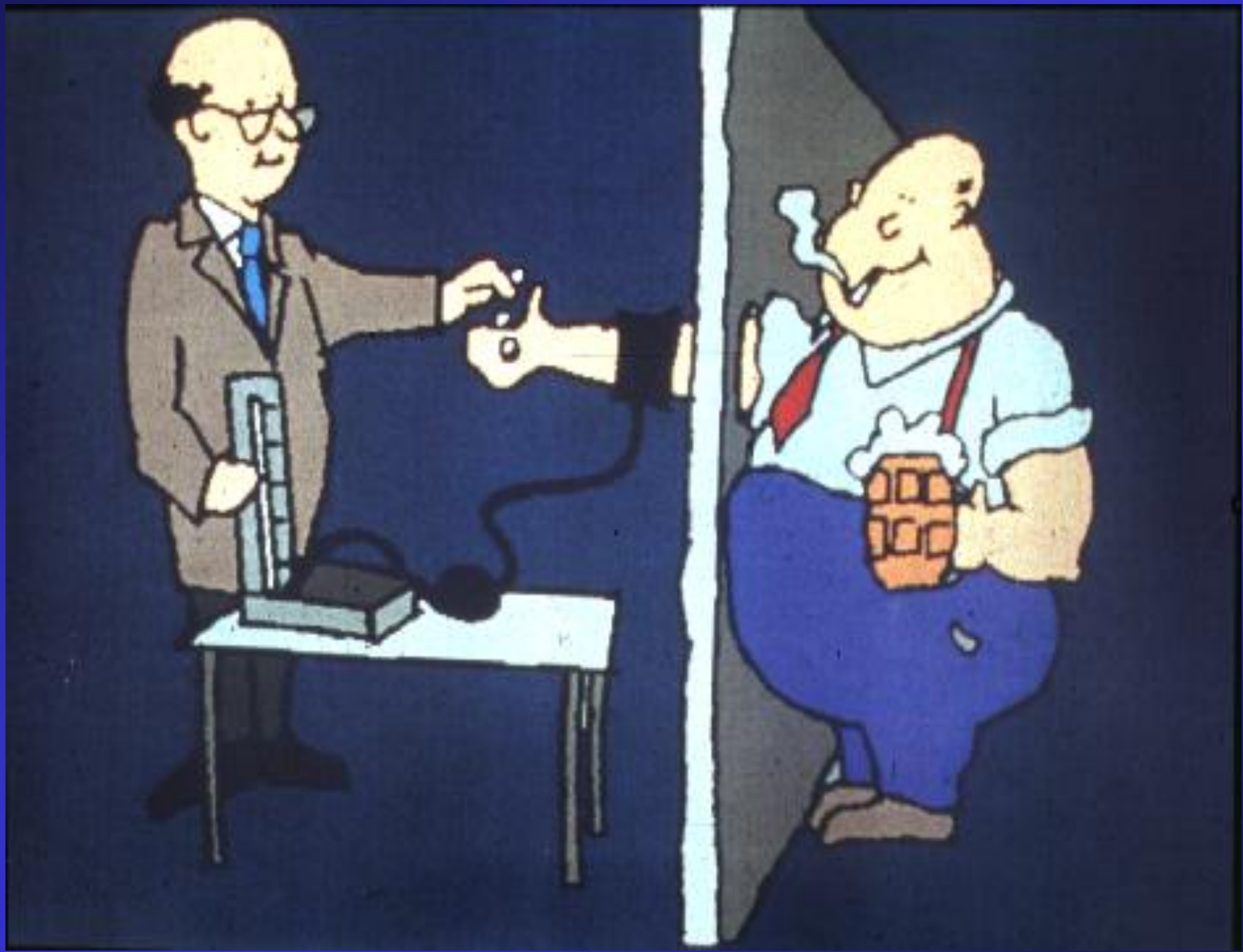

“Large randomised trials demonstrate lowering LDL- cholesterol by 1 mmol/l reduces non-fatal MI and fatal CHD by about 25% (about half the the effect predicted from epidemiological studies for a similar reduction in long term cholesterol lowering in people without vascular disease) “ Collins 2002

With greater reductions in cholesterol there are correspondingly larger reductions in CHD endpoints.