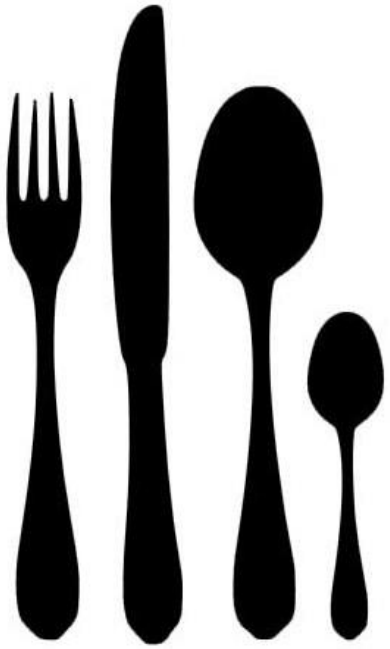
Lien d’intérêt

demain midi



SERVIER

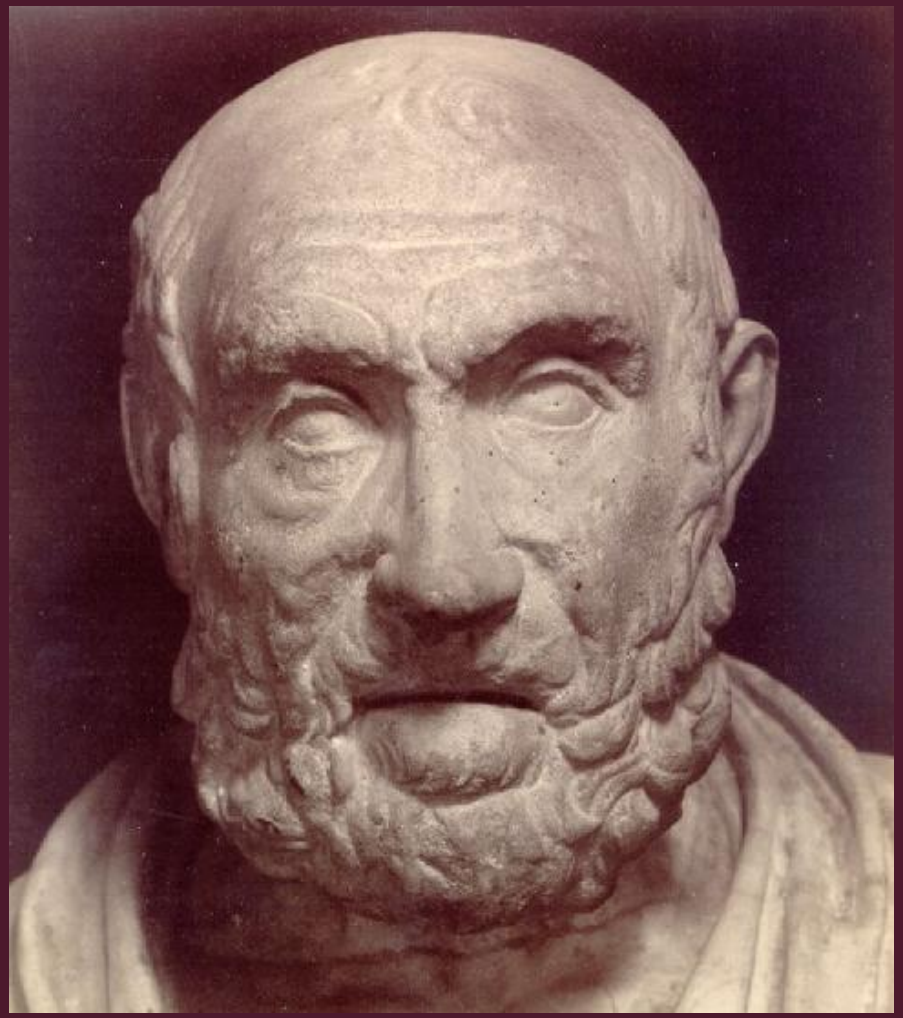
DIU Hypertension artérielle et risque cardiovasculaire et rénal – Séminaire 1
Montpellier, novembre 2018, Jean Ribstein

La tension artérielle et le risque

Introduction : concepts, épidémiologie, physiopathologie

Olim Cous nunc Monspeliensis Hippocrates

De l'élaboration du pronostic …

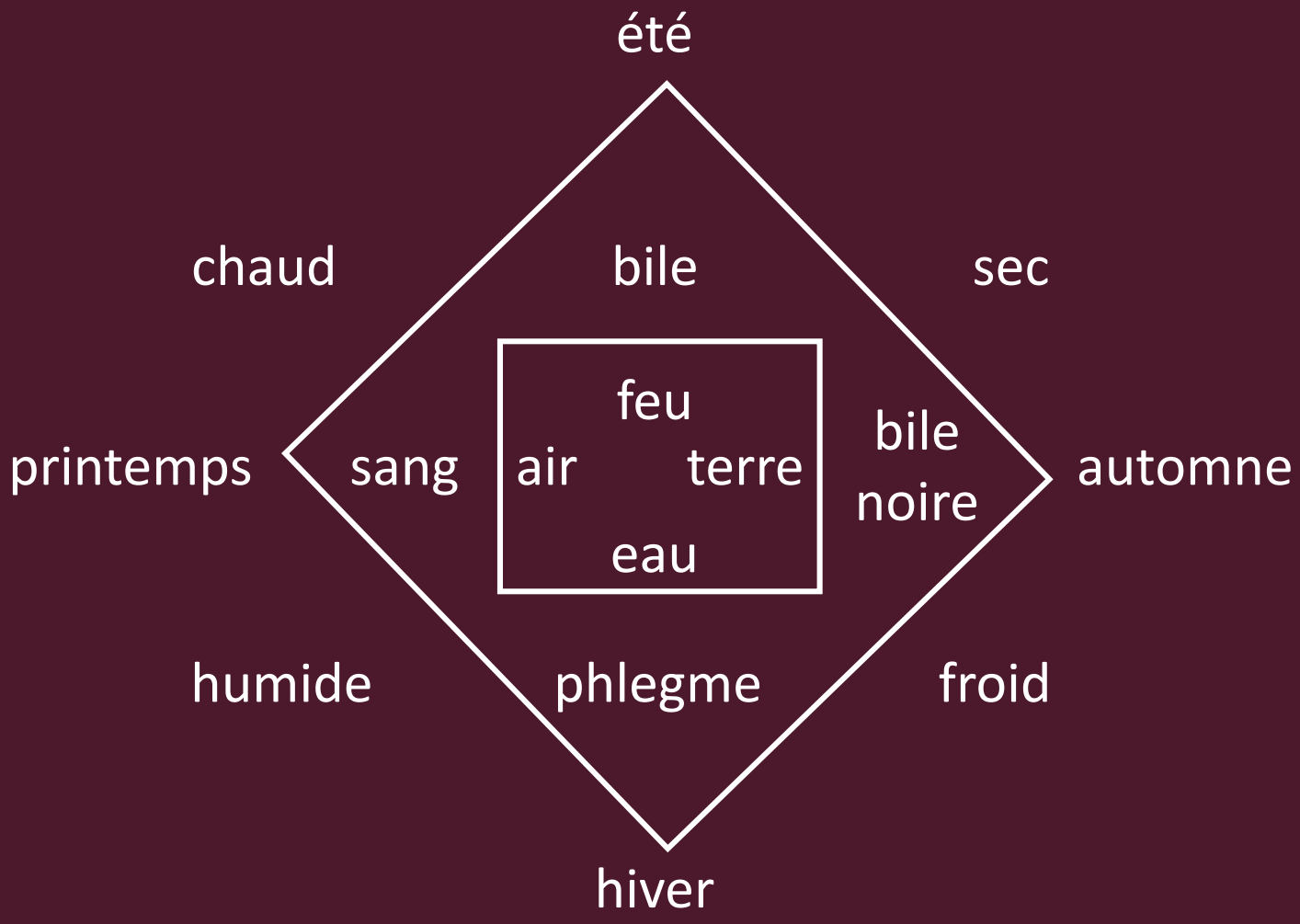


«Pour moi, je ne ferai point de telles divinations, mais j'écris les signes par lesquels on doit conjecturer, parmi les malades, quels guériront et quels mourront, quels guériront et quels mourront en peu ou en beaucoup de temps».

Prorrhétique II

Hippocrate c. 460-370 BC

… au diagnostic des causes



‘Cherchons les causes de ce qui leur arrive’

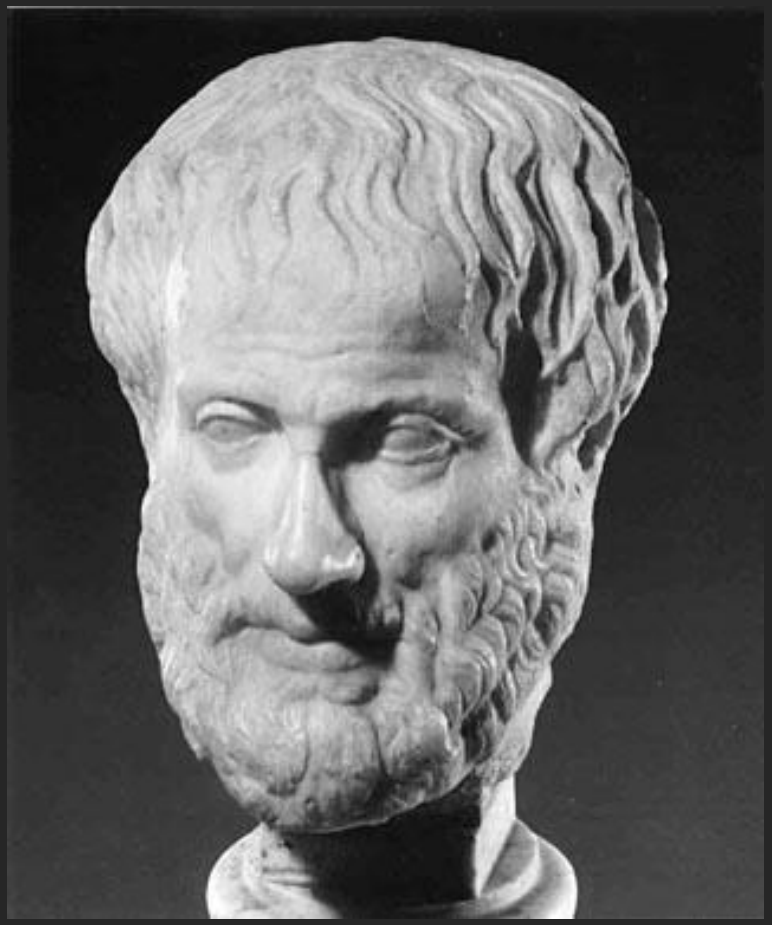
Le principe de causalité

'tout événement a une cause'

centré sur l'objet chez Aristote avec ses 'causes'

- matérielle (le marbre),
- efficiente (l'action du ciseau),
- formelle (l'idée qui transforme),
- finale (l'intention du sculpteur)

déplacé sur le sujet avec ses habitudes associatives (Hume) ou ses catégories d'entendement (Kant)



Aristote 384-322 BC

L’hypertension artérielle et le risque cardiovasculaire et rénal

- Le concept de risque
- La maladie hypertensive
- Le concept de facteur de risque
- La fabrication des scores de risque
- Différencier les éléments du risque
- Communiquer sur le risque
- Gérer le risque

Today's Random Medical News

from the New England Journal of Panic-Inducing Gobbledygook

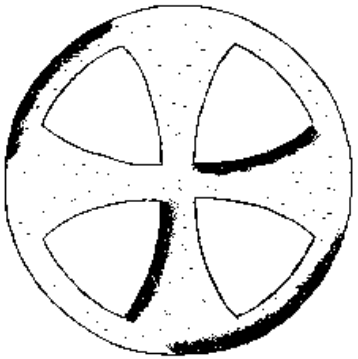
Du hasard à la cause

Le concept de risque

Le risque (mot français depuis 1557, d’origine peut-être maritime) s’est appelé péril (X°), aventure (XI°), hasard (XII°)

Νεμεσις

Τυχη



alea
chance
az zahr

Risque, hasard et probabilité

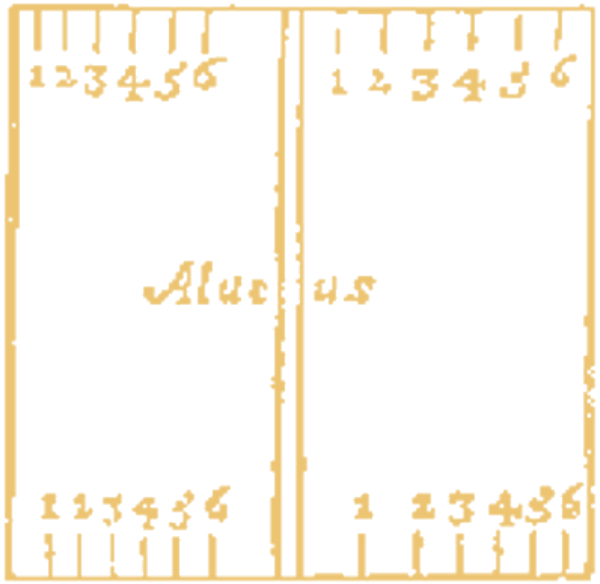
Le risque est

- défini comme la probabilité qu'un événement inattendu se réalise,
- perçu comme un danger ou une menace, quelle que soit la possibilité de le mesurer

Le hasard est de l'ordre de

- l'inexpliqué (on ignore la cause de l'événement),
- l'inexplicable (il parait sans raison),
- le contingent (il aurait pu ne pas se produire),
- le fortuit (il reste imprévisible)

Girolamo Cardano (1501 – 1576)



Liber de ludo aleae

1560

1663

Natural and *Political*

OBSERVATIONS

Mentioned in a following INDEX,

and made upon the

Bills of Mortality.

BY

Capt. *JOHN GRAUNT*,

Fellow of the *Royal Society*.

With reference to the *Government*, *Religion*, *Trade*, *Growth*, *Air*, *Diseases*, and the several Charges of the said CITY.

——*Non, me ut mirentur Turba, laboro,*
Contentus paucis Lectoribus.——

The Fifth Edition, much Enlarged.

LONDON,

Printed by *John Martyn*, Printer to the *Royal Society*, at the Sign of the Bell in St. *Paul's* Church-yard. MDCLXXVI.

CAPTAIN JOHN GRAUNT

(1620-1674)

La naissance des statistiques - 1662

Le risque est
l'espérance mathématique
d'une fonction de
probabilité d'événements

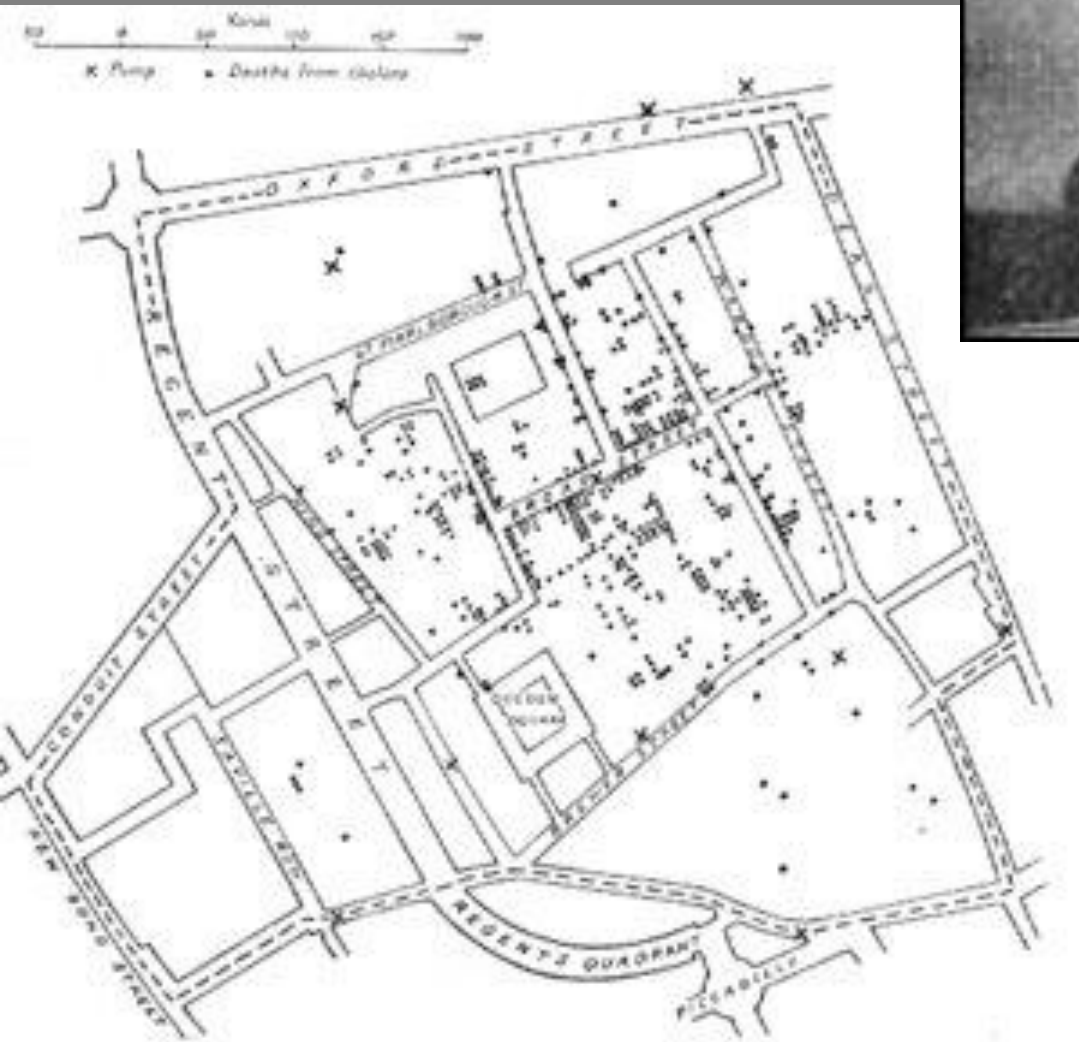
Daniel Bernoulli (1700-1782)

Specimen theoriae novae de mensura sortis - 1738

Pierre-Simon Laplace
(1749 - 1827)

Nous devons
envisager l'état
présent de l'univers
comme l'effet de son
état antérieur, et
comme la cause
de celui qui va suivre
La théorie des probabilités
n'est au fond que du sens
commun réduit au calcul ; elle nous
rend capables d'apprécier avec
exactitude ce qu'un esprit fin ressent
avec une sorte d'instinct dont il est
souvent incapable de rendre compte

John Snow - 1854



Robert Koch
1843-1910

BERLINER

KLINISCHE WOCHENSCHRIFT.

Organ für practische Aerzte.

Mit Berücksichtigung der preussischen Medicinalverwaltung und Medicinalgesetzgebung

nach amtlichen Mittheilungen.

Redacteure: Professor Dr. C. A. Hasli. Verlag von August Hirschwald in Berlin.

Montag, den 10. April 1882. № 15. Neunzehnter Jahrgang.

I. Die Aetiologie der Tuberculose.

(Nach einem in der physiologischen Gesellschaft zu Berlin am 24. März 82 gehaltenen Vortrage.)

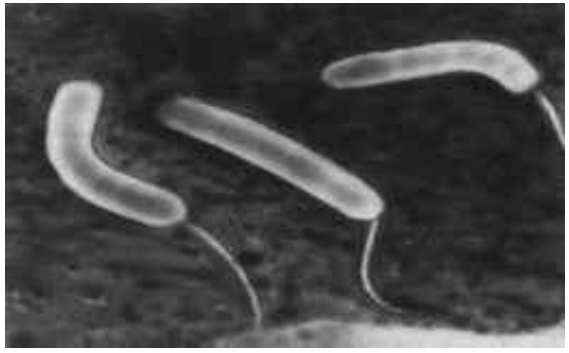
Von

Dr. Robert Koch,

Regierungsrath im Kaiserl. Gesundheitsamte.

Jakob Henle,
1809-1885

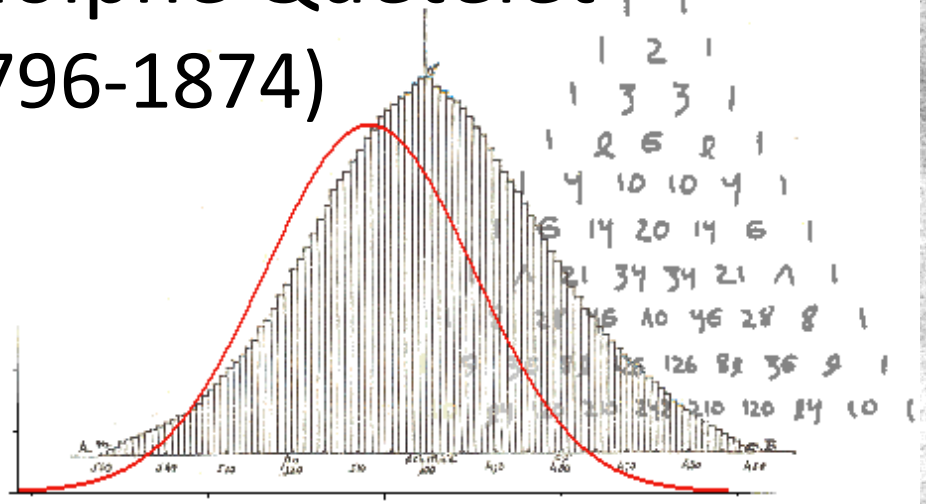
Vibrio cholera 1884

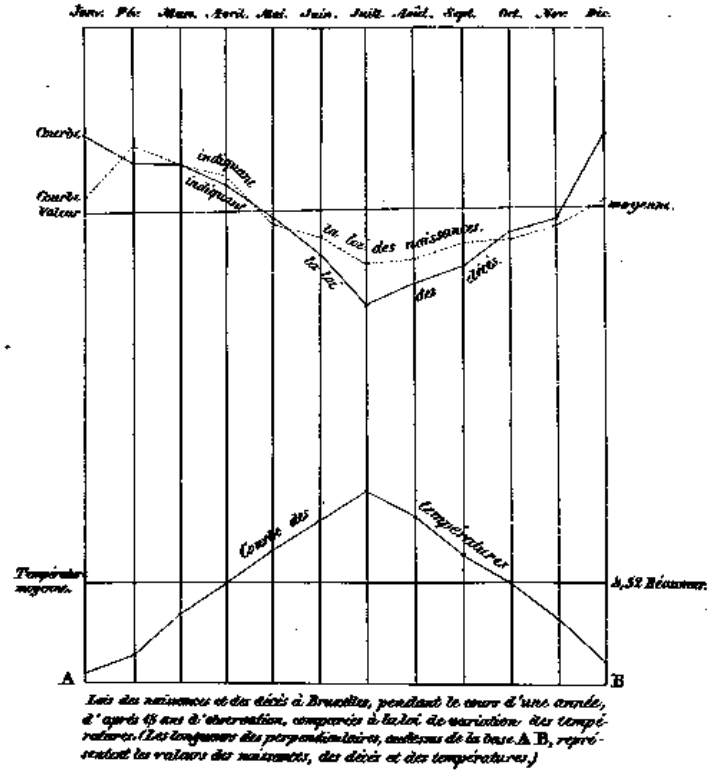


Postulats sur la causalité

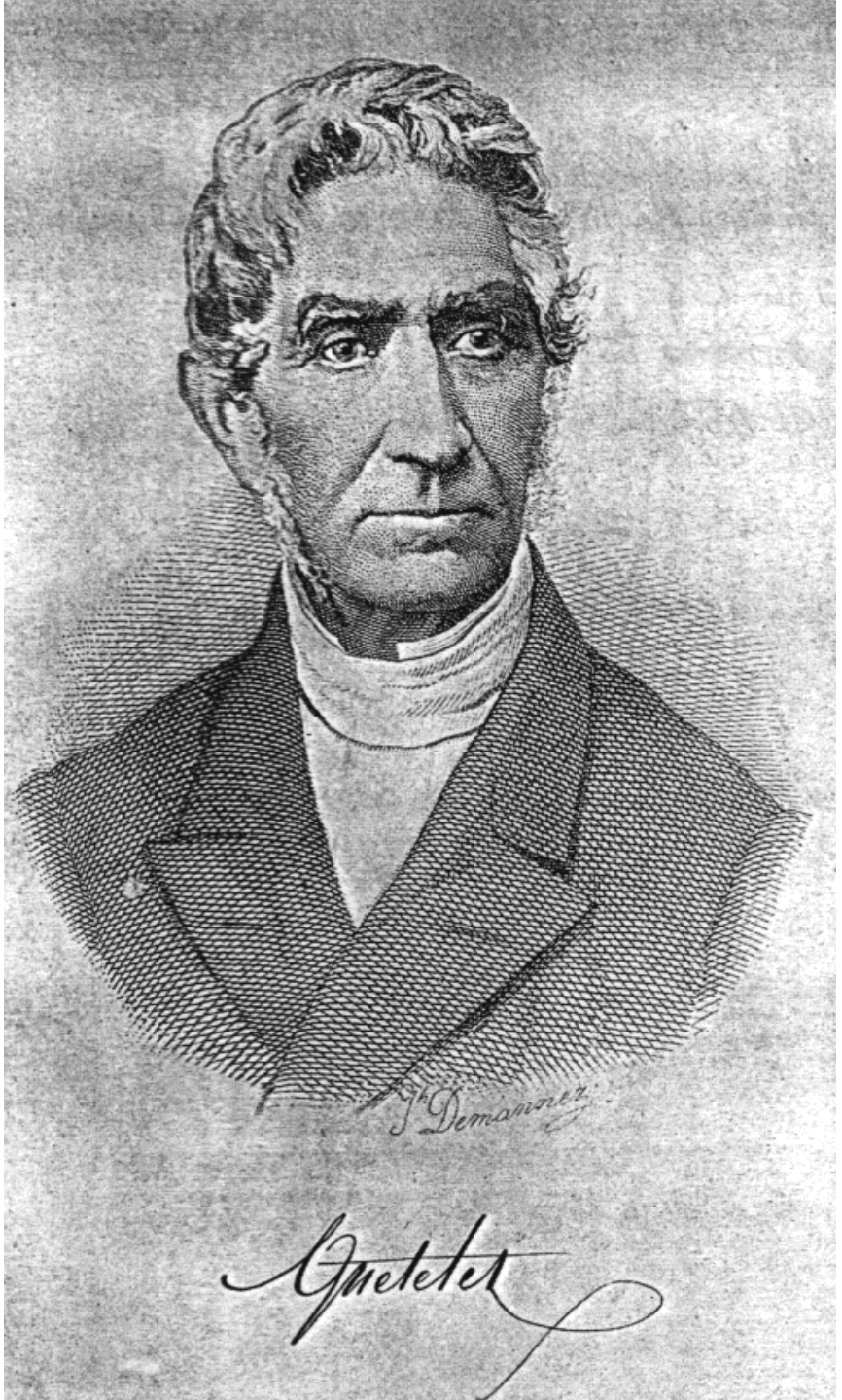
- présent // maladie - absent // santé
- isolable chez l'animal, cultivable en culture
- responsable de la maladie originale par inoculation à l'animal sain, et à nouveau isolable en culture

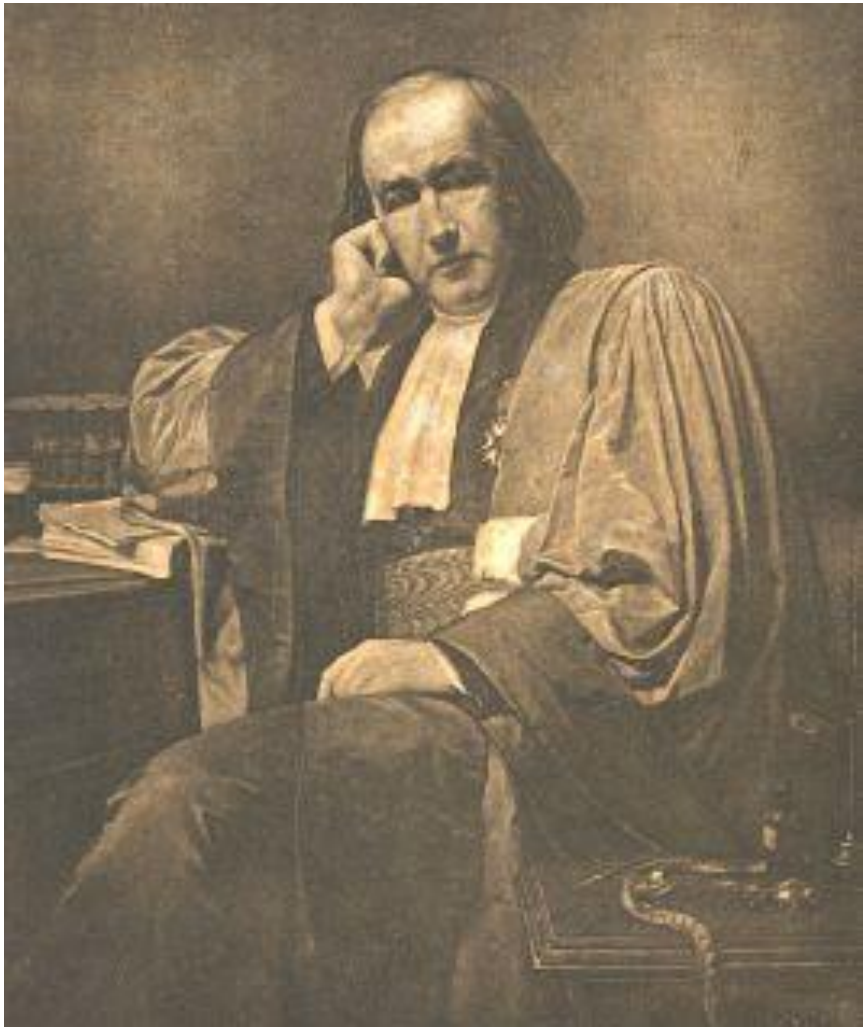
Adolphe Quetelet (1796-1874)





Lois des naissances et des décès à Bruxelles, pendant le cours d'une année, d'après 15 ans d'observation, comparées à la loi de variation des températures. (Les longueurs des perpendiculaires, menées de la base A B, représentent les valeurs des naissances, des décès et des températures.)





Pierre Louis (1787-1872), promoteur de la ‘méthode numérique’ : *la statistique est la base fondamentale et unique de toutes les sciences médicales*.

Claude Bernard (1813-1878), tenant de la ‘médecine expérimentale’ : *l’usage des moyennes et l’emploi de la statistique, en médecine et en physiologie, conduisent pour ainsi dire nécessairement à l’erreur.*

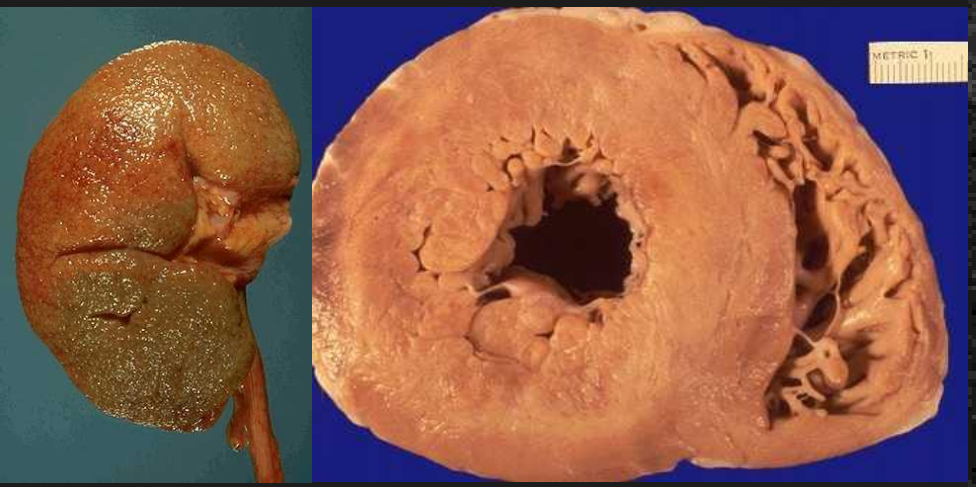
Notions et mesures, en quête d’une définition

L’hypertension artérielle

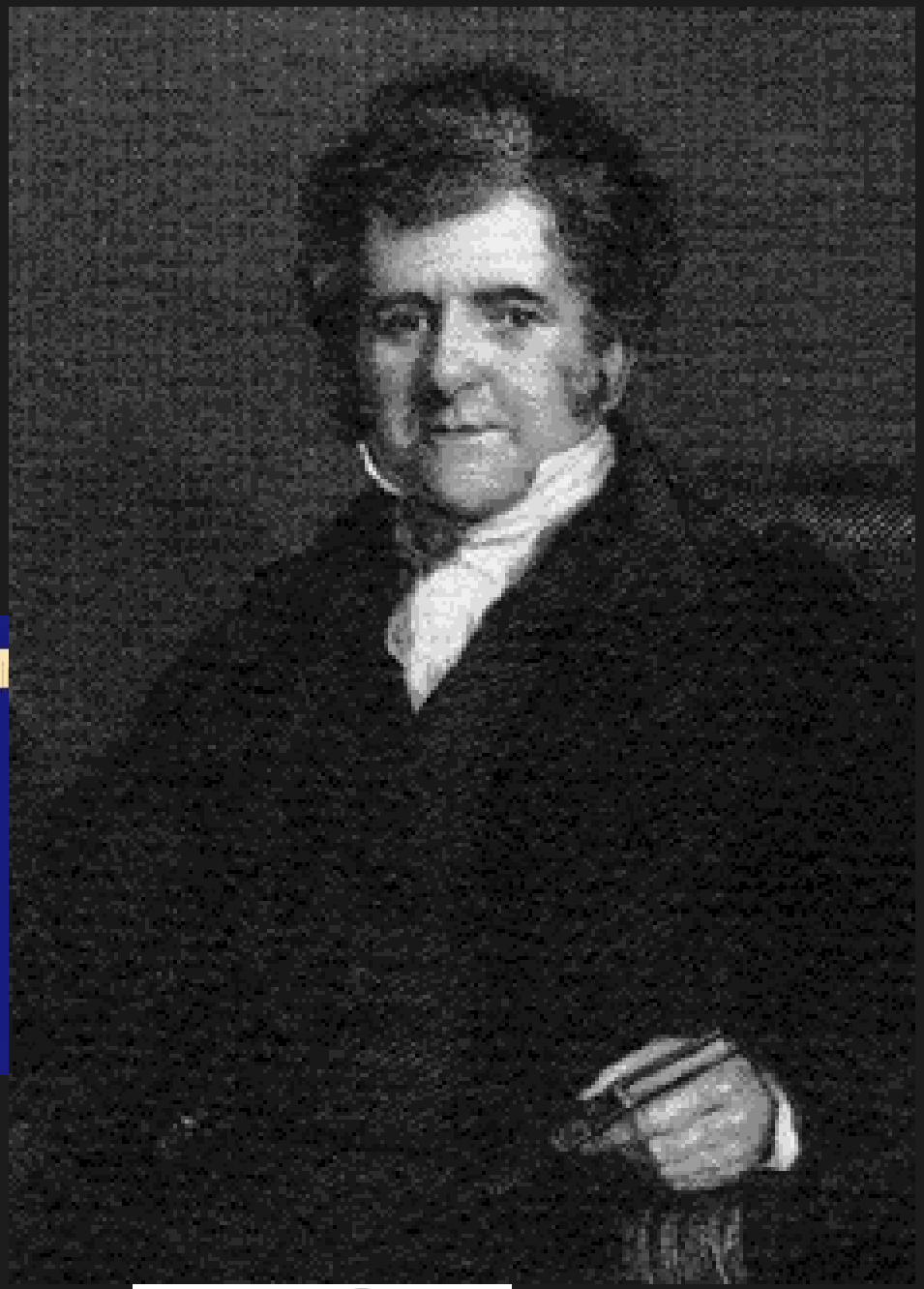
Huang Di Nei Jing
Suwen

Galeni librorum pars quinta
De pulsibus ad eos qui introducuntur

Un concept mécanistique …



Guy's Hospital Reports, London, 1836 ;1:338-400

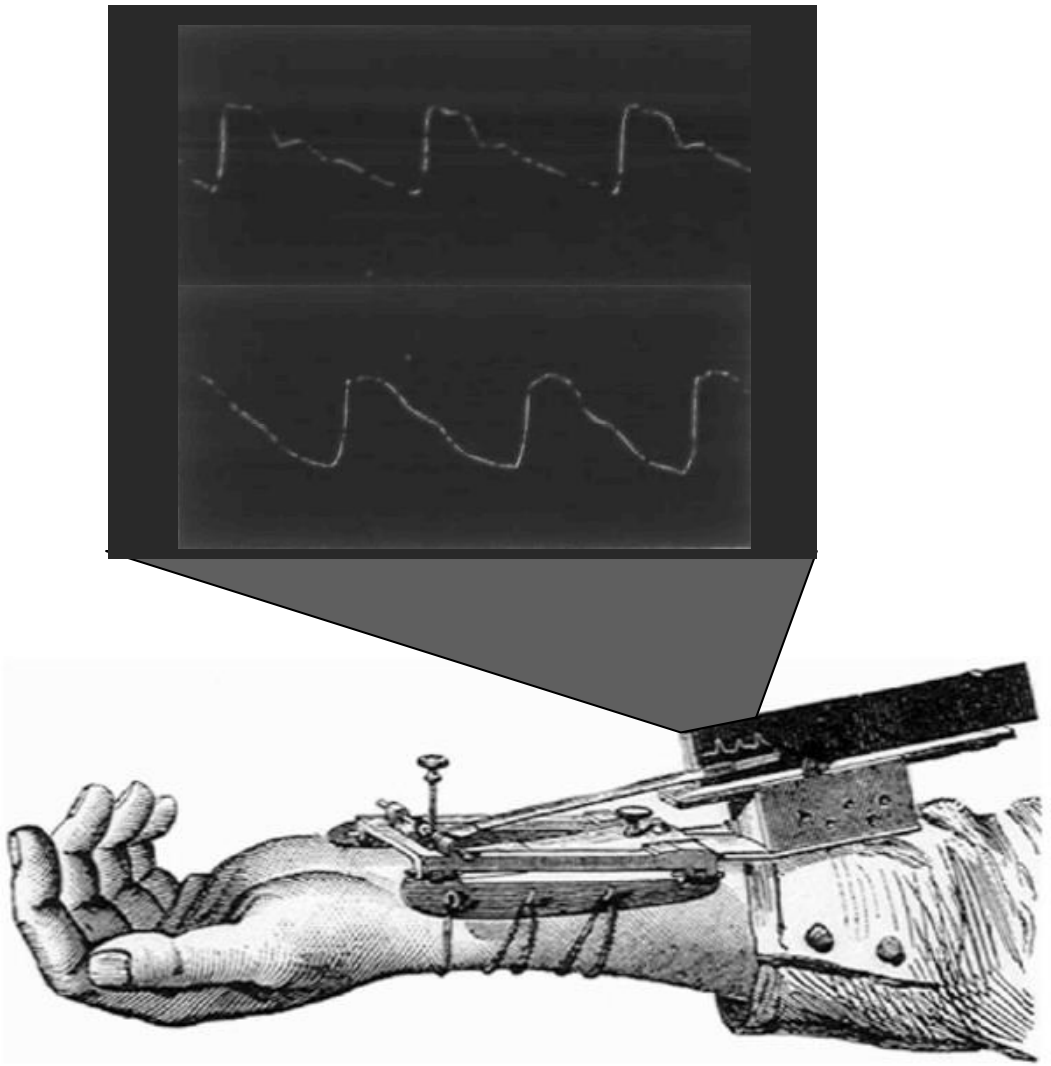


Richard Bright

1789-1858

… dans l'attente de mesures

Frederick Akbar Horatio Mahomed (1849-1884)



Sphygmographe de Marey (1860)

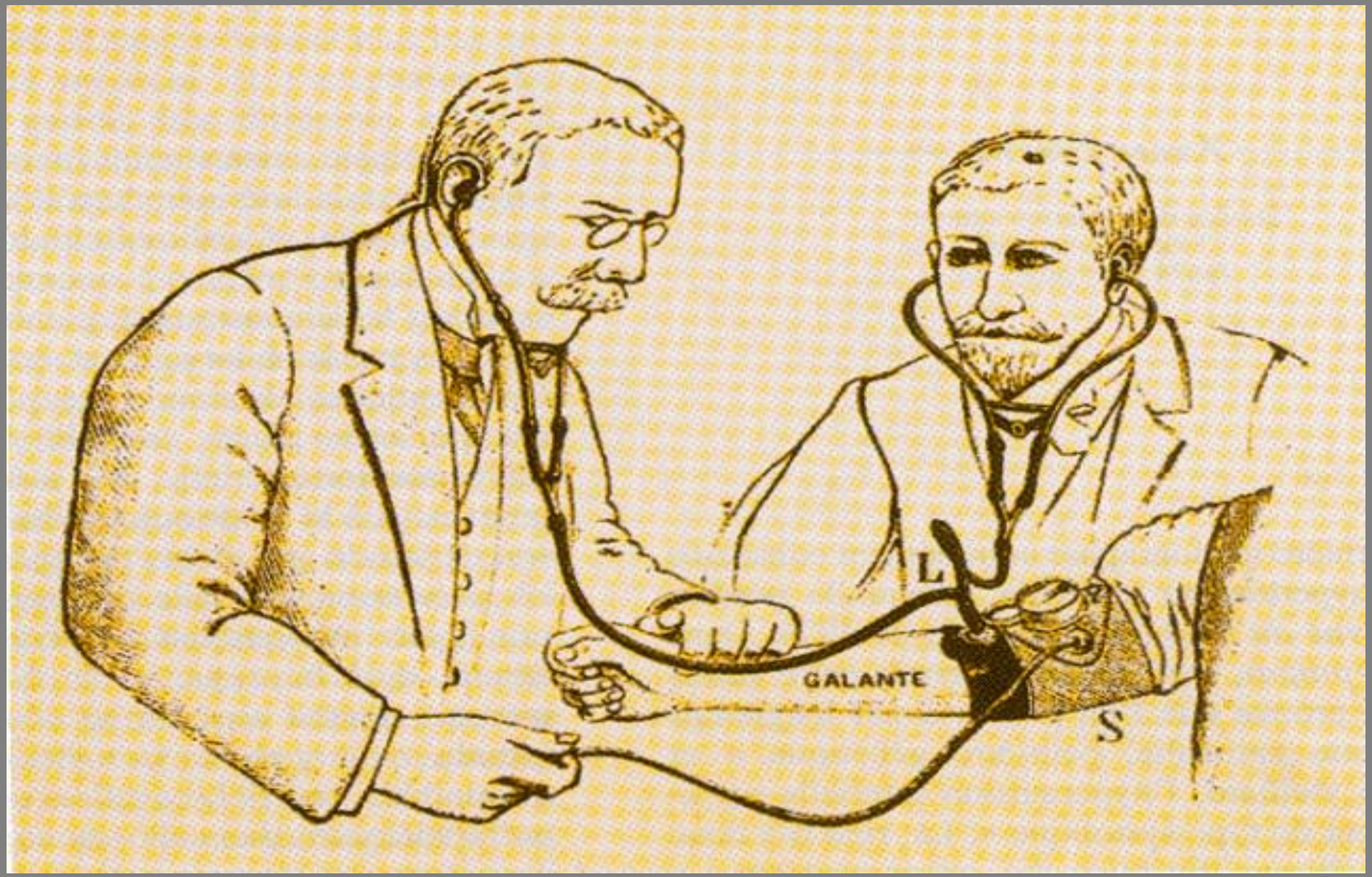
1905

Nikolai Korotkoff (1874-1920)

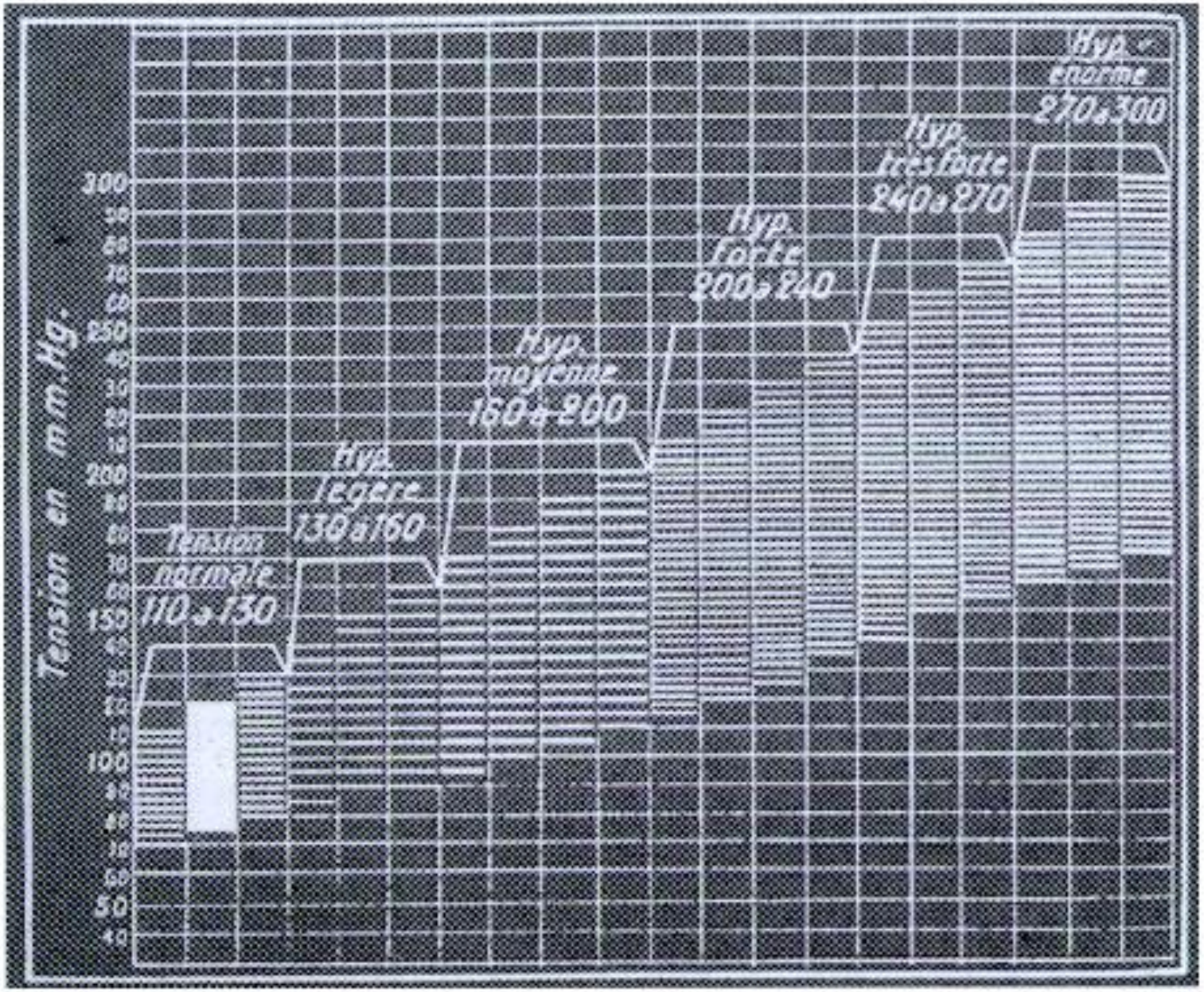
1896

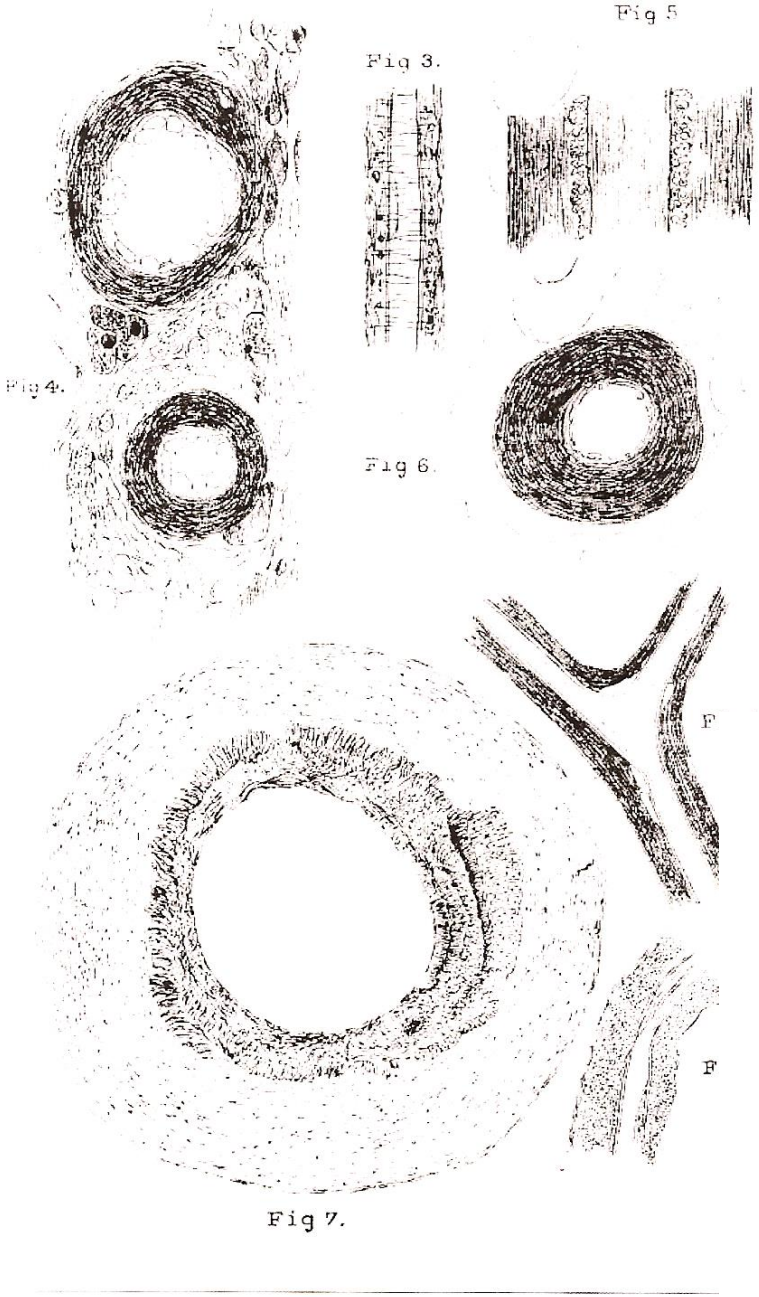
Scipione Riva-Rocci (1863-1937)

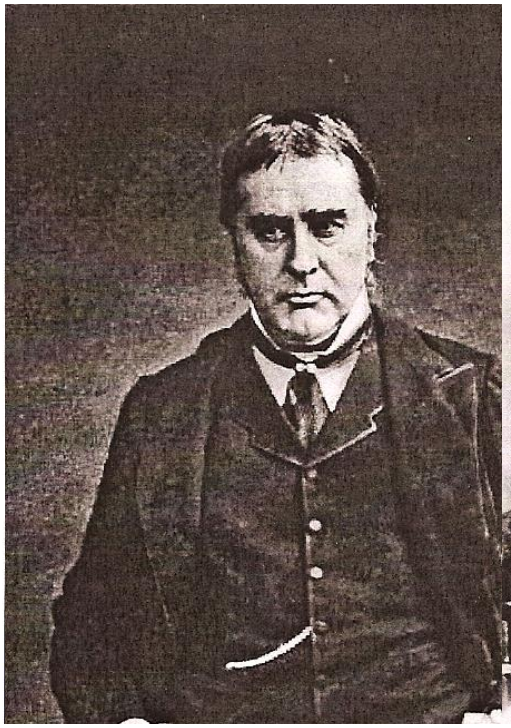
Et ce sera la première ‘maladie quantitative’



Louis Gallavardin. La tension artérielle en clinique. Sa mesure, sa valeur sémiologique (1910. Masson 1920)

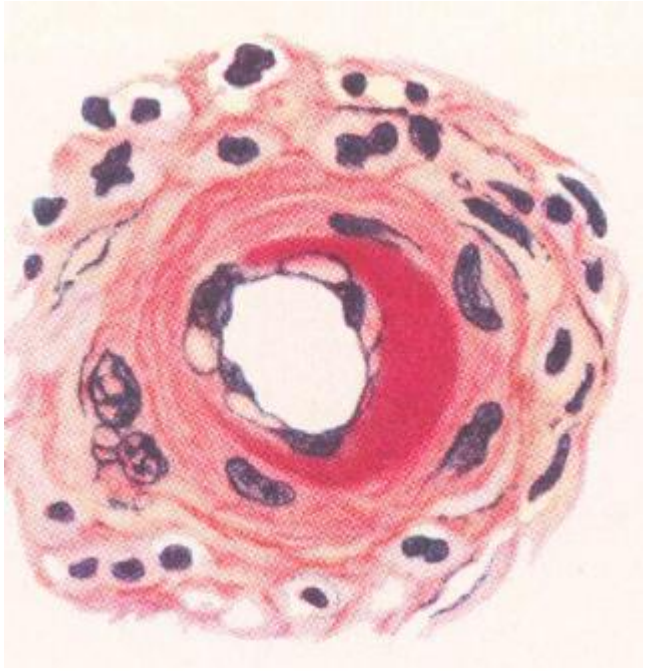






William W Gull & Henry G Sutton
Widespread ‘arteriolo-capillary’ fibrosis

Mais quel est le lien anatomo-clinique ?



Introduction

The association of cardiac enlargement and renal contraction has been recognized since Bright's classical case reports in 1836. Shortly thereafter Johnson added diffuse disease of the smallest arteries to the pathological anatomy of Bright's disease and in 1873 proposed the theory that renal disease was primary with subsequent diffuse thickening of the walls of the smallest arteries leading to increased peripheral resistance, elevated blood pressure and cardiac hypertrophy.

Subsequent observations added complexity rather than simplification to the problem. Gull and Sutton reported widespread small vessel disease called by them "arterio-capillary fibrosis," and observed that "these changes are, or may be, independent of renal disease, and that the renal change in chronic Bright's disease with contracted kidneys, when present, is but a part of a general morbid condition." They concluded that the diffuse vascular disease was a primary pathological change responsible for increased resistance to blood flow. Confirming this general hypothesis were the early clinical observations on blood pressure by Mahomed to the effect that high blood pressure precedes the clinical signs of renal damage.

Moritz AR, Oldt MR. Arteriolar sclerosis in hypertensive and non-hypertensive individuals. Am J Pathol 1937;13

SPECIAL ARTICLE

The Kidney in Essential Hypertension

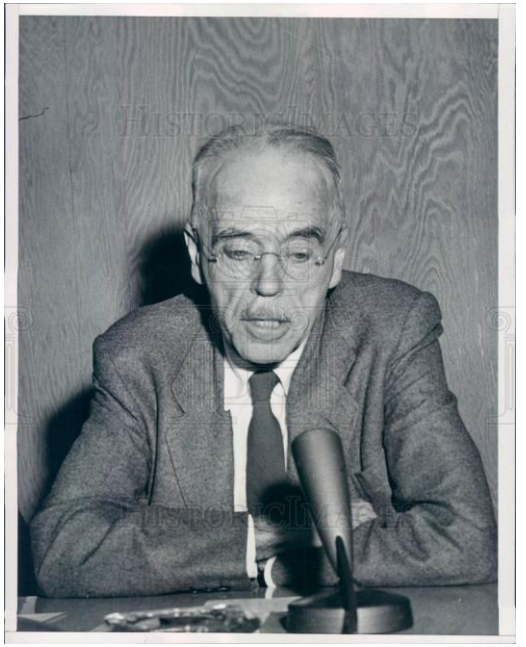
Victim or Culprit

By HERBERT CHASIS, M.D., AND DAVID S. BALDWIN, M.D.

From the Department of Medicine, New York University School of Medicine and the Third and Fourth (New York University) Medical Divisions, Bellevue Hospital, New York, New York.

Work was supported in part by the National Heart Institute, U. S. Public Health Service Grant HE 03222, the Abraham S. Birsh Fellowship Fund, the Joseph Laffan Morse Foundation, and the New York Heart Association.

Une signification controversée pour les médecins



"the treatment of the hypertension itself is a difficult and almost hopeless task in the present state of our knowledge and in fact, for ought we know the hypertension may be an important compensatory process which should not be tampered with even were it certain that we could control it"

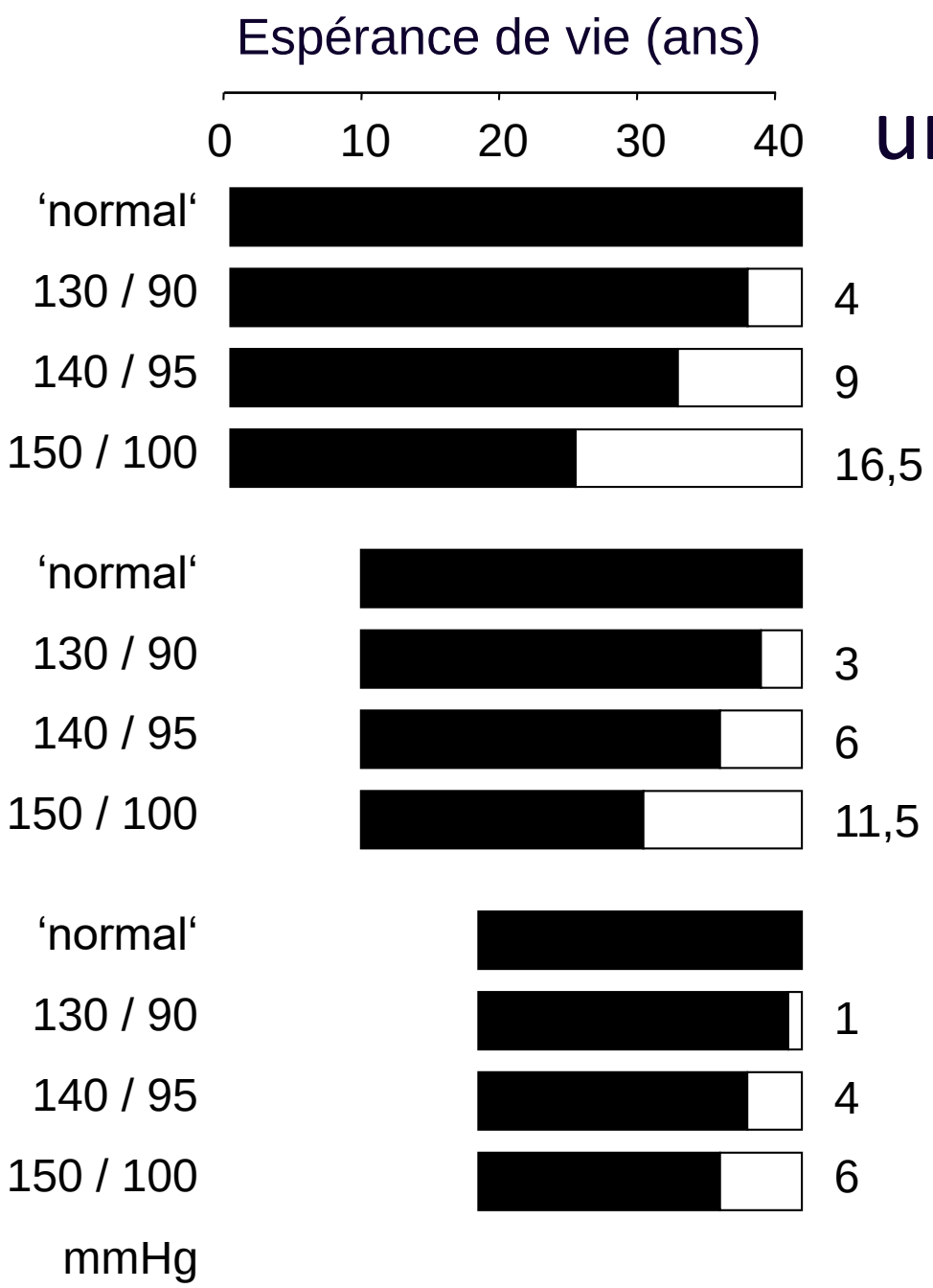
Paul Dudley White. Heart Disease.
MacMillan Med, New York, 1931

… sauf dans le cadre de l'assurance-vie

… dont les médecins du XIX^{ème} siècle cherchent à 'découvrir les grands signes des maladies obscures'

- Anonyme. *Traité complet de l'examen médical dans les assurances sur la vie*. Warnier libraire éd., Paris 1887
- Moritz. *De l'examen du coeur en matière d'assurance vie*. 1er congrès des médecins d'assurance vie. Bruxelles, 1899
- Fischer JW. *The diagnostic value of the sphygmo-manometer in examinations for life insurance*. JAMA 1914;63:1752-4

Ceux-ci font de la PA un marqueur de risque



homme âge 35: 41,5 ans

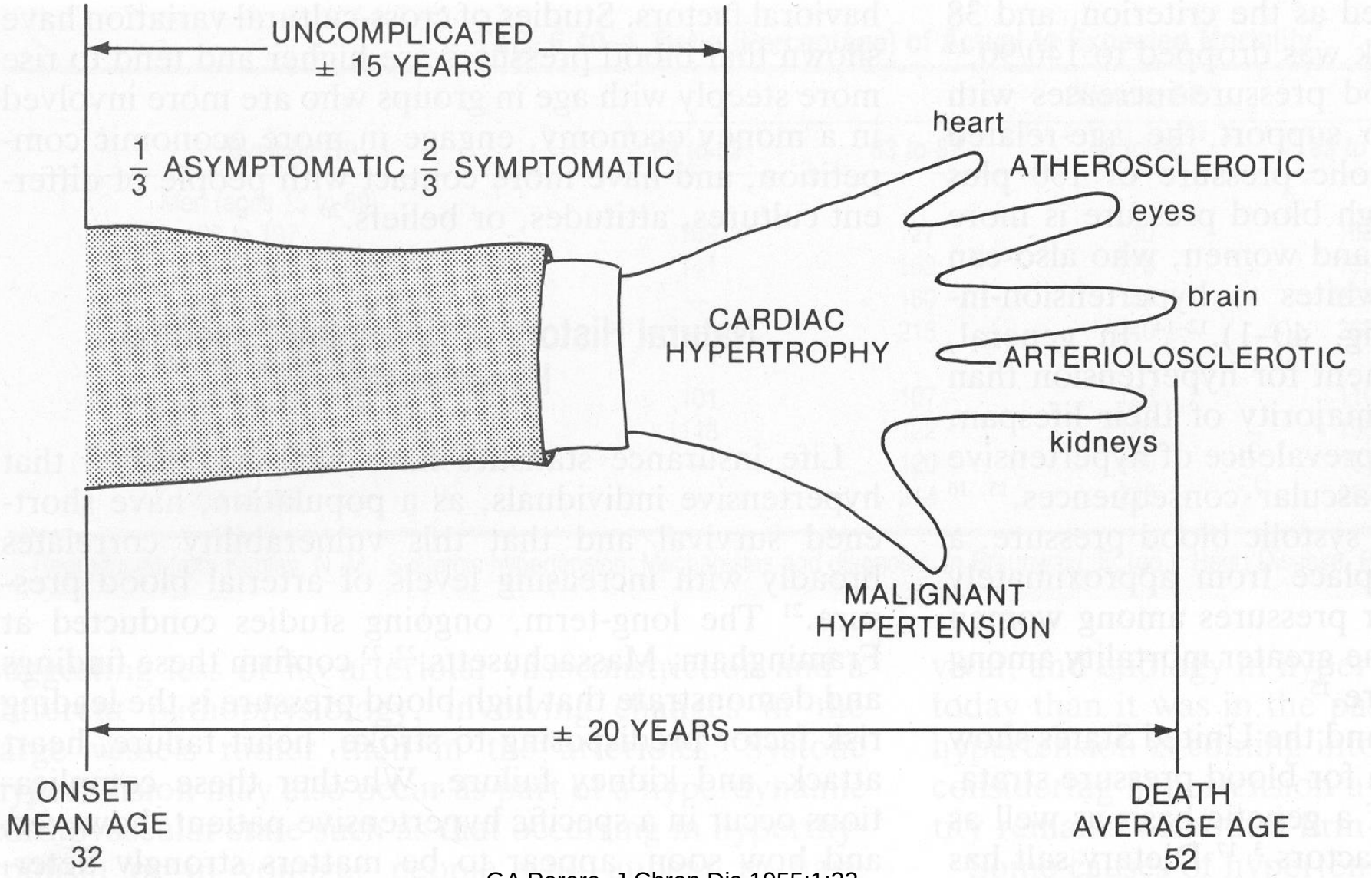
homme âge 45: 32 ans

homme âge 55: 23,5 ans

Metropolitan Life Insurance Company, 1961
in Lew EA. Am J Med 1973;55:281-94

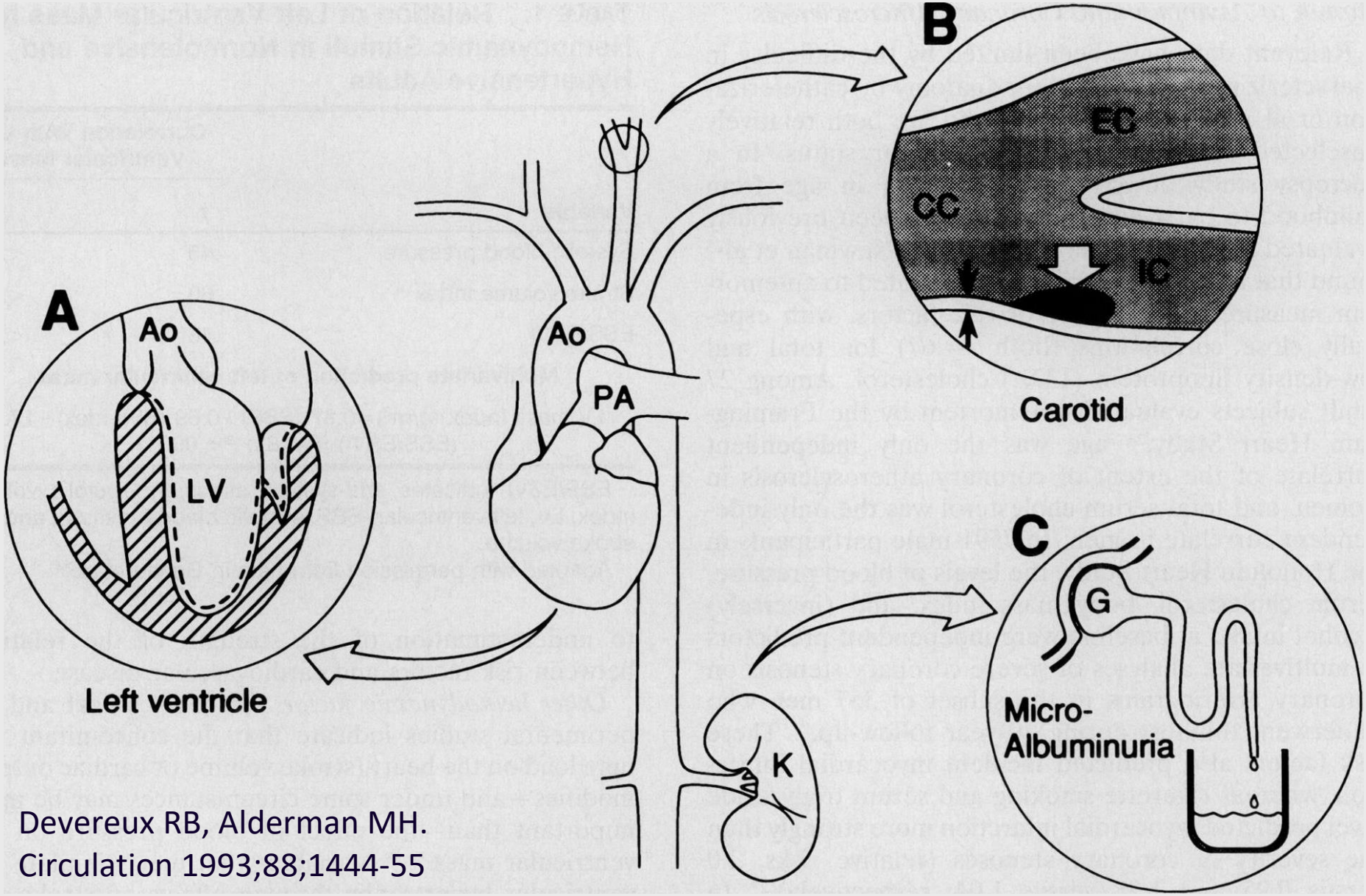
… quand ceux-la décrivent une maladie,

L'hypertension artérielle essentielle au milieu du XX° s.



GA Perera. J Chron Dis 1955;1:33

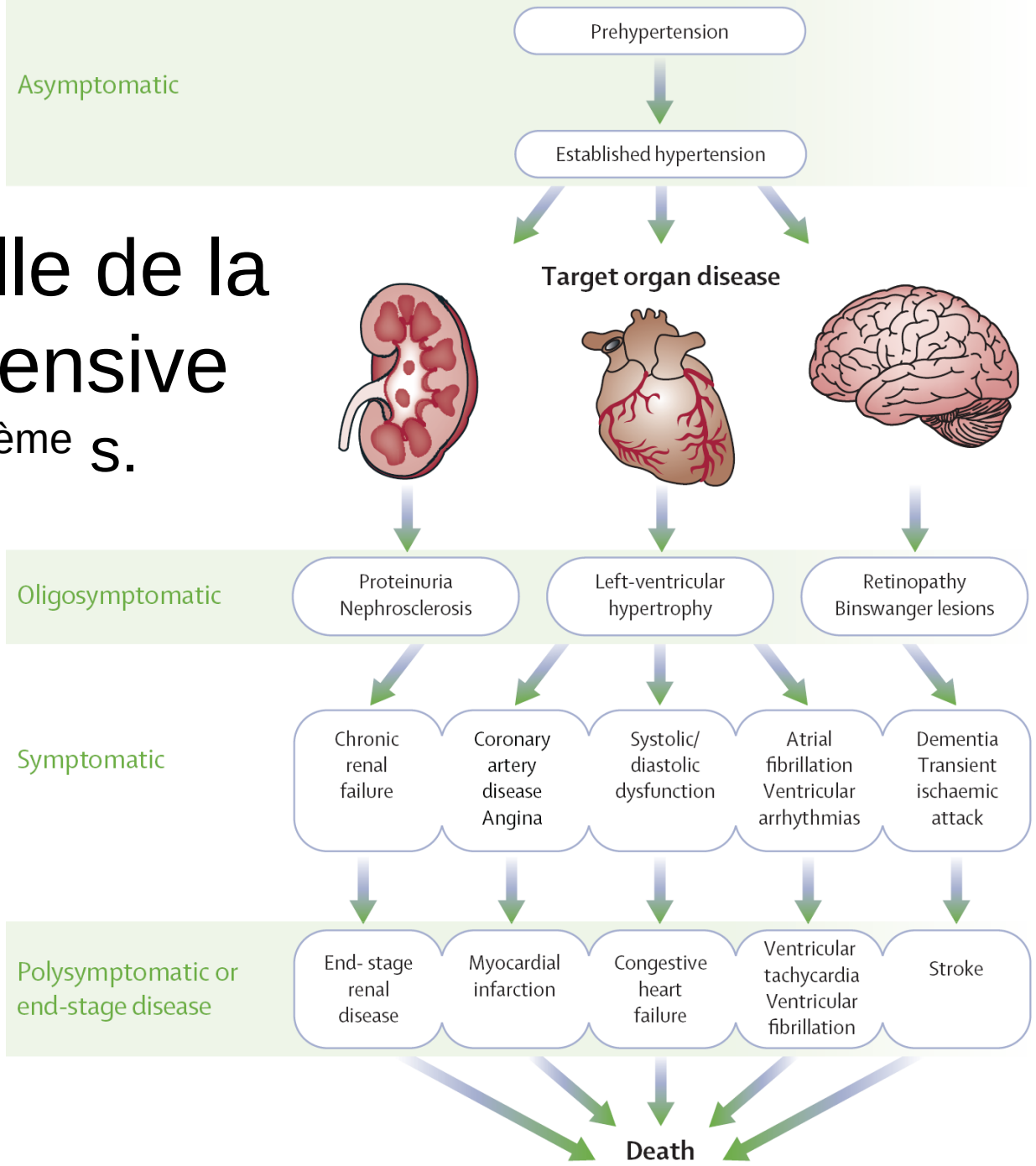
…détectable à un stade de ‘maladie préclinique’



Devereux RB, Alderman MH.
Circulation 1993;88;1444-55

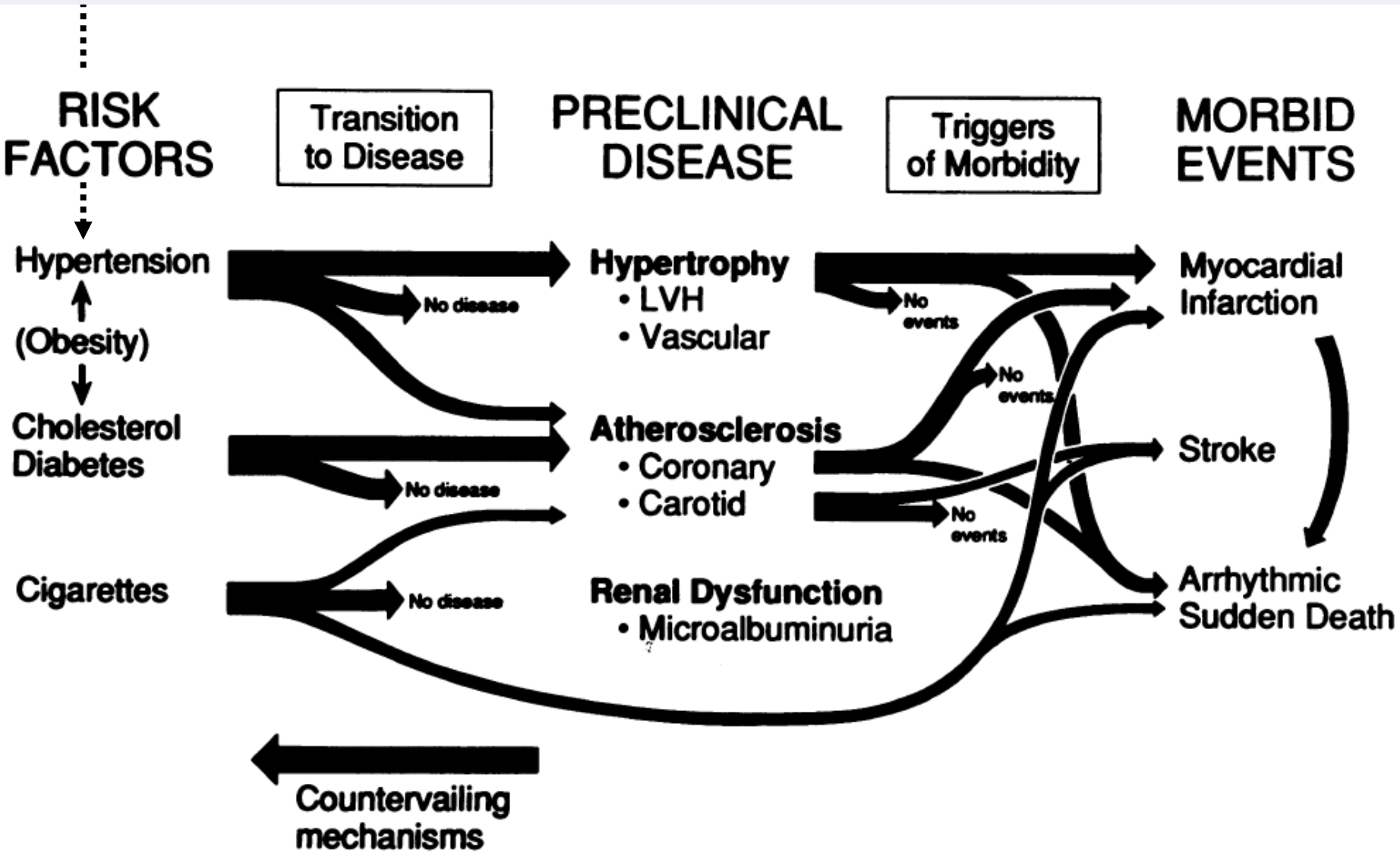
Histoire naturelle de la maladie hypertensive

au tournant du XXI^{ème} s.



Messerli FH, at al. Lancet 2007;370:591

De fait, l'hypertension va devenir un des éléments de la 'maladie cardiovasculaire'



Devereux RB, Alderman MH. Circulation 1993;88;1444-55

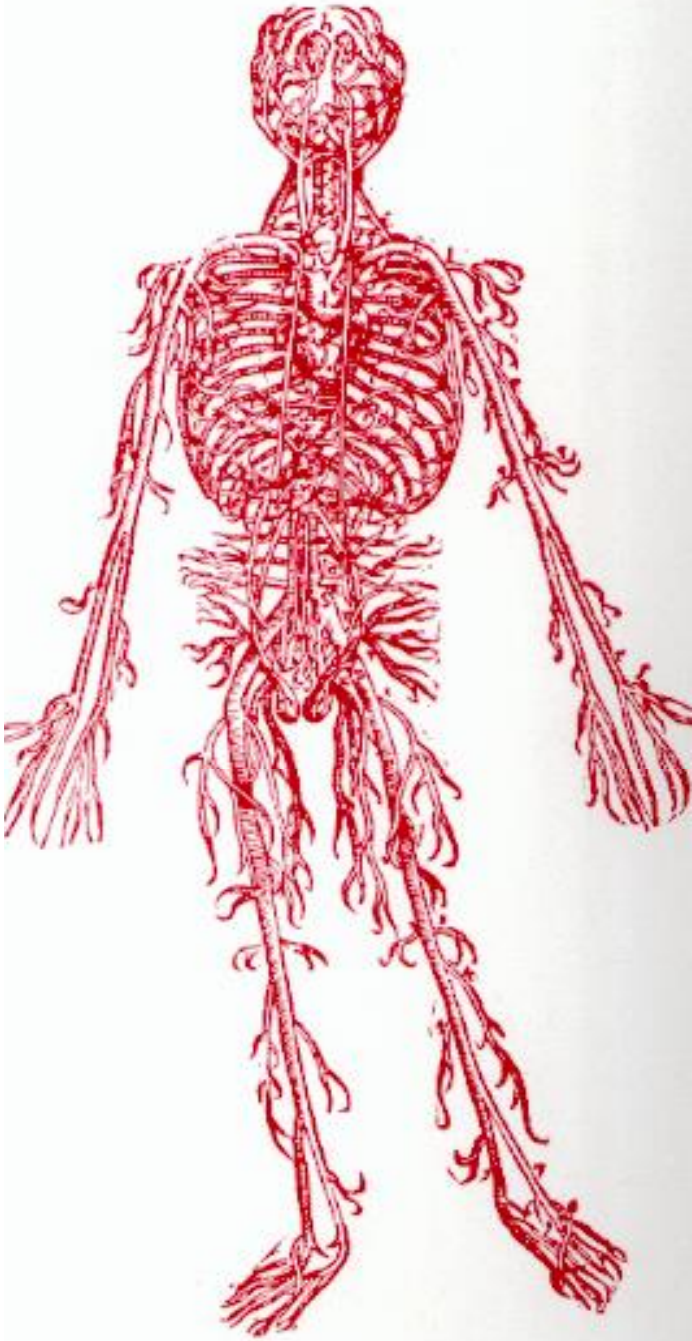
Qu’entend-on donc par

… pression / tension artérielle ?

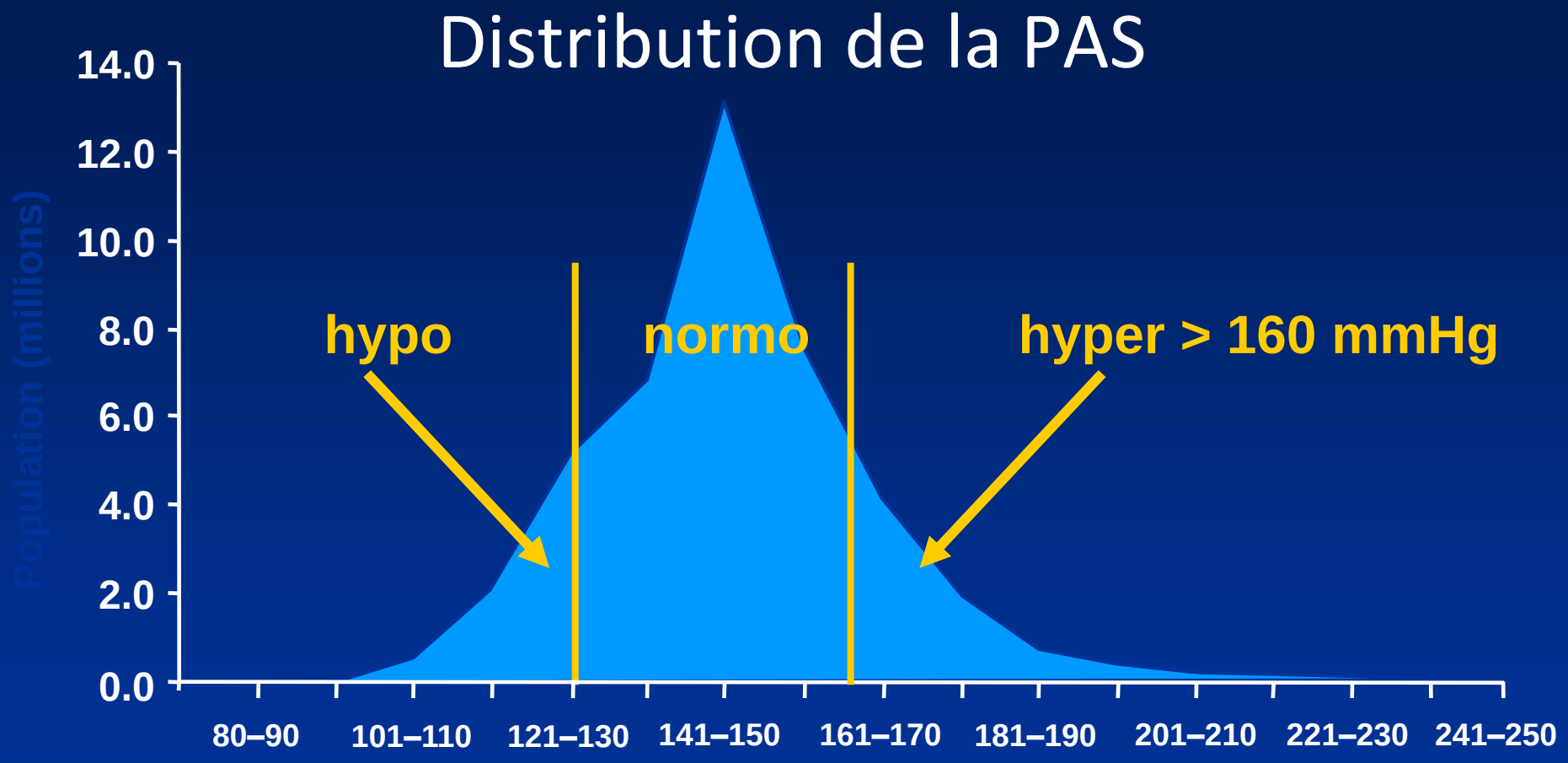
- un paramètre hémodynamique / mécanique artériel
- un signe d’examen pour le médecin
- éventuellement un symptôme de ‘tension’ pour le patient

… hypertension artérielle ?

- un concept physiopathologique
- **une maladie** du système circulatoire, souci individuel
- **un facteur de risque** cardiovasculaire, préoccupation de santé publique
- le résultat d’une interaction entre constitution, environnement et âge

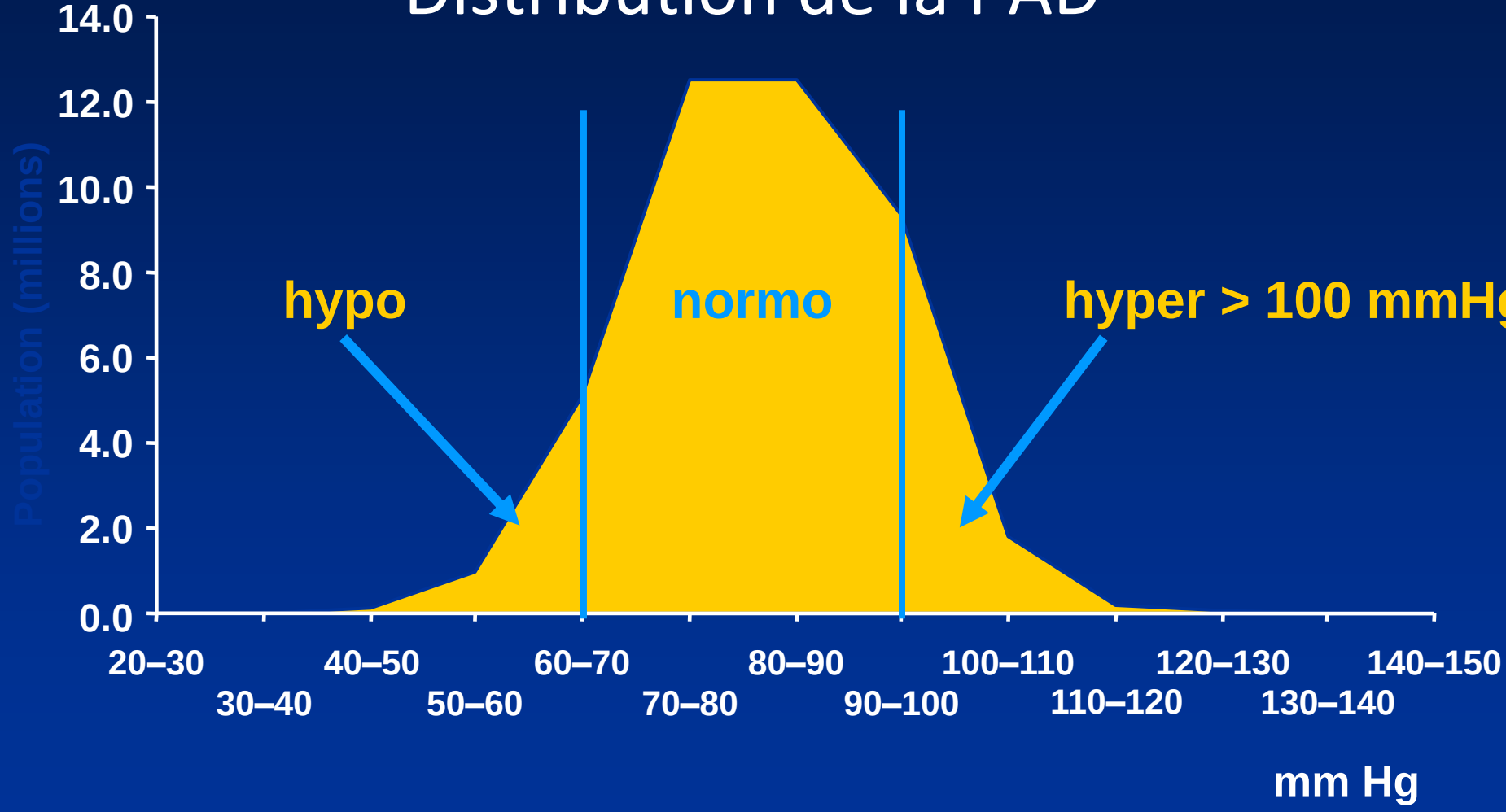


Comment définir l'*hyper*tension ?



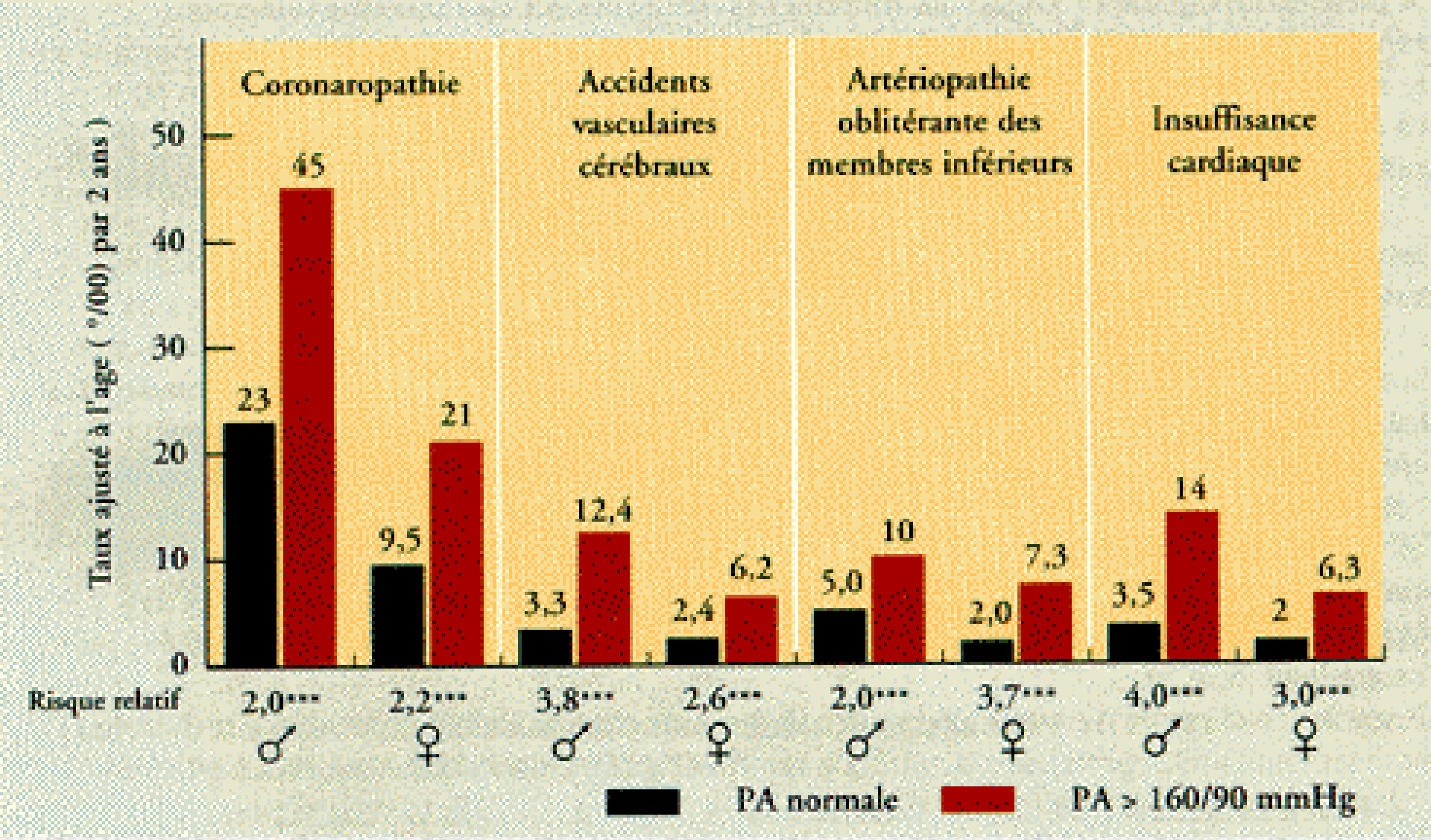
data : the National Health and Nutrition Examination Survey NHANES 1988-94 (USA)

Distribution de la PAD

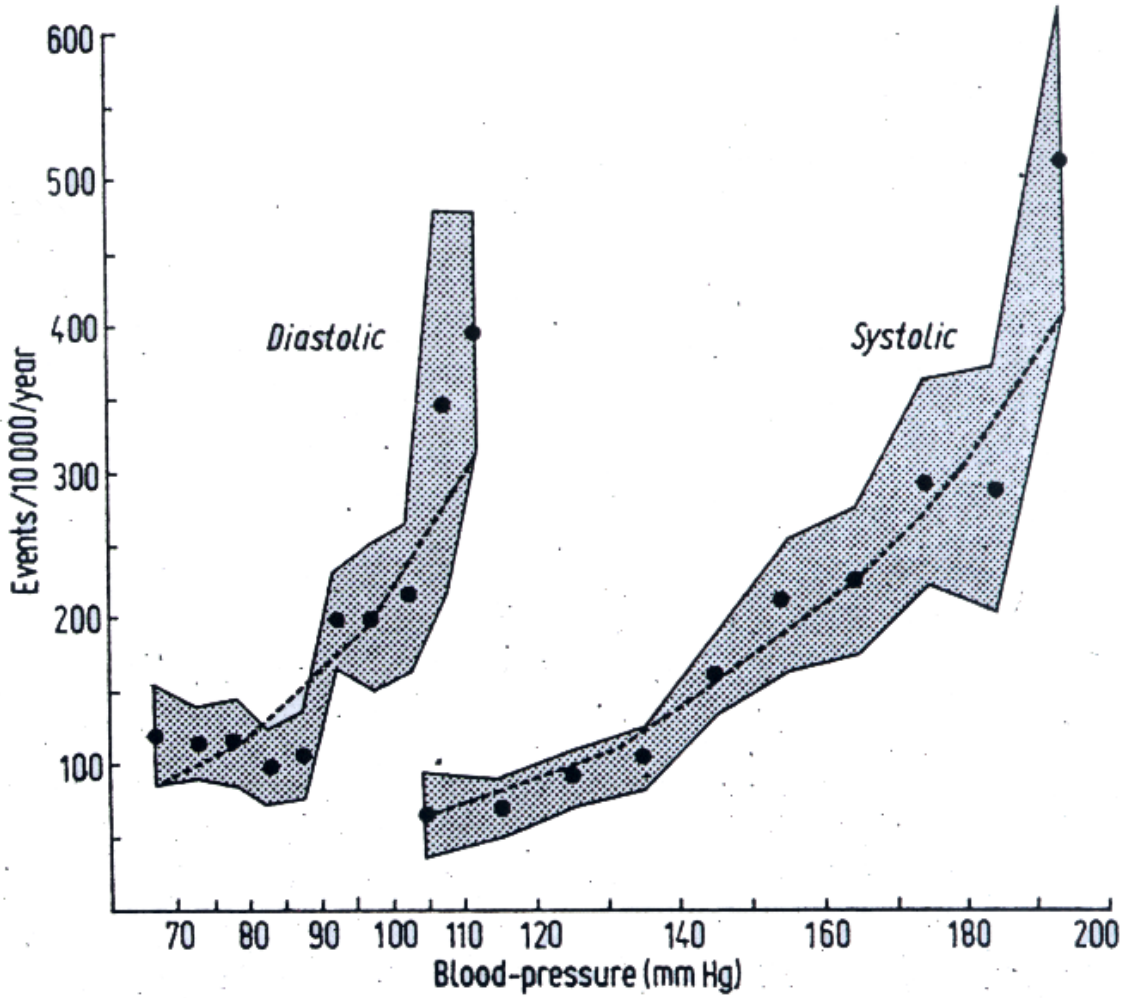


data : the NHANES, National Health and Nutrition Examination Survey 1988-94 (USA)

Une enquête épidémiologique montre que l'élévation tensionnelle comporte un risque



Risque de survenue d'évènements cardio-vasculaires dans l'étude de Framingham en fonction du niveau de pression artérielle (sujets agés de 35 à 64 ans - suivi 36 ans)



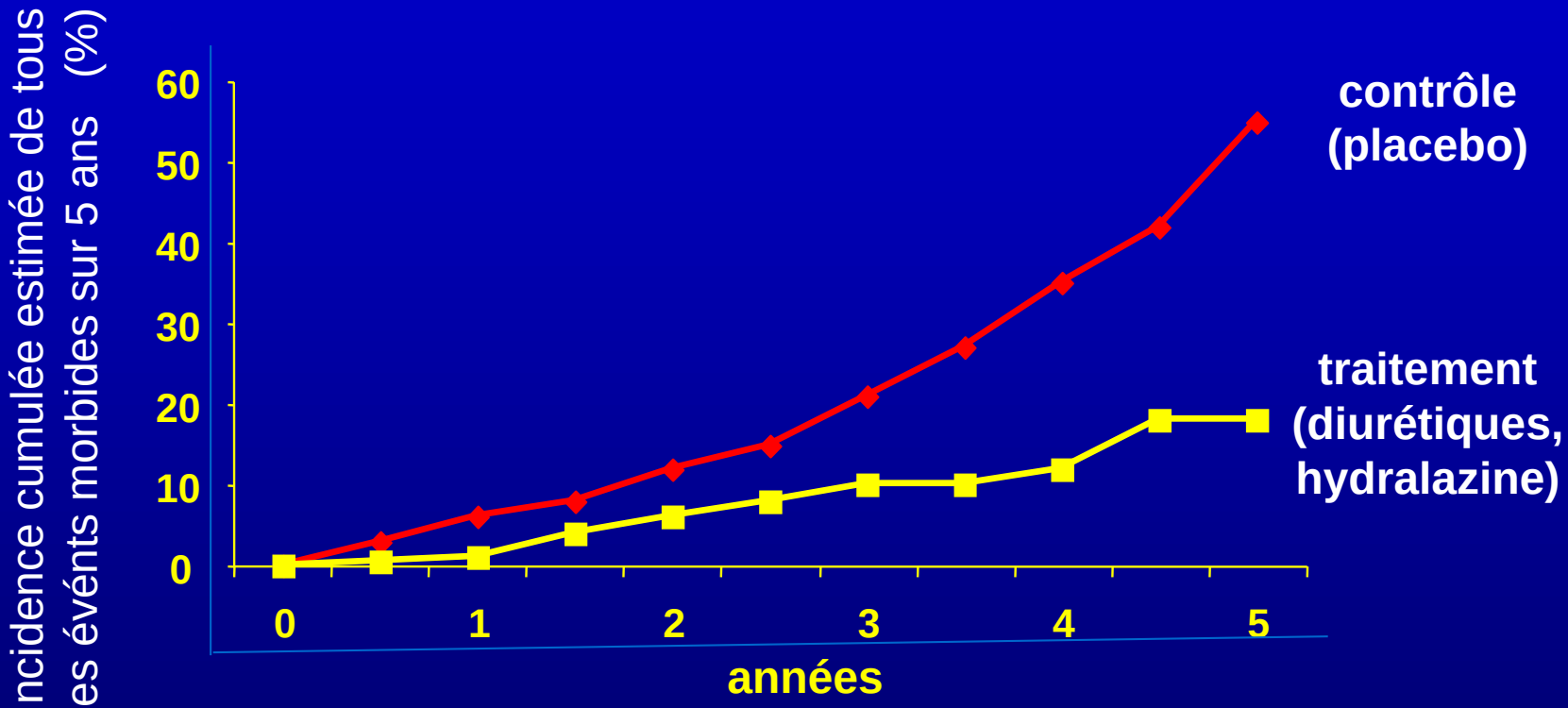
Risque absolu : probabilité de survenue d'un événement pendant un intervalle de temps défini, pour un individu aux caractères définis

FHS -Tension artérielle et atteinte coronaire

Incidence annuelle sur 18 ans

TW Anderson. Lancet 1978;2:1139

Un essai contrôlé démontrera que le traitement antihypertenseur diminue la morbi-mortalité



Veterans Administration Cooperative Study Group on antihypertensive agents
JAMA 1970;213:1143-52

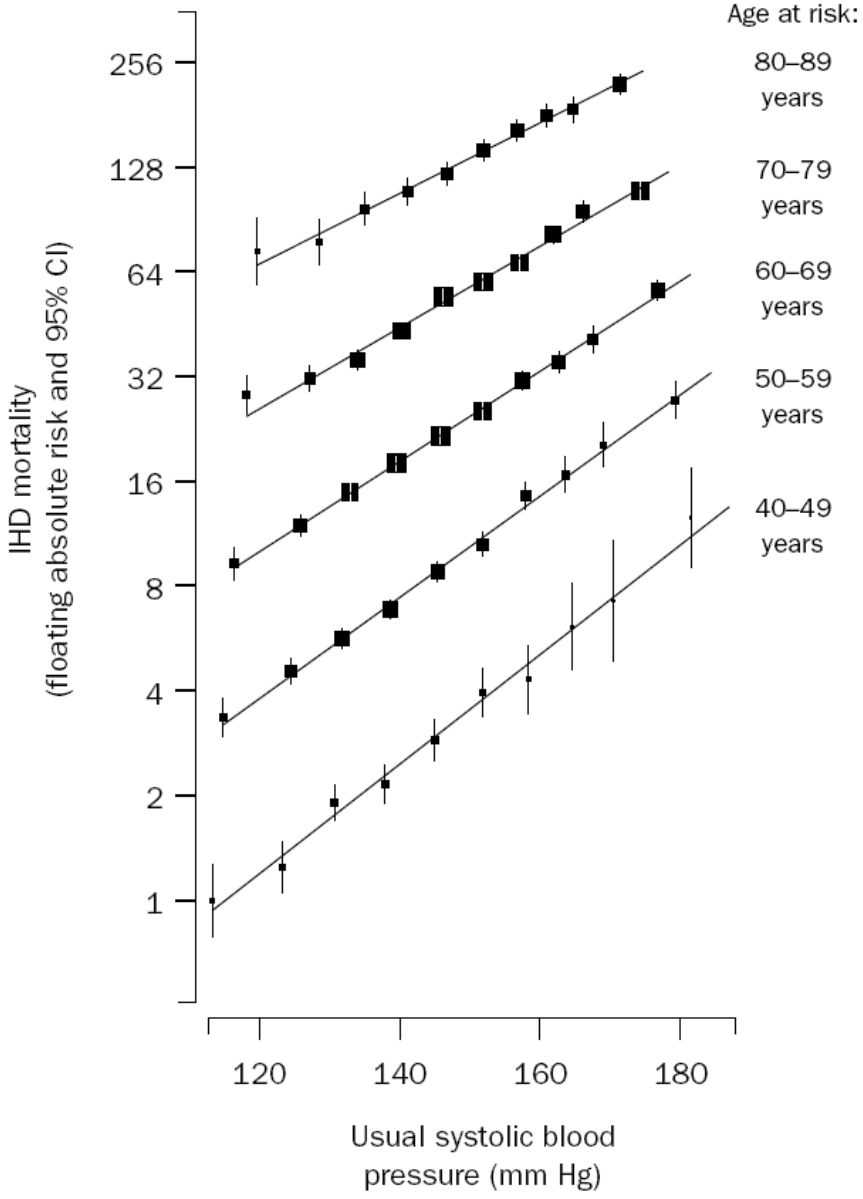
Les valeurs anormales peuvent donc être définies par une approche

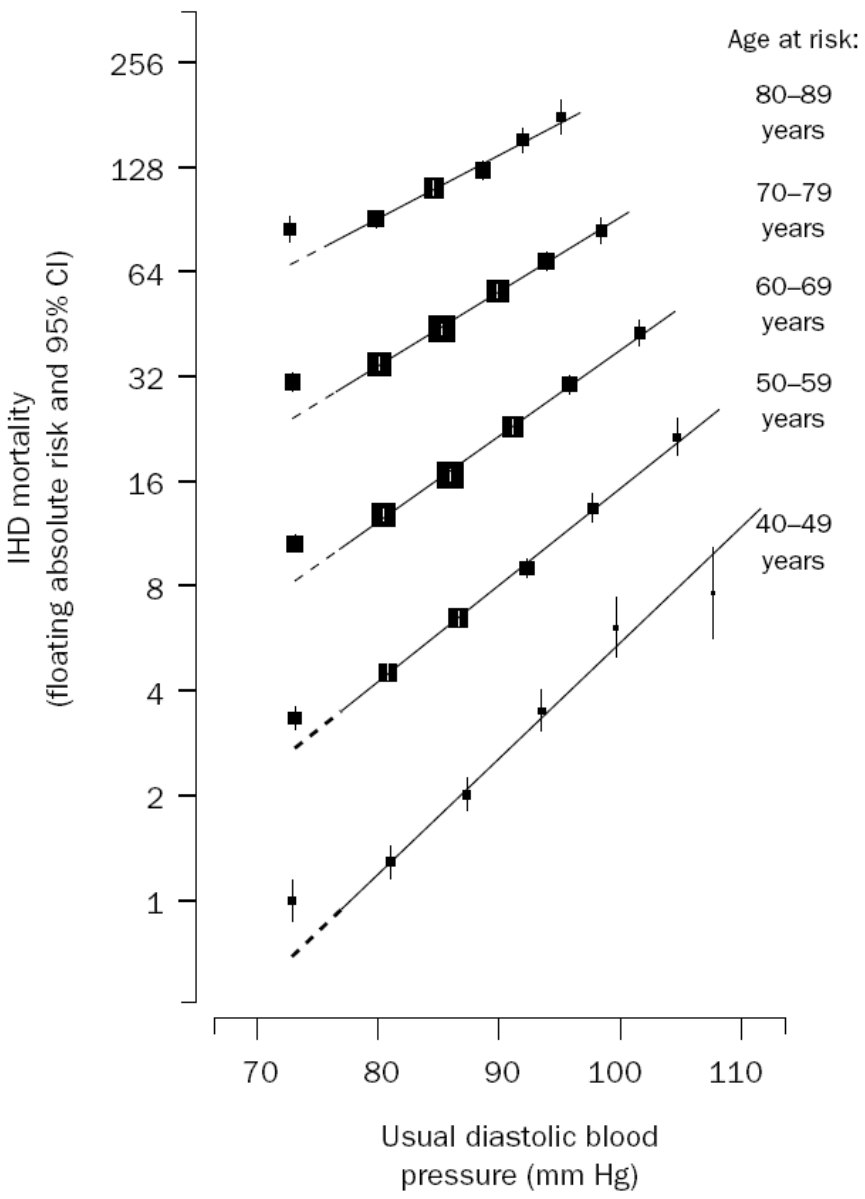
… statistique (distribution dans la population générale)

… descriptive (suivi de cohorte) ou

… pragmatique (démonstration d’un bénéfice thérapeutique)

Mortalité coronarienne par décade d'âge selon la pression artérielle usuelle au début de cette décade

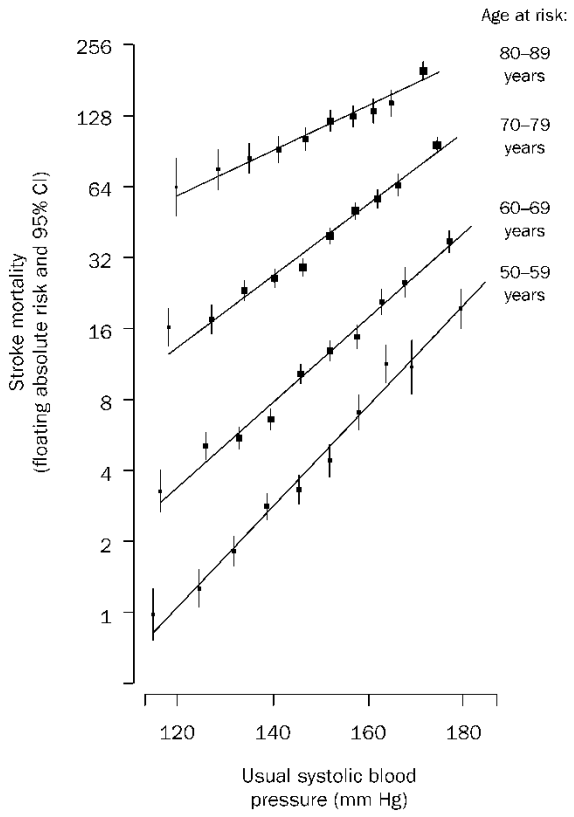




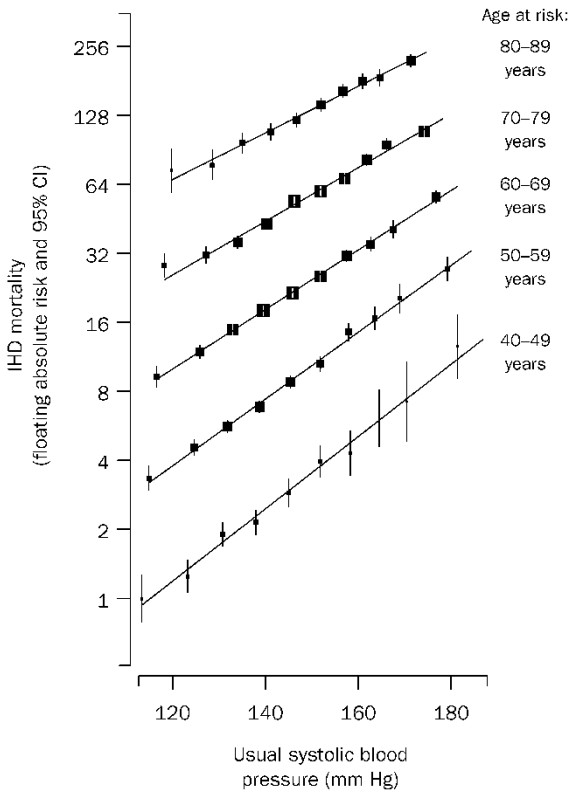
Prospective Studies Collaboration. Lancet 2002;360:1903-13

mortalité vasculaire & pression artérielle

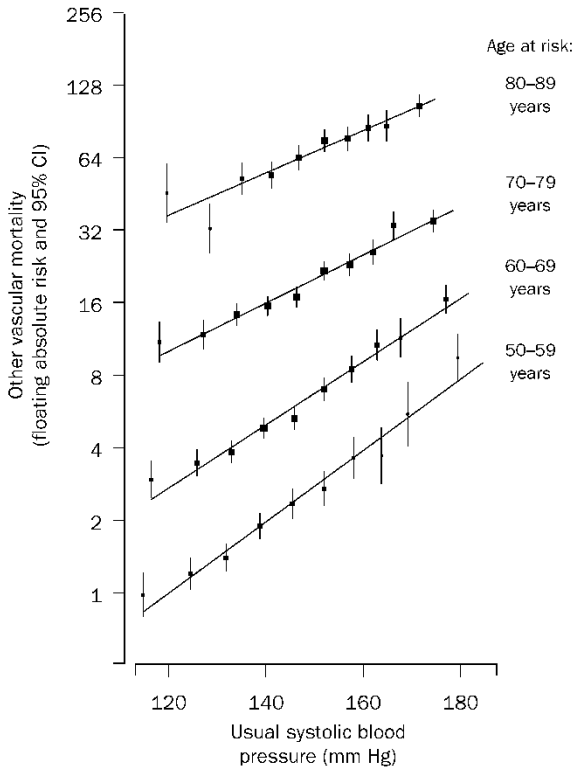
cérébrale



coronarienne



autre

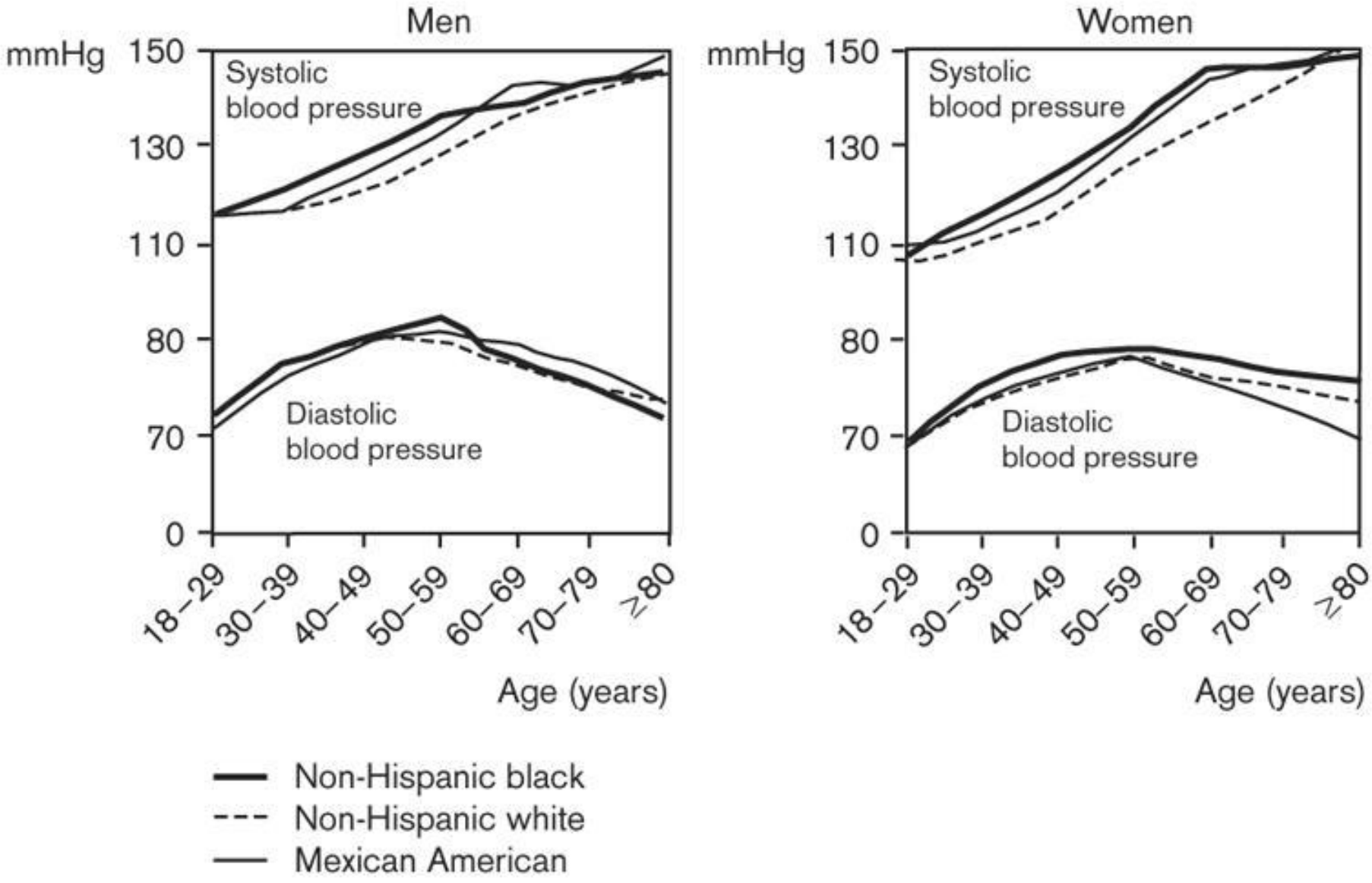


L'élévation de la pression artérielle au-delà de 115/75 mmHg est associée à une augmentation significative et progressive du risque de mortalité vasculaire

[le risque double entre 120/80 et 140/90]

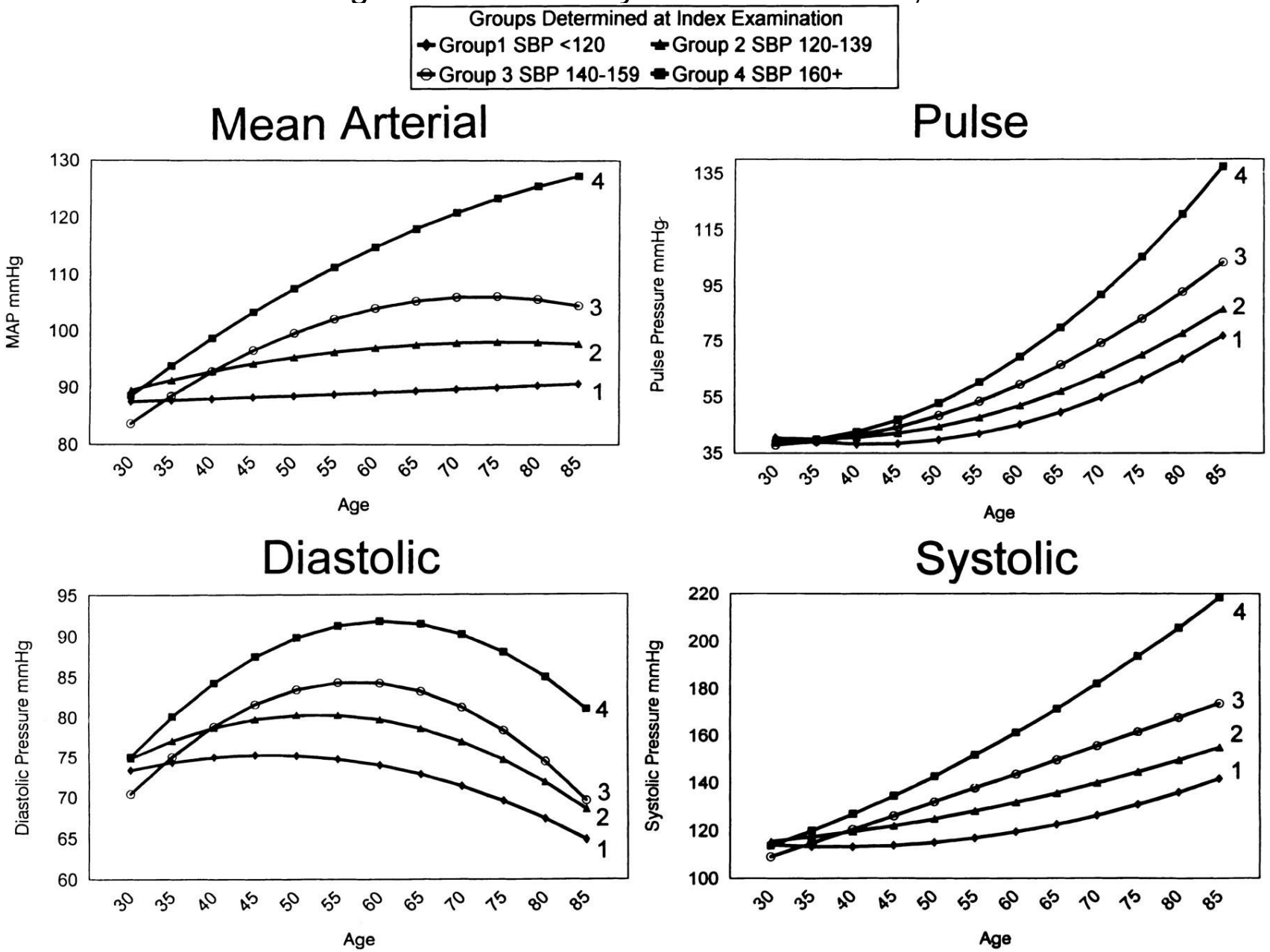
Prospective studies collaboration. Lancet 2002; 360: 1903

PA systolique et diastolique moyenne (par age, ethnicité, et sexe) (*d'après Burt et coll. NHANES*)

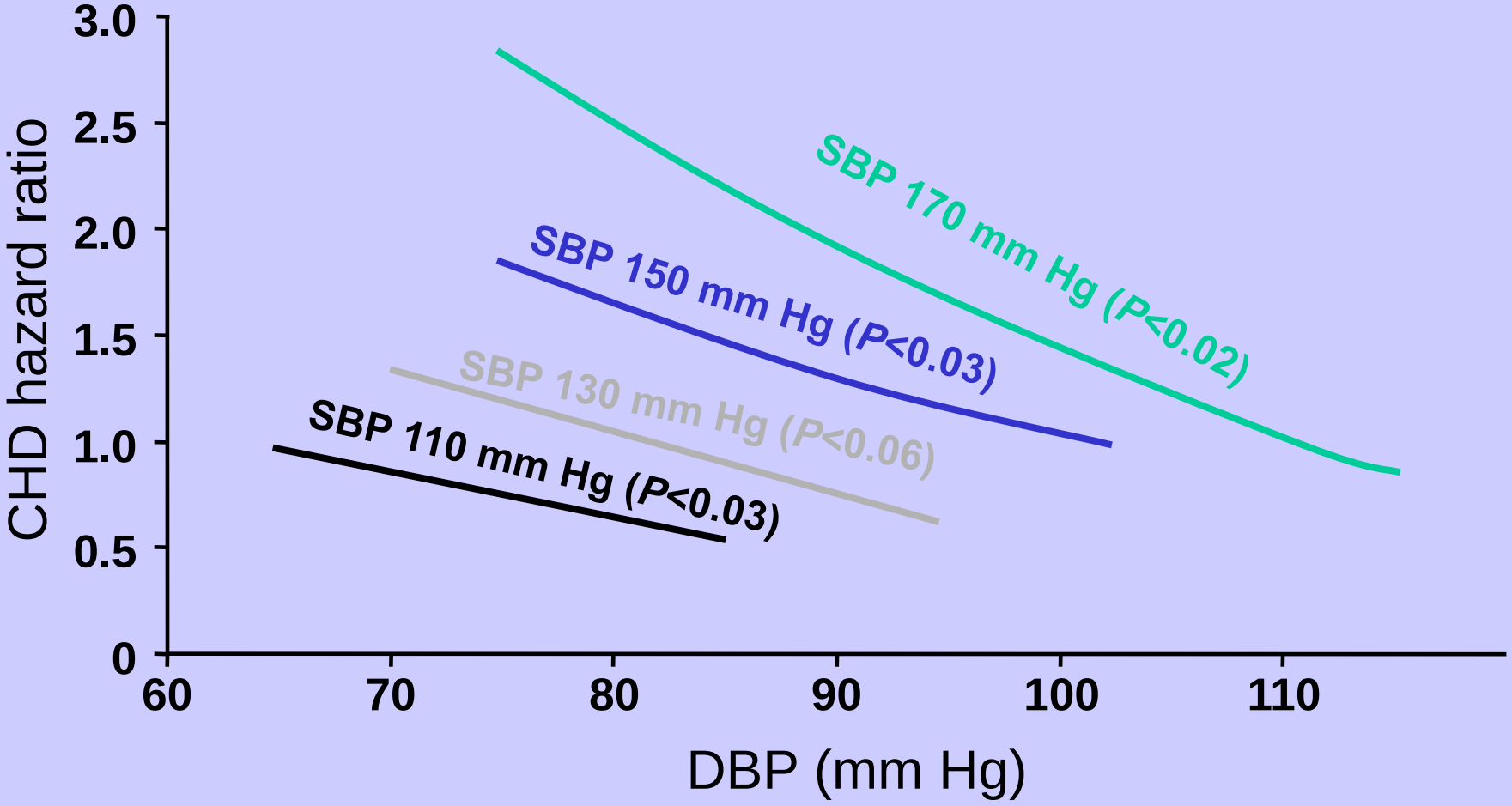


Variations tensionnelles liées à l'âge

The Framingham Heart Study. Circulation 1997;96:308-315

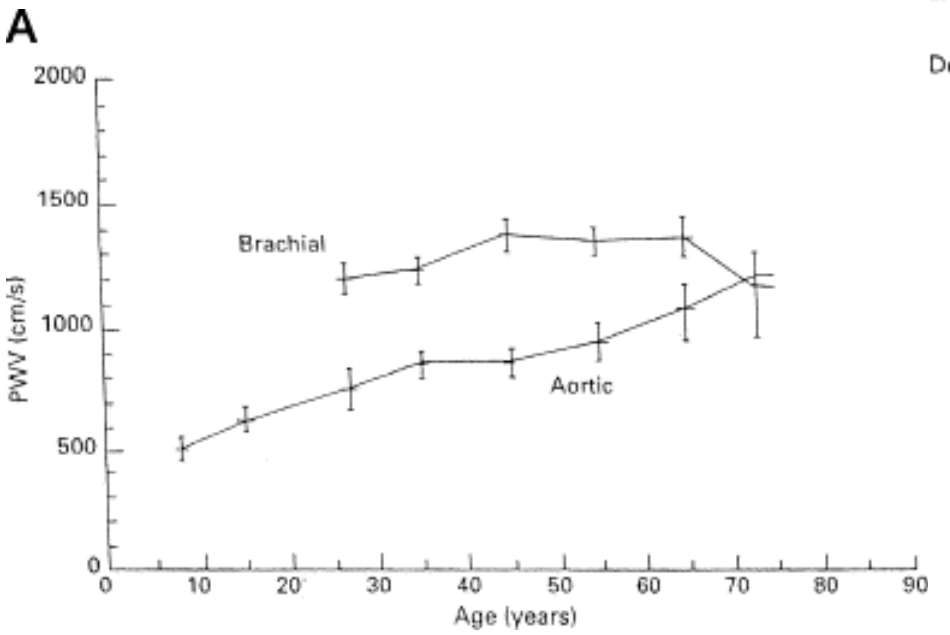


Relations entre PAS / PAD et risque coronarien

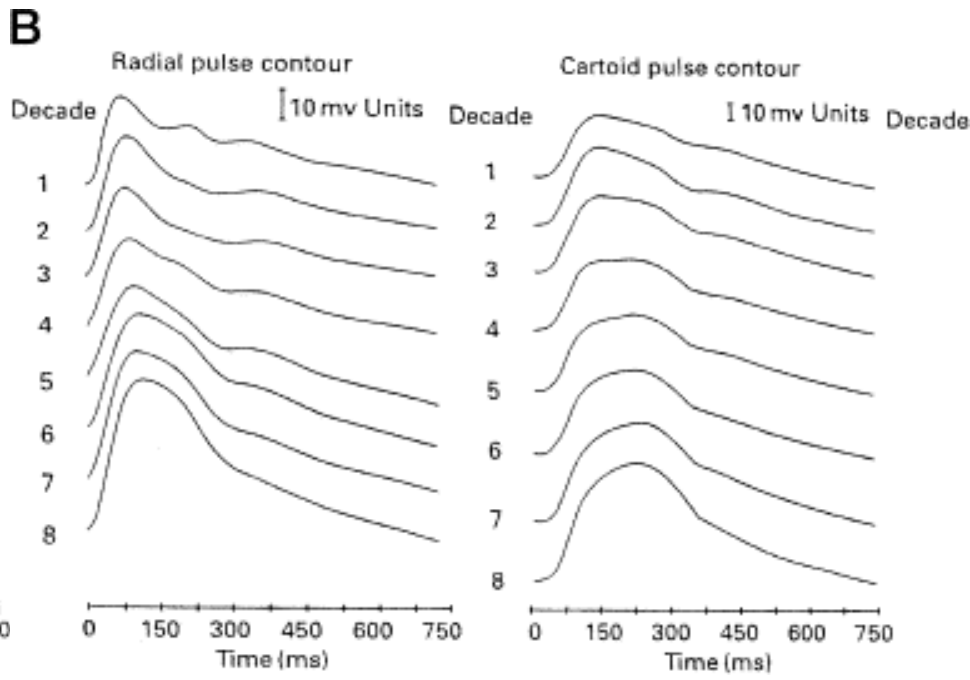


Framingham Heart Study. Franklin et al. Circulation 1999;100:354

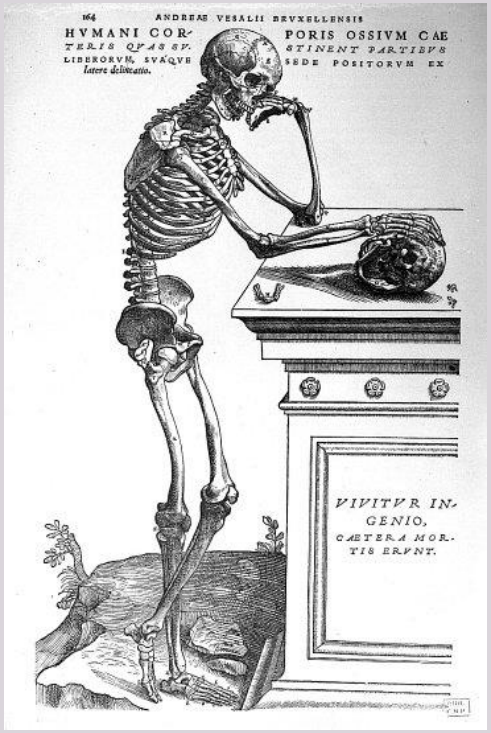
Variations liées à l'âge dans une population 'normale'



vélocité de l'onde de pouls
(Ho K, BSc, Univ NSW, 1982)



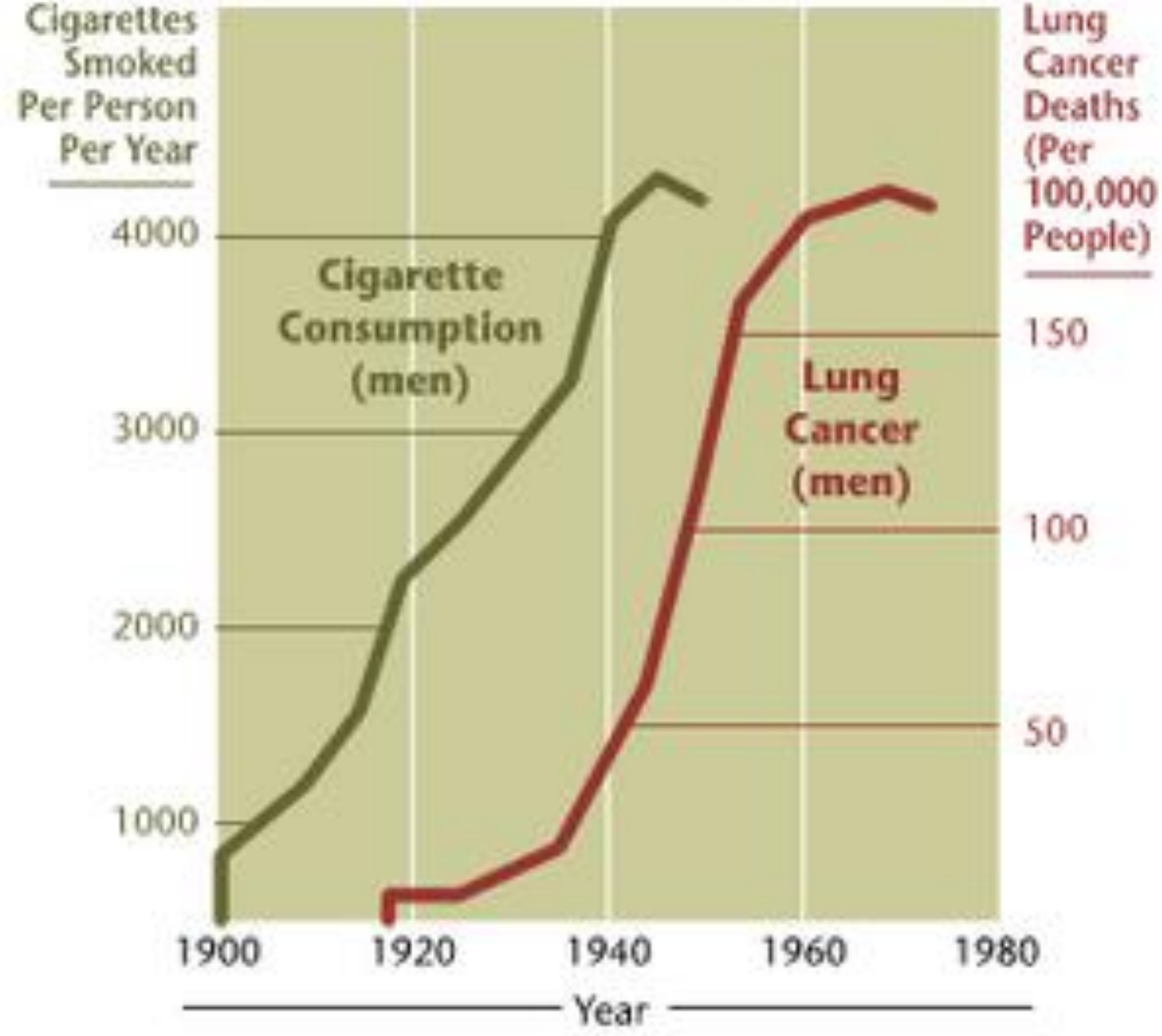
contour de l'onde de pouls
(Kelly R, et al. Circulation, 1989)

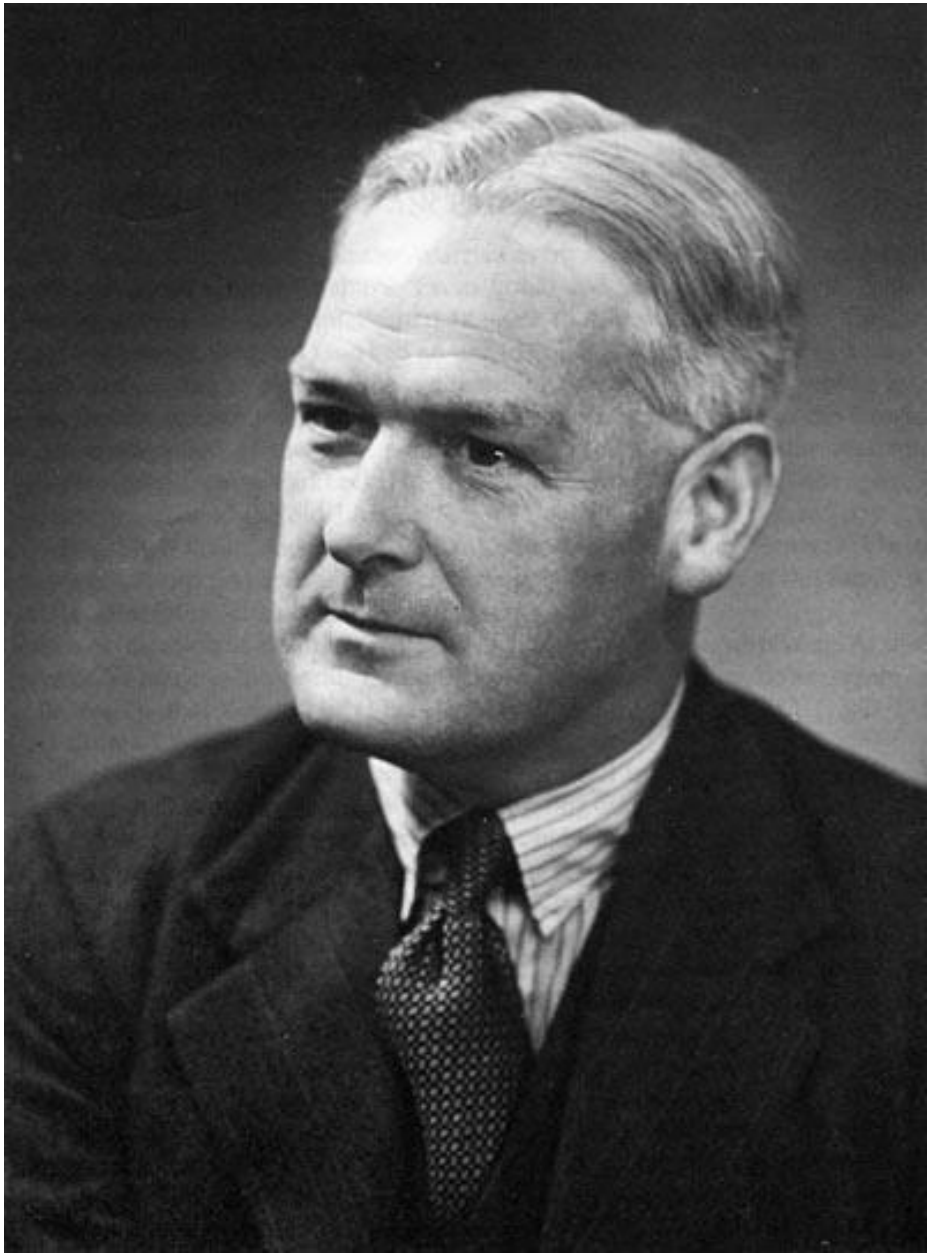


L‘explication des ‘épidémies’ du XX° siècle

Le concept de facteur de risque

20-Year Lag Time Between Smoking and Lung Cancer





Austin Bradford Hill

The Bradford Hill ‘criteria’

(1) strength of association ;

(2) consistency of the observation ;

(3) dose-response (exposure/effect) ;

(4) temporality ;

(5) biological plausibility ;

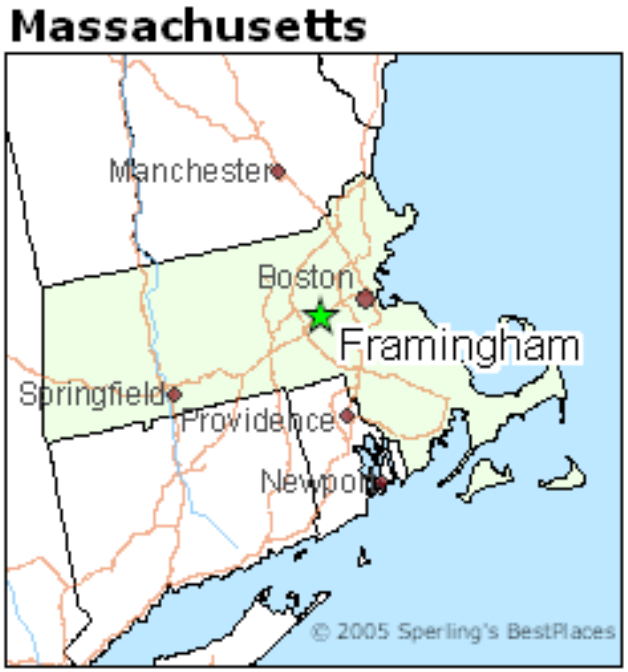
(6) coherence ;

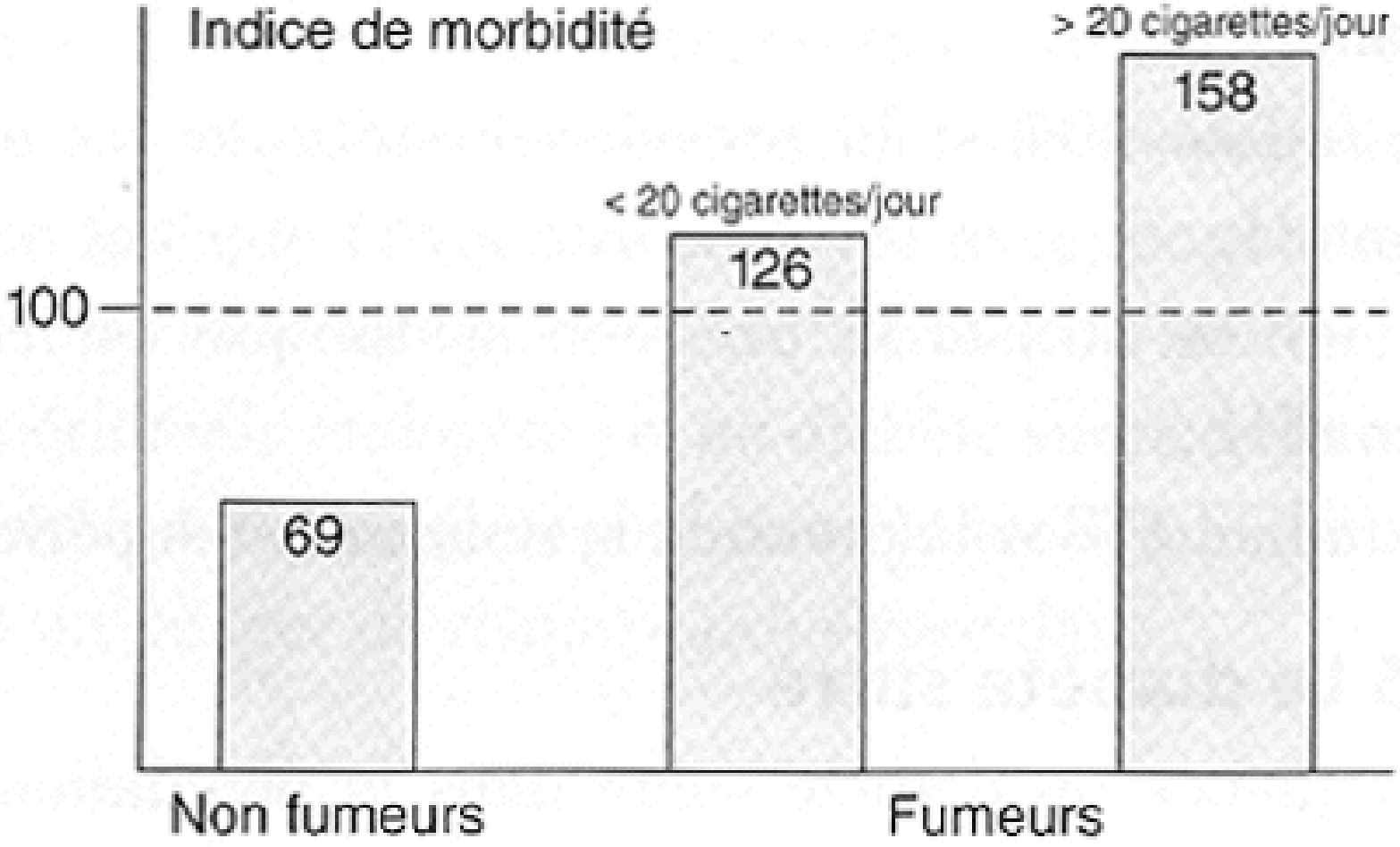
(7) consideration of alternative explanations ;

(8) specificity ;

(9) experimental test of the relation.

Framingham Heart Study (FHS)

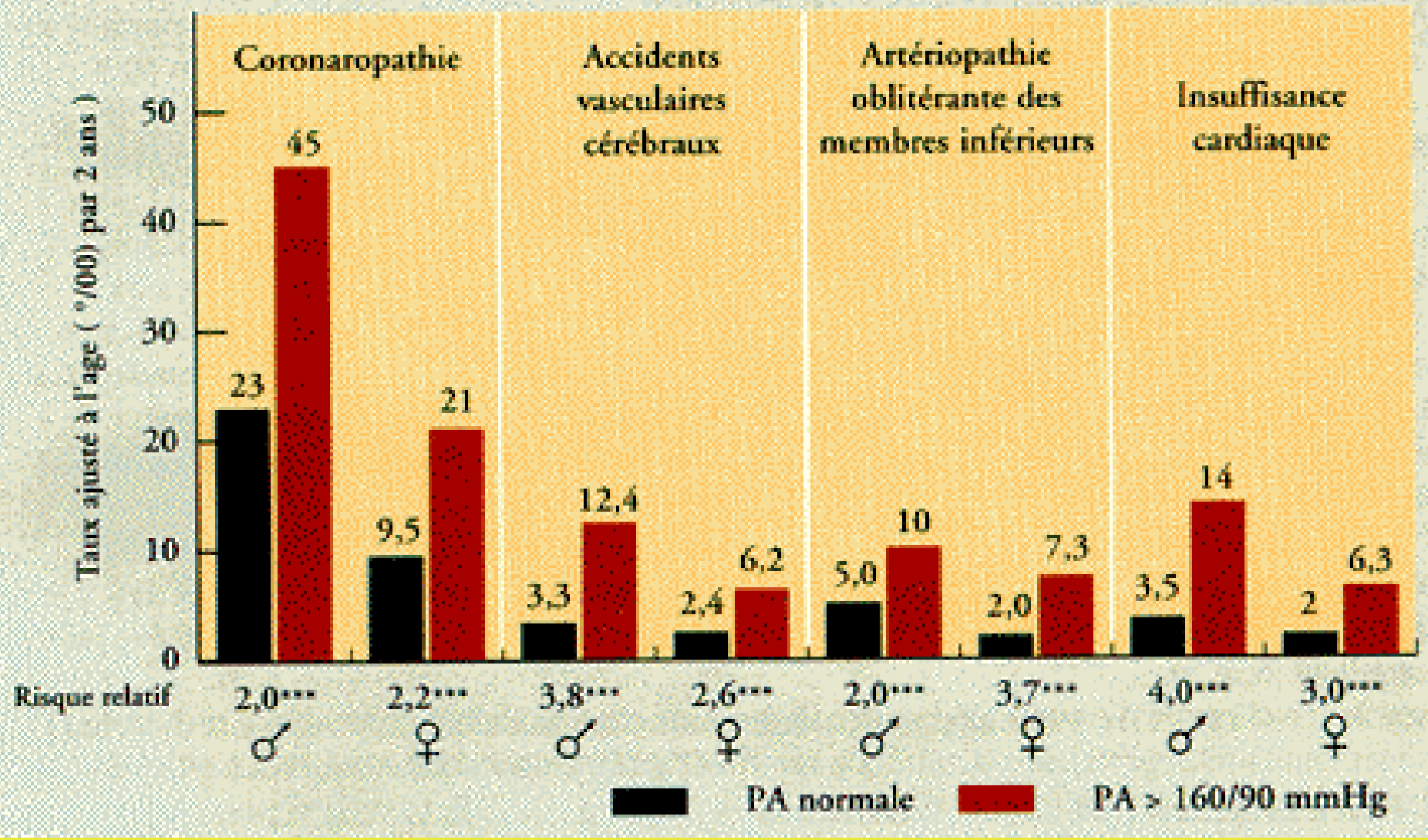




FHS - Tabac et atteinte coronarienne

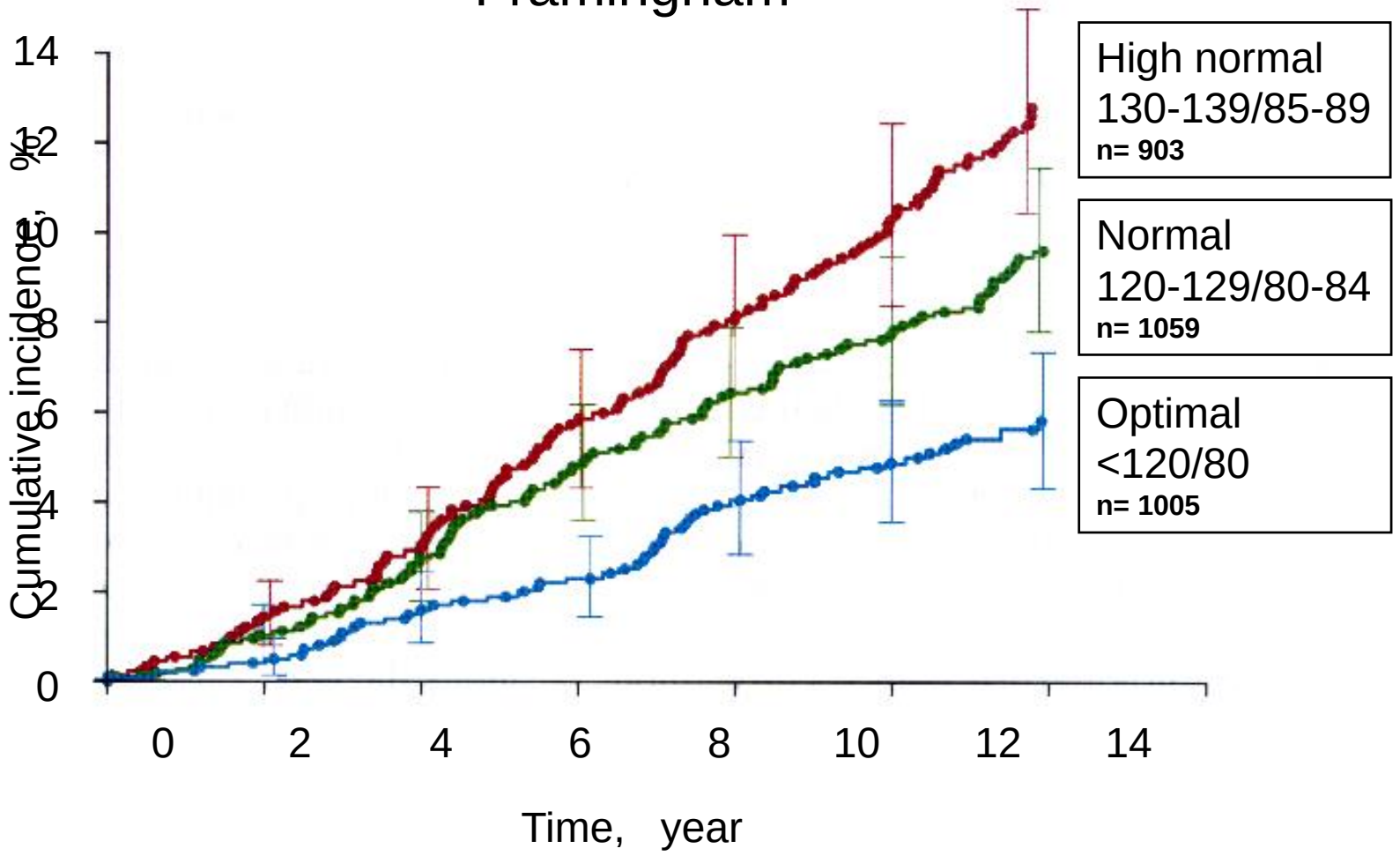
L'indice 100 correspond à la morbidité moyenne de l'ensemble de la population

FHS - Tension artérielle et maladie coronaire



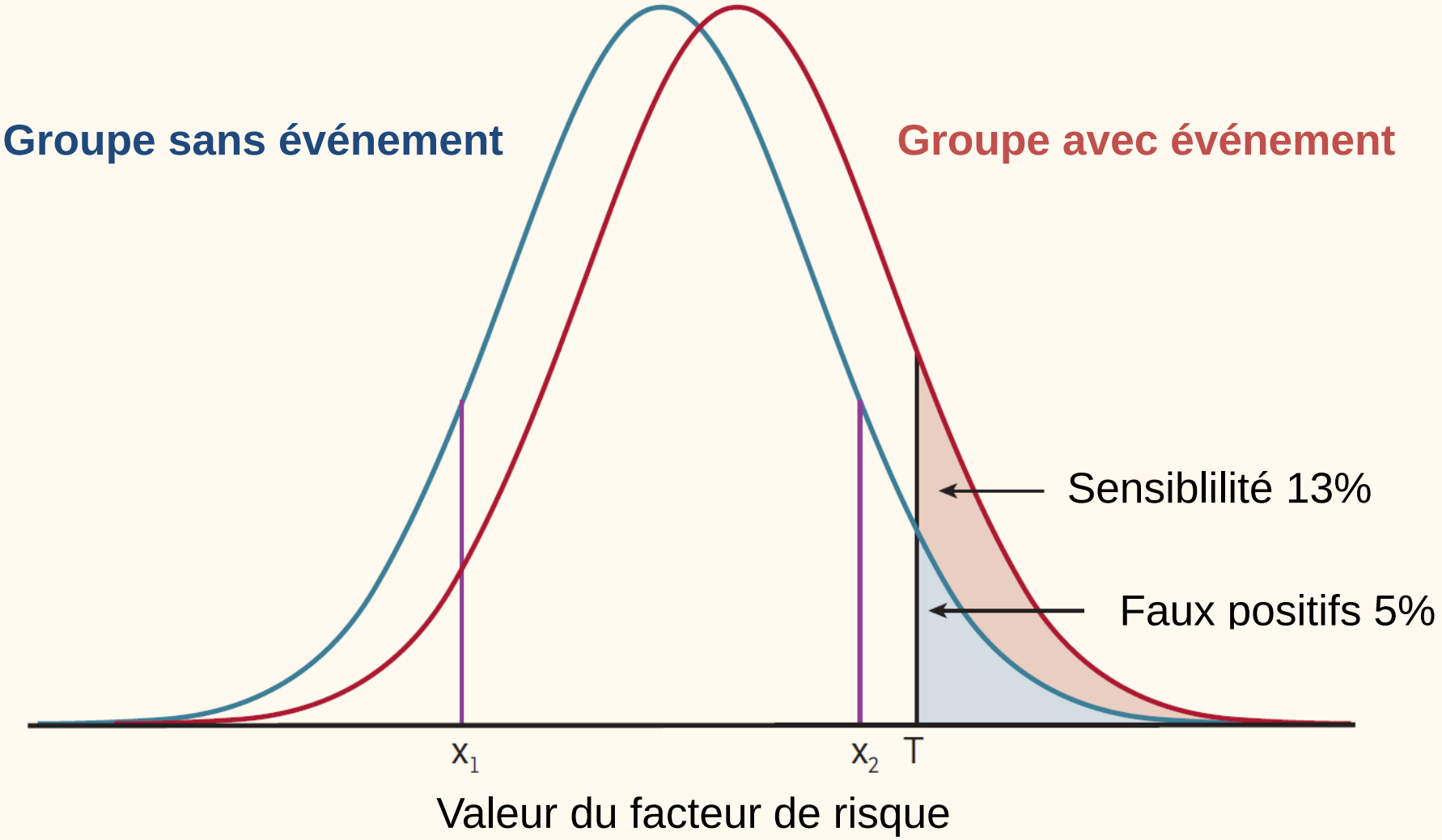
Risque relatif de survenue d'événements cardio-vasculaires en fonction du niveau de pression artérielle (sujets agés de 35 à 64 ans, suivis 36 ans)

Cumulative incidence of cardiovascular events in men without hypertension. Framingham



Vasan et al. NEJM 2001;345:1291

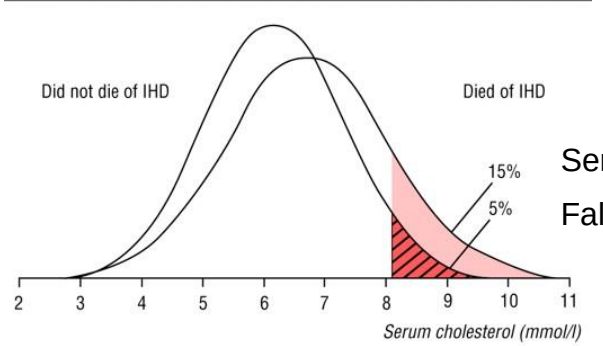
Fonctions de densités de probabilité d'un facteur de risque parmi des sujets chez qui surviendra (ou non) l'événement



Ware JH. NEJM 2006;355:2615

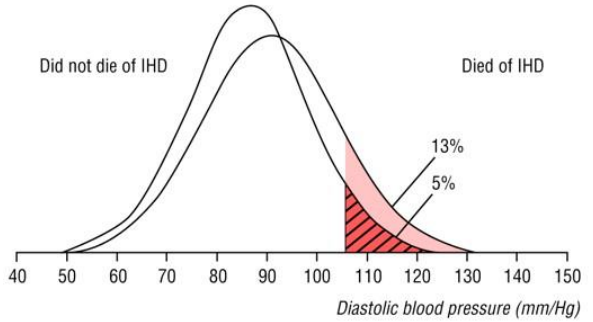
Relative distributions of risk factors in men who subsequently died (or not) of IHD or stroke

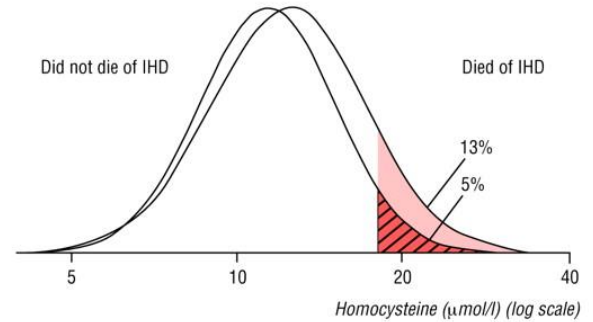
Gaussian distribution fitted to data from a cohort of 22 000 men followed prospectively for 10 years (the BUPA study)

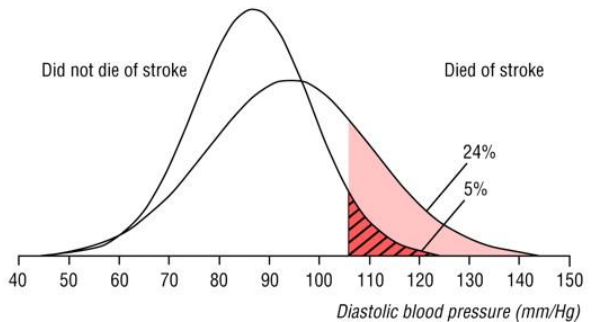


Sensitivity

False positive







Wald NJ et al. BMJ 2003;326:1419

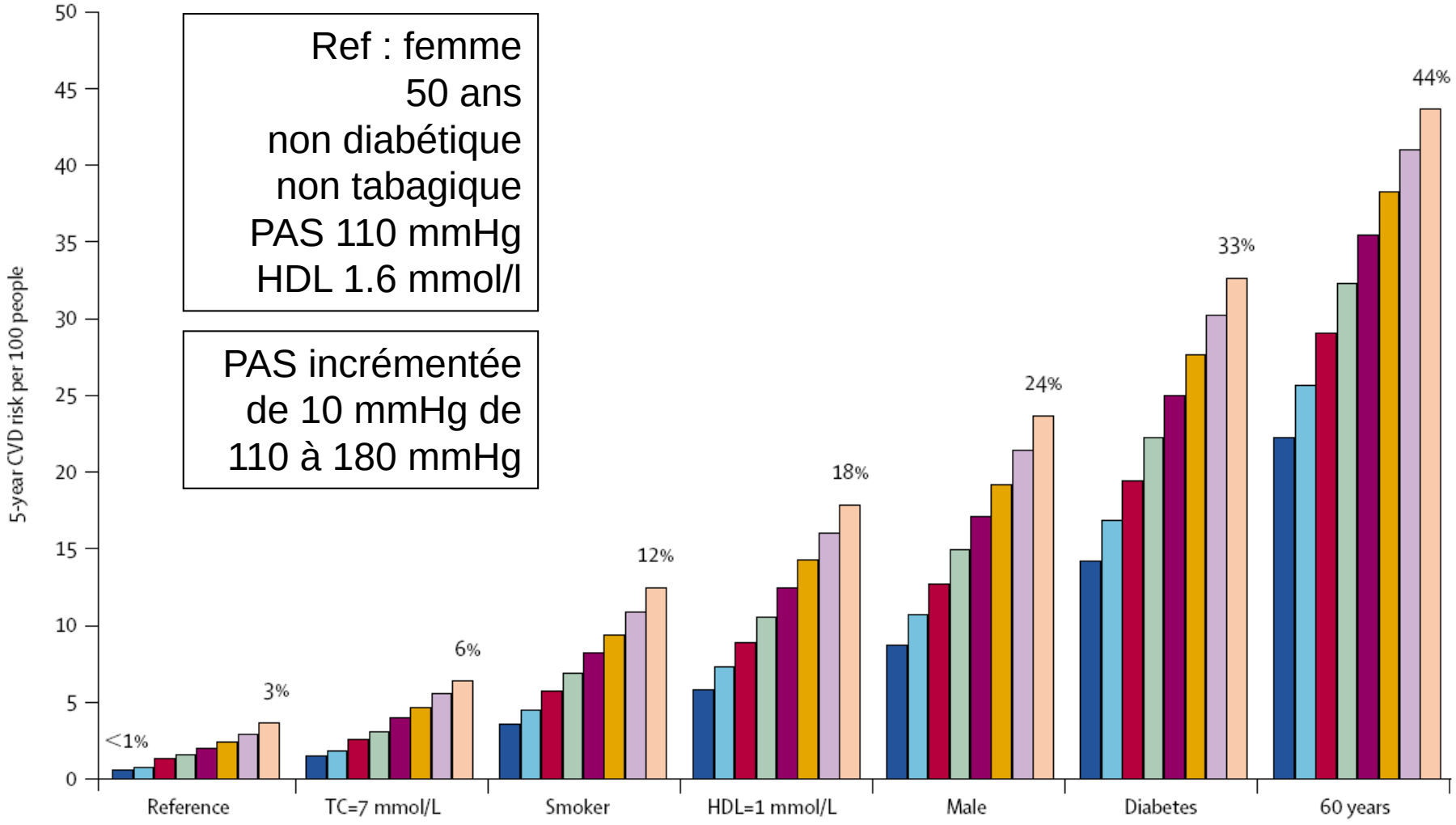
L’hypertension artérielle existe-t-elle ?

- La pression artérielle est une variable biologique distribuée selon une loi quasi normale
- Le diagnostic d’hypertension est basé sur un seuil arbitraire
- L’atteinte cardiovasculaire et rénale attribuée à l’hypertension artérielle est liée de façon continue et linéaire au niveau tensionnel
- La moitié de cette atteinte survient pour des niveaux tensionnels inférieur au seuil ‘commun’ définissant l’hypertension

L’estimation de la probabilité de survenue d’événements

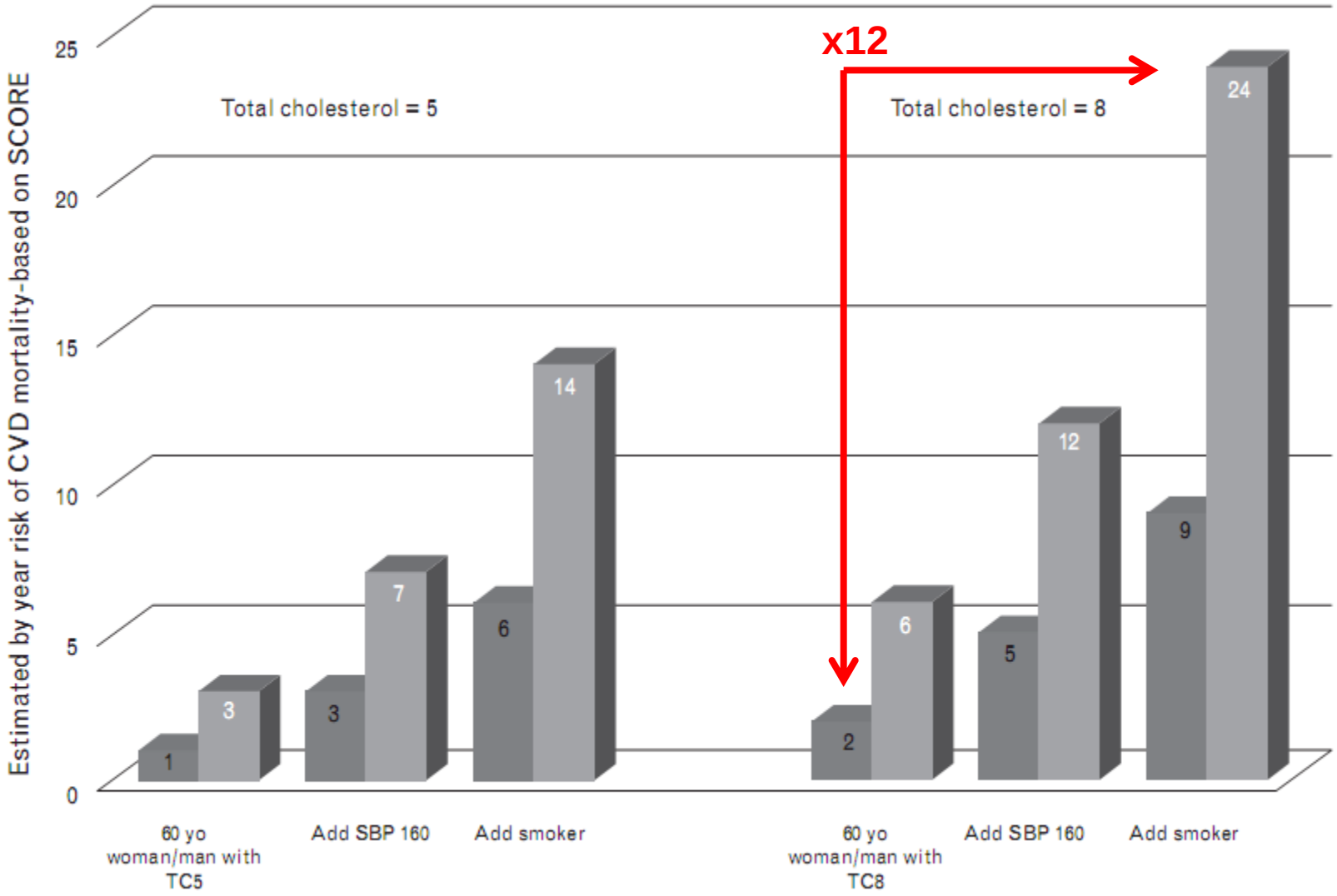
Les scores de risque

Risque cardiovasculaire absolu à 5 ans par PAS à niveaux spécifiés des autres facteurs de risque



Jackson R, et al. Lancet 2005;365:434

De l’importance d’estimer le risque global



Population d'étude & événements

L'échantillonnage doit être identifié et suffisant

- population générale : Framingham, ASSIGN, SCORE (Systematic COronary Risk Evaluation)
- employés (mâles) de l'industrie : PROCAM (Prospective Cardiovascular Münster)
- clientèle de médecine générale : QRISK

Le critère final doit être standardisé et pertinent

- (coronarien ou global)

Méthodes statistiques

La dérivation de la fonction d'estimation la plus utilisée est un modèle de risque proportionnel,

- paramétrique (Weibull) ou
- semiparamétrique (Cox)
- de préférence à une régression logistique

Une validation externe est nécessaire

- généralement supérieure chez le femme et moindre chez le sujet âgé

Evaluation d'un score

Méthodologie de constitution

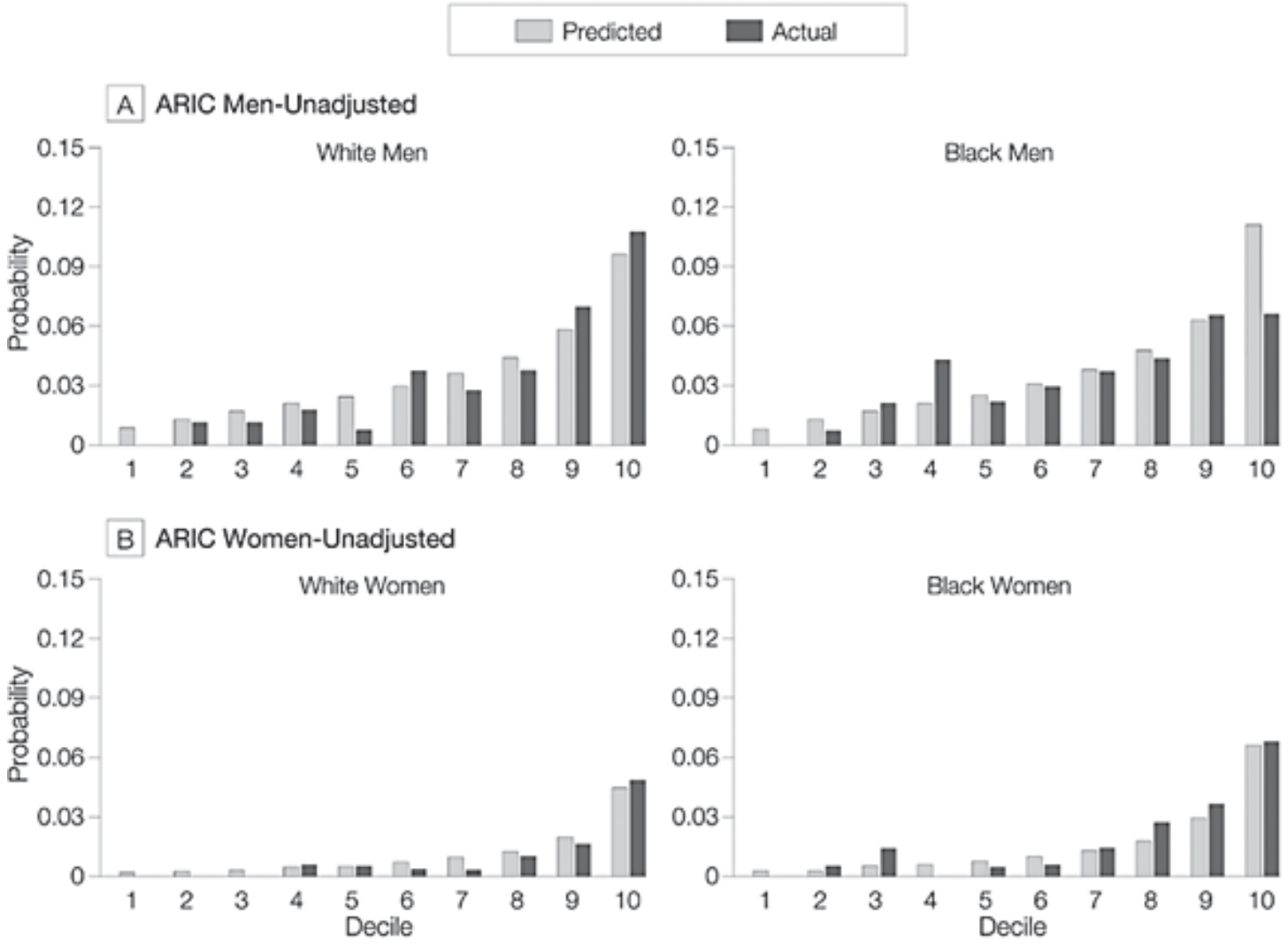
Performance de la fonction (validité int / ext)

- discrimination (sensibilité, spécificité, valeurs prédictives/AUROC, Harrell's C statistic)
- calibration (Hosmer-Lemeshow goodness of fit)
- classification

Inclusion des facteurs appropriés

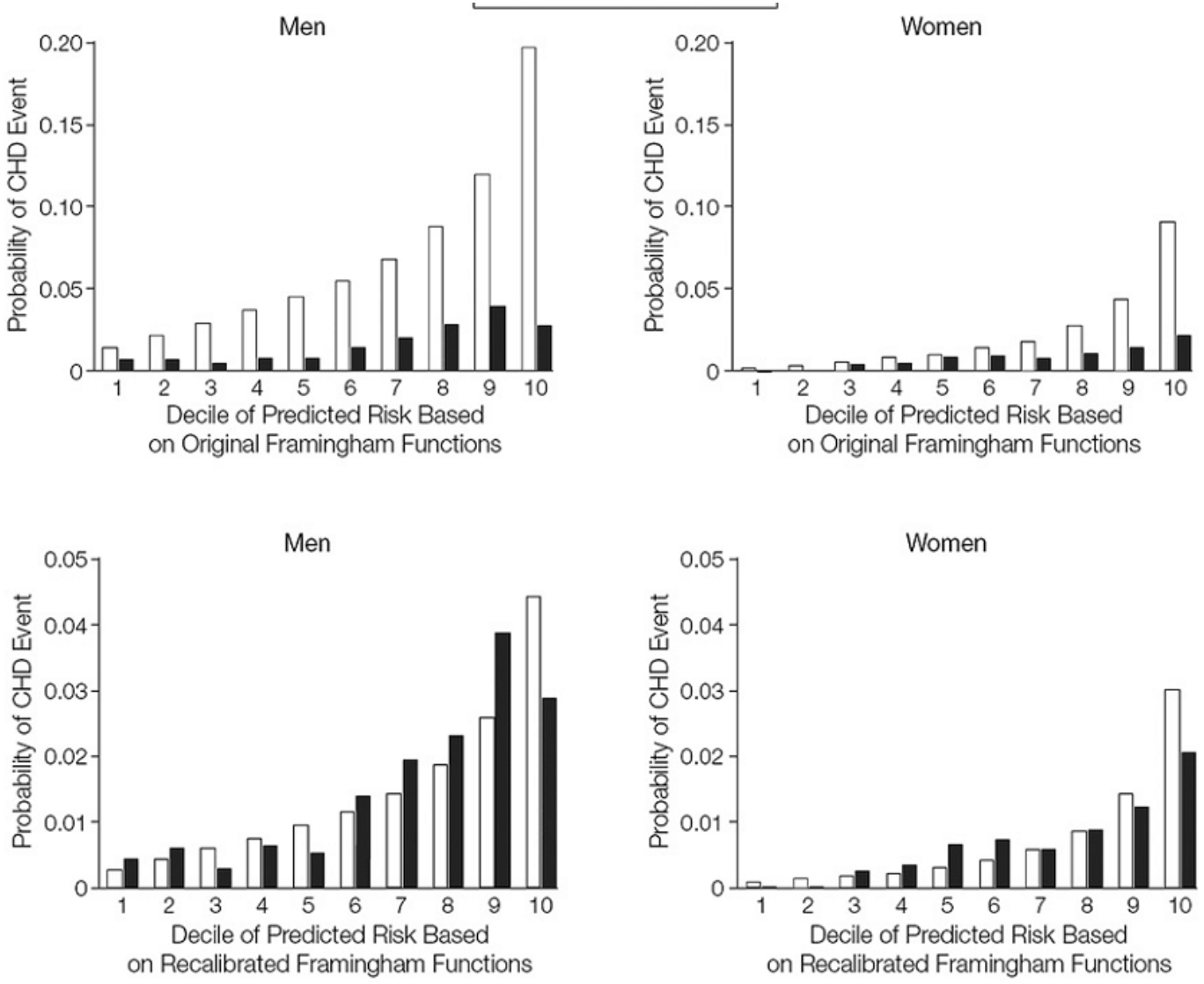
'Usabilité' et utilité ('efficience mesurable')

Framingham 5-yr : performance of predictions for hard CHD events in the ARIC population



D'Agostino RB Sr, et al. JAMA. 2001;286:180-7

Improved Calibration of Framingham Function in Chinese Cohort After Recalibration

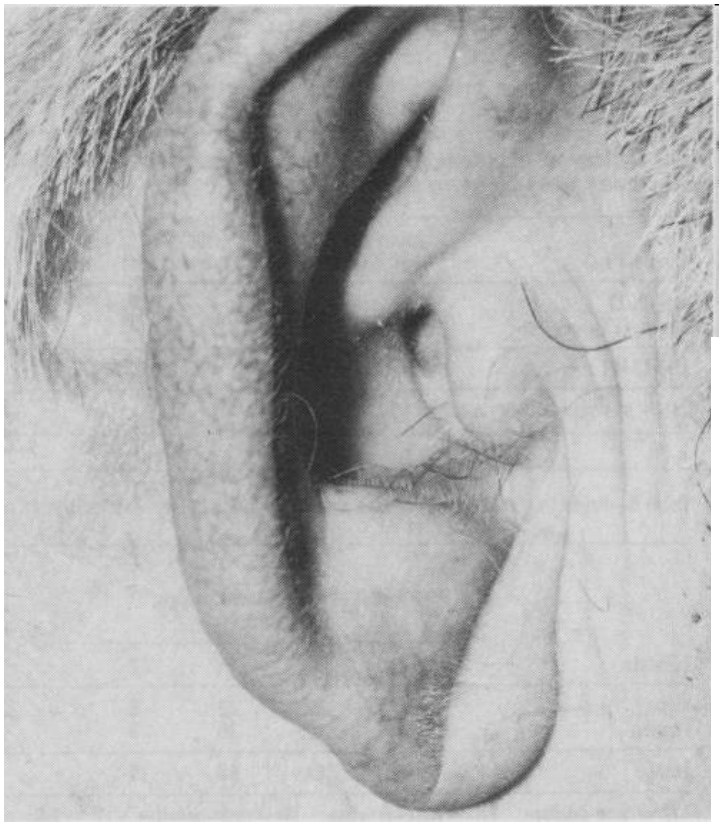


Quels facteurs de risque inclure ?

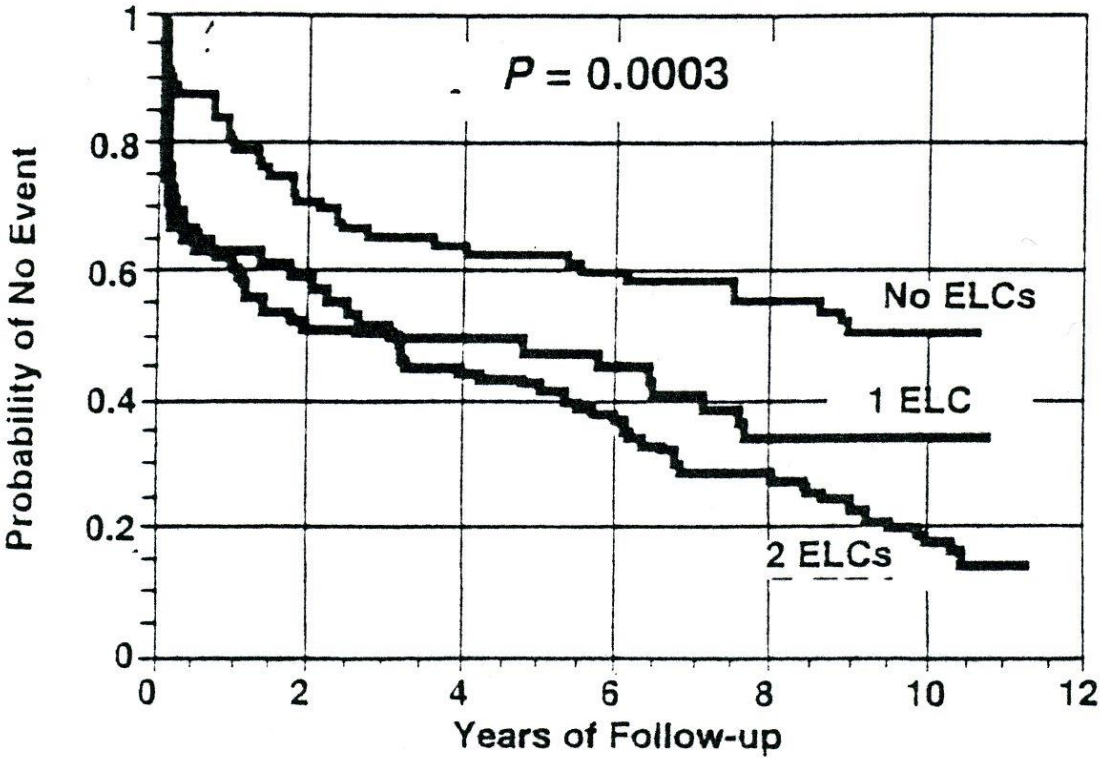
- Age
- Sexe
- Tabagisme
- Cholestérolémie
- Pression artérielle

- HDL-C, HbA1c, hsCRP, …
- atteinte des organes-cibles, CAC, …

Des signes cliniques ?

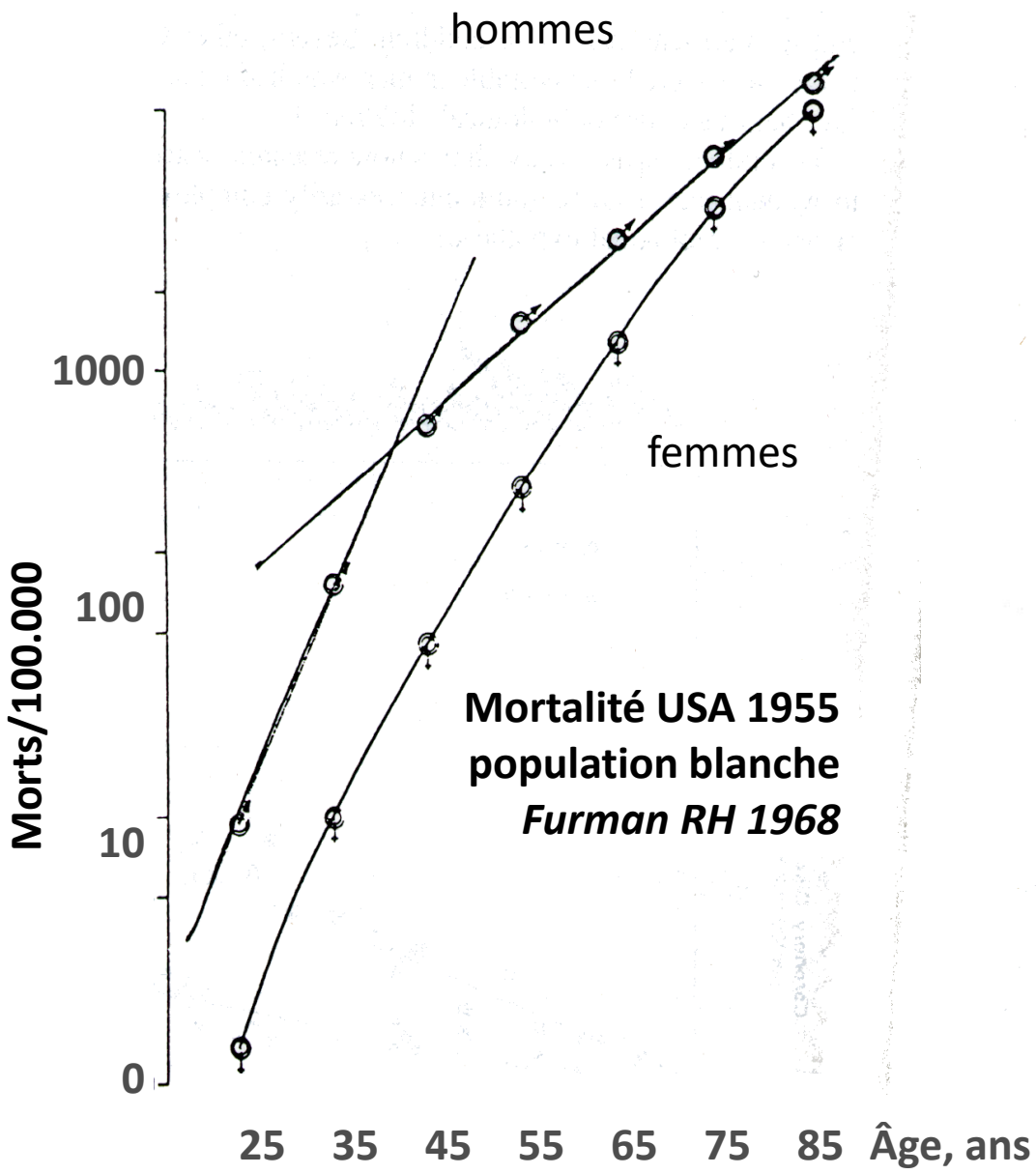


The ear-crease sign in coronary artery disease

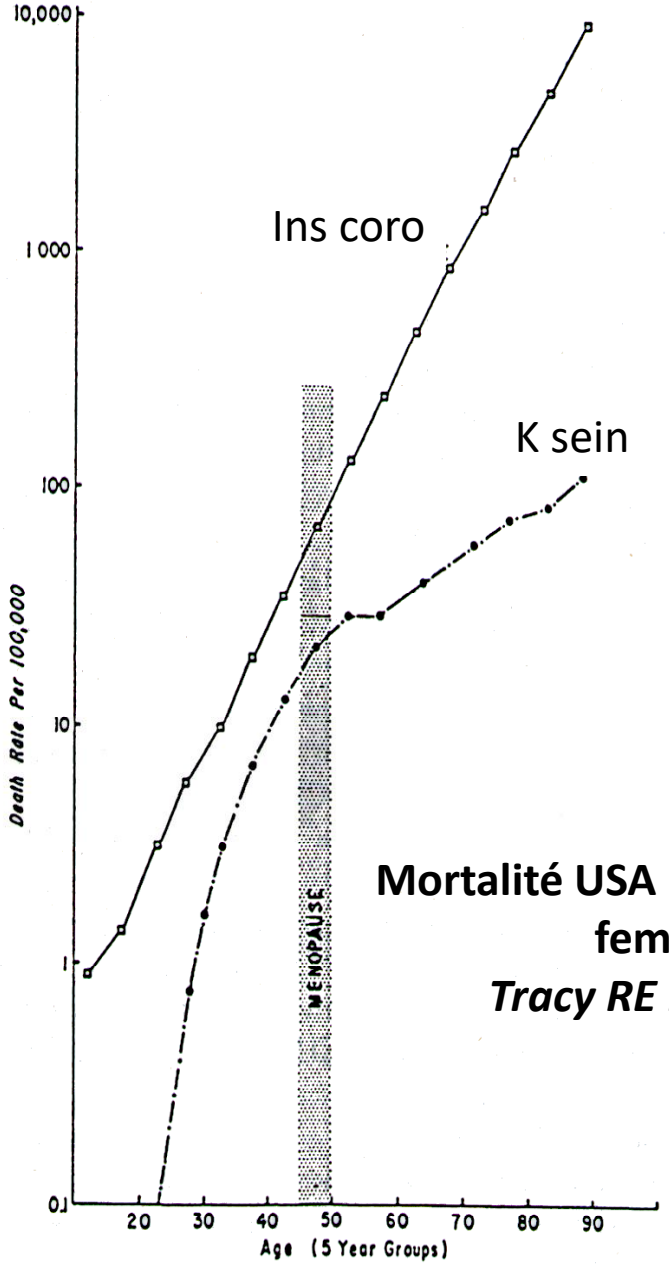


Pasternac A, Sami M. Can Med Assoc J 1982;126:645

Age et sexe ?

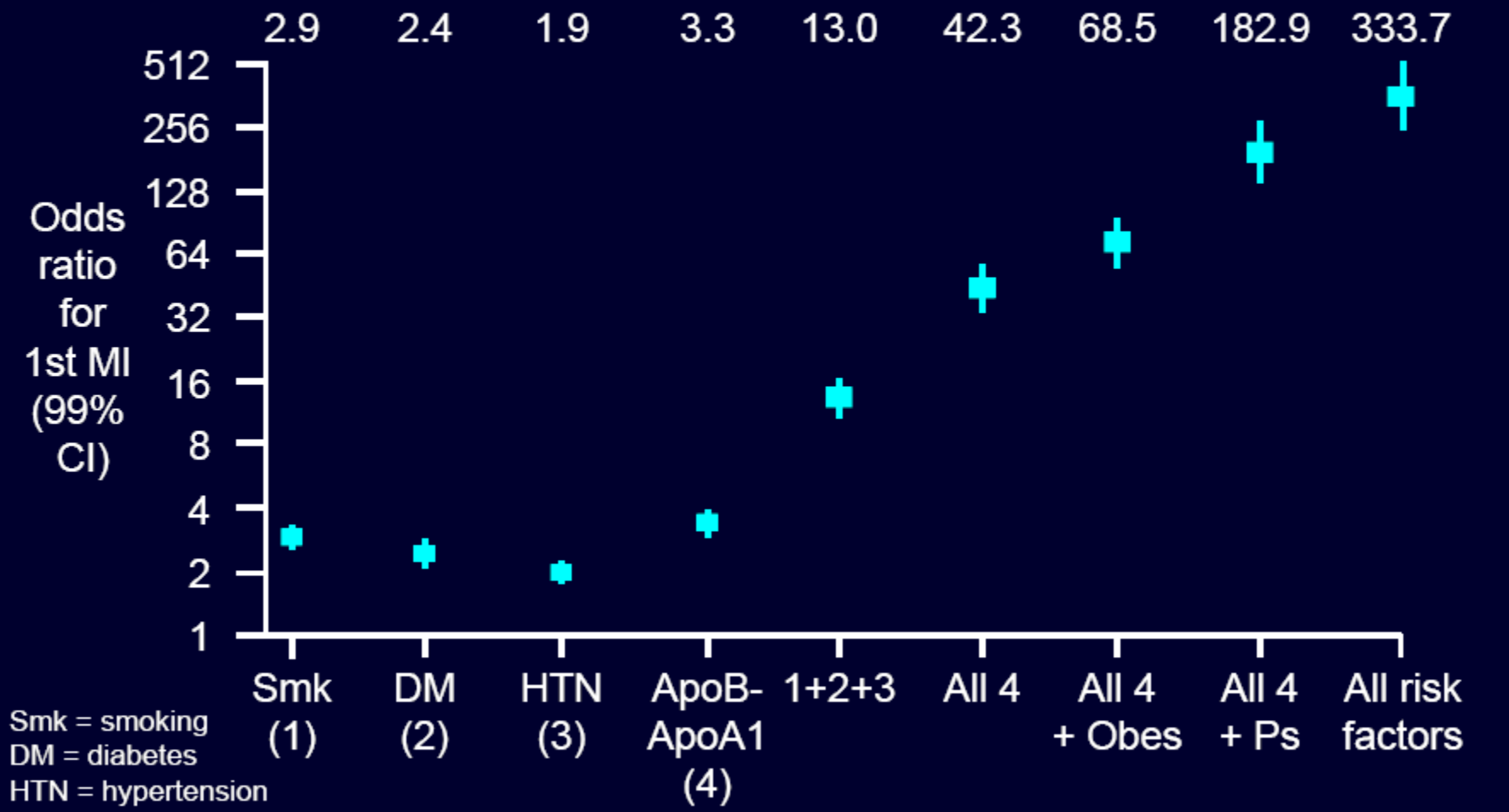


Mortalité USA 1955
population blanche
Furman RH 1968



Mortalité USA 1962
femmes
Tracy RE 1966

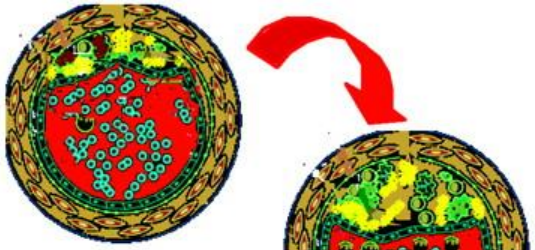
INTERHEART: Impact of multiple risk factors on CV risk



Smk = smoking
DM = diabetes
HTN = hypertension
Obes = obesity
Ps = psychosocial factors
Note: odds ratio plotted on a doubling scale

Yusuf S et al. *Lancet*. 2004;364:937-52.

Biomarkers of acute coronary syndromes



Plaque

- LDL
- ox LDL
- CRP
- IL-6
- IL-10
- IL-18
- Fbg
- TNF-_

Unstable plaque

- MMP-9
- MPO
- ICAM
- VCAM

Plaque rupture

- sCD40L
- PIGF
- PAPP-A
- VCAM

Thrombosis

- PAI-1
- sCD40L
- VwF
- D-dimer

Ischemia

- IMA
- FFA
- Choline
- BNP
- ?IL-6/TF

Necrosis

- cTNT
- cTNI
- CK-MB
- Myg

LV remodeling

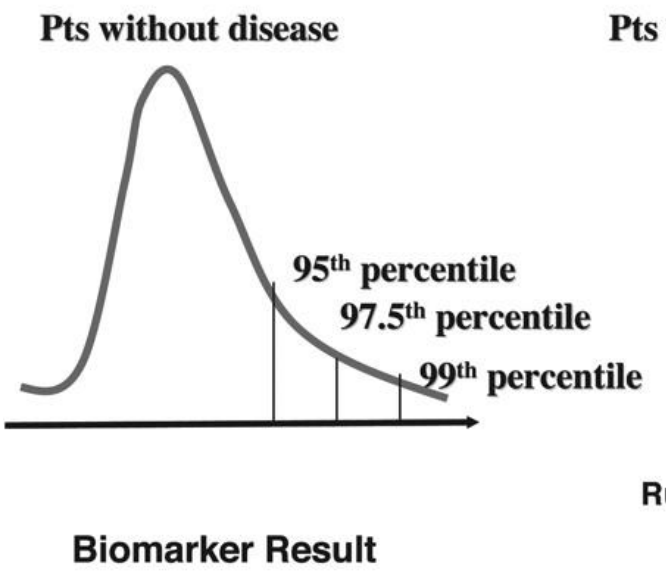
- BNP
- NT-ProBNP
- MMP

Ischemic cascade with elevation of specific markers at different stages

Approaches to defining "abnormal" biomarker values

I

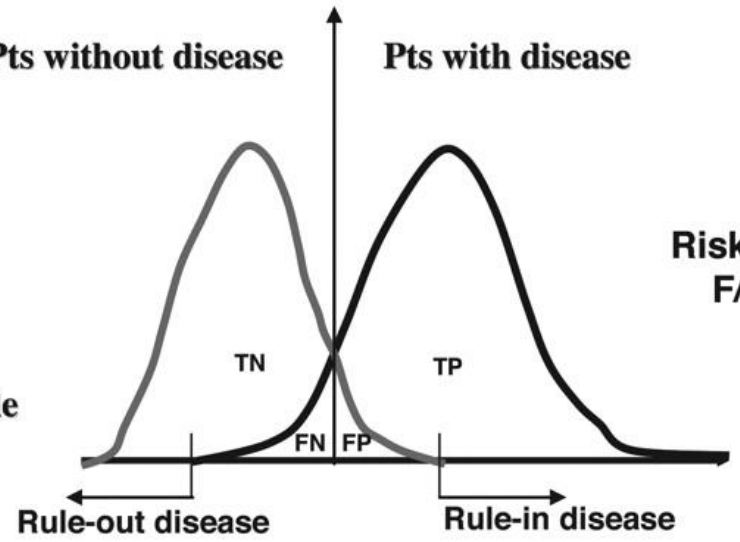
Reference Limits



Reference Limits are statistically derived cutpoints based on the distribution of values in a Reference Sample

II

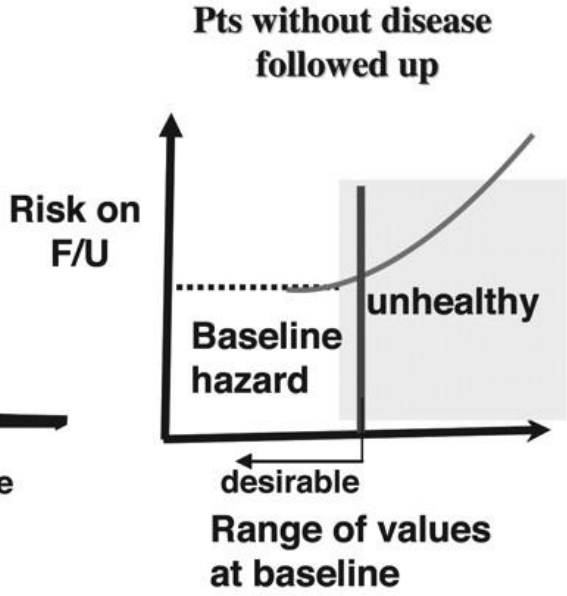
Discrimination Limit



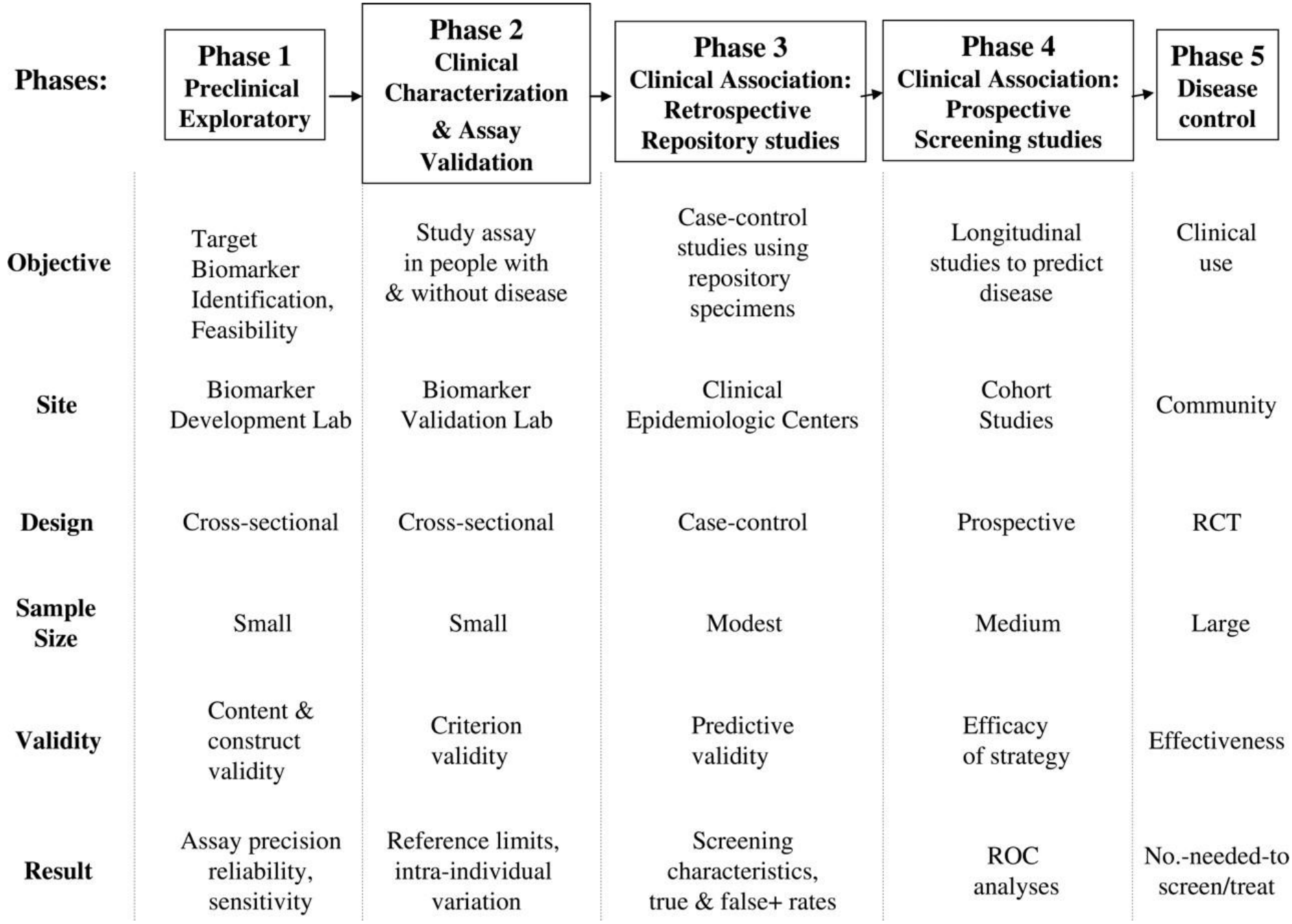
A discrimination limit will separate the distributions of patients with and without the disease

III

Threshold defining Risk

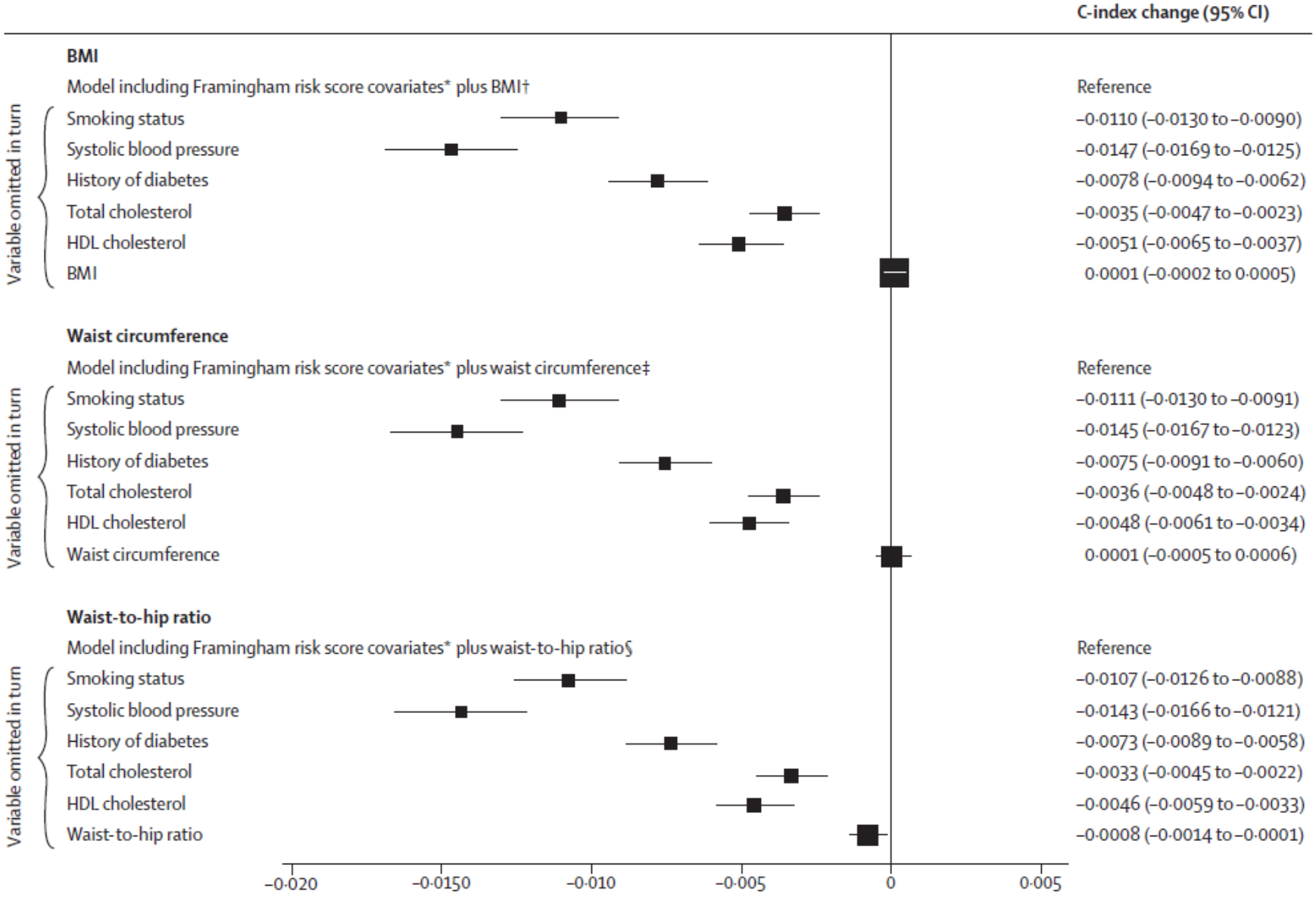


A risk threshold identifies the level at which risk of disease escalates on follow-up



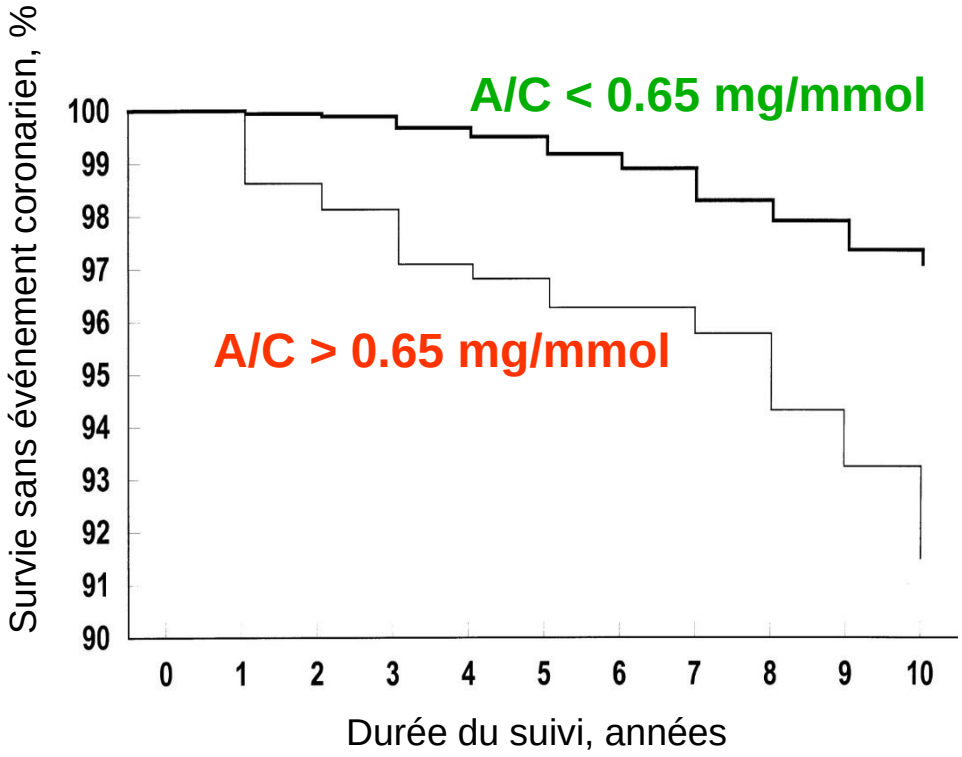
Five phases of biomarker development

Variations de l'index C pour la prédiction du risque après omission de facteurs dans un modèle basé sur le score de Framingham plus IMC, TT, RTH

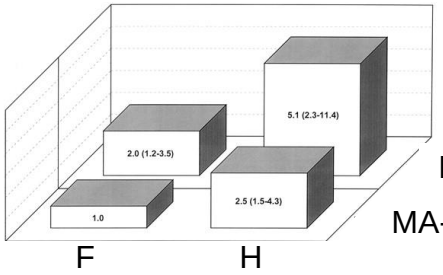


Wormser D, et al. Lancet 2011; 377:1085

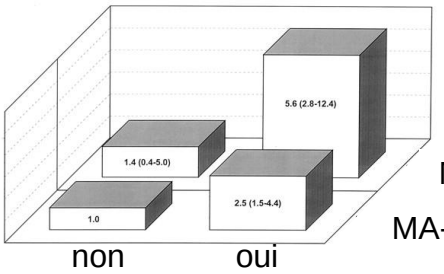
La microalbuminurie est un prédicteur du risque cardiovasculaire dans la population générale



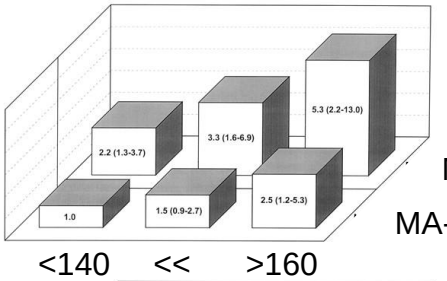
genre



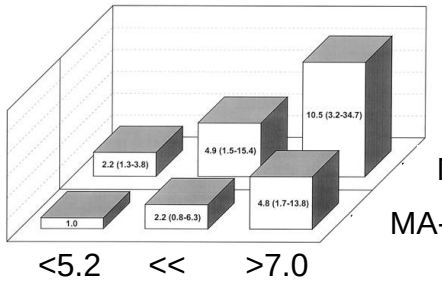
tabac



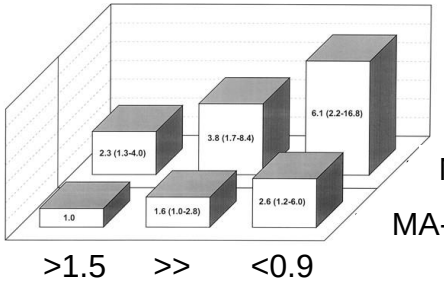
PAS



tot-chol

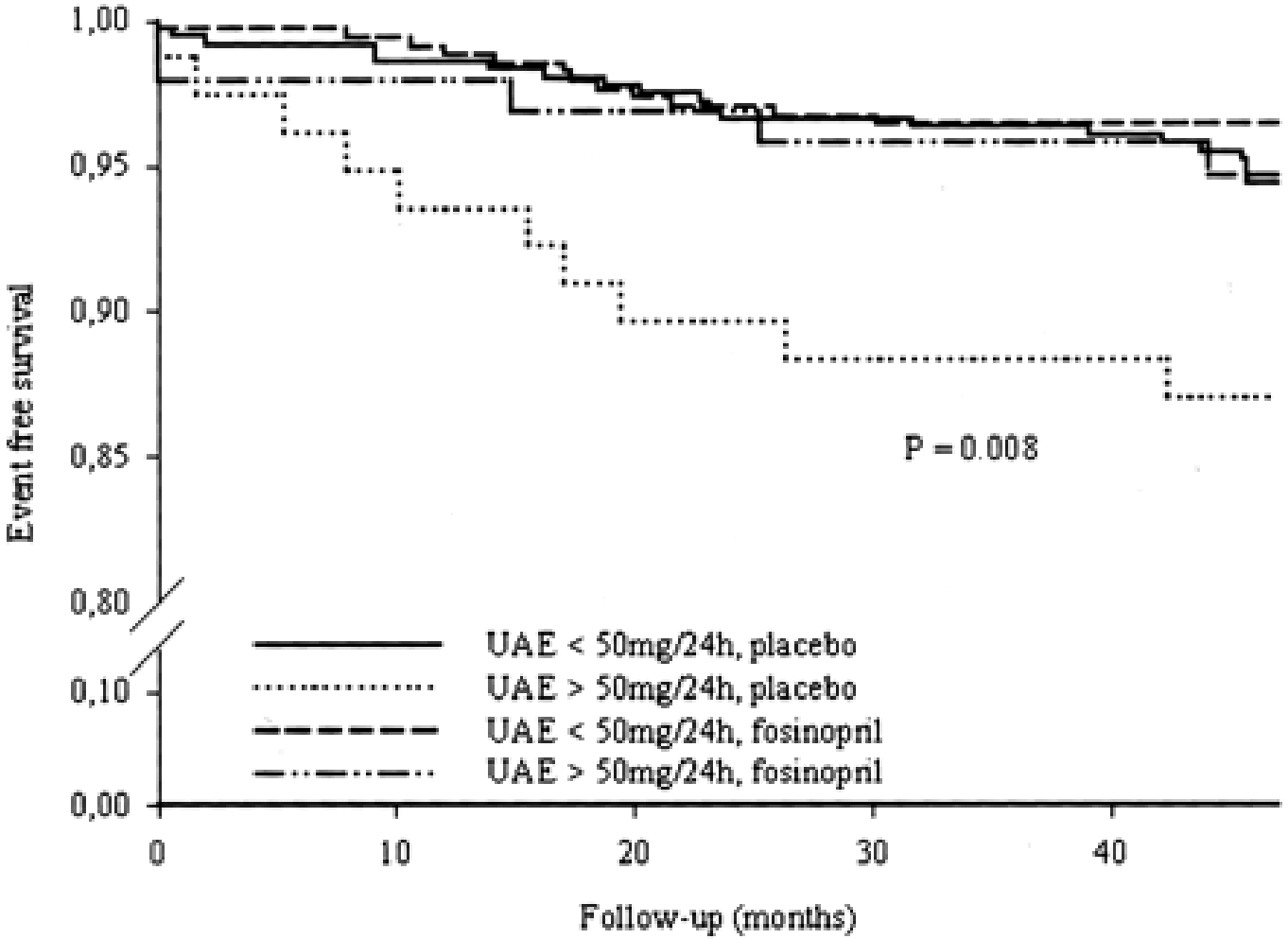


HDL-chol

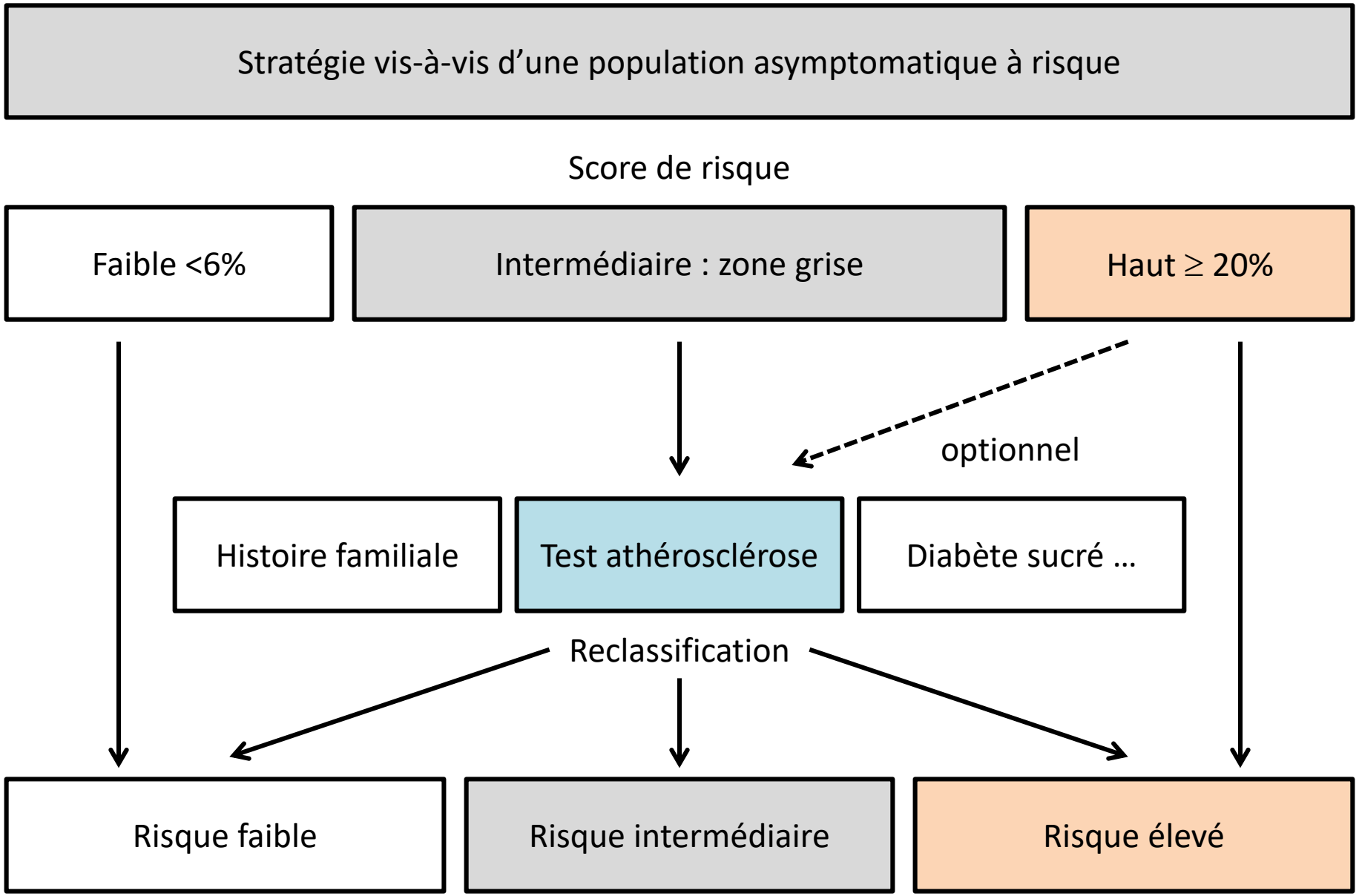


d'après Borch-Johnsen et al. ATVB 1999;19:1992

Seuil d'albuminurie et impact du traitement



Asselbergs et al. PREVEND-IT. Circulation 2004;110:2809



Sillesen H, Falk E. Lancet 2011

Évaluation pré-clinique de la maladie cardiovasculaire

Quantification fonctionelle, mécanique, structurelle par techniques d'imagerie non invasive

- artery intima-media thickness (IMT = EIM),
- pulse-wave velocity and analysis (PWV = VOP),
- brachial artery flow-mediated dilatation (FMD),
- left ventricular geometry (LVM = MVG),
- coronary artery calcification (CAC).

Reclassification With CIMT Added to Framingham Risk Score

Without events

Framingham Risk	Framingham Risk With CIMT: <5%	5%-20%	>20%
<5%	20271 →	867	–
5-20%	1115	← 17280 →	362
>20%		315	← 1611

Total without events, No. (%)

39162 (93.6)	No change
1229 (2.9%)	Up classification
1430 (3.4%)	Down classification

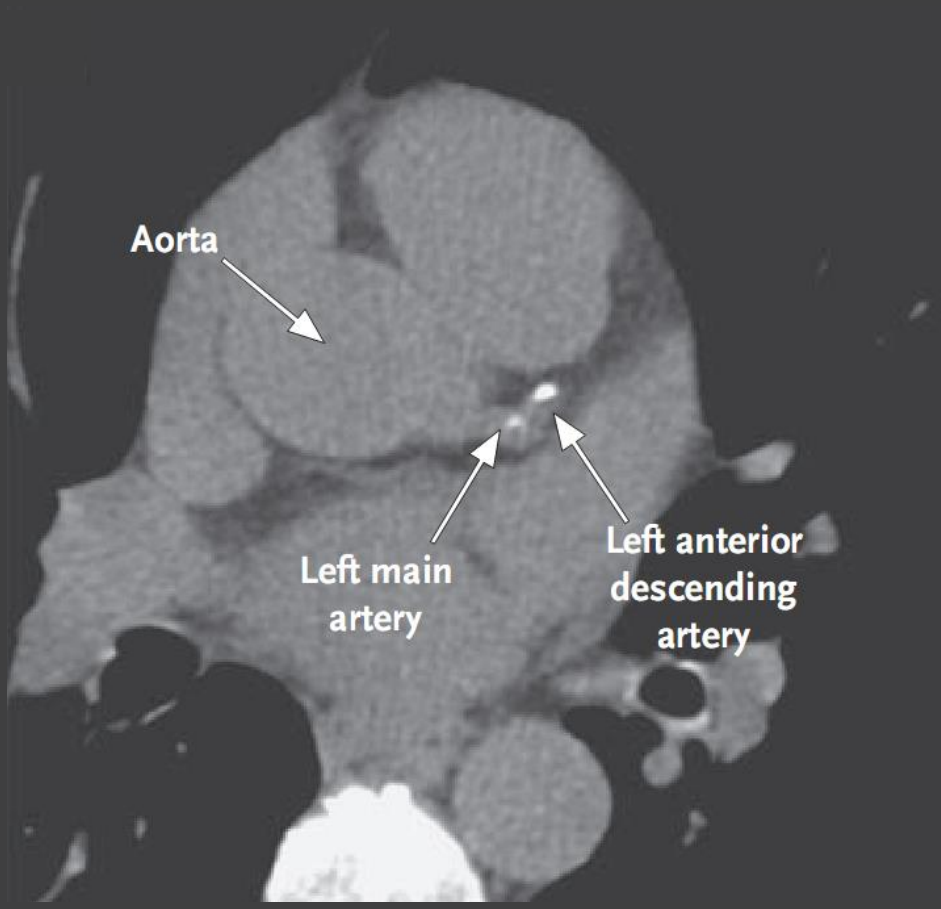
With events

Framingham Risk	Framingham Risk With CIMT: <5%	5%-20%	>20%
<5%	537 →	67	–
5-20%	69	← 2410 →	102
>20%		85	← 737

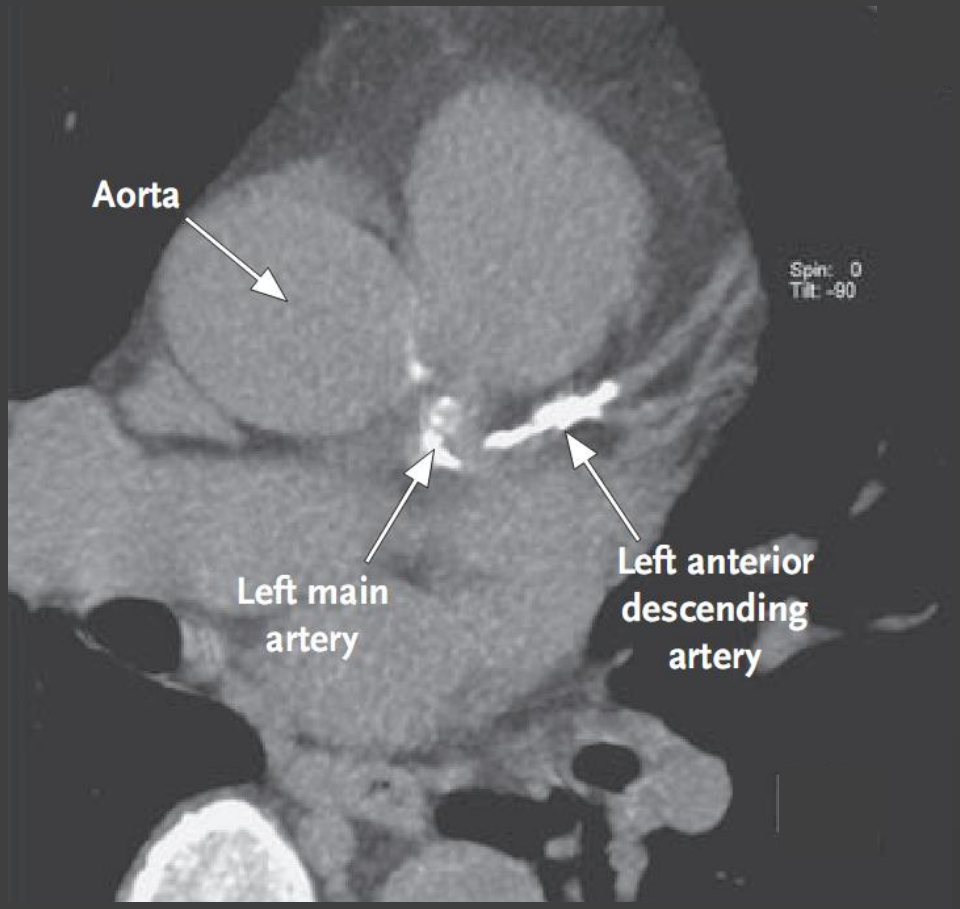
Total with events, No. (%)

3684 (91.9%)	No change
169 (4.2%)	Up classification
154 (3.8%)	Down classification

CT Scans : calcifications of the Left Coronary Artery in asymptomatic men



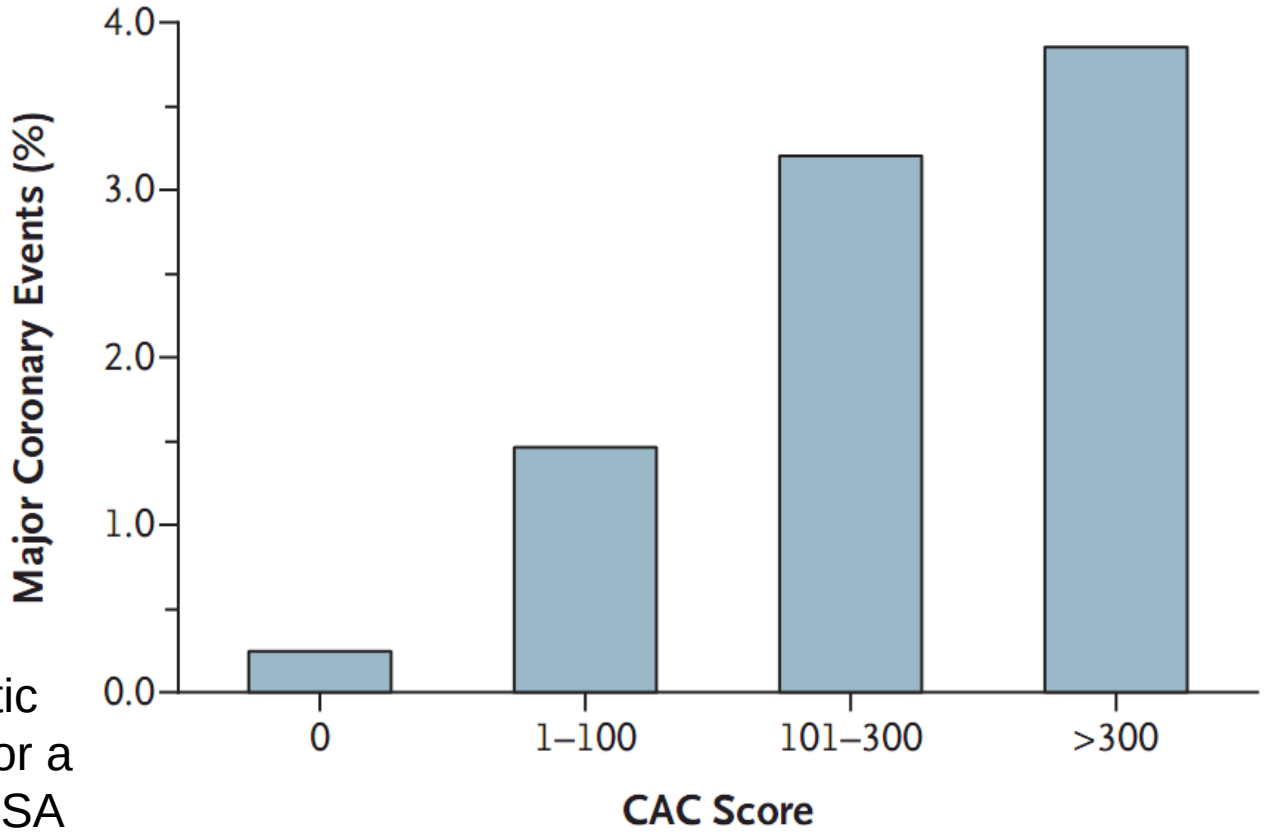
age 51, CACs 80 : 85° percentile



age 81, CACs 1054 : 70° percentile

Bonow RO. NEJM 2009;361:990

Risk of major coronary events with increasing Coronary-Artery Calcium score



6722 initially asymptomatic healthy adults, followed for a median of 3.8 years - MESA

No. of Events	8	25	24	32
No. at Risk	3409	1728	752	833
Hazard Ratio (95% CI)	1.00	3.89 (1.72–8.79)	7.08 (3.05–16.47)	6.84 (2.93–15.99)

Detrano RC, et al. Radiology 2005:236:477

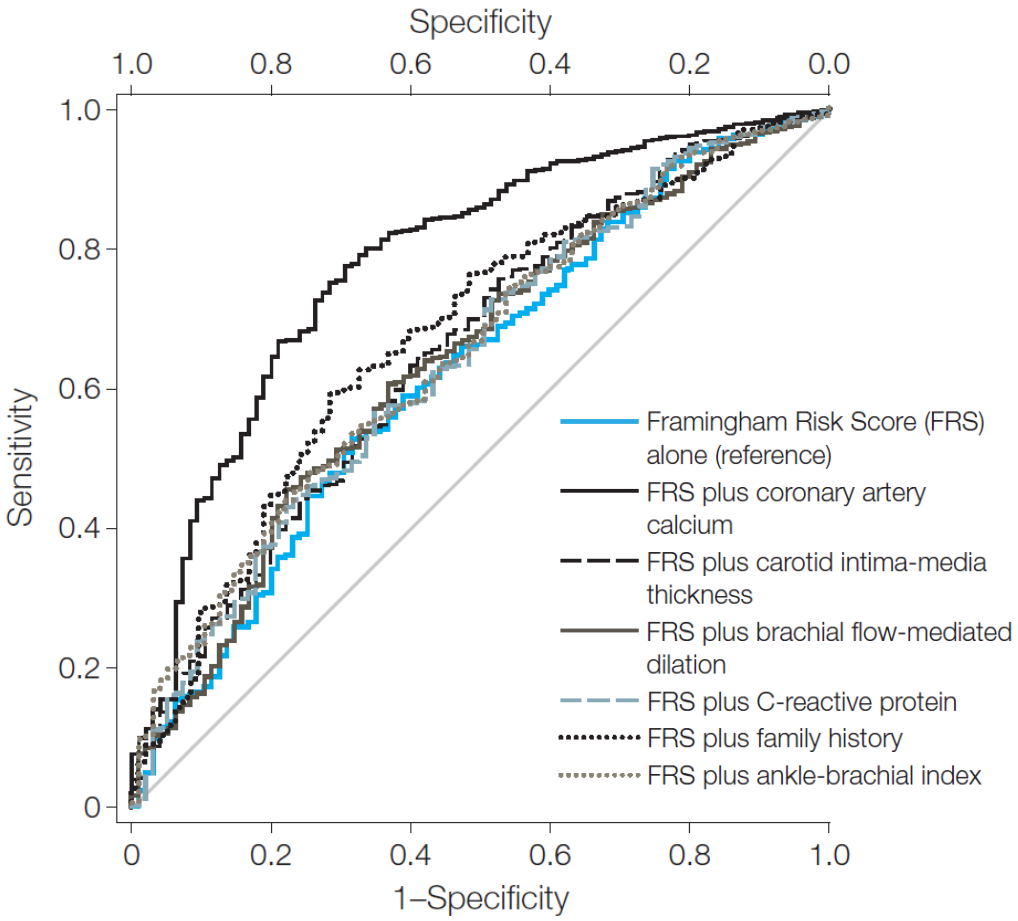
Study[ref]	Patient Type	No. of Patients in Full Study	Mean Age, y	Follow-Up Duration, y	Events in Persons With CAC=0 Scores, n	Events Per Year in CAC=0 Patients, Mean	Total No. of Persons With CAC=0	Annual Event Rate in CAC=0 Patients, Per 100 People
Georgiou et al[4]	Emergency room patients with chest pain	192	53	4.2	0	0	76	0
Schenker et al[6]	Referred for cardiac evaluation	606	61	1.4	11	7.7	213	3.6
Rozanski et al[8]	Mixed sample of self-referred and MD-referred	1,153	58.4	2.7	3	1.1	252	0.47
Greenland et al[9]	Asymptomatic with at least 1 risk factor	1,312	66	7.0	14	2.0	316	0.63
Keelan et al[10]	Coronary angiography patients	288	56	6.9	0	0	48	0
Arad et al[11]	Asymptomatic	1,173	53	3.6	2	0.55	496	0.11
Raggi et al[12]	Asymptomatic	632	52	2.7	1	0.37	292	0.13
Wong et al[13]	Asymptomatic	926	54	3.3	0	0	392	0
Arad et al[14]	Asymptomatic	4,613	59	4.3	8	1.8	1504	0.12
Kondos et al[15]	Self-referred–mostly asymptomatic	5,635	51	3.1	5	1.6	1816	0.09
Anand et al[16]	Asymptomatic type 2 diabetic patients	510	53	3.0	1	0.33	274	0.12
Taylor et al[17]	Asymptomatic	2000	43	3.0	2	0.67	1791	0.04
Church et al[18]	Preventive evaluation patients	10,746	54	3.5	7	2.0	5472	0.04
Becker et al[19]	Asymptomatic	1,726	58	3.3	0	0	367*	0

*12 patients with CAC=0 had coronary revascularization. Number includes only the patients with CAC=0 who had no interventions at all.

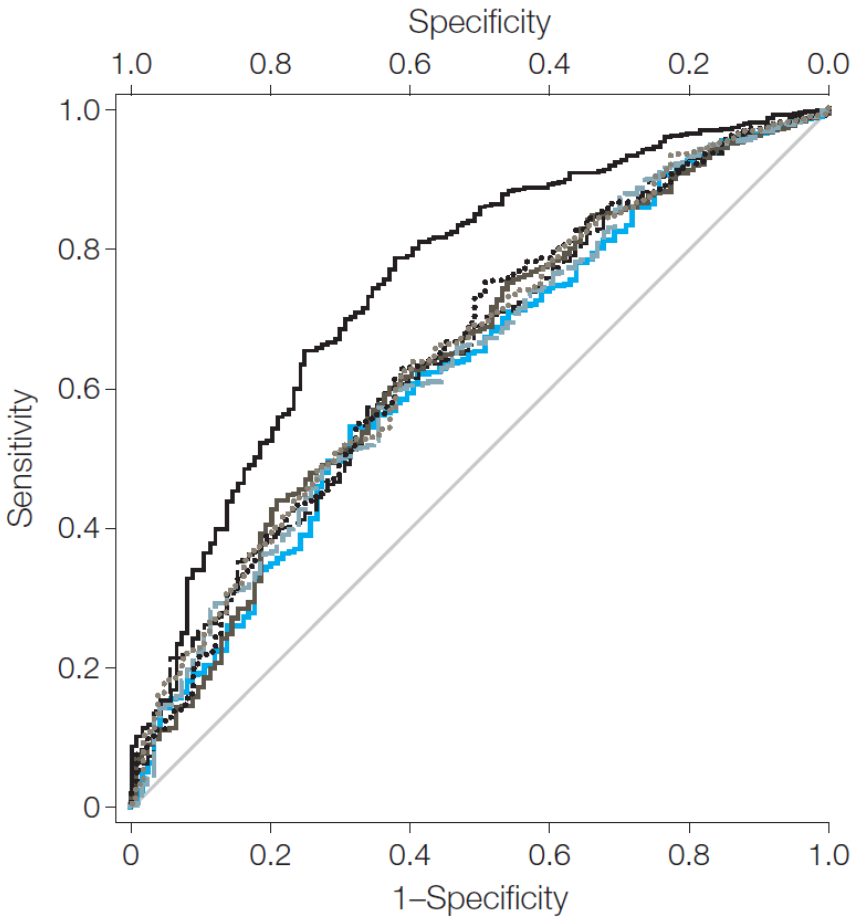
Greenland P, Bonow RO. *Circulation*2006;117:1627

Novel risk markers for improvement in cardiovascular risk assessment in intermediate-risk individuals

Incident coronary heart disease



Incident cardiovascular disease

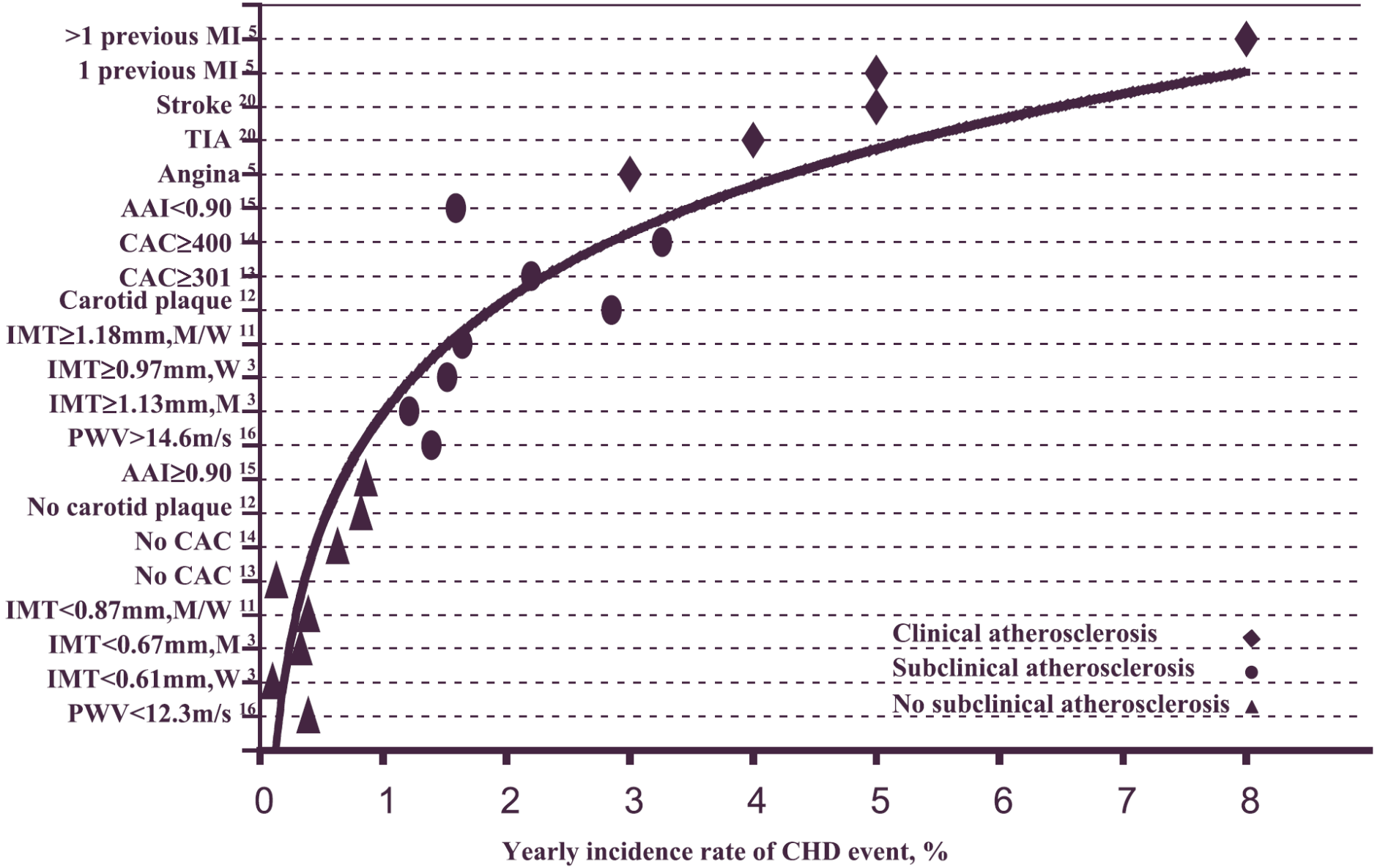


the Multi-Ethnic Study of Atherosclerosis (MESA), n=1330

Yeboah J, et al. *JAMA* 2012;308:788-95

Relation of CHD incidence with absence and presence of subclinical atherosclerosis and presence of clinical arterial disease

Simon A, et al. Hypertension 2006;48:392



ARR vs RRR in higher vs lower risk groups

ARR absolute risk reduction ; RRR relative risk reduction

Lipid lowering trials meta-analysis

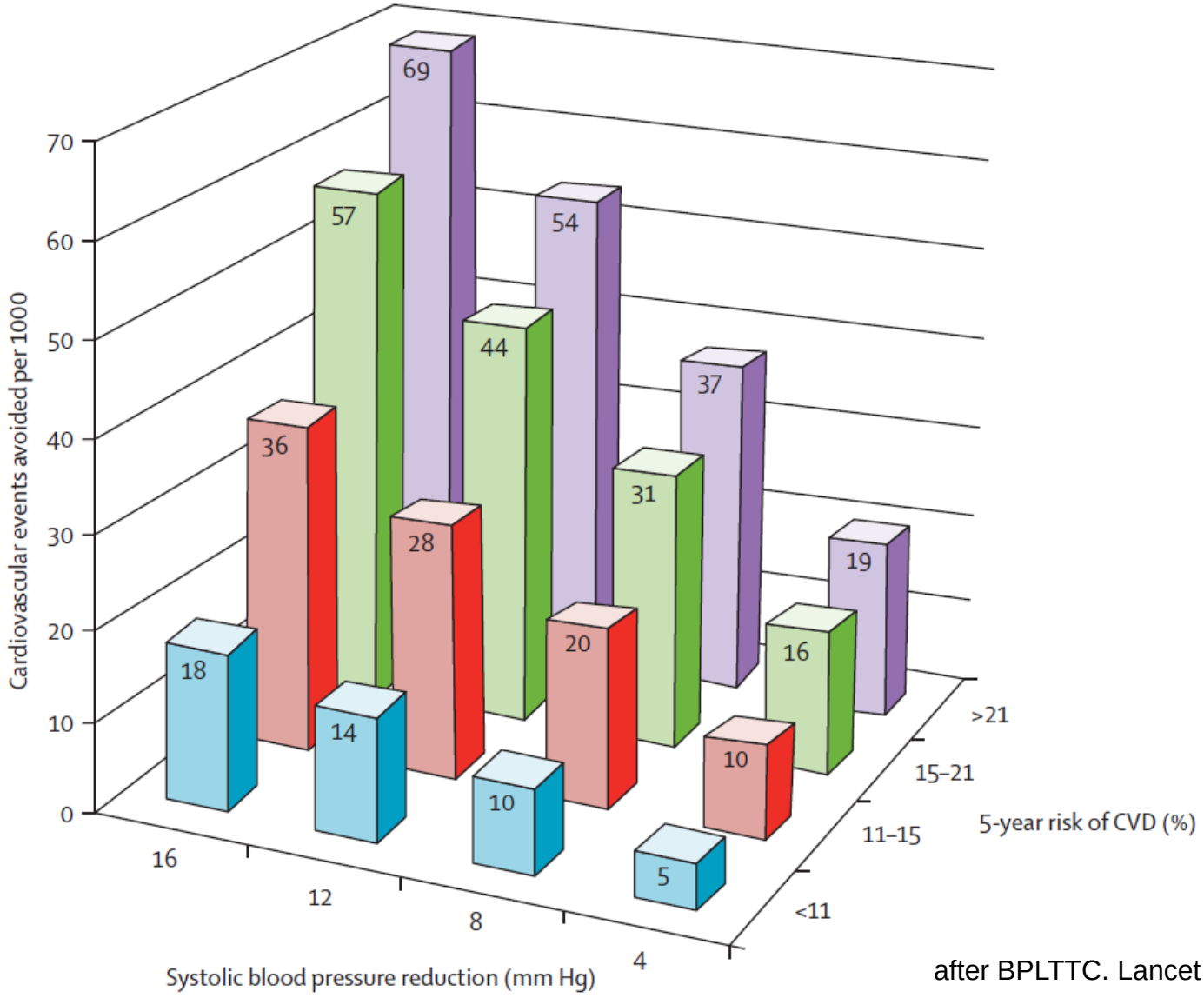
Risk of CHD	ARR	RRR
History of vascular disease		
• Few or no participants	2.0 % (1.7-2.3)	24 % (17-30)
• Most or all participants	3.4 % (3.1-3.6)	24 % (18-21)

Blood pressure lowering trials meta-analysis

Risk of stroke	ARR	RRR
History of stroke		
• Few or no participants	1.4 % (1.2-1.5)	35 % (29-41)
• Most or all participants	4.4 % (3.4-5.4)	24 % (14-34)

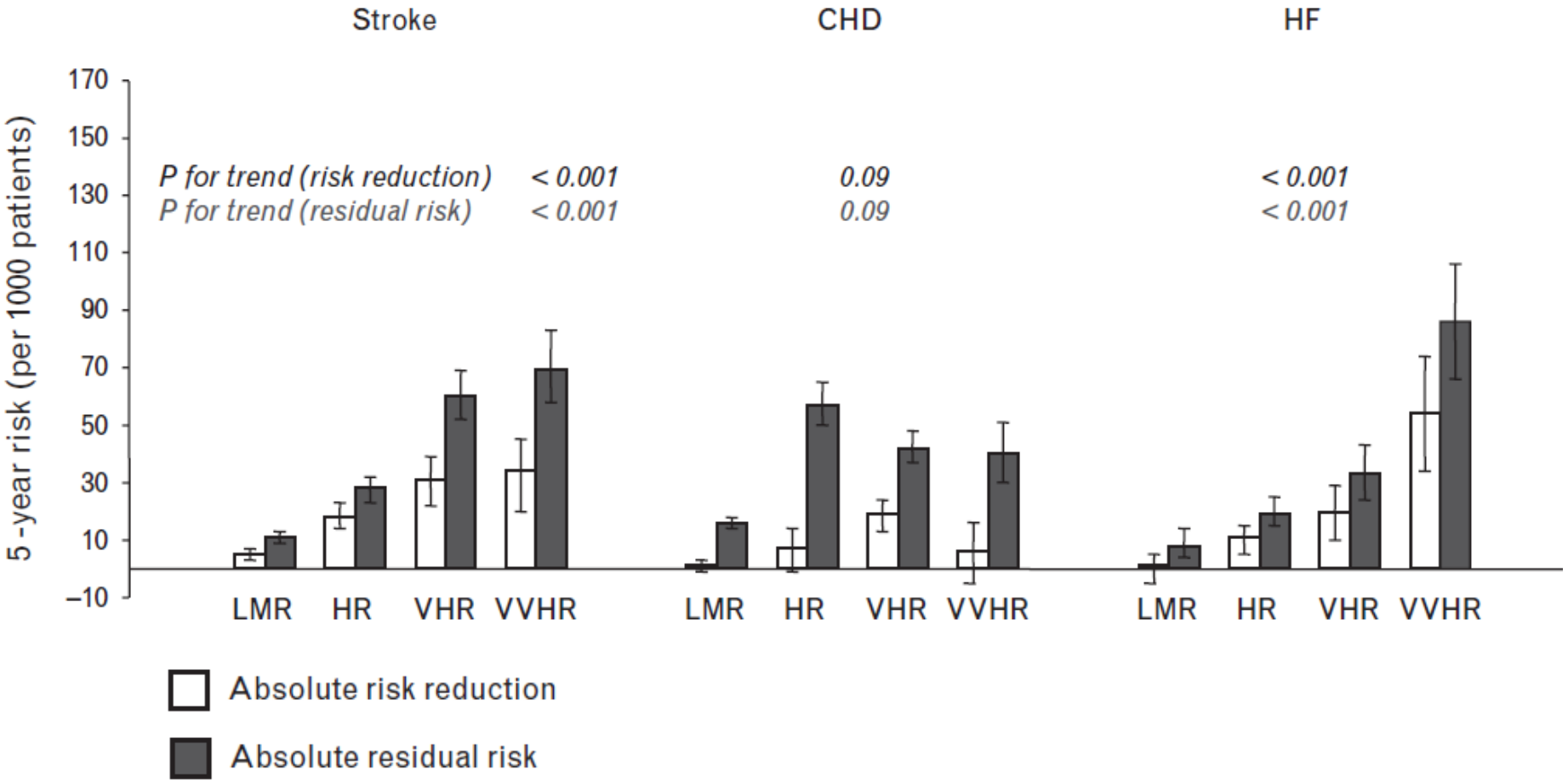
adapted from Jackson R, et al. Lancet 2005;365:434

Avoidable events by baseline risk and extent of blood pressure lowering



after BPLTTC. Lancet 2014;384:591-8

Absolute RR by BP-lowering treatment (standardized to 10/5mmHg SBP/DBP) & residual risk in trials stratified by increased level of CV risk in the control group

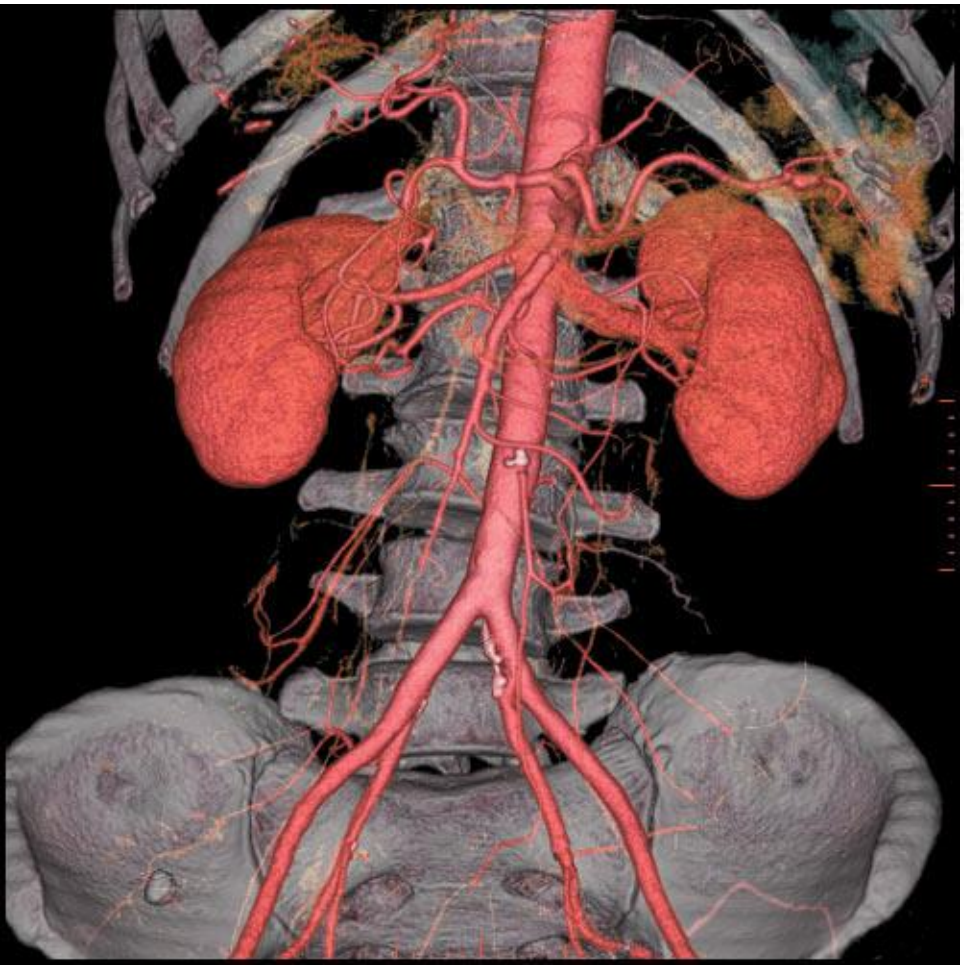


Thomopoulos C, et al. J Hypertens 2014;32:000

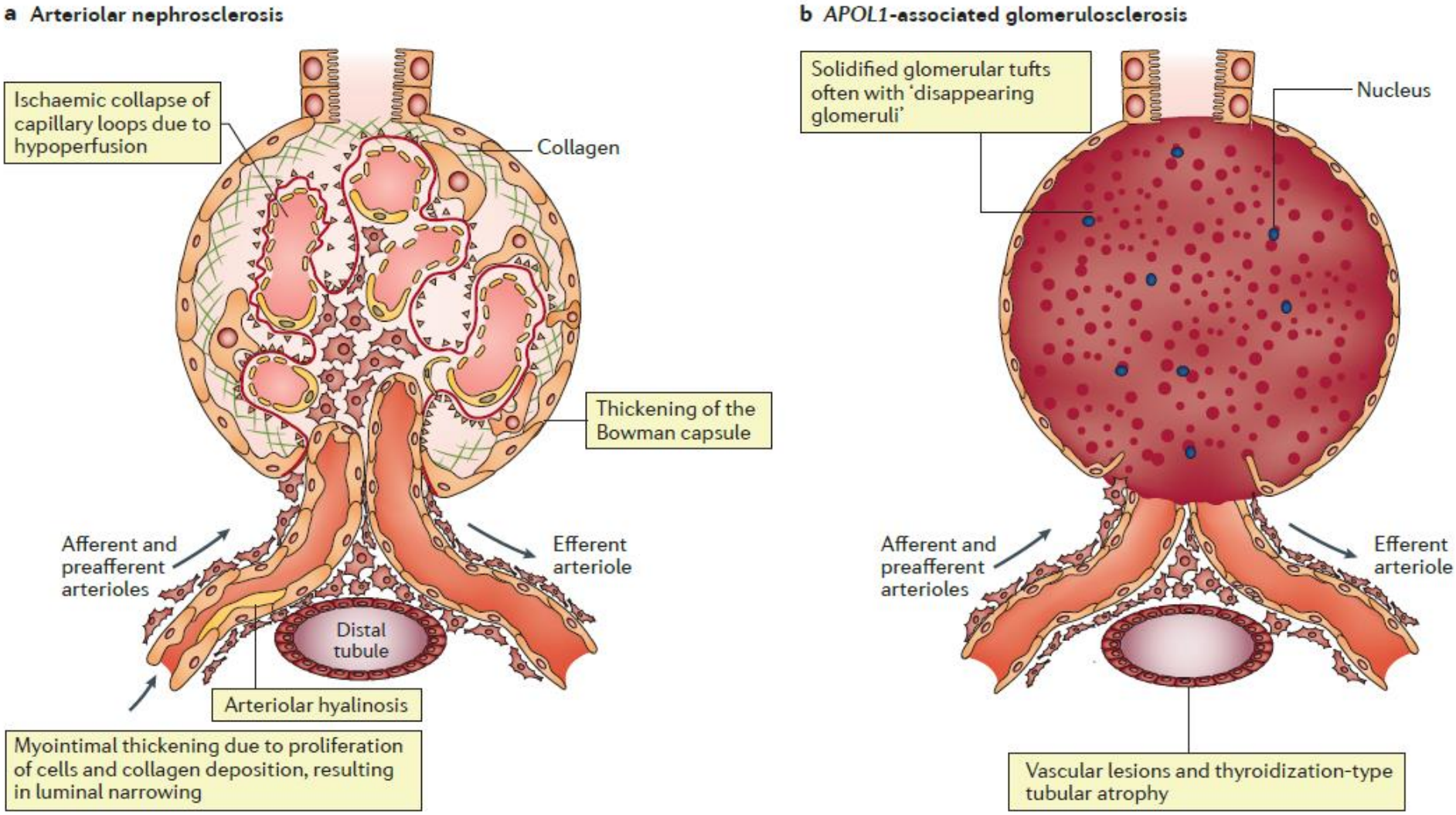
Mettre en perspective les éléments du risque

Faut-il dé/reconstruire le risque global ?

Pourquoi cardiovasculaire et rénal ?
Le rein est d'abord un organe vasculaire



Schematic representation of vascular and glomerular lesions in hypertension-attributed nephropathy



Freedman BI, Cohen AH. Nat Rev Nephrol 2015

La prévalence de l'insuffisance rénale chronique terminale traitée (IRCT) varie selon les régions françaises

Registre REIN 2016 :

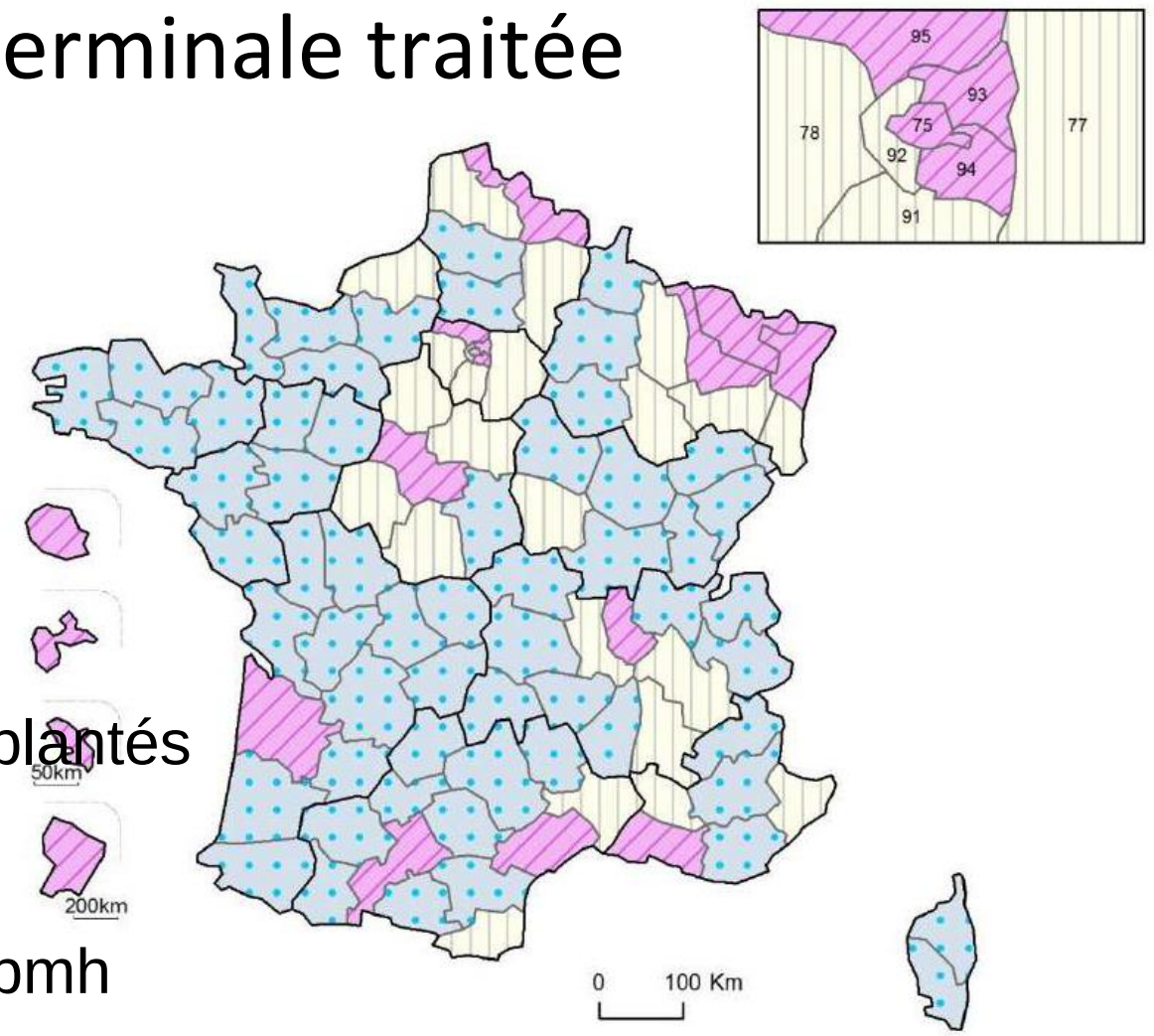
<u>prévalence</u>

698 dialysés + 564 transplantés

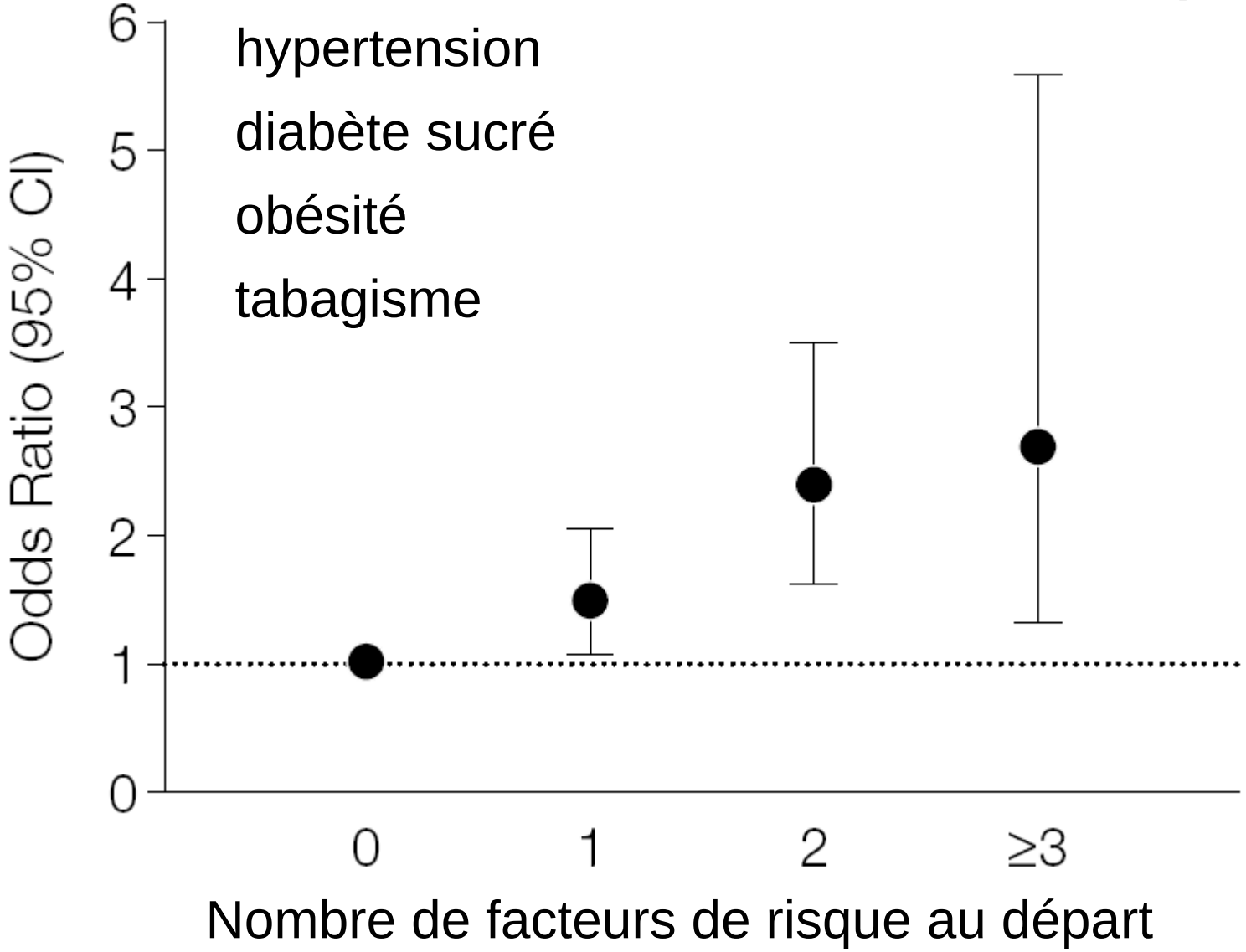
soit 1262 irct pmh

<u>incidence</u>

165 nouveaux cas pmh

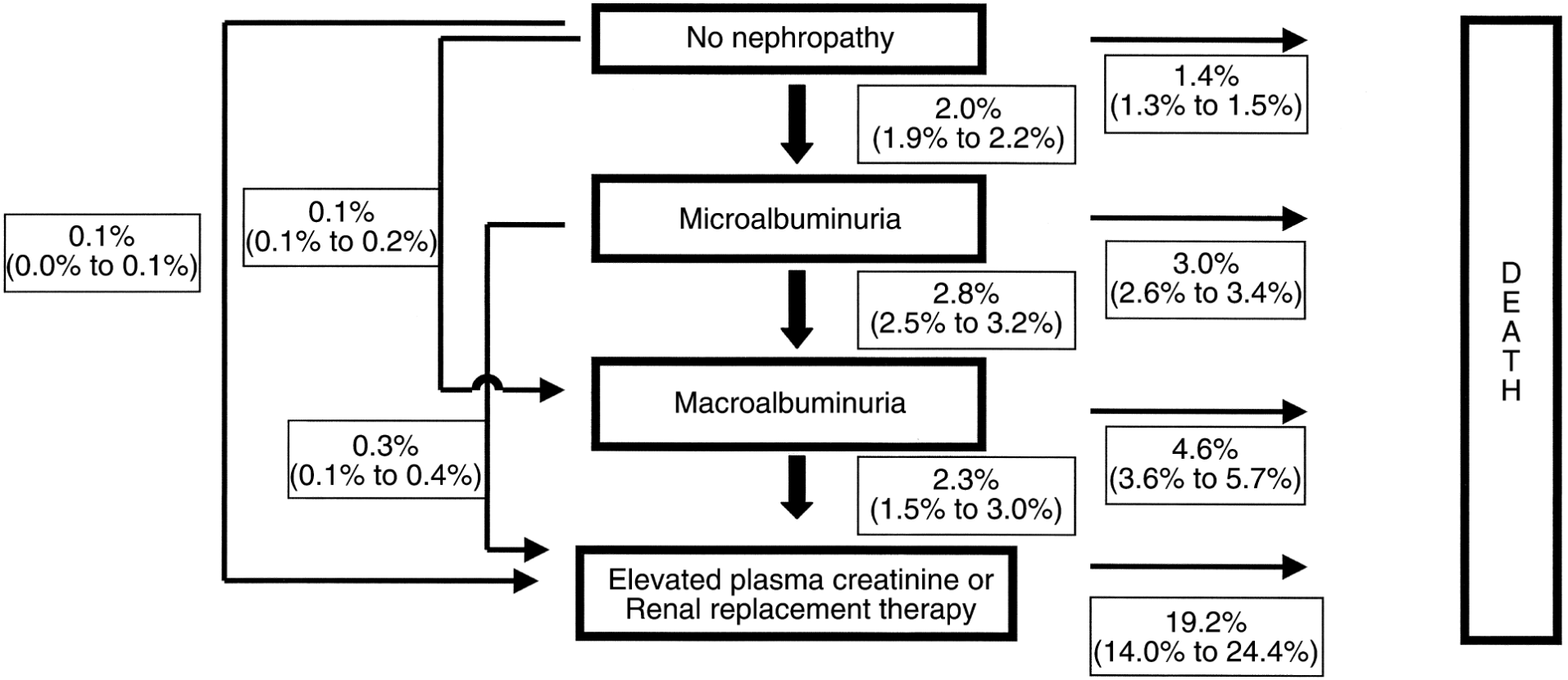


Quatre facteurs de risque cardiovasculaires prédisent la maladie rénale chronique



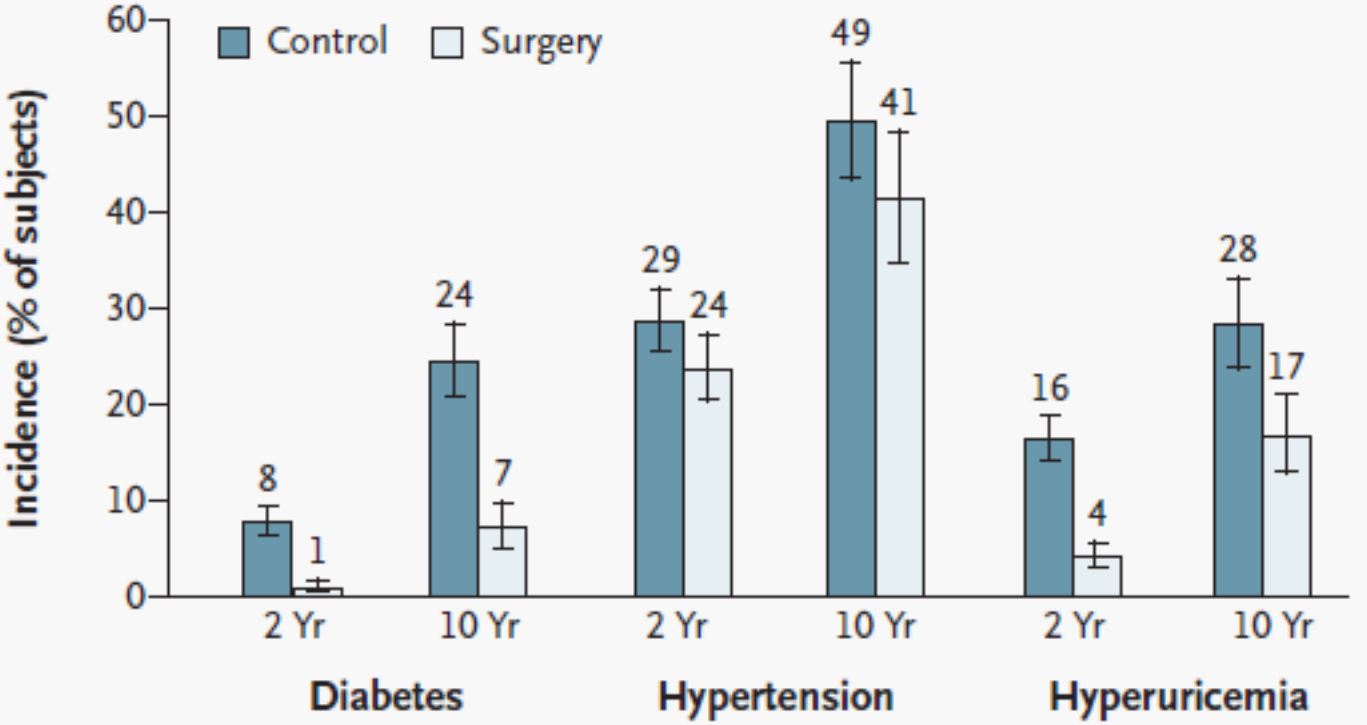
d'après Framingham : Fox CS, et al. JAMA 2004;291:844

La microalbuminurie prédit surtout la mortalité chez le diabétique type 2



d'après UKPDS 64 : Retnakaran R, et al. Diabetes 2006;55:1832-9

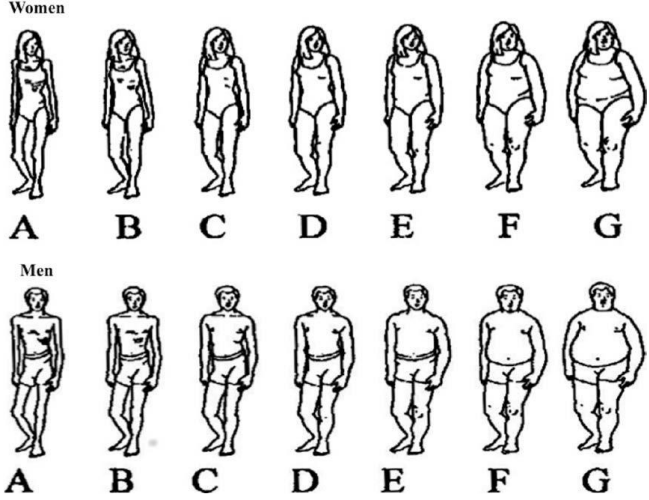
Incidence of diabetes, hypertension, hyperuricemia among subjects in the SOS study

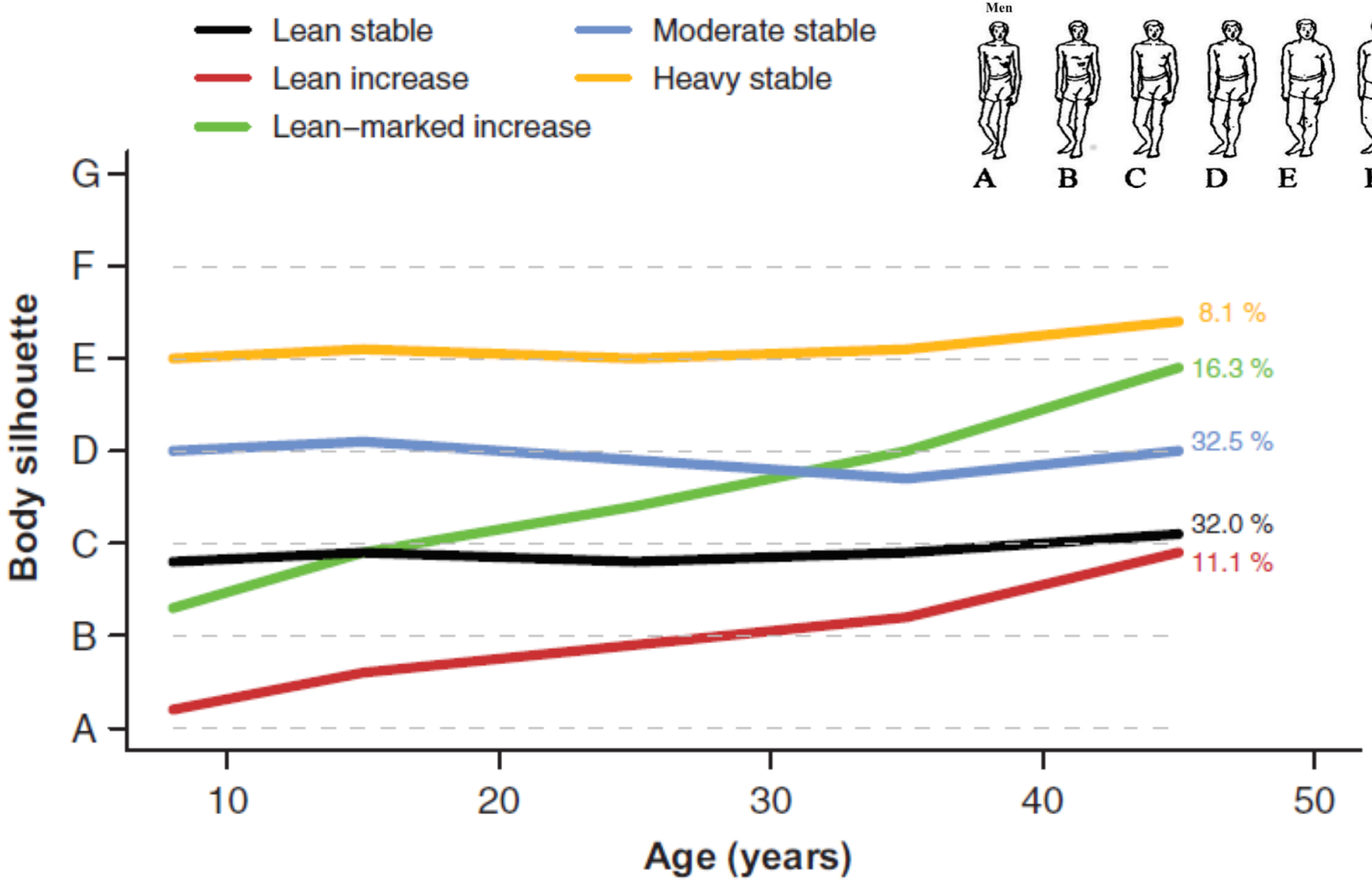


No. of subjects						
Control	1402	539	770	279	1017	382
Surgery	1489	517	623	215	1044	342
Odds ratio	0.14	0.25	0.78	0.75	0.22	0.49
95% CI	0.08–0.24	0.17–0.38	0.60–1.01	0.52–1.08	0.15–0.31	0.34–0.71
P value	<0.001	<0.001	0.06	0.13	<0.001	<0.001

Sjöström L, et al. *NEJM* 2004;351:2683-93

Body silhouette trajectories across the lifespan and vascular aging





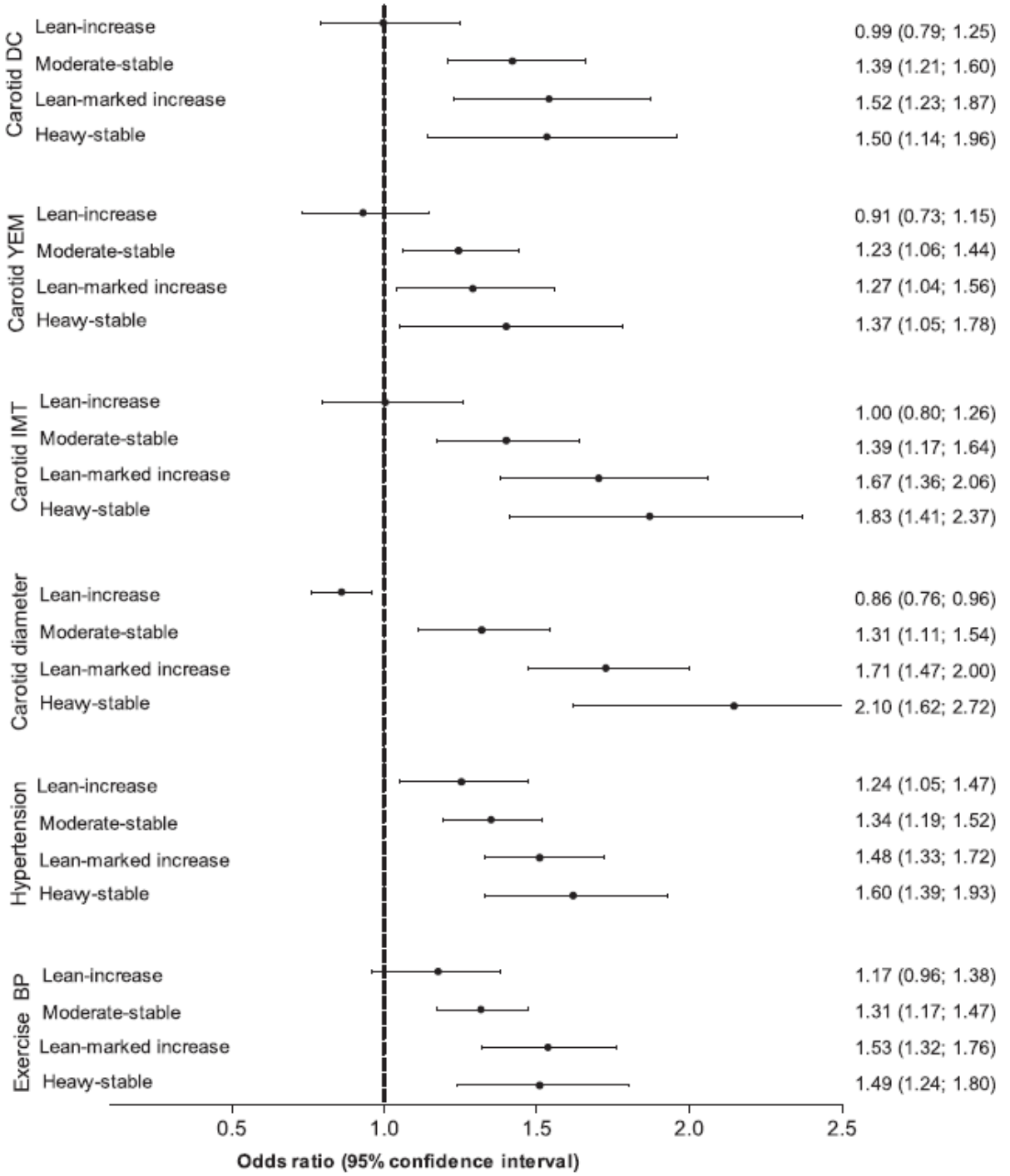
van Sloten TT, et al. Hypertension 2018;72:1095

Associations between body silhouette trajectories and manifestations of vascular aging

Carotid
- **distensibility**
- Young's **elastic modulus**
- **intima-media thickness**
- **diameter**

Resting **hypertension** or use of antihypertensive medication

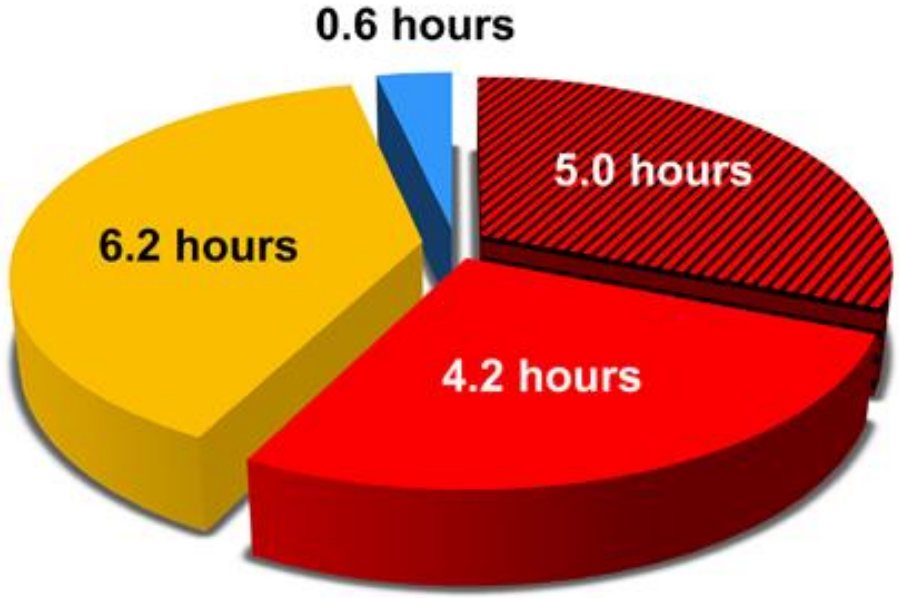
Exaggerated **exercise BP**

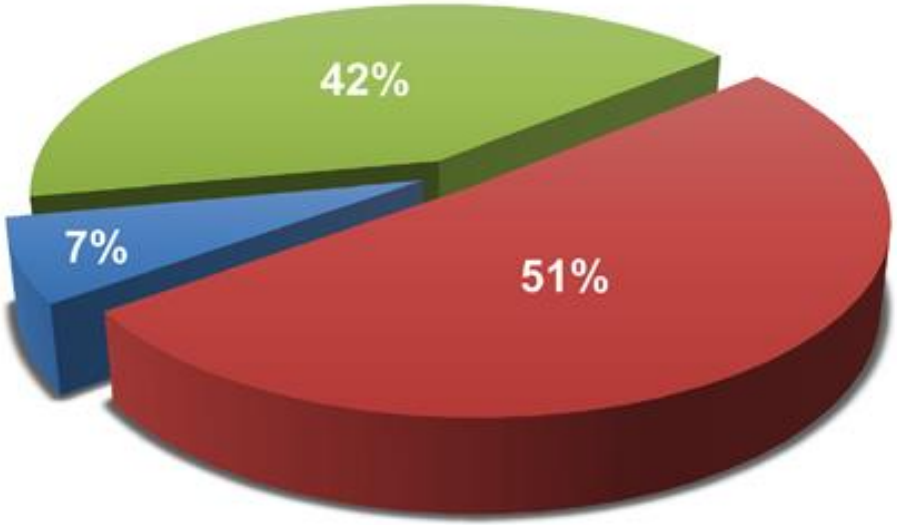


van Sloten TT, et al. Hypertension 2018;72:1095

Sitting less and moving more.

Implications for hypertension





Moderate-vigorous intensity activity

Light intensity activity

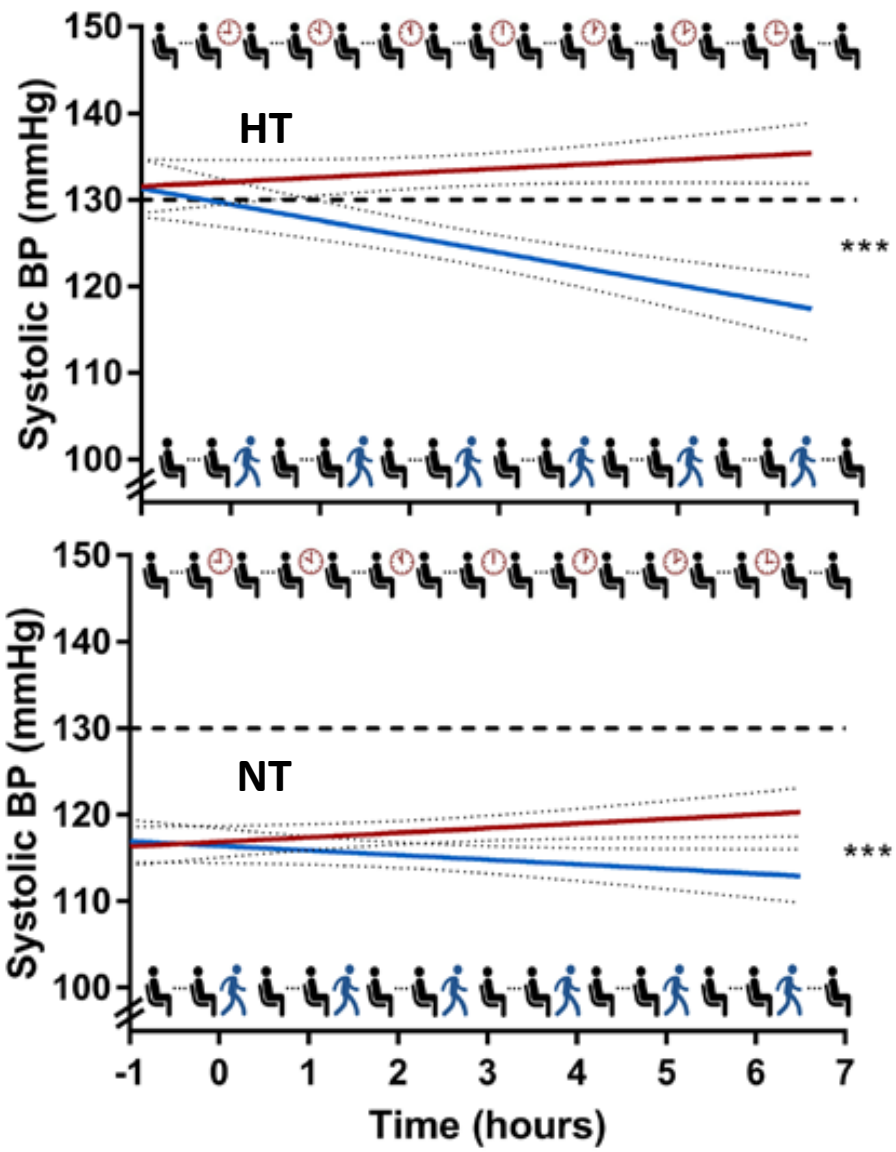
Sitting in <30 min bouts

Prolonged sitting in ≥30 min bouts

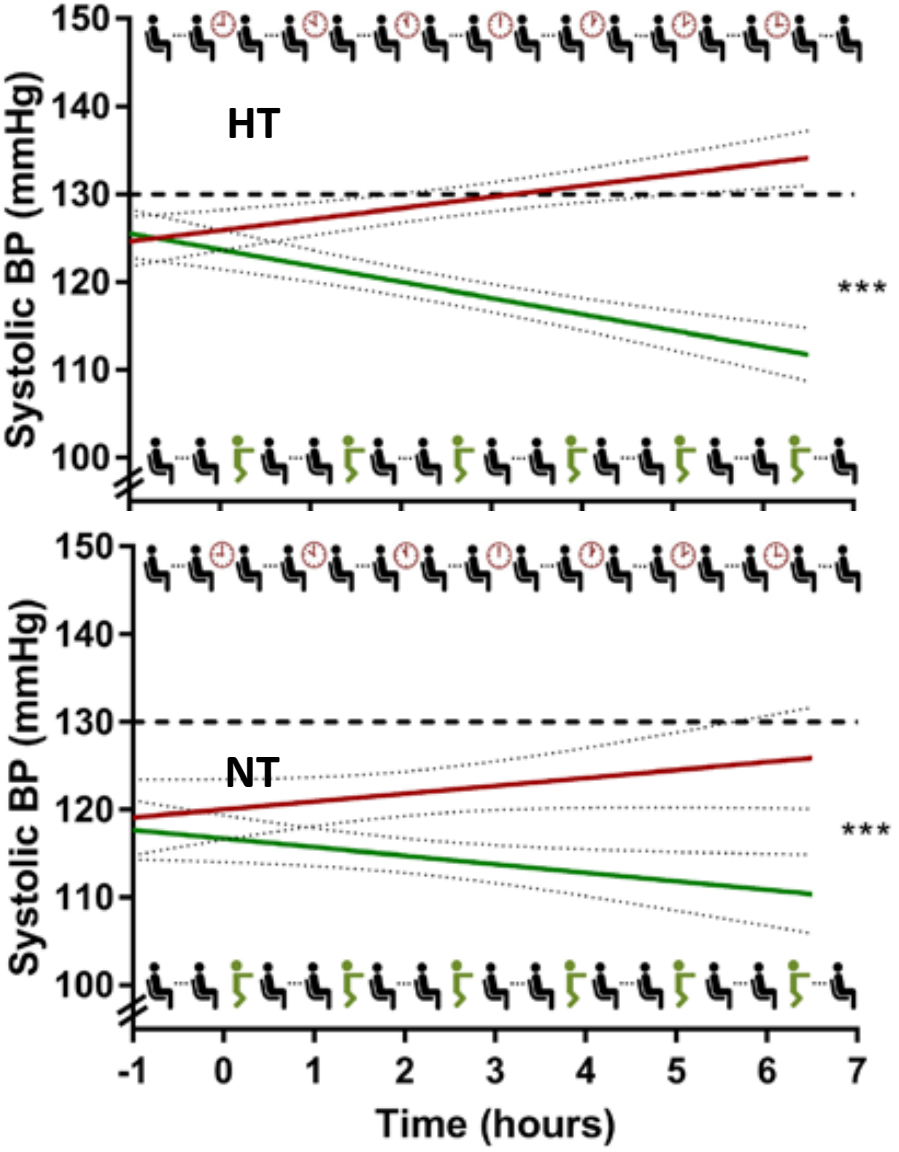
Proportion of population accumulating prolonged sitting in ≥30 min bouts totalling:

<2 h/day 2-4 h/day >4 h/day

Paddy C, et al. *Hypertension* 2018;72:1037



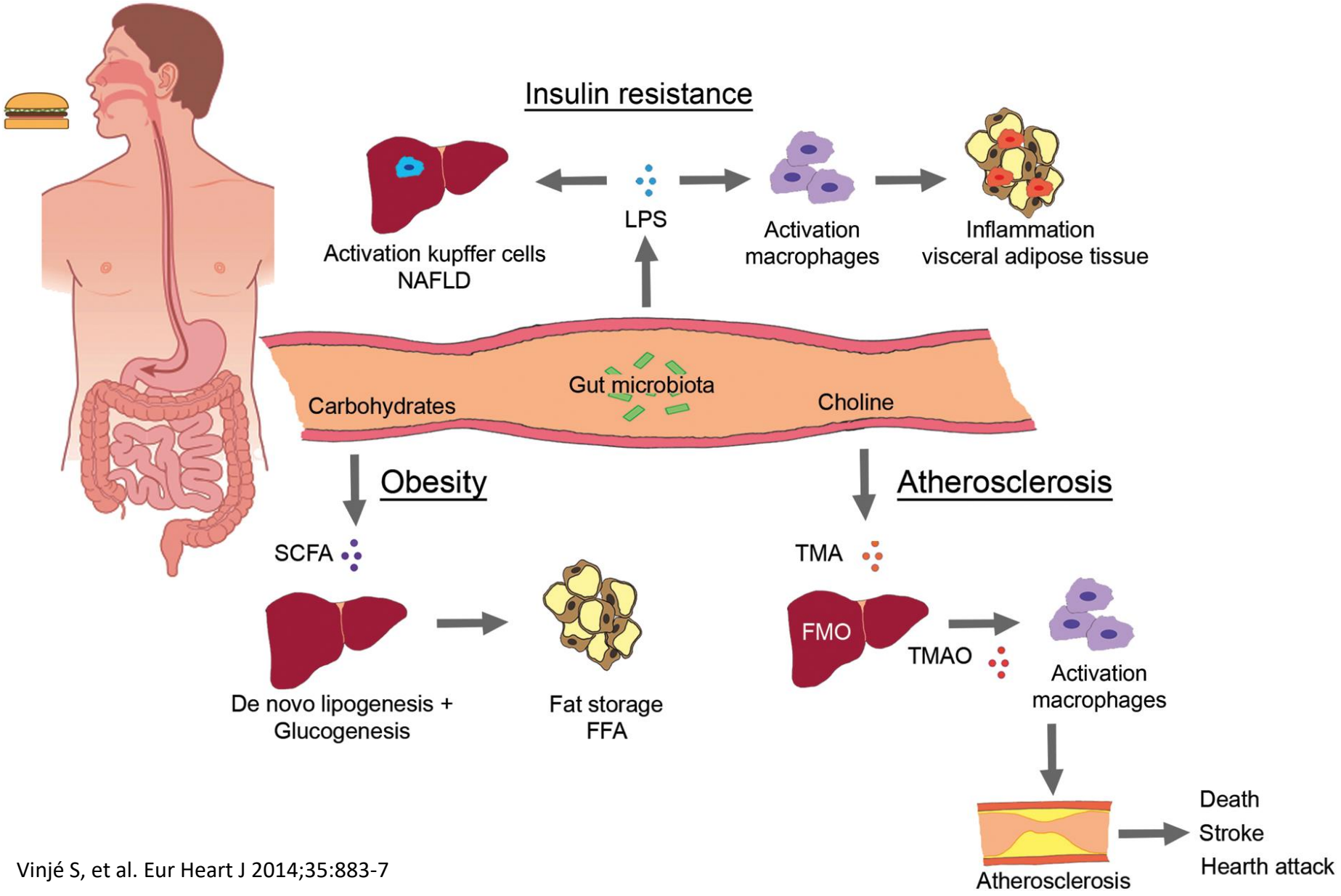
uninterrupted sitting (red) vs sitting/3 min walks (blue) every 30 min



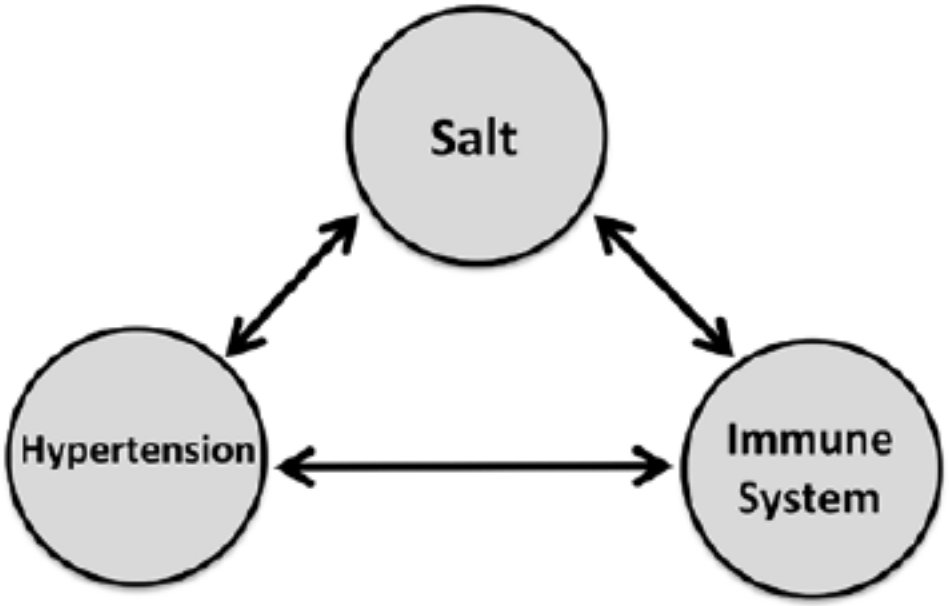
uninterrupted sitting (red) vs sitting/3 min resistance activity (green) every 30 min

Paddy C, et al. *Hypertension* 2018;72:1037

Intestinal microbiota can alter cardio-metabolism



Vinjé S, et al. Eur Heart J 2014;35:883-7

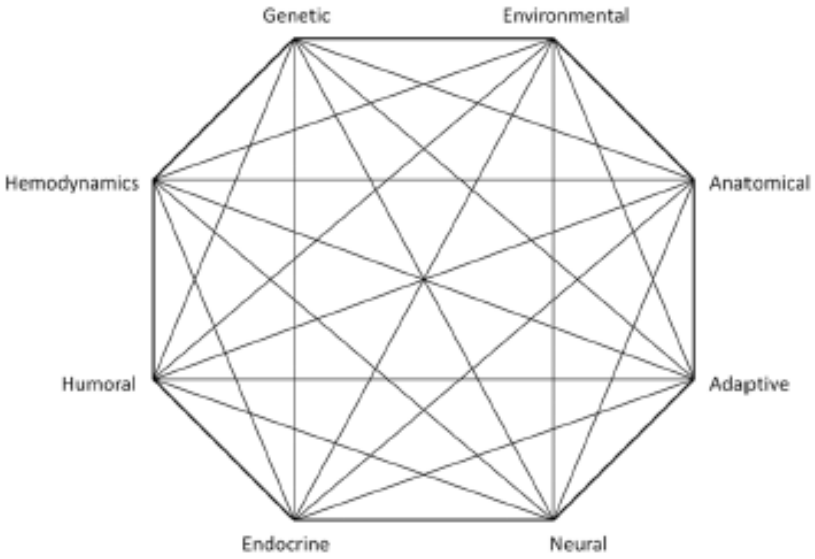


National Heart, Lung, and Blood Institute Working Group Report on Salt in Human Health and Sickness

Building on the Current Scientific Evidence

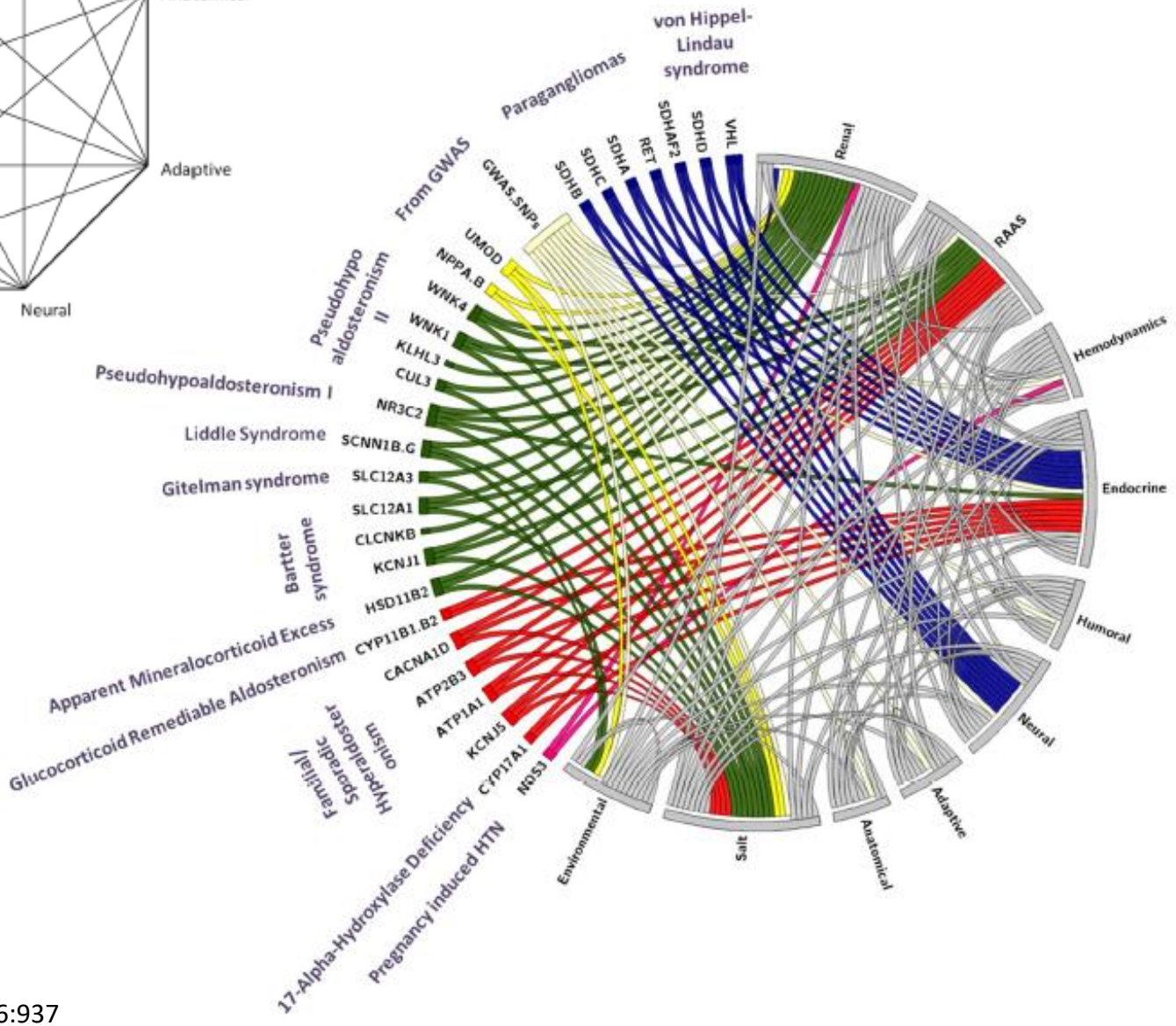
Young S. Oh, Lawrence J. Appel, Zorina S. Galis, David A. Hafler, Jiang He, Amanda L. Hernandez, Bina Joe, S. Ananth Karumanchi, Christine Maric-Bilkan, David Mattson, Nehal N. Mehta, Gwendolyn Randolph, Michael Ryan, Kathryn Sandberg, Jens Titze, Eser Tolunay, Glenn M. Toney, David G. Harrison

Hypertension. 2016;68:281-288. DOI: 10.1161/HYPERTENSIONAHA.116.07415.



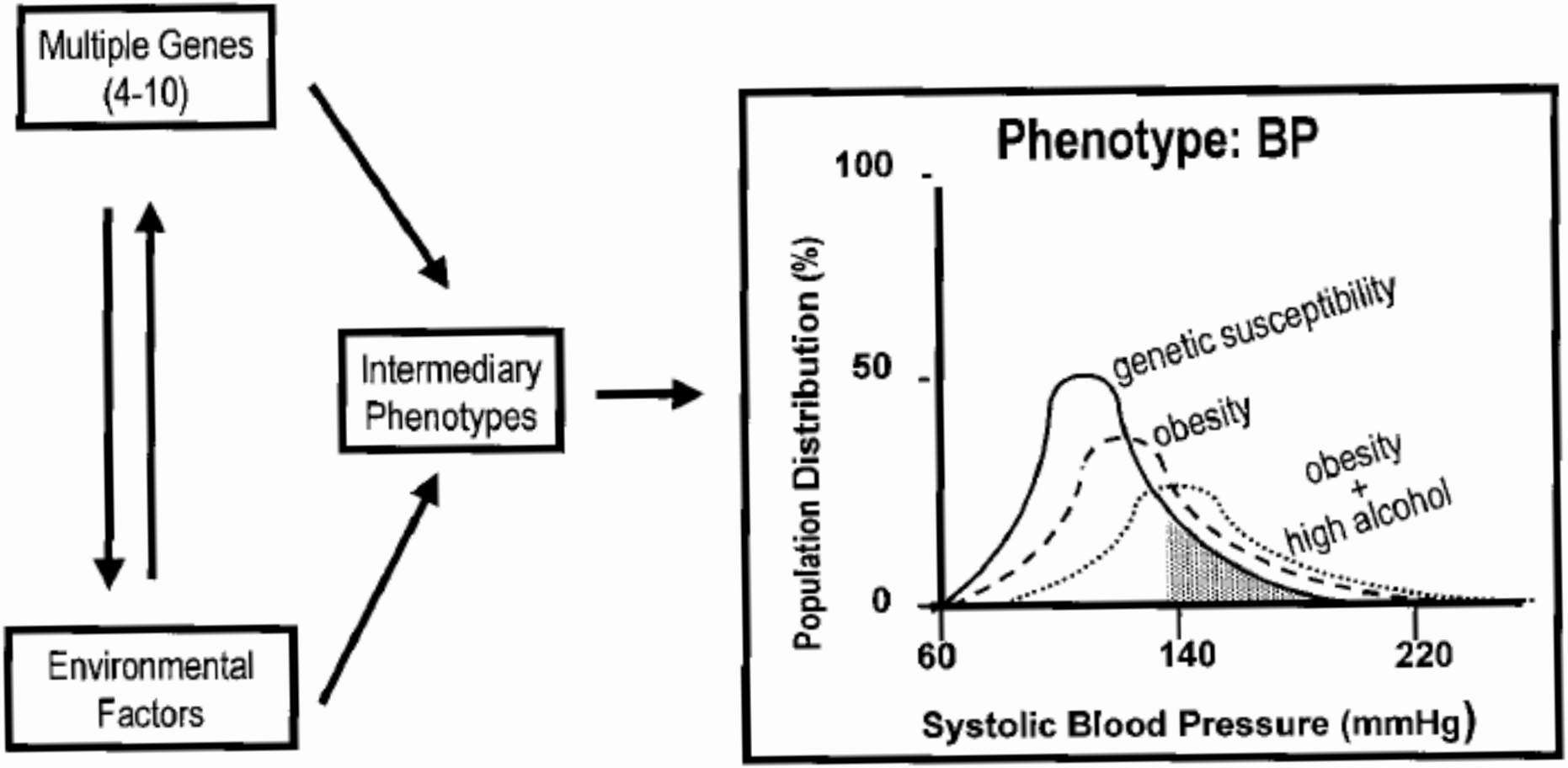
Irvine Page, 1960

2014 update



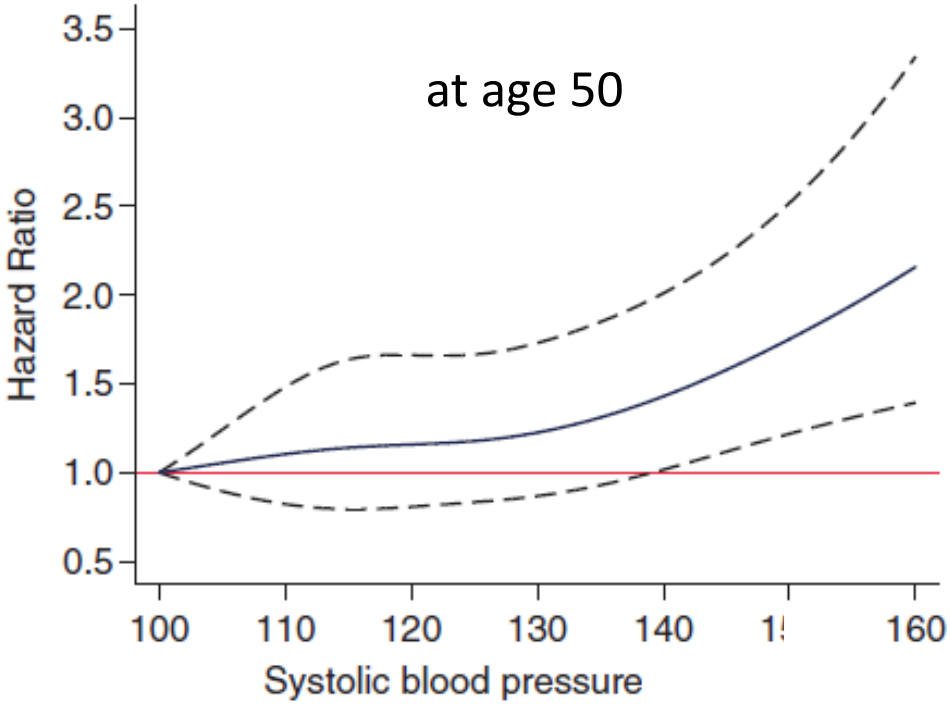
Padmanabhan S, et al. Circ Res 2015;116:937

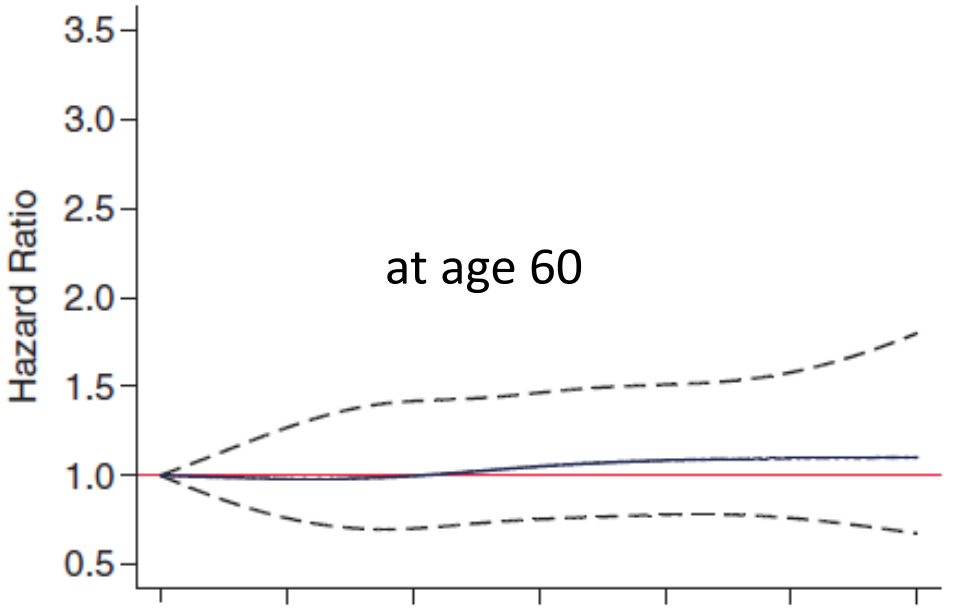
Interaction among genetic and environmental factors in the development of hypertension

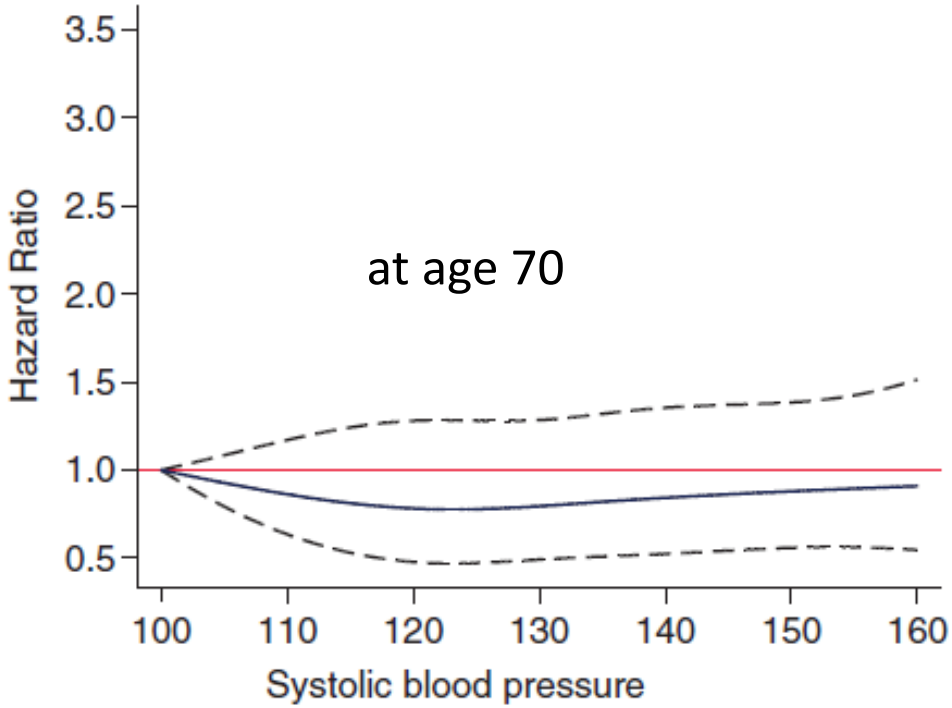


CarreteroOA , Oparil S. Circ 2000;101:329

Association of SBP with later dementia



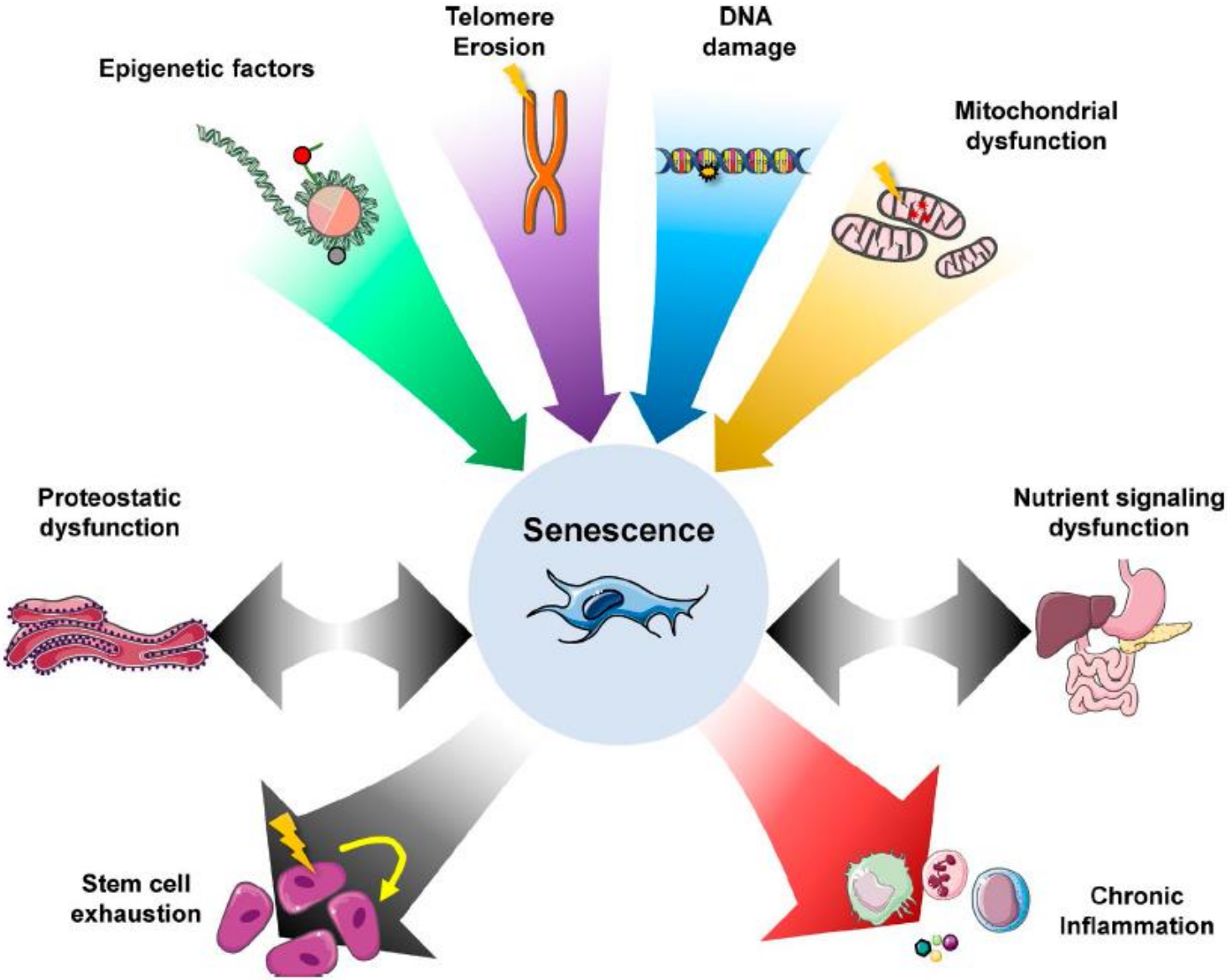




cohorte Whitehall II, n=8639 (1/3 F)

Abell JG, et al. Eur Heart J 2018;39:3119

Âge ou senescence

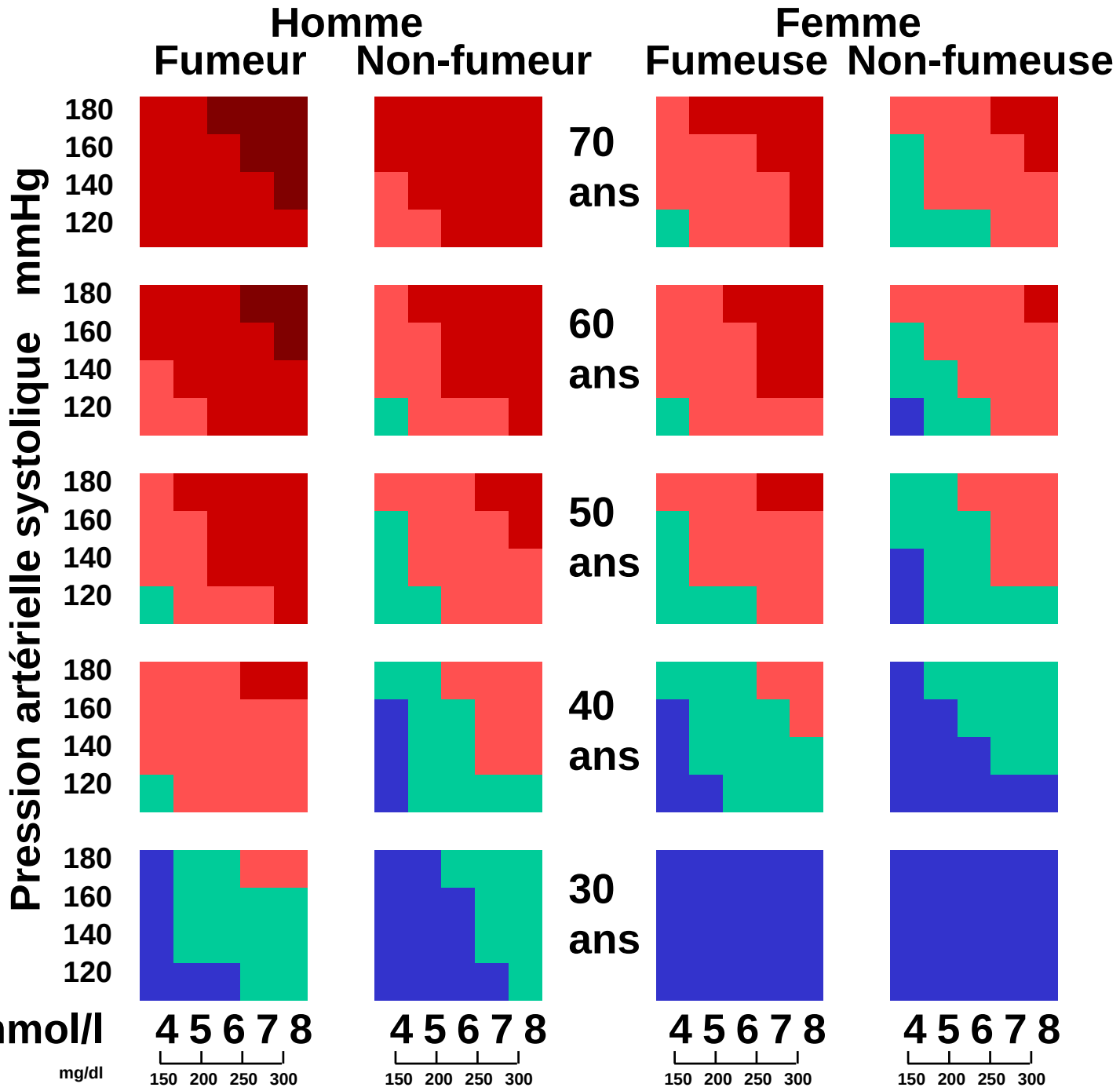


McHugh D, Gil J. JCB 2017;217:65

Une synthèse des données

La représentation du risque

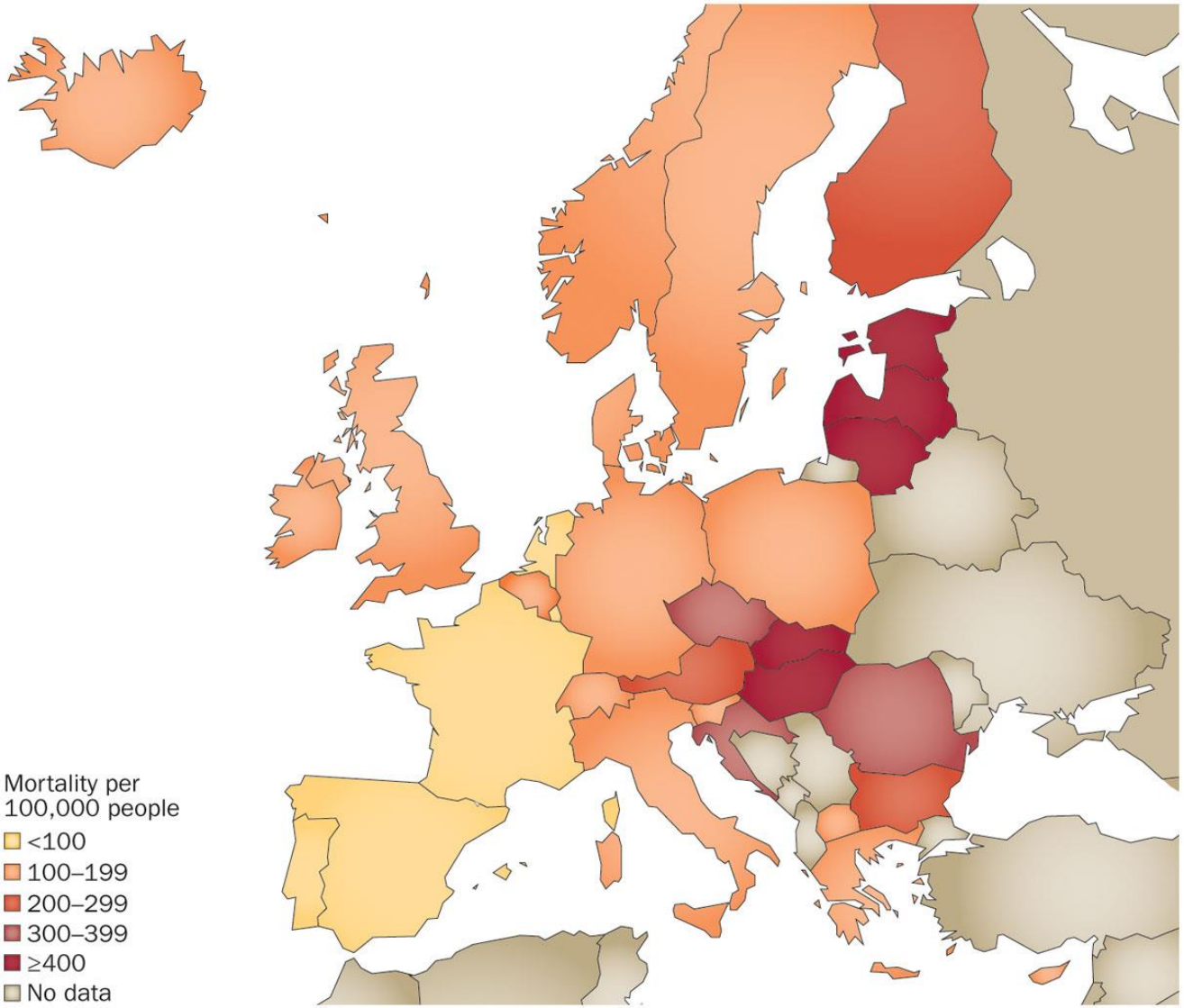
Risque coronaire absolu à 10 ans



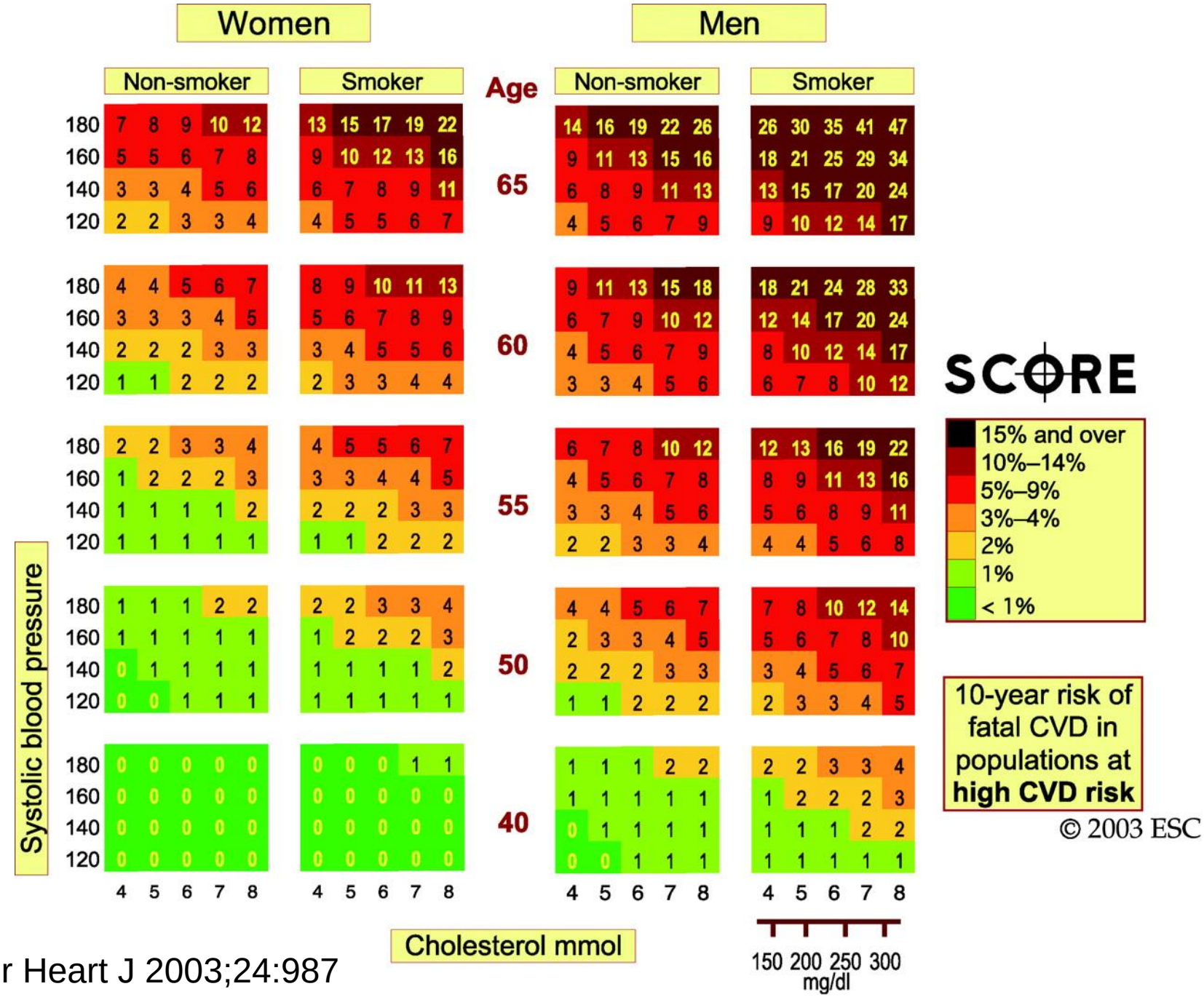
- >40% *
- 20-40%
- 10-20%
- 5-10%
- <5%

* majoré si
.diabète sucré (x2)
.histoire familiale
.anomalie lipidique
(HDL<1et/ou TG>2mmol/l)

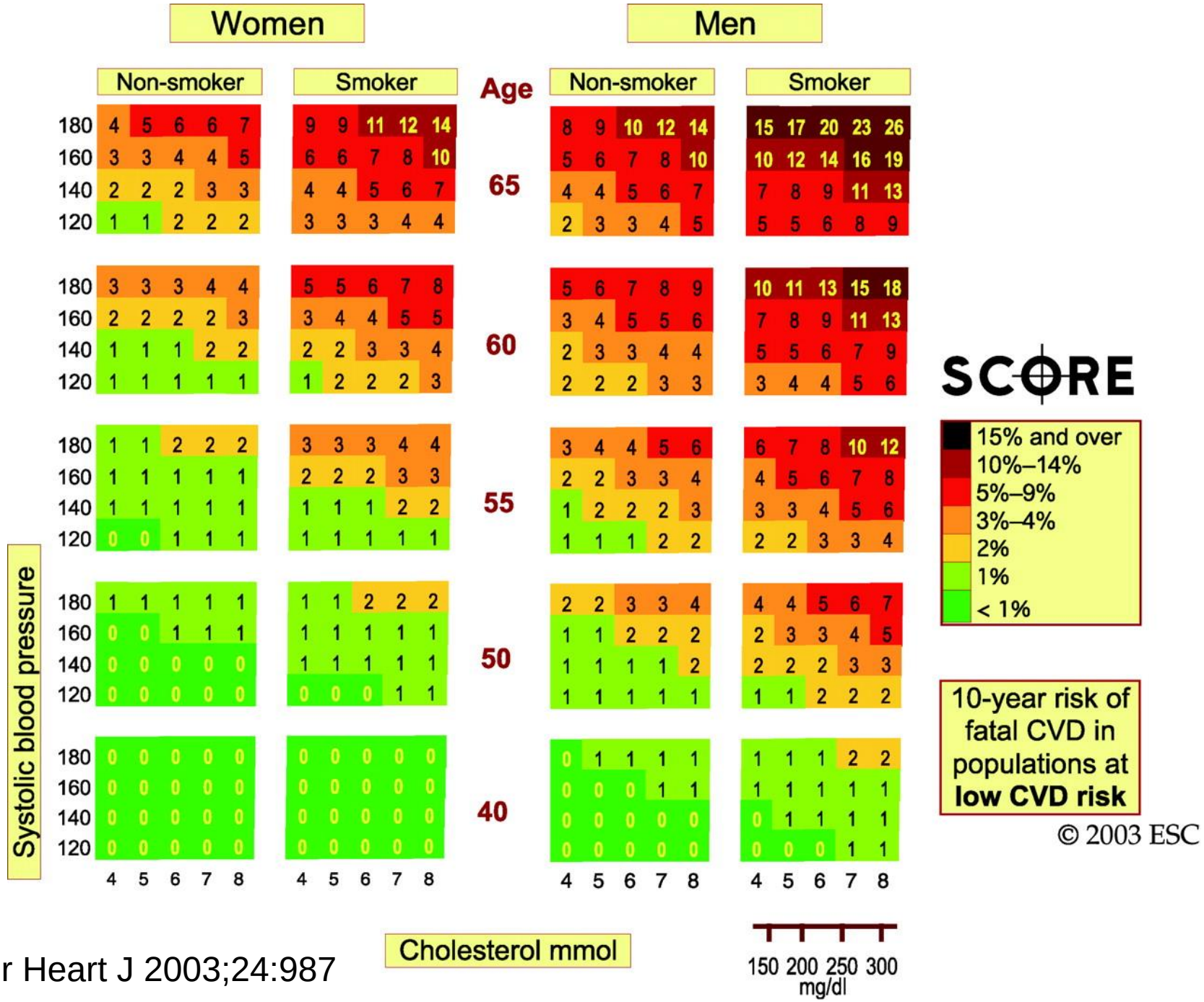
Mortalité coronaire en Europe



Pinto FJ. *Nat. Rev. Cardiol.* doi:10.1038/nrcardio.2013.116

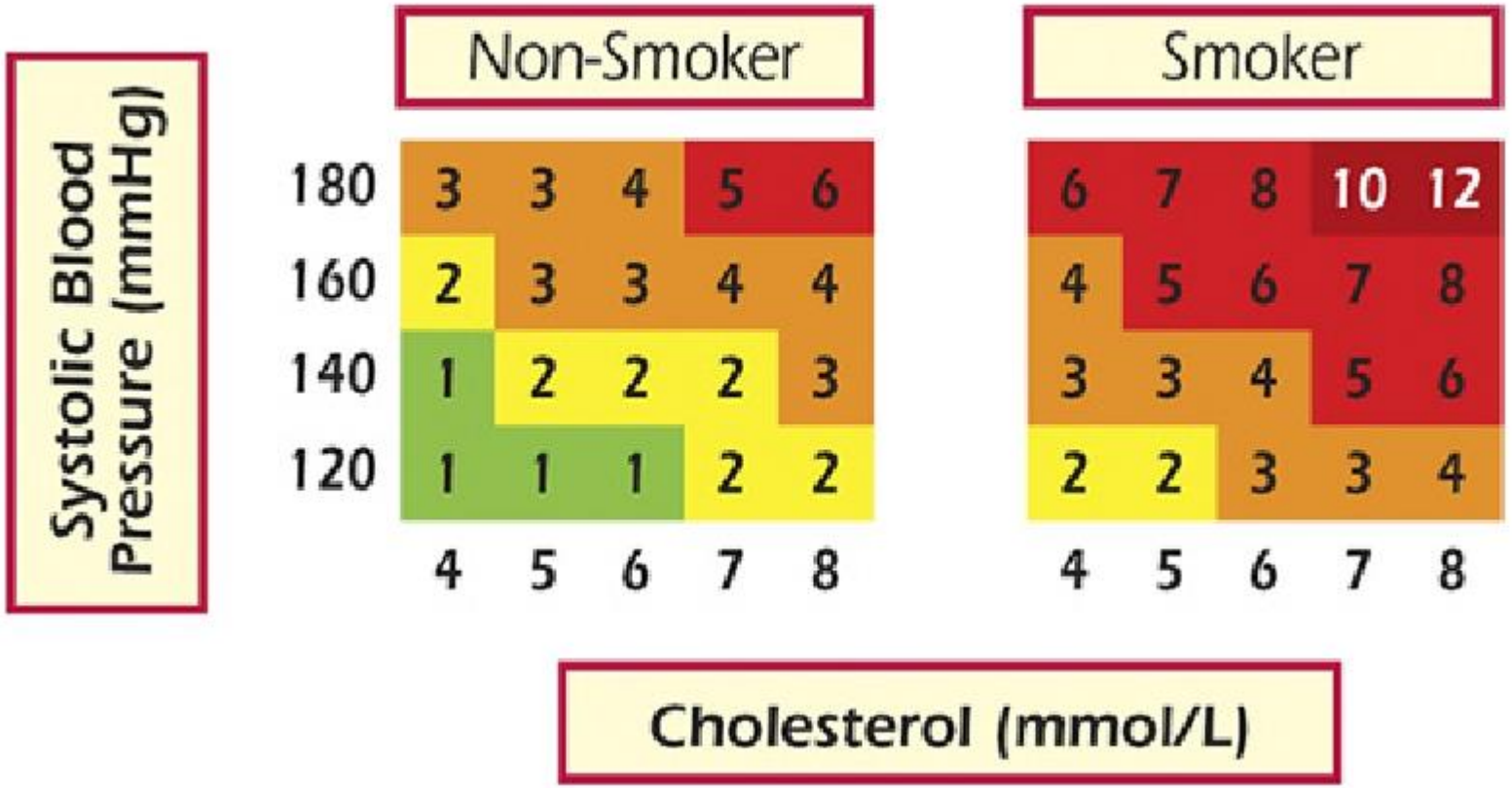


Eur Heart J 2003;24:987



Eur Heart J 2003;24:987

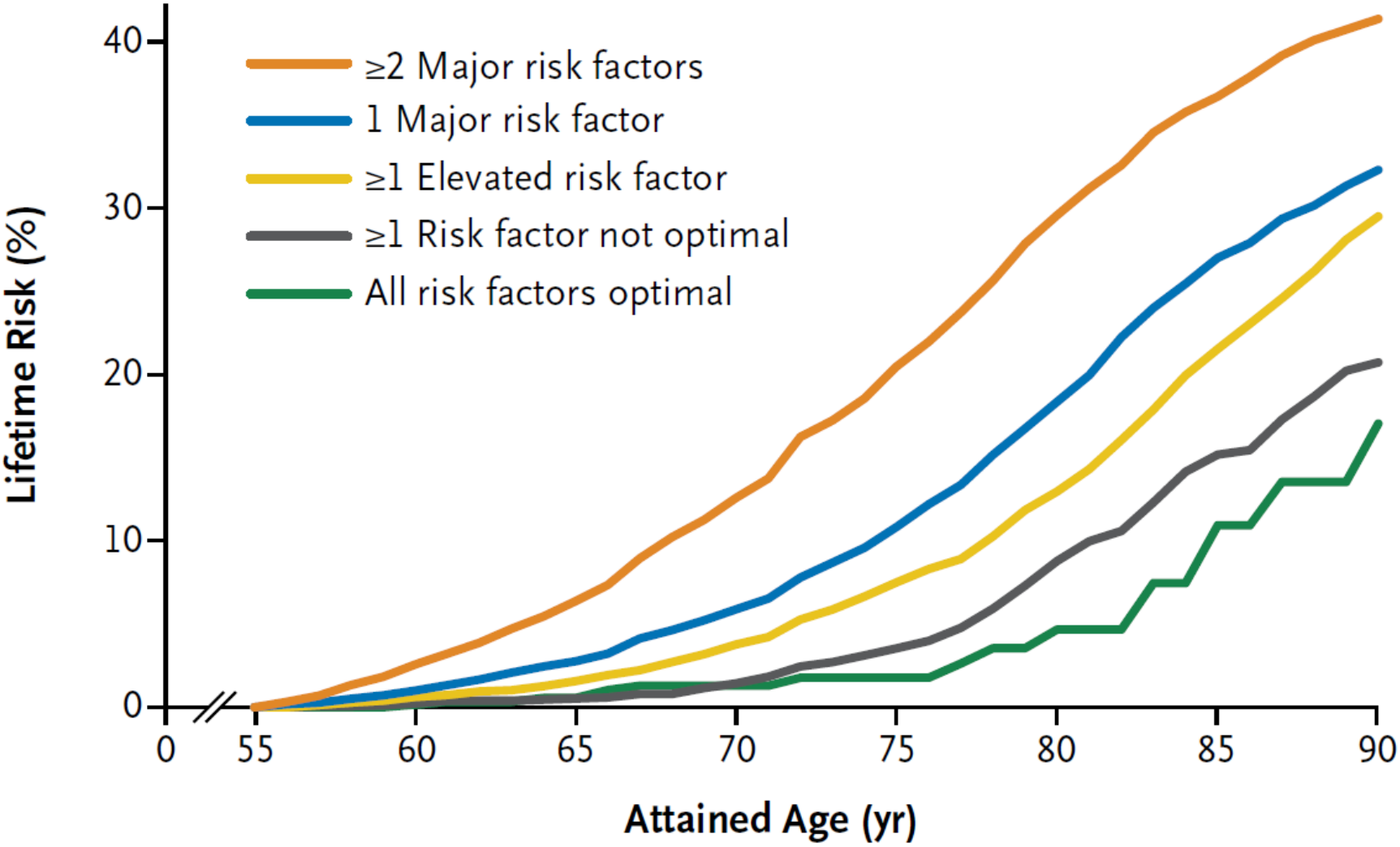
Relative risk chart (SCORE)



Graham I, et al. Eur J Cardiovasc Prev Rehabil 2007; 14 (Suppl 2):S1–S113

Lifetime risk of death from cardiovascular disease

men, black and white, age 55 yrs, according to the aggregate burden of risk factors and adjusted for competing risks of death



Berry JD, et al. *New Eng J Med* 2012;366:321

Lifetime risk of death from cardiovascular disease

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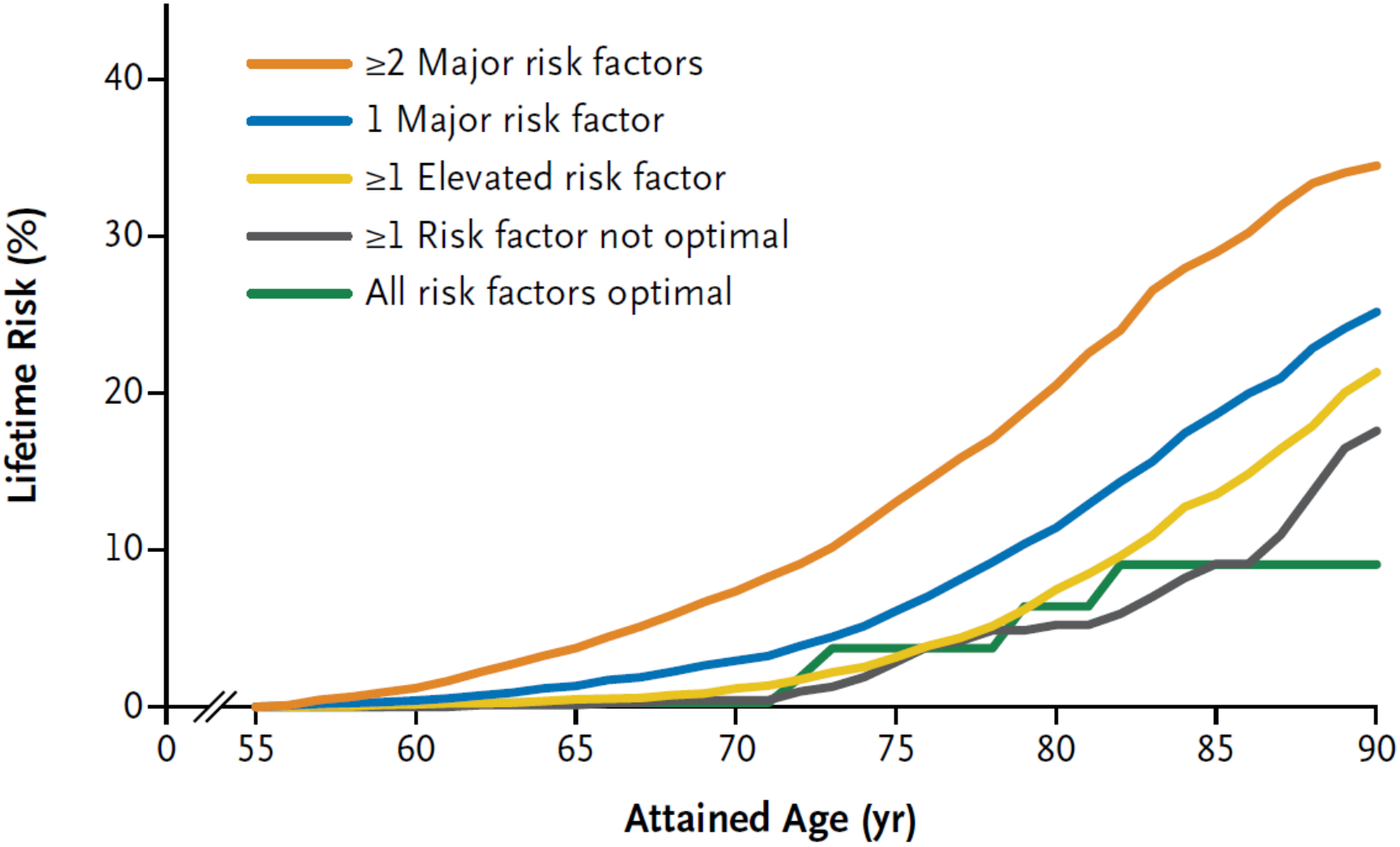
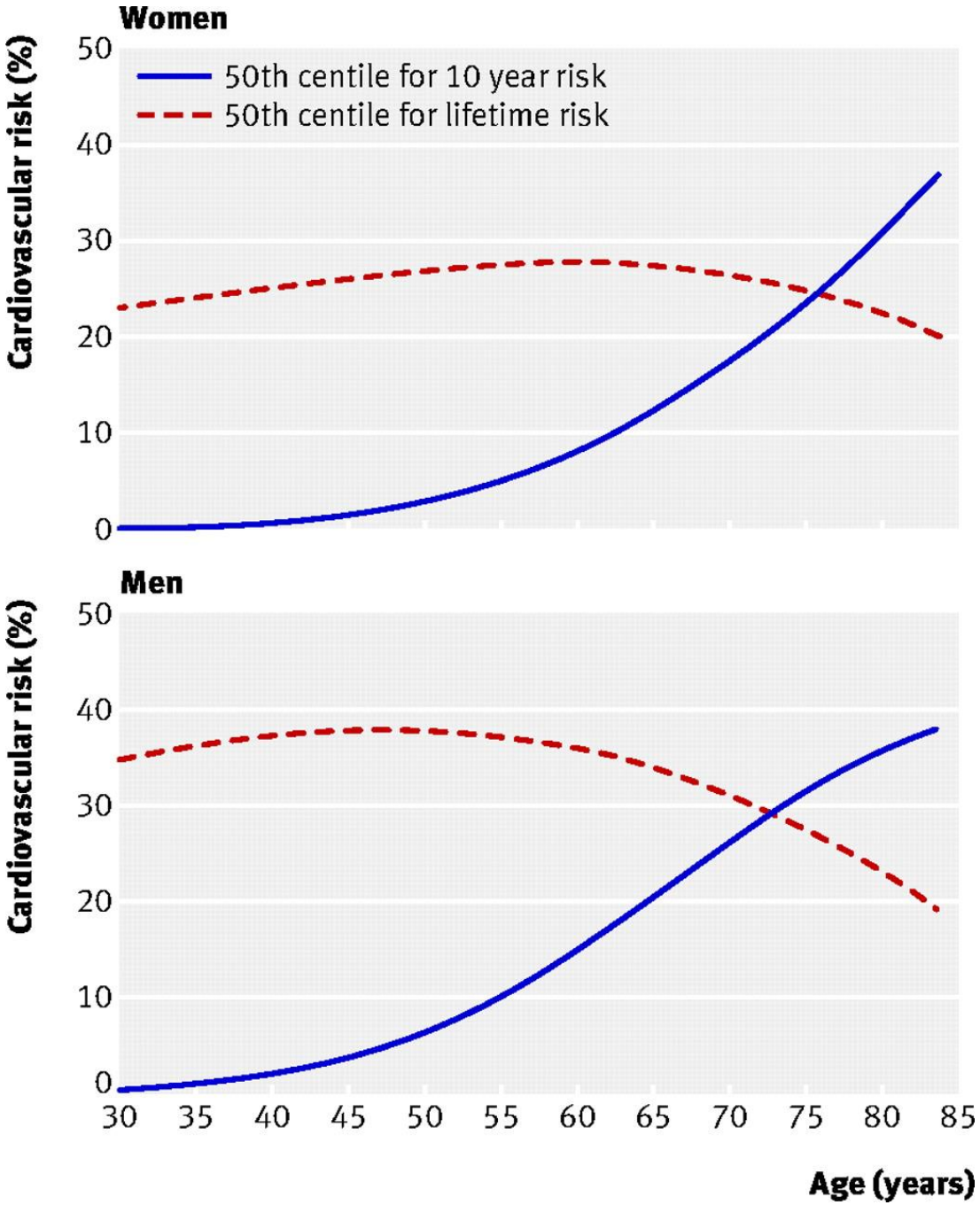


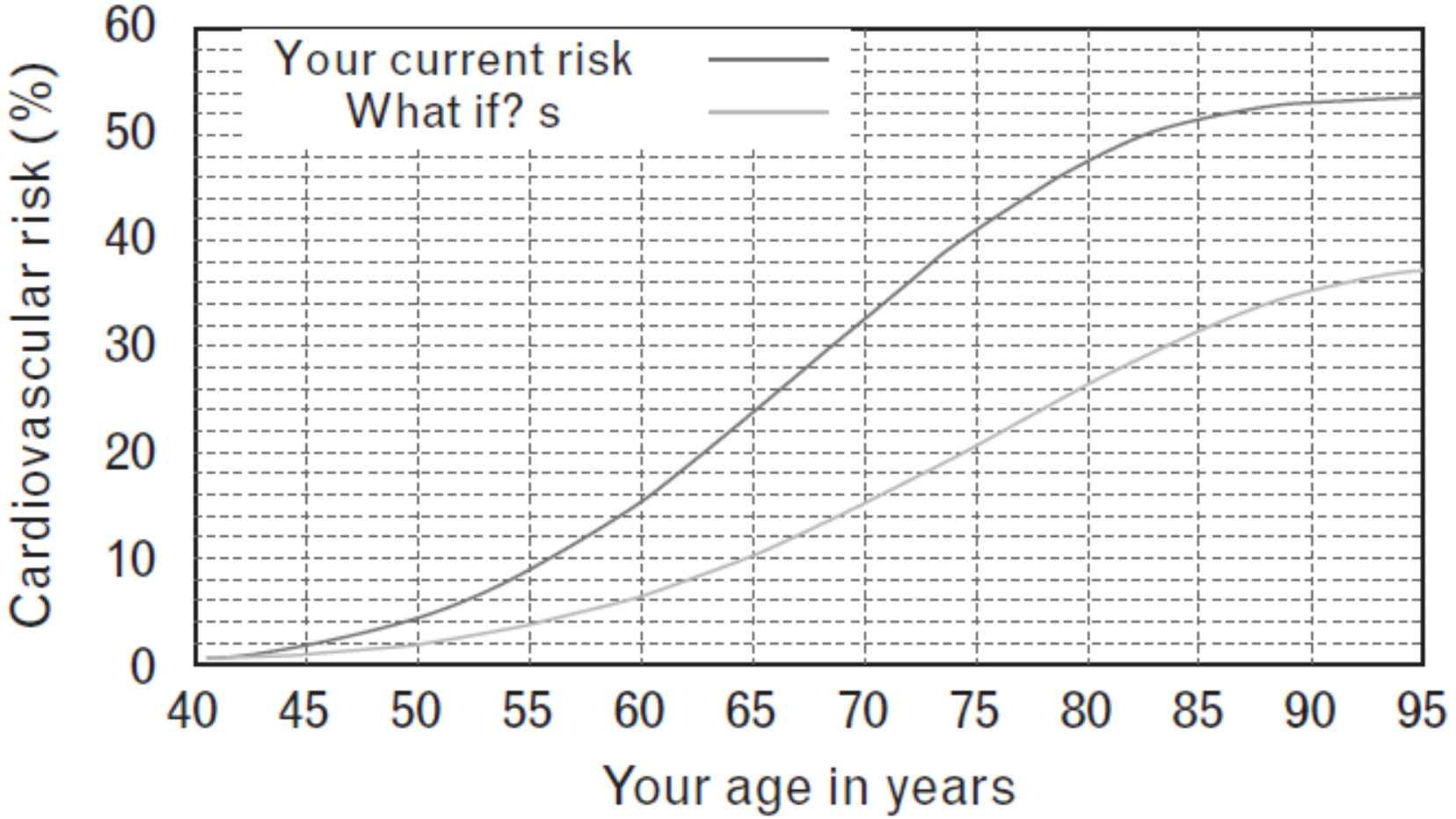
Berry JD, et al. *New Eng J Med* 2012;366:321

Comparaison de la distribution du risque cardiovasculaire vie entière versus 10 ans sur la base de QRISK2 (2010)



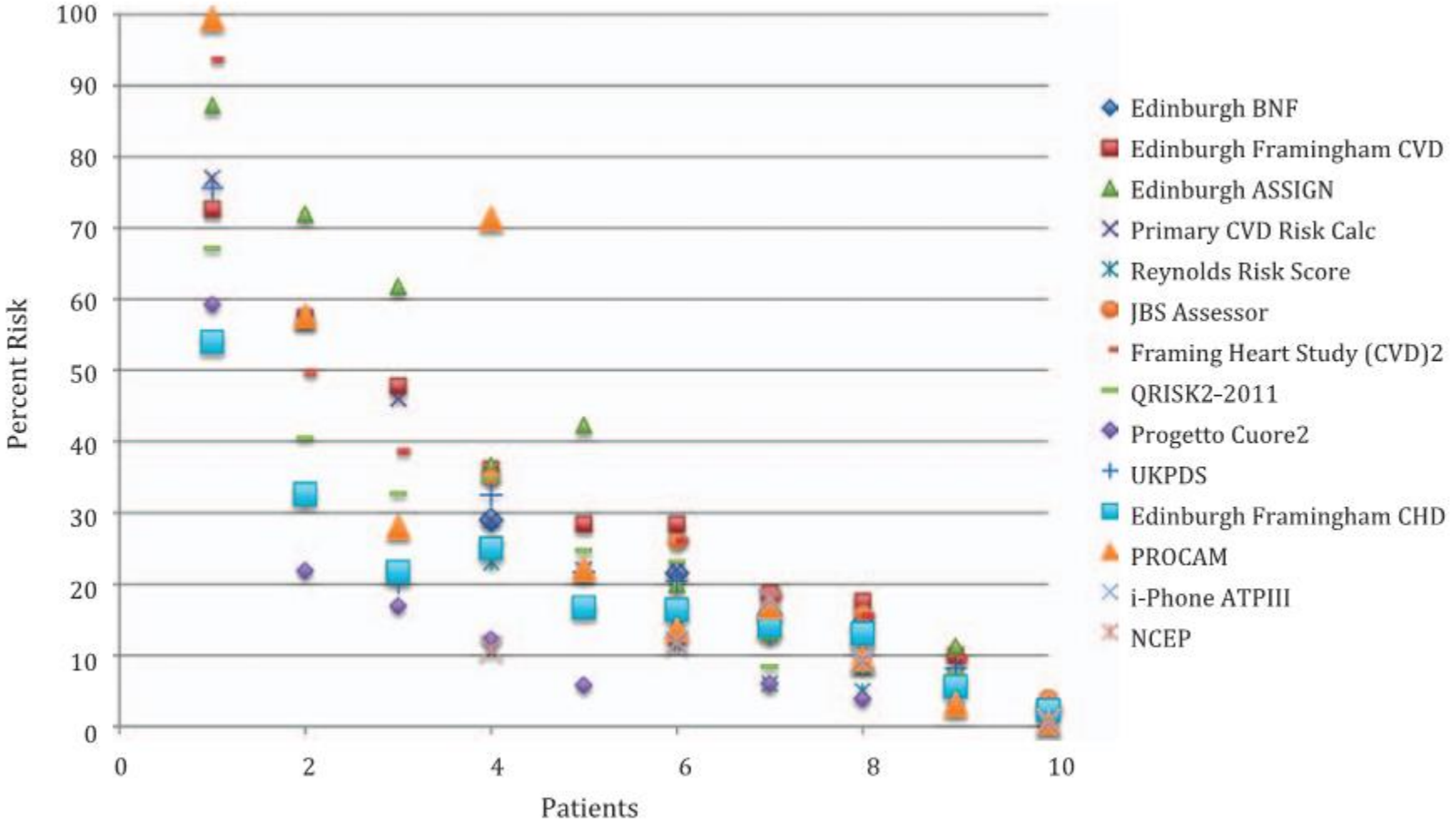
Hippisley-Cox J et al. BMJ 2010;341:bmj.c6624

QRISK model to estimate lifetime risk of cardiovascular disease



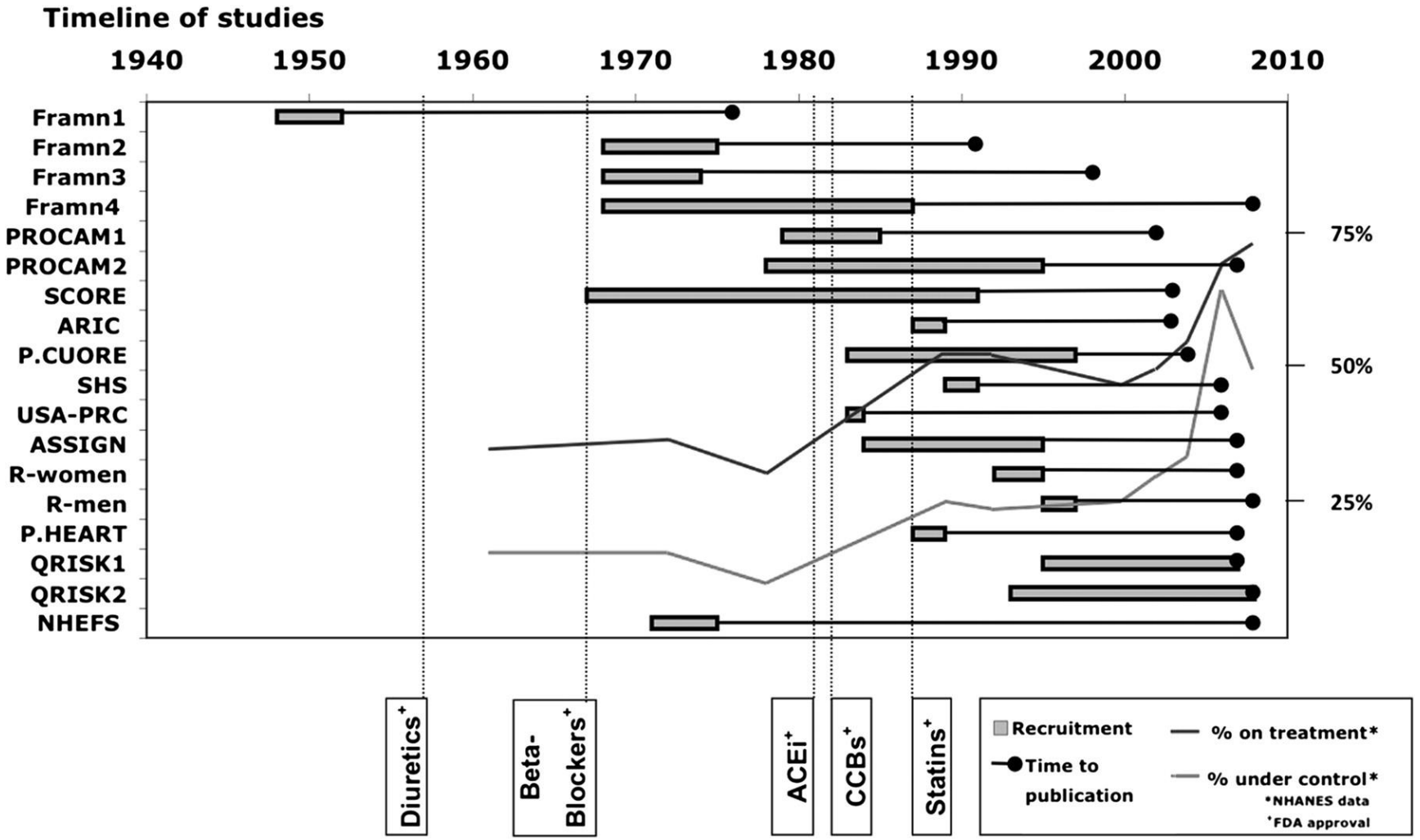
Hippisley-Cox J, et al. BMJ 2010; 341:c6624

10-yr cardiovascular disease and coronary heart disease risk calculators for 10 sample patients



Allan GM, et al. Circulation 2013;127:1948

Cardiovascular risk scores do not account for the effect of treatments



Liew SM, et al. Heart 2011;97:689

Stratification européenne du risque cv

Blood pressure (mmHg)					
Other risk factors, OD or Disease	Normal SBP 120–129 or DBP 80–84	High normal SBP 130–139 or DBP 85–89	Grade 1 HT SBP 140–159 or DBP 90–99	Grade 2 HT SBP 160–179 or DBP 100–109	Grade 3 HT SBP ≥180 or DBP ≥110
No other risk factors	Average risk	Average risk	Low added risk	Moderate added risk	High added risk
1–2 risk factors	Low added risk	Low added risk	Moderate added risk	Moderate added risk	Very high added risk
3 or more risk factors, MS, OD or Diabetes	Moderate added risk	High added risk	High added risk	High added risk	Very high added risk
Established CV or renal disease	Very high added risk	Very high added risk	Very high added risk	Very high added risk	Very high added risk

ESC/ESH Guidelines 2007

Stratification française du risque cv - HAS

autres facteurs de risque	pression artérielle **140-159 / 90-99**	pression artérielle **160-179 / 100-109**	pression artérielle **≥180 / 110**
0 fdra (autre que hta)	risque faible		
1 ou 2 fdra		risque moyen	
≥ 3 fdra et/ou adoc et/ou ds			risque élevé
mal cardio-vasc / rénale			

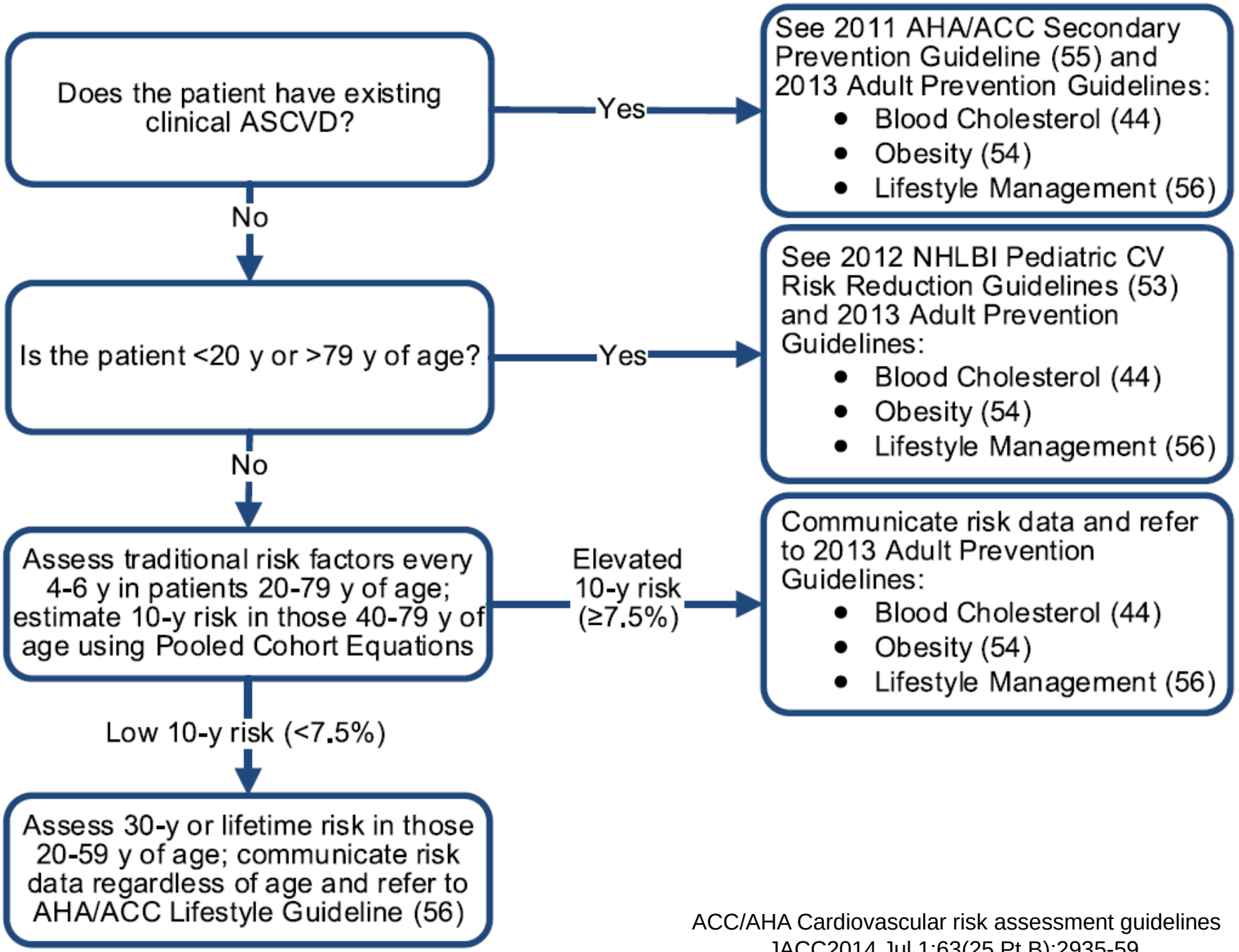
fdra, facteur de risque associé ; adoc, atteinte des organes cibles

PRISE EN CHARGE DE L'HYPERTENSION ARTÉRIELLE DE L'ADULTE

- L'objectif tensionnel, y compris chez les diabétiques et les patients avec maladies rénales, est d'obtenir une pression artérielle systolique comprise entre 130 et 139 mm Hg et une pression artérielle diastolique inférieure à 90 mm Hg, confirmées par une mesure de la pression artérielle en dehors du cabinet médical.
- Des objectifs plus ambitieux peuvent être proposés chez certains patients, après avis spécialisé.

Recommendations	NHLBI Grade	NHLBI Evidence Statements	ACC/AHA COR	ACC/AHA LOE
Assessment of 10-Year Risk of a First Hard ASCVD Event				
1. The race- and sex-specific Pooled Cohort Equations* to predict 10-year risk of a first hard ASCVD event should be used in non-Hispanic African Americans and non-Hispanic whites, 40–79 years of age.	B (Moderate)	N/A	I	B (4–8)
2. Use of the sex-specific Pooled Cohort Equations for non-Hispanic whites may be considered for estimation of risk in patients from populations other than African Americans and non-Hispanic whites.	E (Expert Opinion)	N/A	IIb	C
CQ1: Use of Newer Risk Markers After Quantitative Risk Assessment				
1. If, after quantitative risk assessment, a risk-based treatment decision is uncertain, assessment of ≥1 of the following—family history, hs-CRP, CAC score, or ABI—may be considered to inform treatment decision making.	E (Expert Opinion)	Appendix 4	IIb†	B (9–17)
2. Routine measurement of CIMT is not recommended in clinical practice for risk assessment for a first ASCVD event.	N (No recommendation for or against)	Appendix 4	III: No Benefit†	B (12,16,18)
3. The contribution of ApoB, CKD, albuminuria, and cardiorespiratory fitness to risk assessment for a first ASCVD event is uncertain at present.	N (No recommendation for or against)	Appendix 4	—	—
CQ2: Long-Term Risk Assessment				
1. It is reasonable to assess traditional ASCVD risk factors‡ every 4–6 years in adults 20–79 years of age who are free from ASCVD and to estimate 10-year ASCVD risk every 4–6 years in adults 40–79 years of age who are free from ASCVD.	B (Moderate)	Appendix 5 CQ2/ES7	IIa	B (19,20)
2. Assessment of 30-year or lifetime ASCVD risk on the basis of traditional risk factors‡ may be considered in adults 20–59 years of age who are free from ASCVD and are not at high short-term risk.	C (Weak)	Appendix 5 CQ2/ES2, CQ2/ES3, CQ2/ES4, CQ2/ES5, CQ2/ES6	IIb	C (20–22)

ACC/AHA Cardiovascular risk assessment guidelines
JACC2014 Jul 1;63(25 Pt B):2935-59

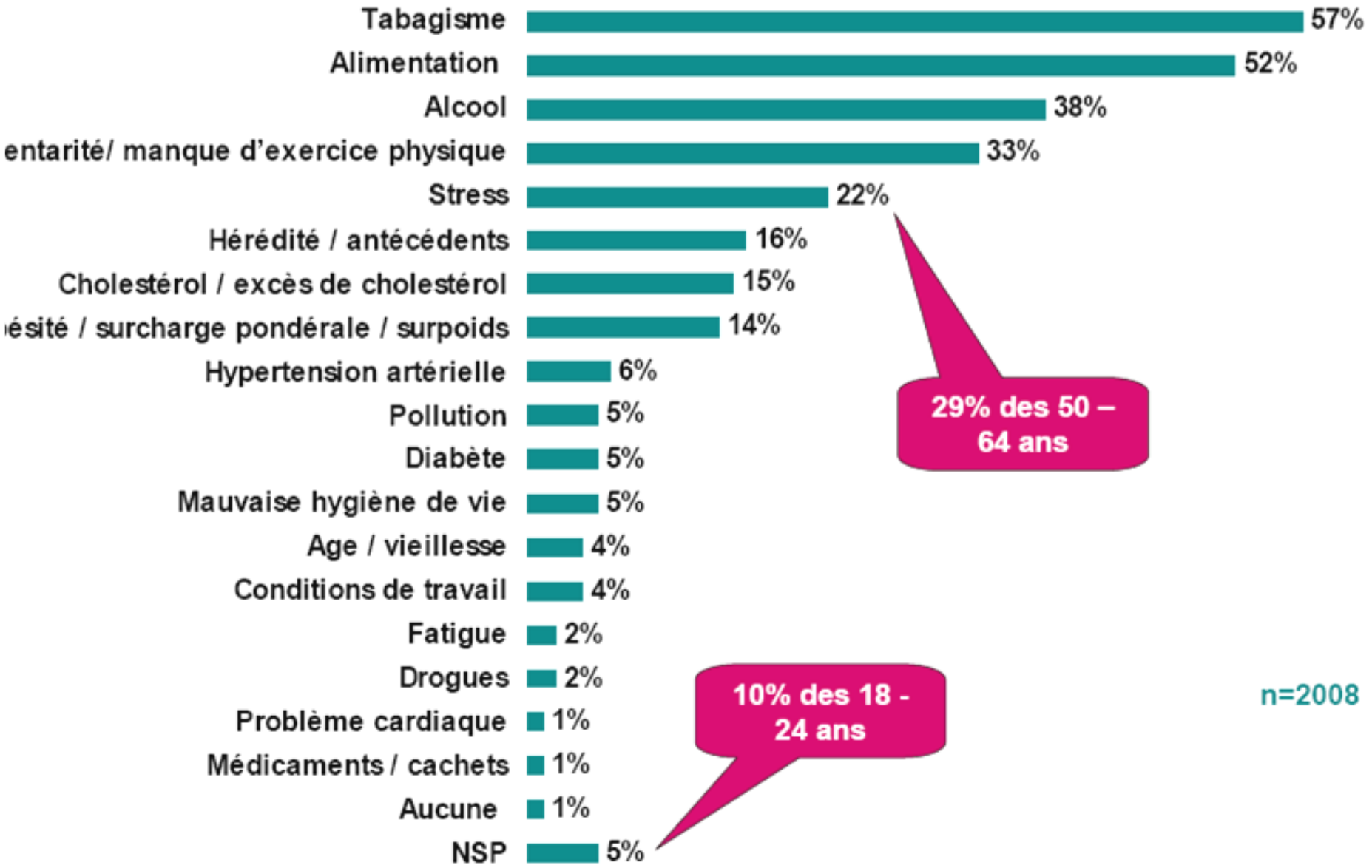


ACC/AHA Cardiovascular risk assessment guidelines
JACC2014 Jul 1;63(25 Pt B):2935-59

La transmission de la notion de risque aux premiers intéressés

Communiquer sur le risque

A votre avis, quelles sont les causes, les facteurs de risque des maladies cardiovasculaires ?



n=2008

indicateurs du bénéfice attendu d'une intervention

Risque Absolu	RA
Risque Relatif	$RR = [RA/RA_{ref}]$
Réduction Relative du risque	RRR = [1-RR]
Réduction Absolue du risque	$RAR = [RA_{ref} – RA]$
Nombre de sujets à traiter	NST = [1/RAR]
	ou $[1/ (RA_{ref} x RRR)]$

Le langage de l'individu ou du groupe

Homme 74 ans, 175/85 mmHg, sous antidiabétiques oraux
SHEP

	Taux d'évents des pts contrôles / traités		RR	RRR	RRA	NST
	%	%	%	%	%	5ans
Mort. totale	10.2	9.0	0.88	12	1.2	83
Mort. CV	4.7	3.8	0.81	19	0.9	111
Mort. ictus	0.59	0.42	0.71	29	0.17	588
Tous ictus	6.9	4.5	0.65	35	2.4	42
Tous events CV	17.5	12.2	0.70	30	5.3	19

La connaissance du risque ou le risque de connaître

Epidemiology

General Cardiovascular Risk Profile for Use in Primary Care

The Framingham Heart Study

Ralph B. D'Agostino, Sr, PhD; Ramachandran S. Vasan, MD; Michael J. Pencina, PhD; Philip A. Wolf, MD; Mark Cobain, PhD; Joseph M. Massaro, PhD; William B. Kannel, MD

Background—Separate multivariable risk algorithms are commonly used to assess risk of specific atherosclerotic cardiovascular disease (CVD) events, ie, coronary heart disease, cerebrovascular disease, peripheral vascular disease, and heart failure. The present report presents a single multivariable risk function that predicts risk of developing all CVD and of its constituents.

Methods and Results—We used Cox proportional-hazards regression to evaluate the risk of developing a first CVD event in 8491 Framingham study participants (mean age, 49 years; 4522 women) who attended a routine examination between 30 and 74 years of age and were free of CVD. Sex-specific multivariable risk functions ("general CVD" algorithms) were derived that incorporated age, total and high-density lipoprotein cholesterol, systolic blood pressure, treatment for hypertension, smoking, and diabetes status. We assessed the performance of the general CVD algorithms for predicting individual CVD events (coronary heart disease, stroke, peripheral artery disease, or heart failure). Over 12 years of follow-up, 1174 participants (456 women) developed a first CVD event. All traditional risk factors evaluated predicted CVD risk (multivariable-adjusted $P<0.0001$). The general CVD algorithm demonstrated good discrimination (C statistic, 0.763 [men] and 0.793 [women]) and calibration. Simple adjustments to the general CVD risk algorithms allowed estimation of the risks of each CVD component. Two simple risk scores are presented, 1 based on all traditional risk factors and the other based on non–laboratory-based predictors.

Conclusions—A sex-specific multivariable risk factor algorithm can be conveniently used to assess general CVD risk and risk of individual CVD events (coronary, cerebrovascular, and peripheral arterial disease and heart failure). The estimated absolute CVD event rates can be used to quantify risk and to guide preventive care. (*Circulation.* **2008;117: 743-753.**)

Key Words: cardiovascular diseases ■ coronary disease ■ heart failure ■ risk factors ■ stroke

A man is as old as his arteries

Thomas Sydenham 1624-1689

Calcul d'un score / hommes

Points	Age, y	HDL	Total Cholesterol	SBP Not Treated	SBP Treated	Smoker	Diabetic
−2		60+		<120			
−1		50–59					
0	30–34	45–49	<160	120–129	<120	No	No
1		35–44	160–199	130–139			
2	35–39	<35	200–239	140–159	120–129		
3			240–279	160+	130–139		Yes
4			280+		140–159	Yes	
5	40–44				160+		
6	45–49						
7							
8	50–54						
9							
10	55–59						
11	60–64						
12	65–69						
13							
14	70–74						
15	75+						
Points allotted							

D'Agostino R et al. Circulation 2008;117:743

Langage ‘médecin’ ‘% de risque à 10 ans’

Table 8. CVD Risk for Men

Points	Risk, %
≤−3 or less	<1
−2	1.1
−1	1.4
0	1.6
1	1.9
2	2.3
3	2.8
4	3.3
5	3.9
6	4.7
7	5.6
8	6.7
9	7.9
10	9.4
11	11.2
12	13.2
13	15.6
14	18.4
15	21.6
16	25.3
17	29.4
18+	>30

Langage ‘patient’ ‘âge vasculaire’

Table 10. Heart Age/Vascular Age for Men

Points	Heart Age, y
<0	<30
0	30
1	32
2	34
3	36
4	38
5	40
6	42
7	45
8	48
9	51
10	54
11	57
12	60
13	64
14	68
15	72
16	76
≥17	>80

D’Agostino R et al. Circulation 2008;117:743

L'âge des artères pour tous

Estimez l'âge de vos artères

Pour chaque question, trouvez le nombre de points correspondant à votre sexe et à votre situation. Le total des points vous permet de calculer votre âge vasculaire.

1. Quel âge avez-vous ?

	Femme	Homme
30 - 34	0	0
35 - 39	2	2
40 - 44	4	5
45 - 49	5	6
50 - 54	7	8
55 - 59	8	10
60 - 64	9	11
65 - 69	10	12
70 - 74	11	14
75 et +	12	15

2. Êtes-vous fumeur ?

	Femme	Homme
Non	0	0
Oui	3	4

3. Êtes-vous diabétique ?

	Femme	Homme
Non	0	0
Oui	4	3

4. Quelle est votre pression systolique ?
(La pression artérielle est définie par 2 chiffres : le premier, le plus haut, correspond à la pression systolique)

Si vous êtes non traité par des médicaments pour l'hypertension

	Femme	Homme
< 120	-3	-2
120 - 129	0	0
130 - 139	1	1
140 - 149	2	2
150 - 159	4	2
160 et +	5	3

Si vous êtes traité par des médicaments pour l'hypertension

	Femme	Homme
< 120	-1	0
120 - 129	2	2
130 - 139	3	3
140 - 149	5	4
150 - 159	6	4
160 et +	7	5

5. Quel est votre taux de cholestérol total en g/l ?

	Femme	Homme
< 1,60	0	0
1,60 - 1,99	1	1
2,00 - 2,39	3	2
2,40 - 2,79	4	3
2,80 et +	5	4

6. Quel est votre taux de HDL cholestérol en g/l ?

	Femme	Homme
0,6 et +	-2	-2
0,50 - 0,59	-1	-1
0,45 - 0,49	0	0
0,35 - 0,44	1	1
< 0,35	2	2

Votre total de points est :

Estimez l'âge de vos artères en reportant le total de vos points

Total des points	Femme	Homme
< 0	< 30 ans	< 30 ans
1	31 ans	32 ans
2	34 ans	34 ans
3	36 ans	36 ans
4	39 ans	38 ans
5	42 ans	40 ans
6	45 ans	42 ans
7	48 ans	45 ans
8	51 ans	48 ans
9	55 ans	51 ans
10	59 ans	54 ans
11	64 ans	57 ans
12	68 ans	60 ans
13	73 ans	64 ans
14	79 ans	68 ans
15 et +	> 80 ans	
15		72 ans
16		76 ans
17 et +		> 80 ans

Votre âge réel : ans
Votre âge vasculaire estimé : ans

Calculez l'âge de vos artères sur www.comiteHTA.org

Une enquête française

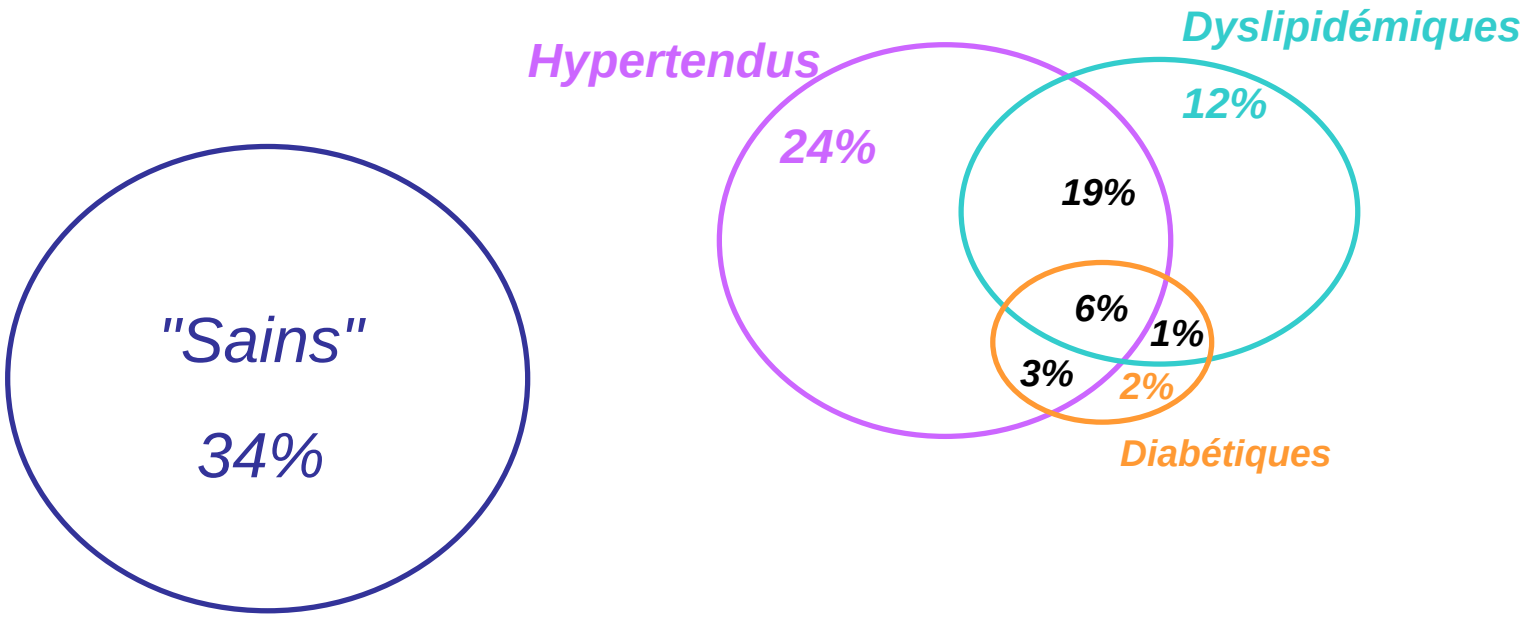
Méthodologie	Interrogation par voie postale de 4500 individus issus du panel ACCESS SANTE de TNS Sofres représentatifs de la population des 35 ans et plus
Echantillon	3838 individus de 35 ans et plus
Période de réalisation de l'enquête	Avril / Mai 2009
Matériel d'enquête	Questionnaire auto administré de 4 pages
Critères de pondération	Redressement effectué sur les 3838 individus répondants sur les critères suivants : région, habitat, PCS, sexe et âge

Caractéristiques de la population

49% d'hommes; 57±14 ans; 30.2% de sujets traités pour HTA.

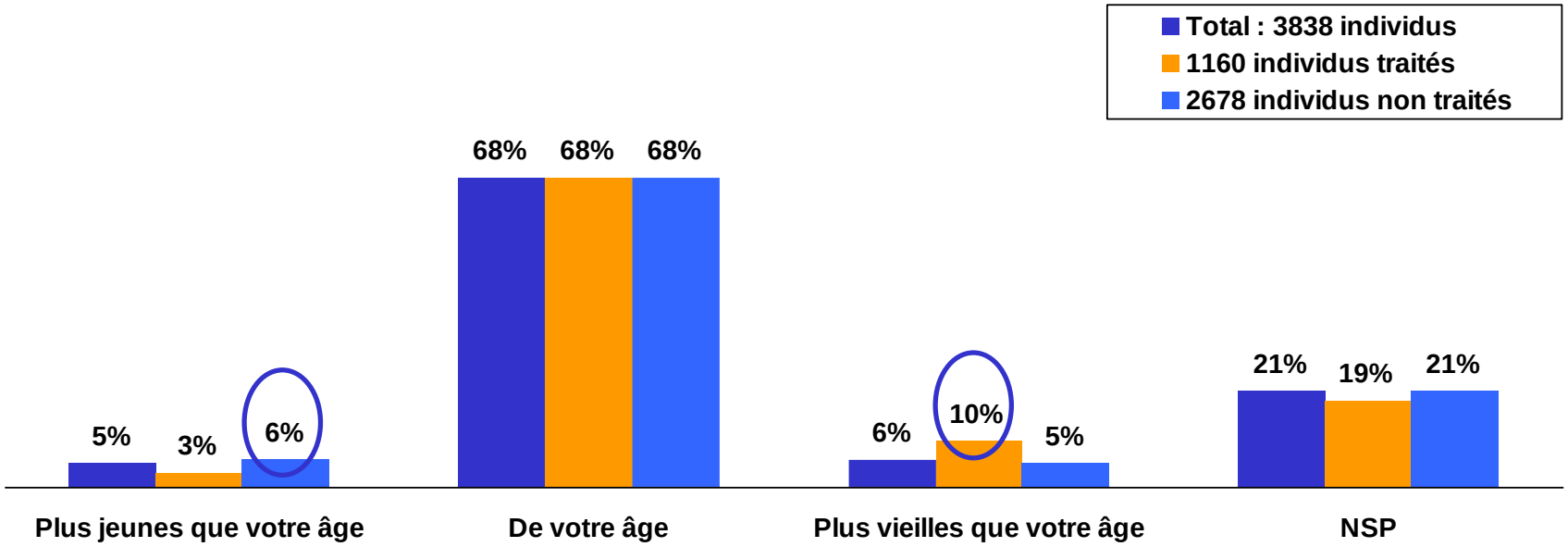
	HT (n=1159)	NT (n=2679)
Age (ans)	66 ± 12	53 ± 13
IMC (kg/m^2)	27.8 ± 4.8	25.2 ± 4.4
PAS/PAD (mmHg)	132±14 / 77±9	125±14 / 77 ±11

Ensemble des individus âgés de 60 ans et plus (n=1616)



Opinions concernant l'âge des artères

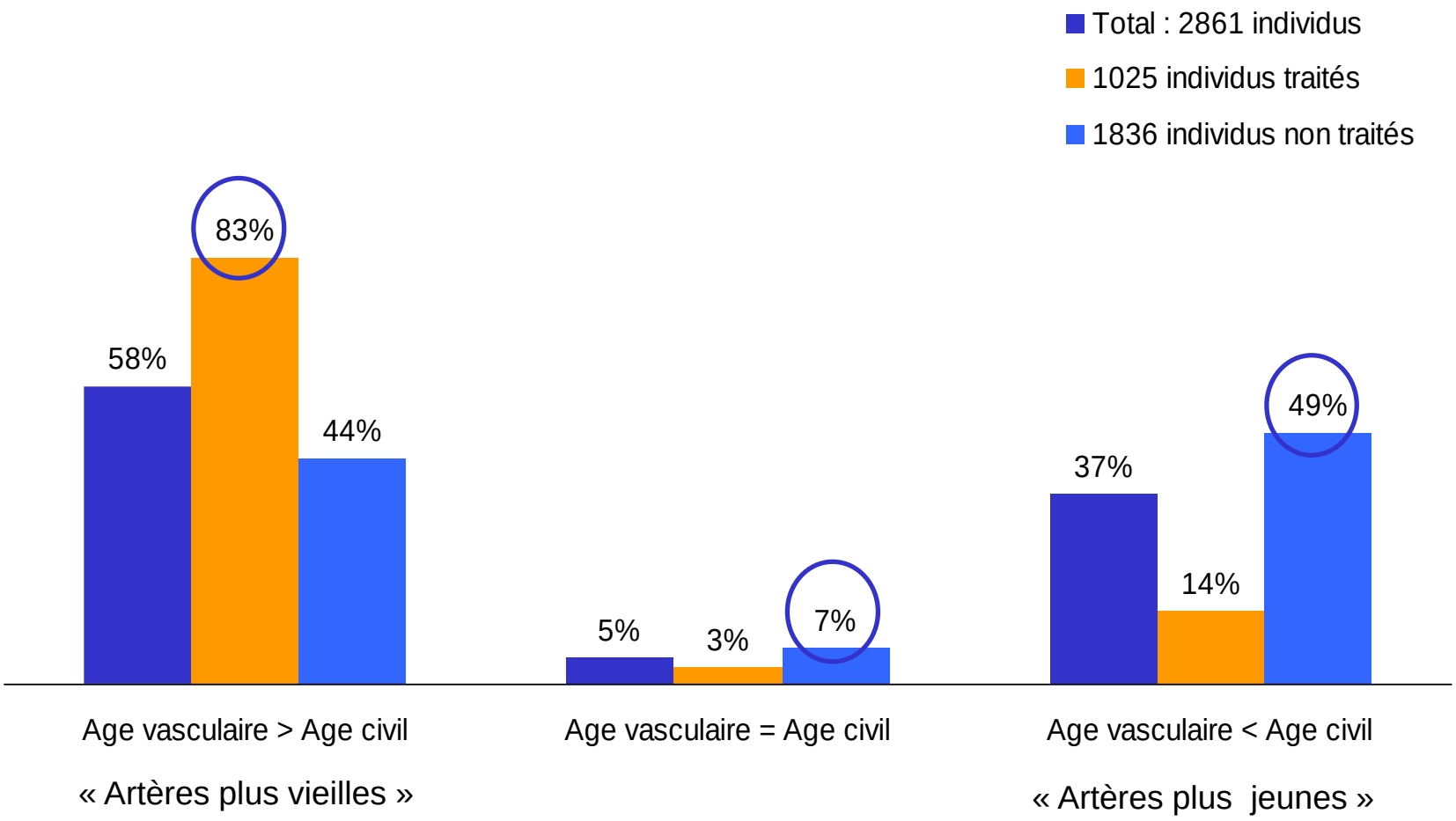
Question : Pensez-vous que vous avez des artères ?



De fait, 83% des hypertendus et 44% des sujets >35 ans non hypertendus avaient un âge vasculaire **supérieur** à leur âge civil

Enquête FLAHS 2009

Écarts d’âge vasculaire / civil



26.9% des femmes et 55% des hommes étaient à haut risque cardiovasculaire (>15% de risque à 10 ans)

Estimation de l'âge artériel d'une population de consultants d'un centre de santé de la CPAM

Entre janvier 2008 et juin 2009,
11351 consultants (5823 hommes), âgés de 30 à 75 ans
explorés au centre d'examens de santé de la CPAM de Bobigny
Recensement des variables nécessaires au calcul de l'âge vasculaire
(sexe, âge, tabac, diabète, antiHT, PAS, cholestérol total & HDL)
selon une méthode standardisée.
Bornage de l'âge vasculaire entre 30 et 80 ans

Jean-Jacques Mourad, Alain Michault, Marilucy Lopez-Sublet, Sylvain Le Jeune, Hervé Le Clesiau
CHU Avicenne, AP-HP et Université Paris 13 (EA3412) et Centre de Santé, CPAM 93, Bobigny, France.

RESULTATS

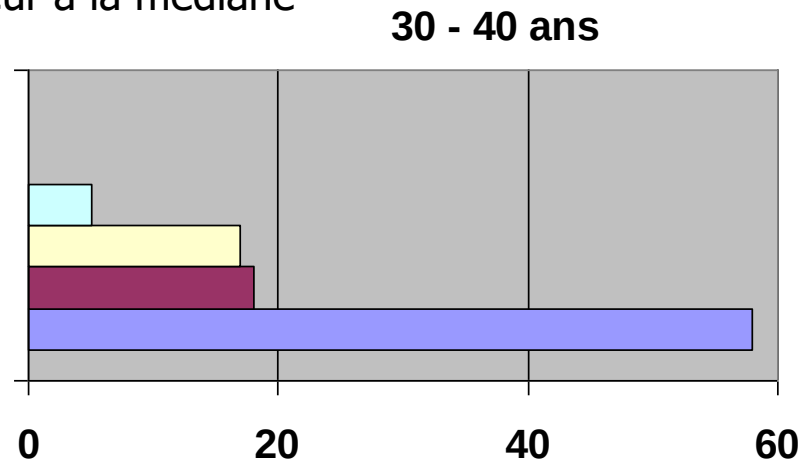
28% des hommes et 13% des femmes sont fumeurs actifs

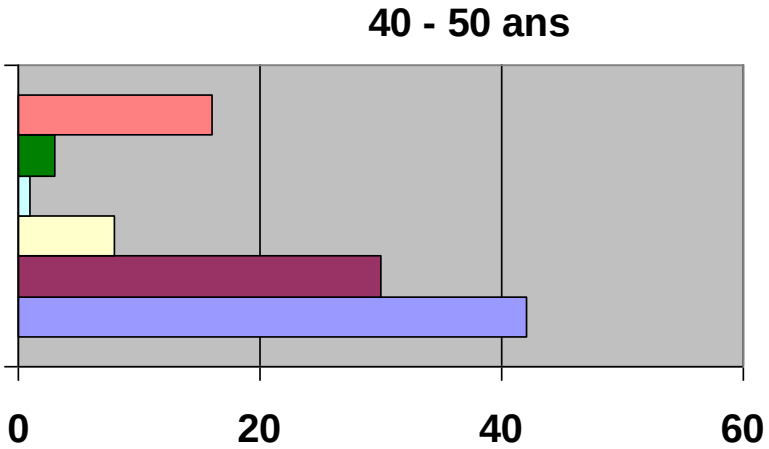
15% des hommes et 16% des femmes ont un âge vasculaire >80ans, alors que moins de 5% de la population explorée est âgée de 70 à 75 ans

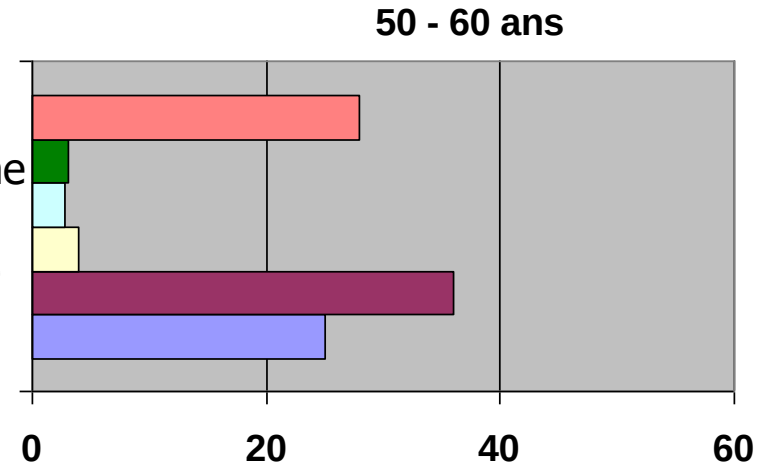
Écart de 7 à 10 ans entre âge civil et âge vasculaire pour les classes d'âge à partir de 40 ans chez les hommes, et au delà de 50 ans chez les femmes

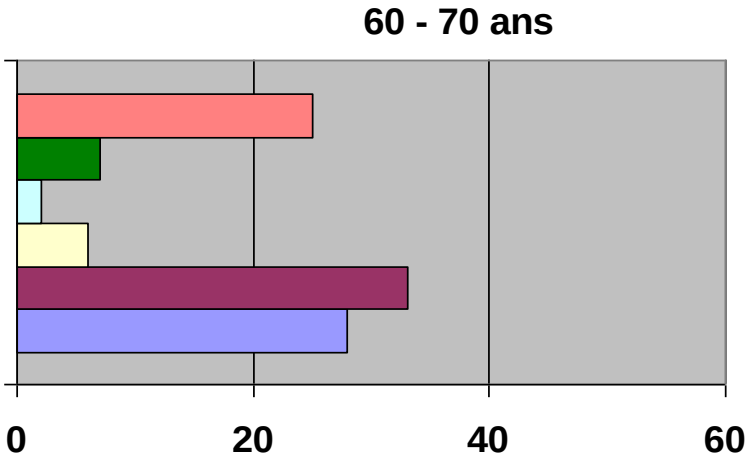
	HOMMES		FEMMES	
Classes d'âge civil	Age civil moyen	Age vasculaire moyen	Age civil moyen	Age vasculaire moyen
30-34	32.0	35.9	32.0	31.2
35-39	37.0	40.8	37.0	35.8
40-44	41.9	49.1	42.0	43.1
45-49	47.0	53.8	47.0	49.8
50-54	51.9	60.2	52.0	60.6
55-59	57.1	68.7	56.8	66.9
60-64	61.8	71.7	61.7	70.4
65-69	66.8	75.1	66.7	75.0
70-74	71.6	78.3	71.9	77.2
75-79	75.0	79.2	75.0	78.7

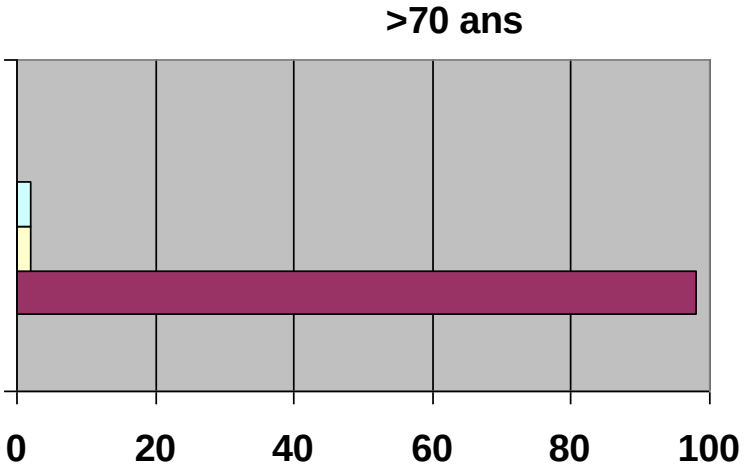
L'analyse des données selon l'algorithme CHAID (application PASW Modeler-Clémentine sur SPSS) permet de montrer le poids relatif de l'hypertension, du tabagisme actif, du diabète, d'un cholestérol total>2g/l ou d'un HDL<0.5 g/l dans l'existence d'un delta âge artériel / âge civil supérieur à la médiane









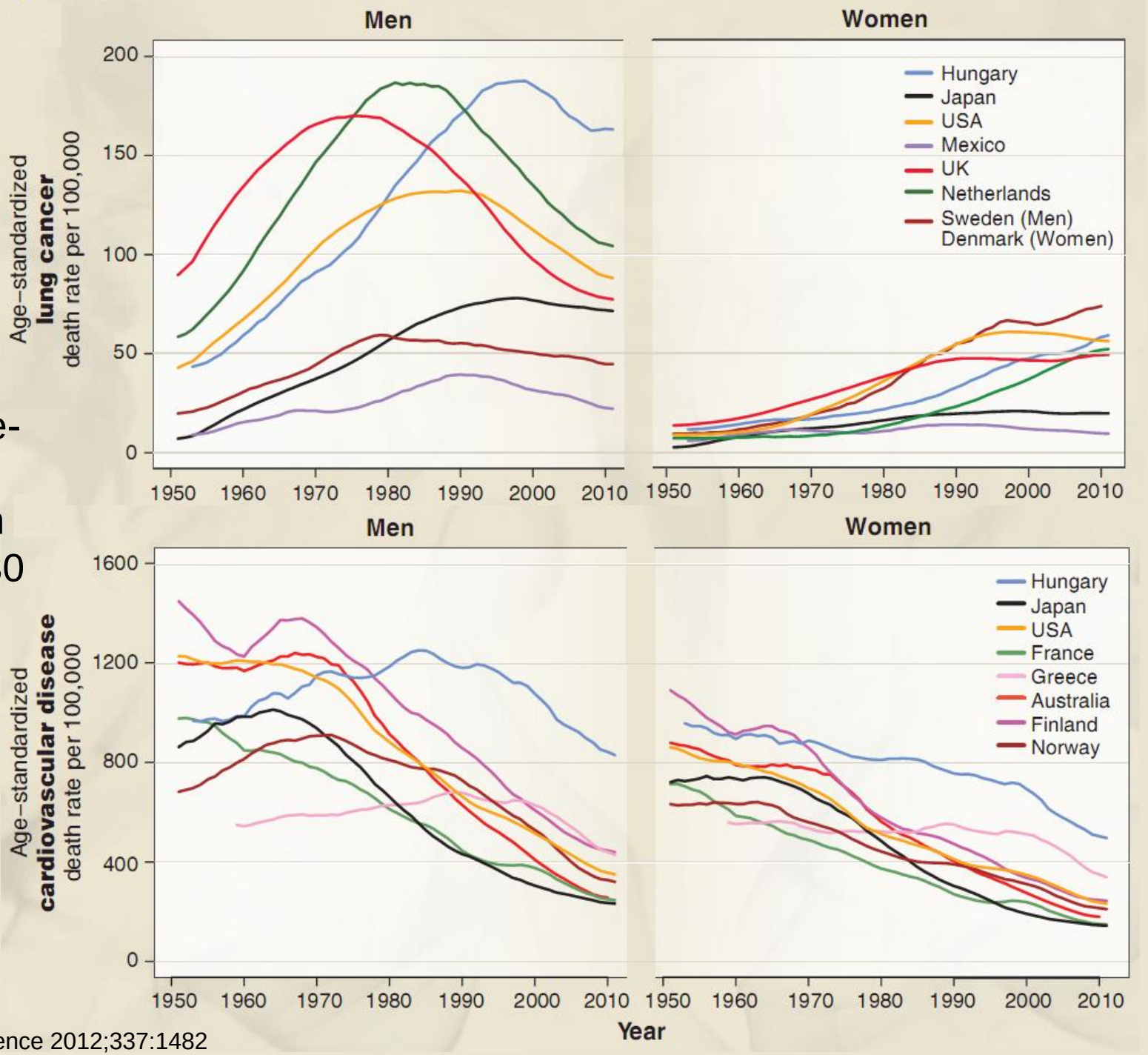


Tabac
PAS>140 mmHg
HDL<0,5g/l
Chol ttl>2g/l
Sexe Masculin
Diabète

La stratégie des actions de prévention

Gérer le risque

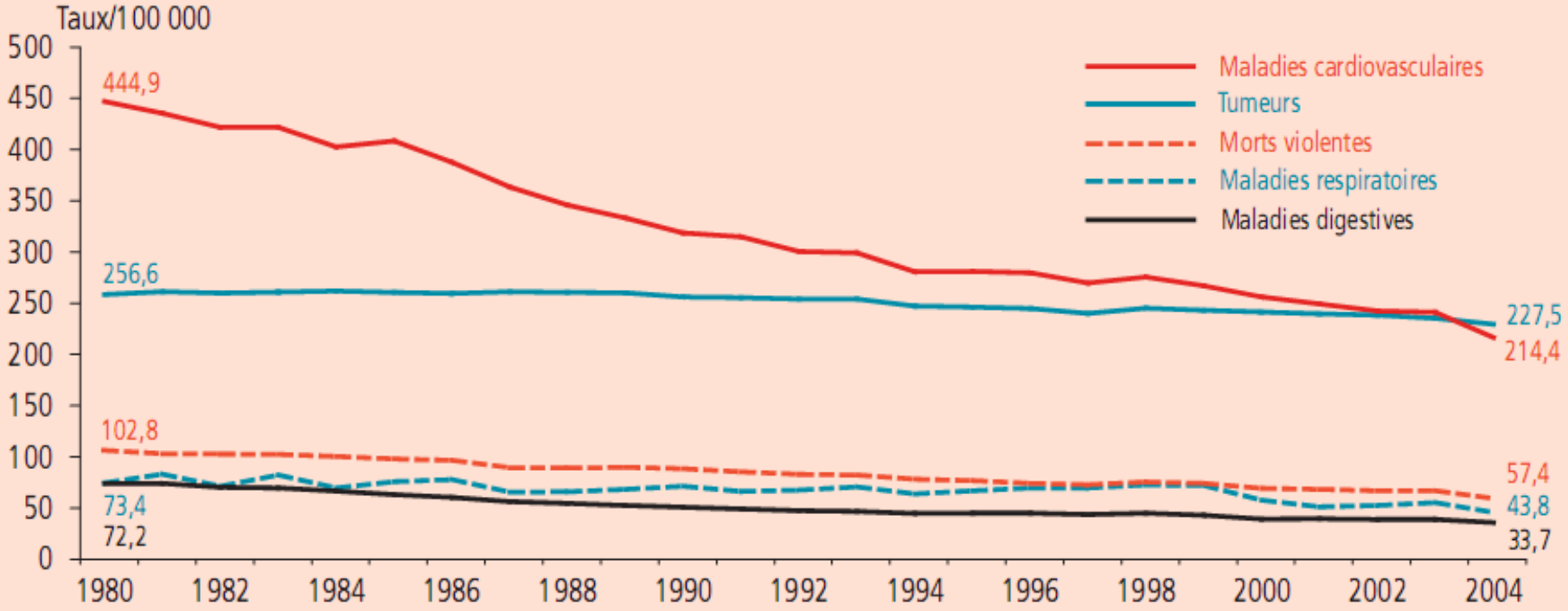
Trends in age-standardized death rates in adults age ≥30 years



Ezzati M, Riboli E. Science 2012;337:1482

Evolution des taux de décès

1980-2004, France métropolitaine, deux sexes

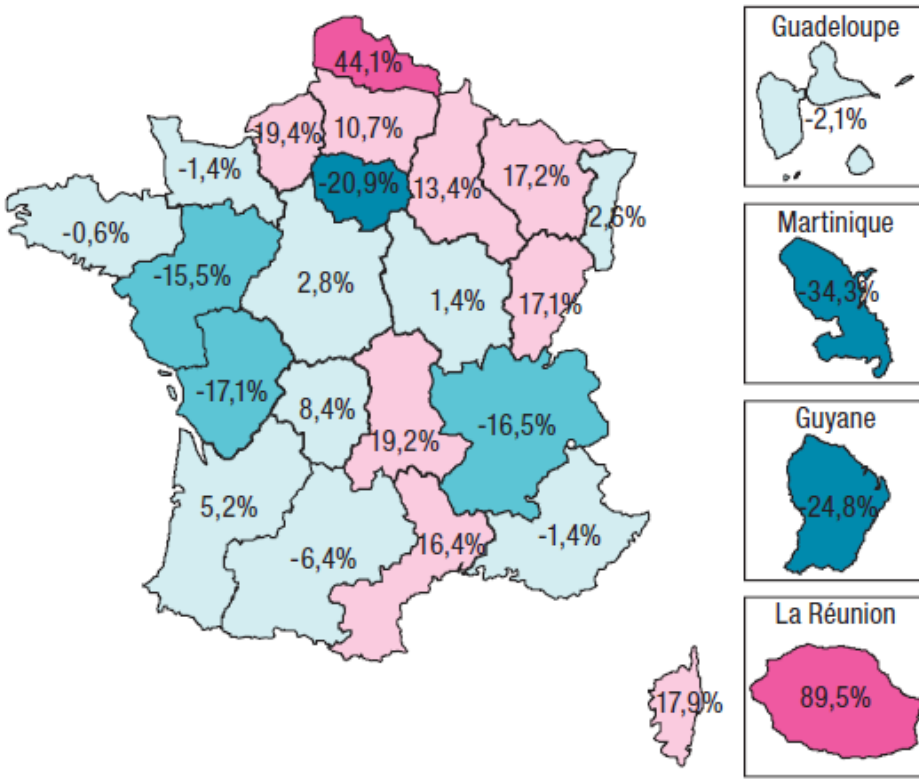


* Taux de décès standardisés pour 100 000

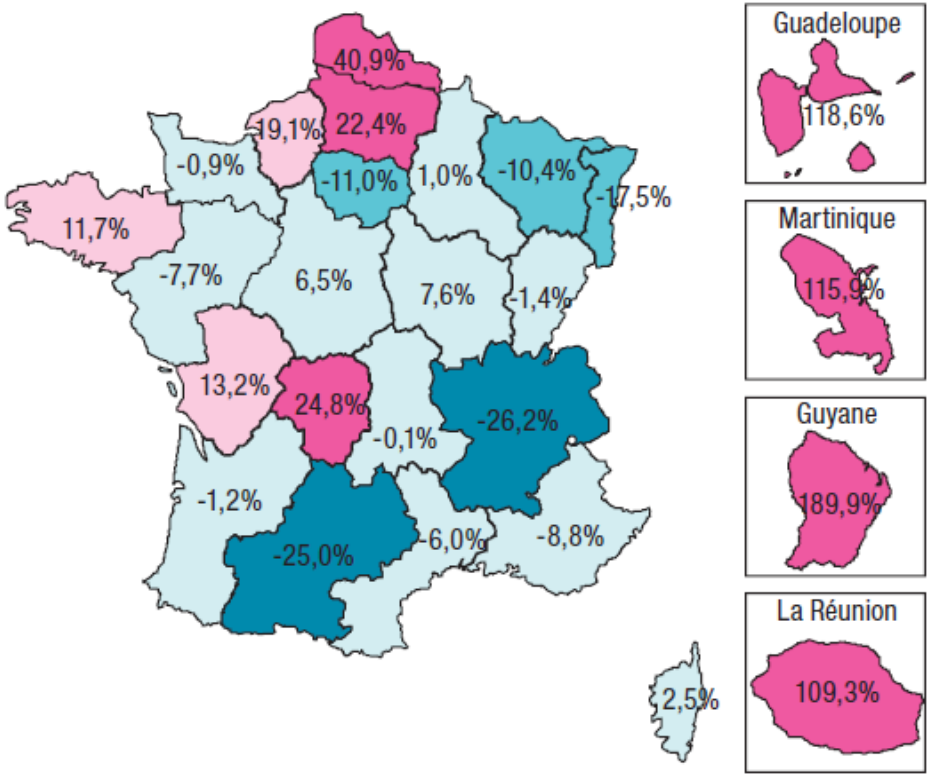
BEH Bulletin épidémiologique hebdomadaire
Septembre 2007

Disparités régionales de la mortalité cardiovasculaire prématurée

France (2008-2010)



Cardiopathies ischémiques

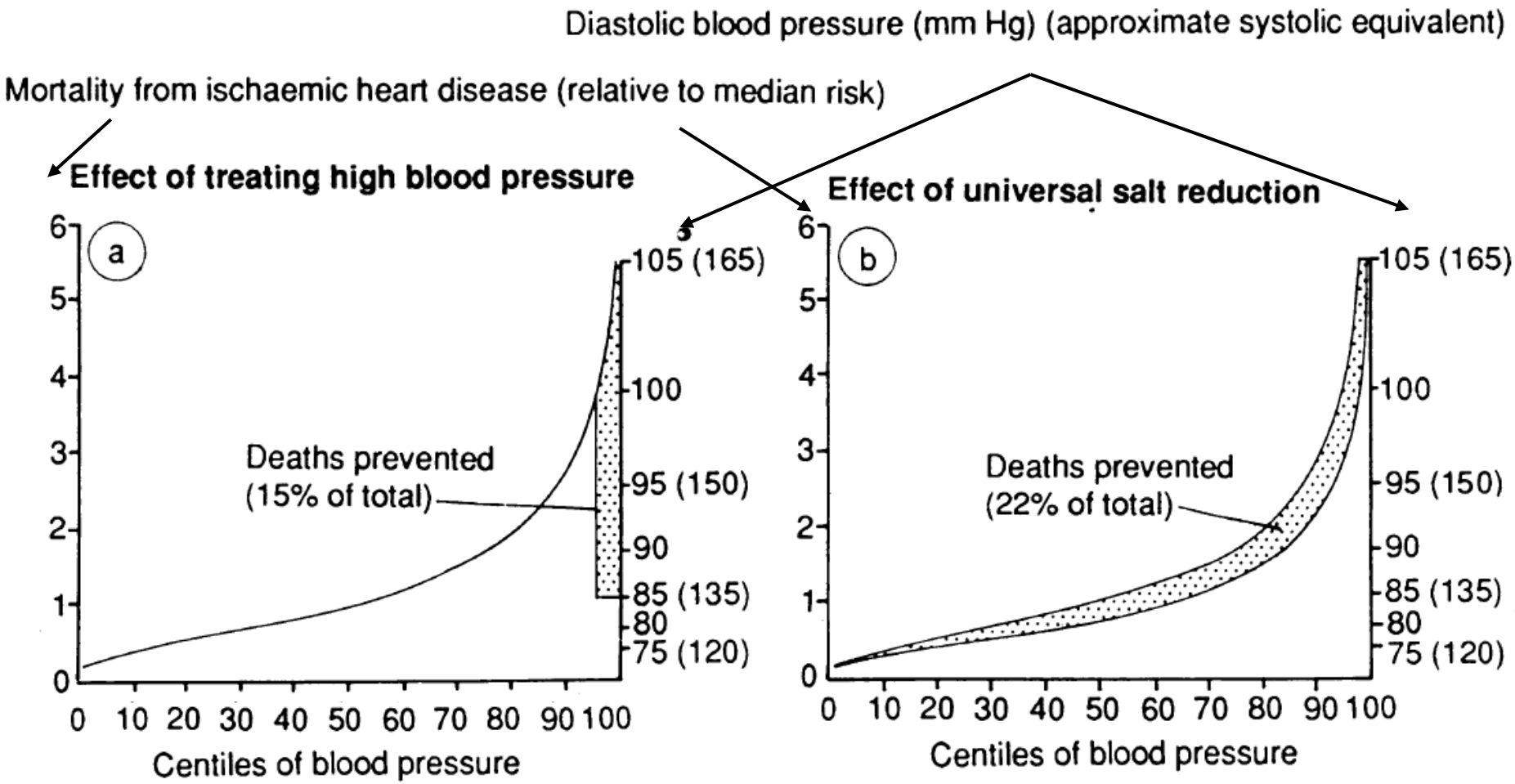


Accidents cérébro-vasculaires

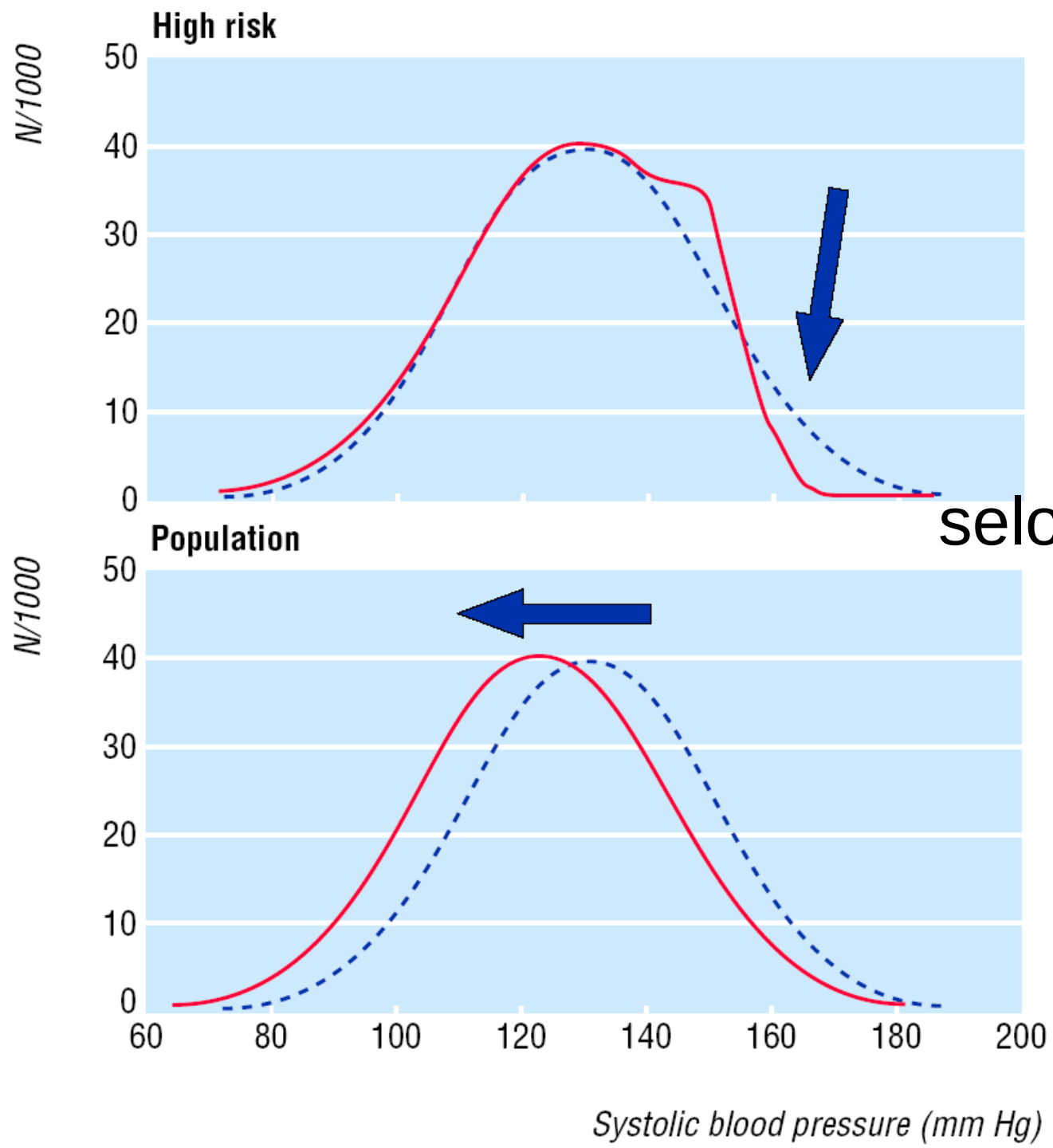
Gabet A, et al. BEH 2014;26:430-8

Comparaison des approches thérapeutiques et préventives

(monothérapie antihypertensive vs réduction de l'apport sodé de 9 à 6 g/j)



Law MR, et al. BMJ 1991;302:811-24

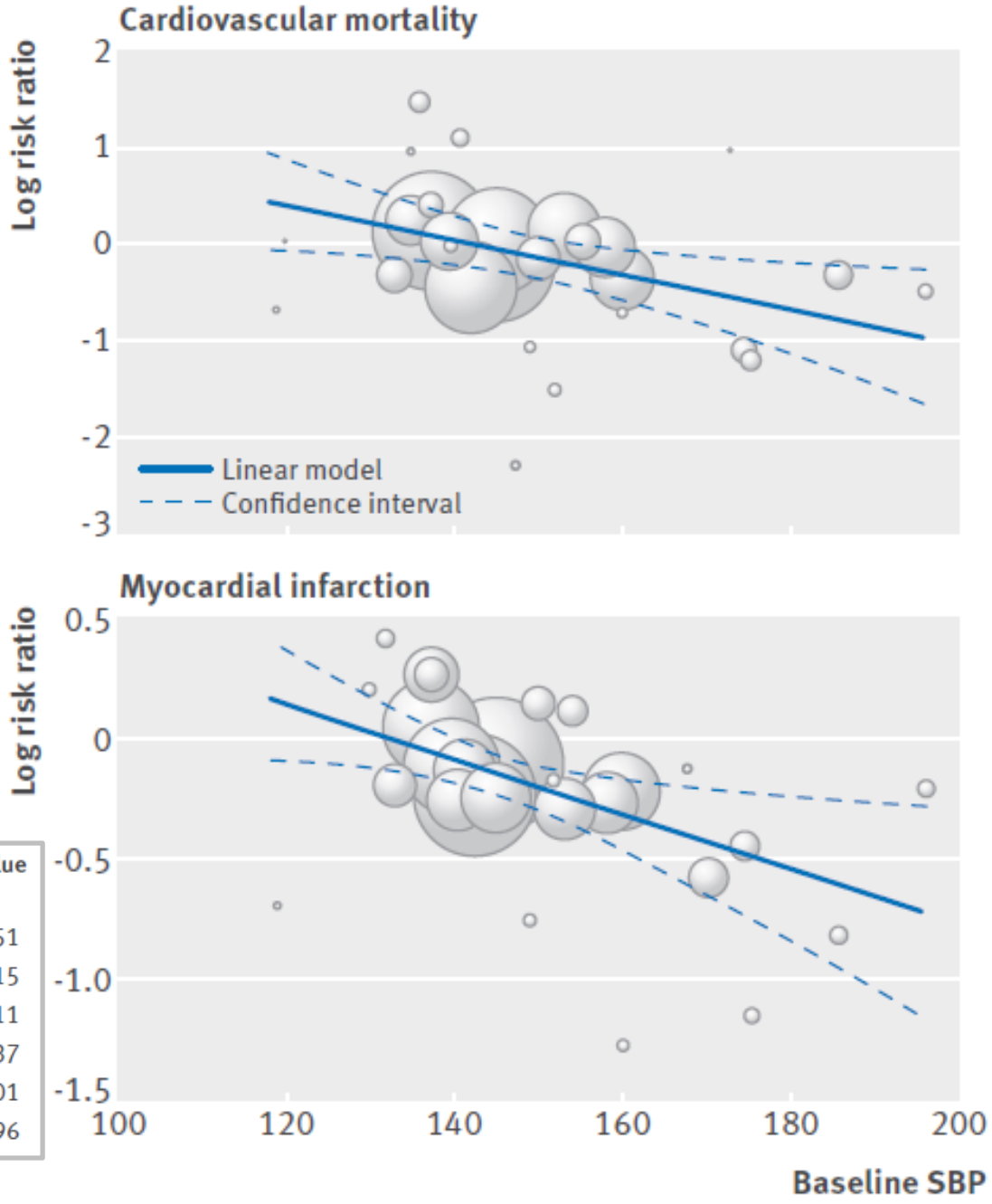


Impact sur une population idéale de deux stratégies de prévention :

selon que l'on vise le segment à haut-risque ou l'ensemble

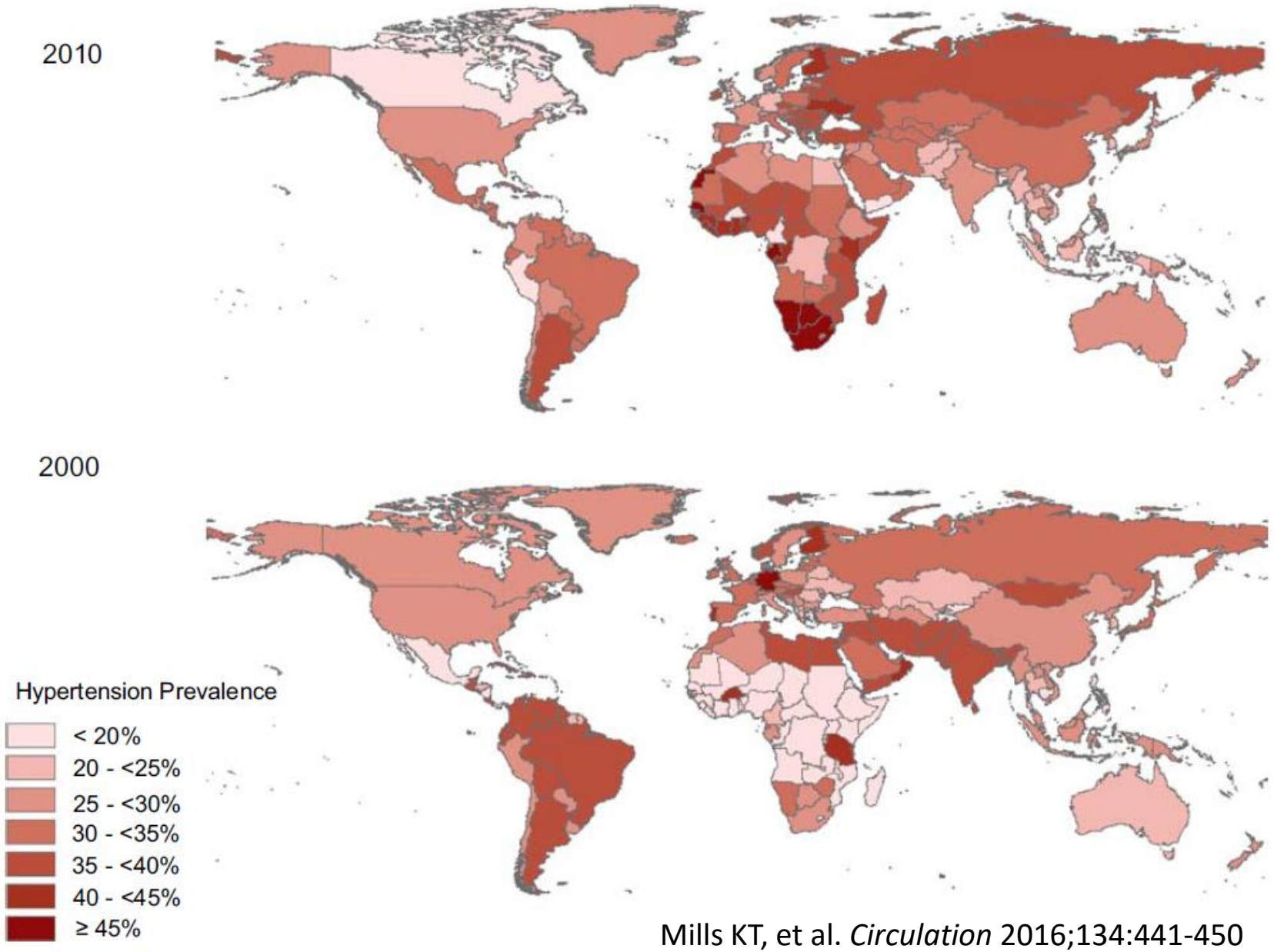
Metaregression analyses of treatment effect in relation to baseline SBP in patients with diabetes mellitus

RR expressed as change in treatment effect for each 10 mm Hg lower baseline SBP



Outcome	Relative risk (95% CI)	P value
Mortality	1.04 (0.98 to 1.10)	0.151
Cardiovascular mortality	1.15 (1.03 to 1.29)	0.015
Myocardial infarction	1.12 (1.03 to 1.22)	0.011
Stroke	1.07 (0.98 to 1.18)	0.137
Heart failure	1.05 (0.93 to 1.20)	0.401
End stage renal disease	1.05 (0.90 to 1.22)	0.496

Age- and sex-standardized prevalence of hypertension in adults 20 years and older



Mills KT, et al. *Circulation* 2016;134:441-450

Voluntary targets from the WHO Global Action Plan for the Prevention and Control of NCDs 2013–2020

- A **25%** relative reduction in risk of premature mortality from cardiovascular disease, cancer, diabetes, chronic respiratory diseases

- At least **10%** relative reduction in the harmful use of alcohol, as appropriate

- A **10%** relative reduction in prevalence of insufficient physical activity

- A **30%** relative reduction in mean population intake of salt/sodium

- A **30%** relative reduction in prevalence of current tobacco use in persons aged 15+ years

- A **25%** relative reduction in the prevalence of raised blood pressure or contain the prevalence of raised blood pressure

- **Halt the rise** in diabetes and obesity

- At least **50%** of eligible people receive drug therapy and counselling to prevent heart attacks and strokes

- An **80%** availability of the affordable basic technologies and essential medicines, including generics, required to treat major noncommunicable diseases in both public and private facilitities

Community Outreach and Cardiovascular Health (COACH) Trial

A Randomized, Controlled Trial of Nurse Practitioner/Community Health Worker Cardiovascular Disease Risk Reduction in Urban Community Health Centers

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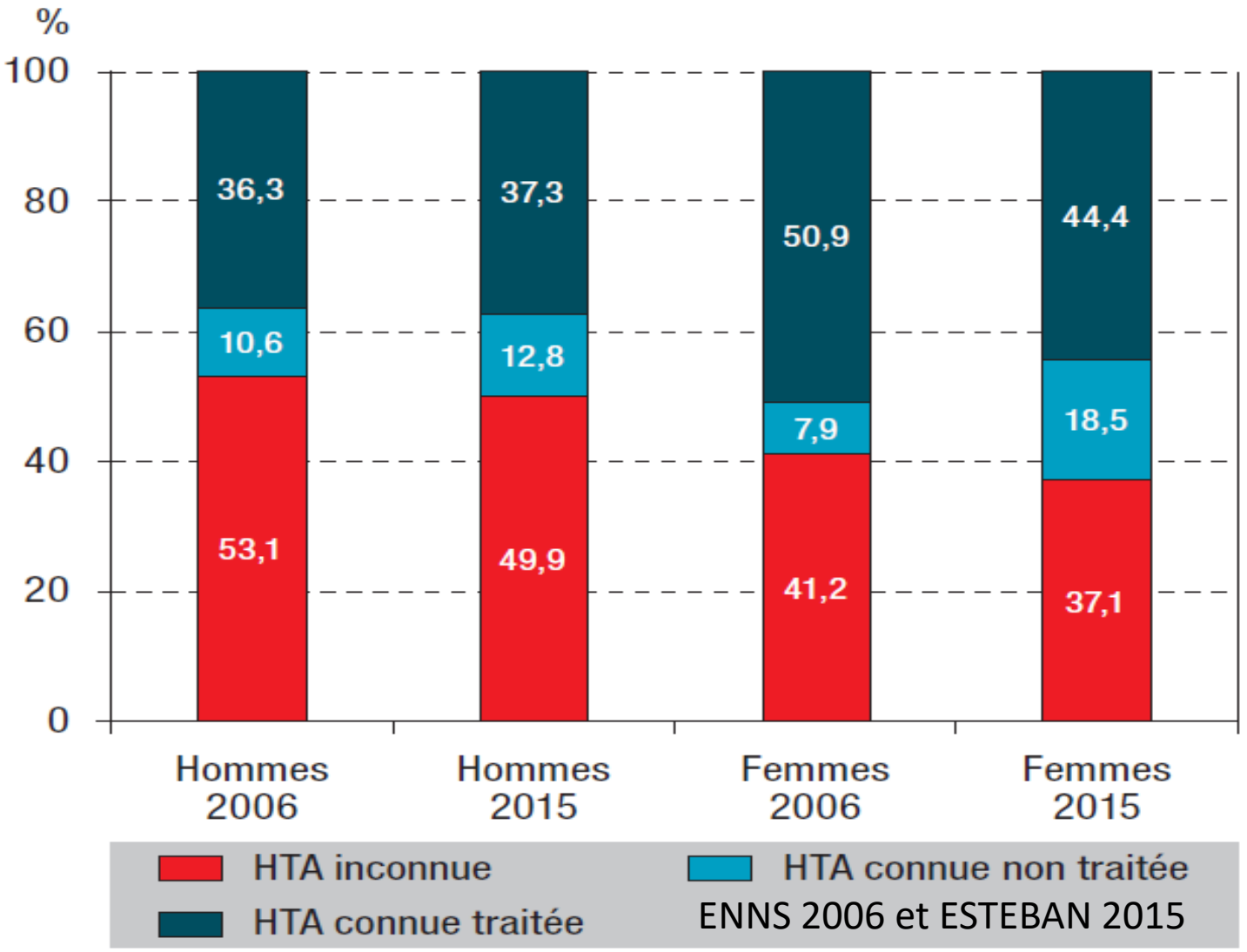
Circ Cardiovasc Qual Outcomes 2011;4;595-602

nurse practitioner /community health worker (NP/CHW) teams versus enhanced usual care (EUC)

Conclusions—An intervention delivered by an NP/CHW team using individualized treatment regimens based on treat-to-target algorithms can be an effective approach to improve risk factor status and perceptions of chronic illness care in high-risk patients.

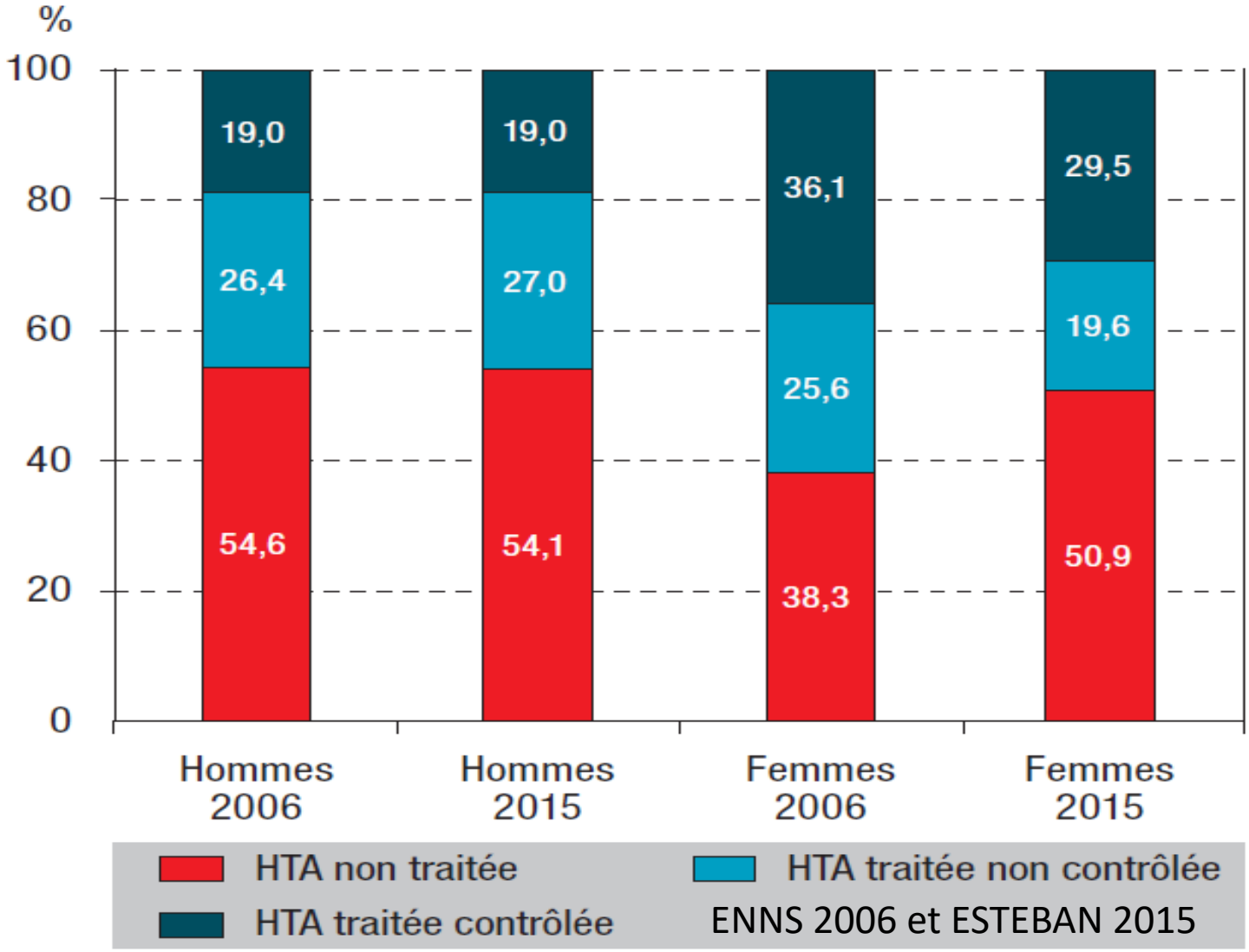
Clinical Trial Registration—URL: http://www.clinicaltrials.gov. Unique identifier: NCT00241904.

Prévalence de l'hypertension en France - ESTEBAN



Perrine AL & al. Bull. Epidémiol. Hebd. 2018;10:170-9

Prévalence de l'hypertension en France - ESTEBAN



Perrine AL & al. Bull. Epidémiol. Hebd. 2018;10:170-9

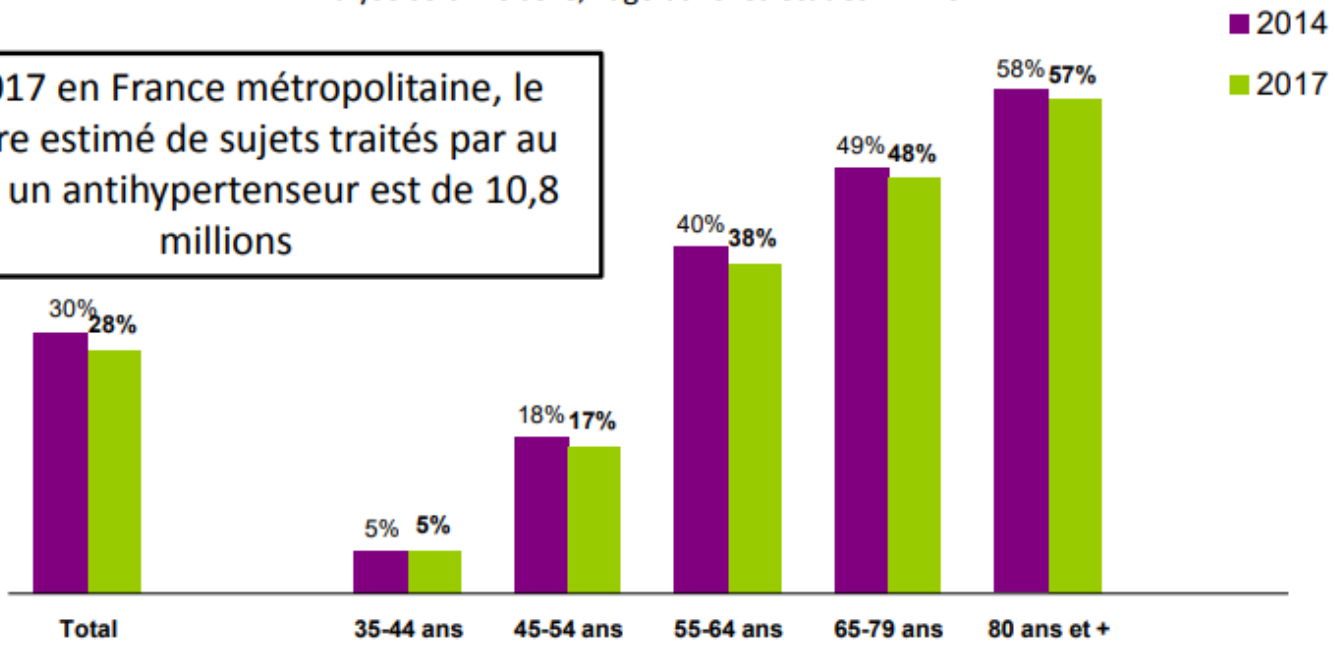
Prévalence de l'hypertension en France - FLASHS

FLAHS
2014
2017

Prise d'un médicament pour l'hypertension artérielle en 2014 et 2017

Analyse selon le sexe, l'âge dans les études FLAHS

En 2017 en France métropolitaine, le nombre estimé de sujets traités par au moins un antihypertenseur est de 10,8 millions



Effectifs 2014	3562	900	907	676	576	503
Effectifs 2017	4783	1227	1228	902	763	663

Q1 : Actuellement, prenez-vous un médicament pour traiter l'hypertension artérielle ?

Enquête FLAHS 2014- French League Against Hypertension Survey
Enquête FLAHS 2017- French League Against Hypertension Survey

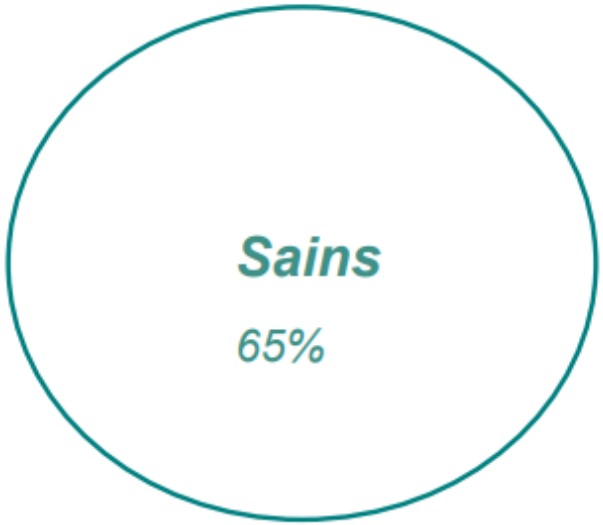
www.comitehta.org

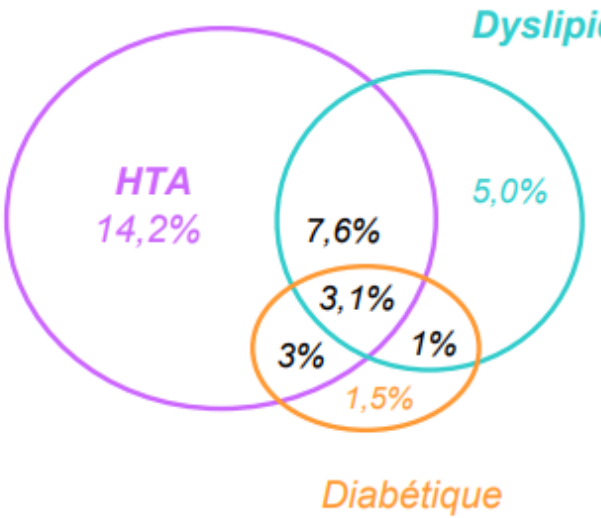
Prévalence de l'hypertension en France - FLASHS

FLAHS 2017

Traitement de l'HTA, du diabète, de la dyslipidémie chez les 35 ans et plus

En 2017 : 13,7 millions de sujets traités pour au moins un des 3 pathologies





HTA : 27,9 %	10,823 millions [9,9-11,8]
Dyslipidémie : 16,6 %	6,439 millions [5,4-7,5]
Diabète : 8,5 %	3,297 millions [3,2-3,4]

Q1 : Actuellement, prenez-vous un médicament pour traiter l'hypertension artérielle?
Q6 : Actuellement, prenez-vous un médicament pour traiter le cholestérol?
Q7 : Actuellement, prenez-vous un médicament pour traiter le diabète?

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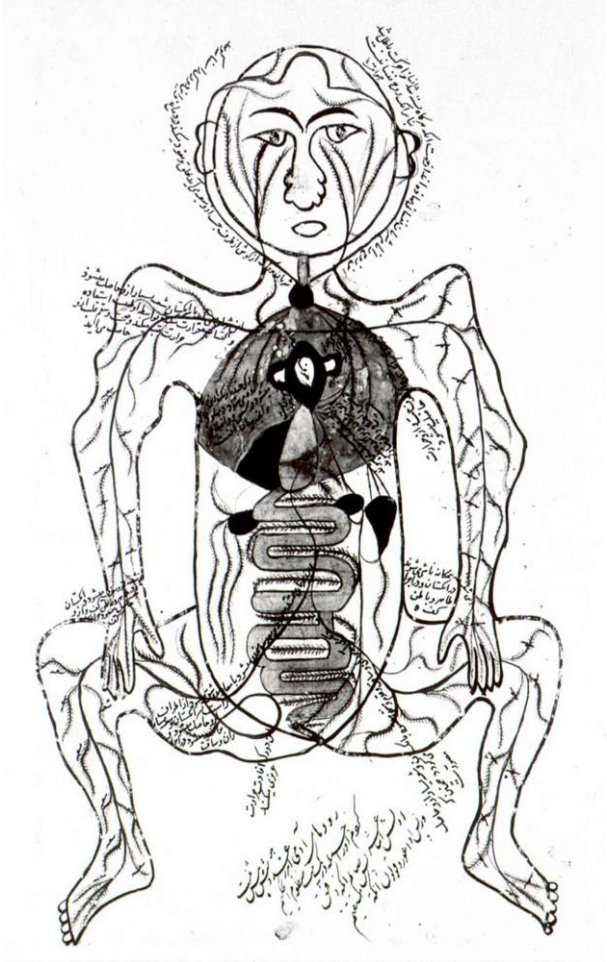
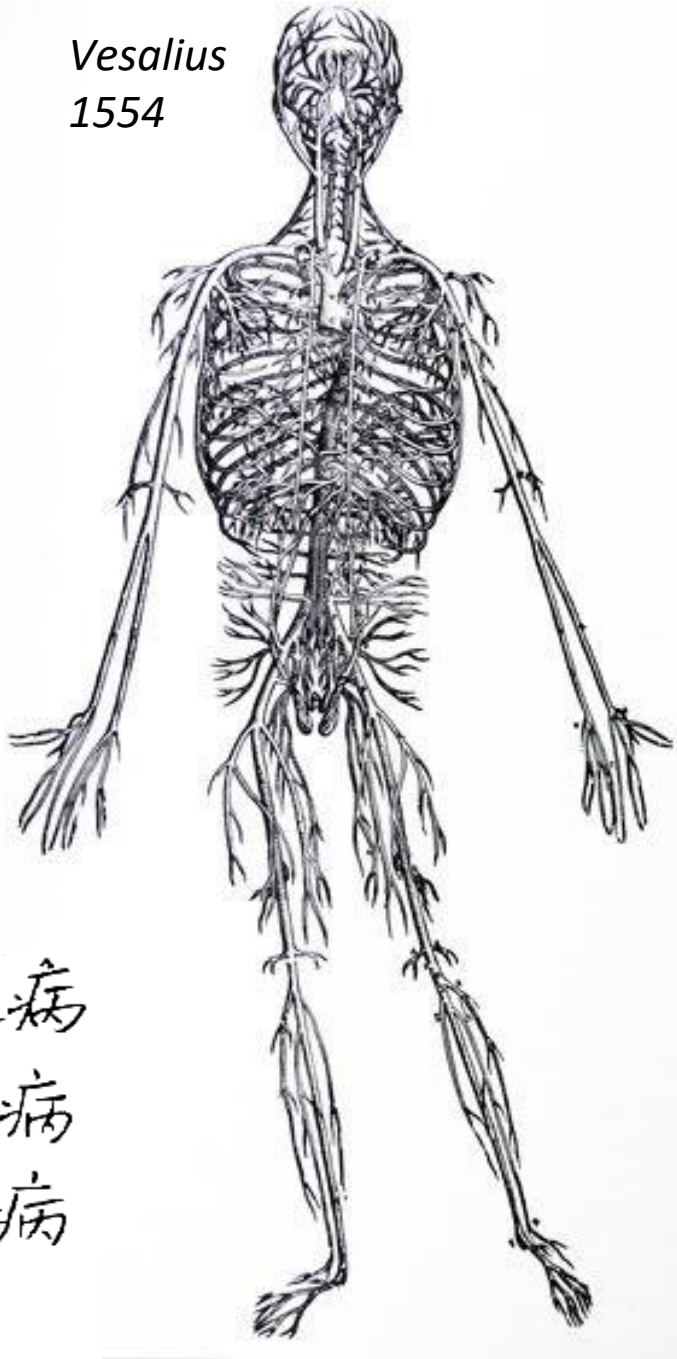
Ensemble des individus âgés de 35 ans et plus (n=4783)

Muhammad ibn Ahmad ibn Yusuf ibn Ilyas
~1390



Vesalius
1554



上医医未病之病
中医医将病之病
下医医已病之病

Huang Dee Nai-Chan ～黄帝：内経～
~ 2600 BC