Invecchiamento e sistema cardiovascolare

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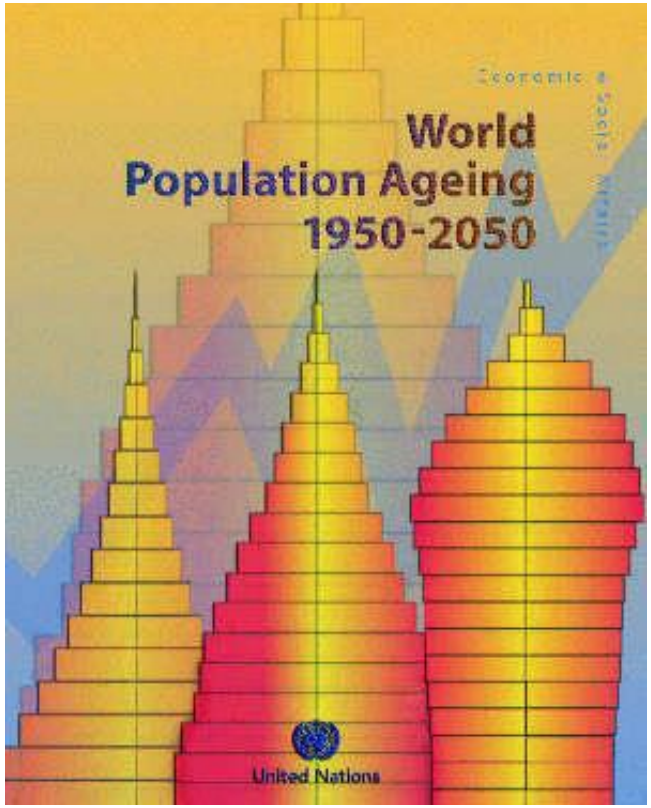


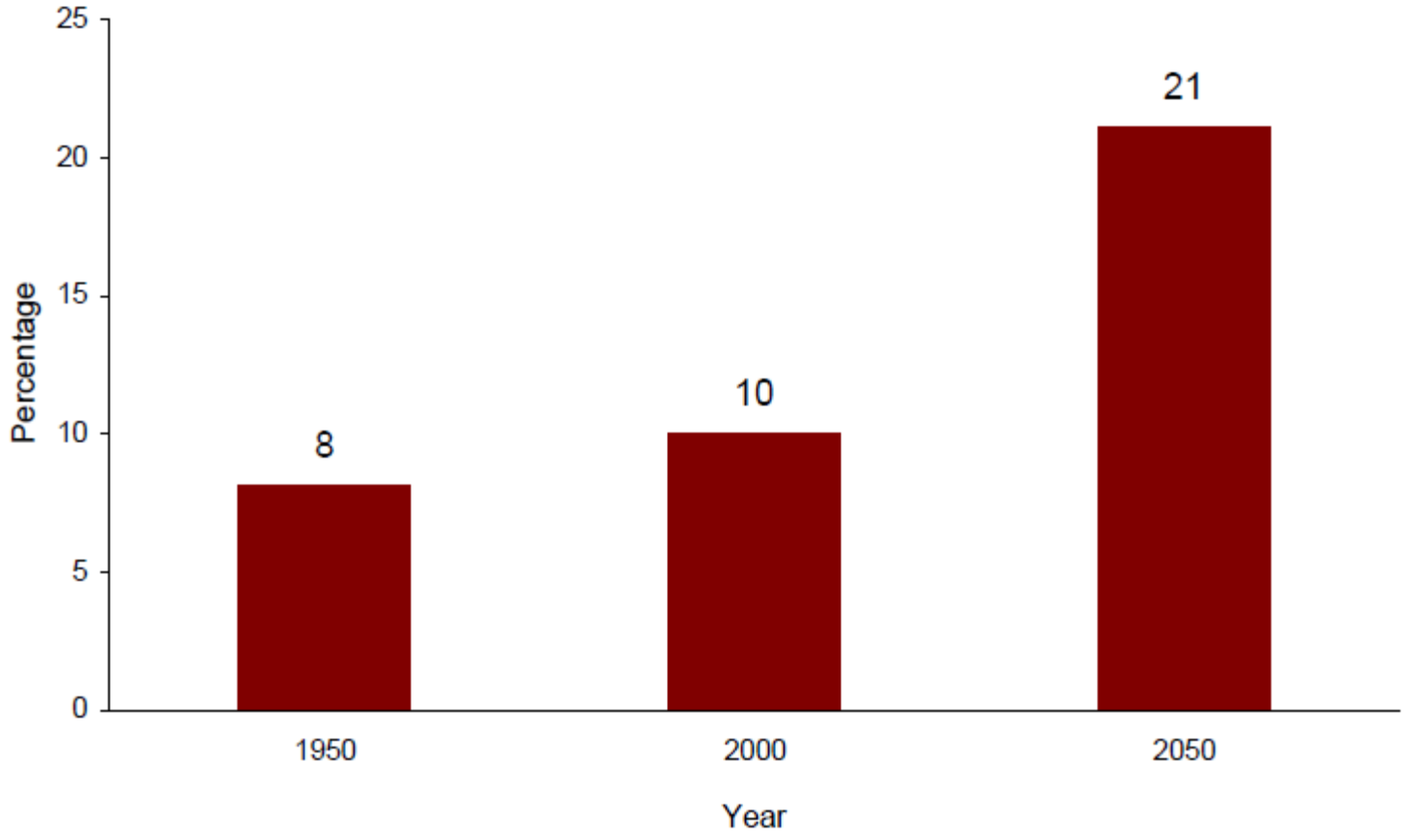
Invecchiamento della popolazione

UN Dept. of Economic and social affairs, population division report

Si tratta di un fenomeno:

- **Senza precedenti:** nella storia umana e nel 21° secolo questo fenomeno sarà più rapido che nel secolo precedente.
- **Pervasivo:** globale anche se con diversa rapidità tra diverse nazioni ed aree
- **Persistente**: non torneremo indietro alle popolazioni giovani che conoscevano i nostri predecessori
- **Con profonde implicazioni** per molti aspetti della vita umana

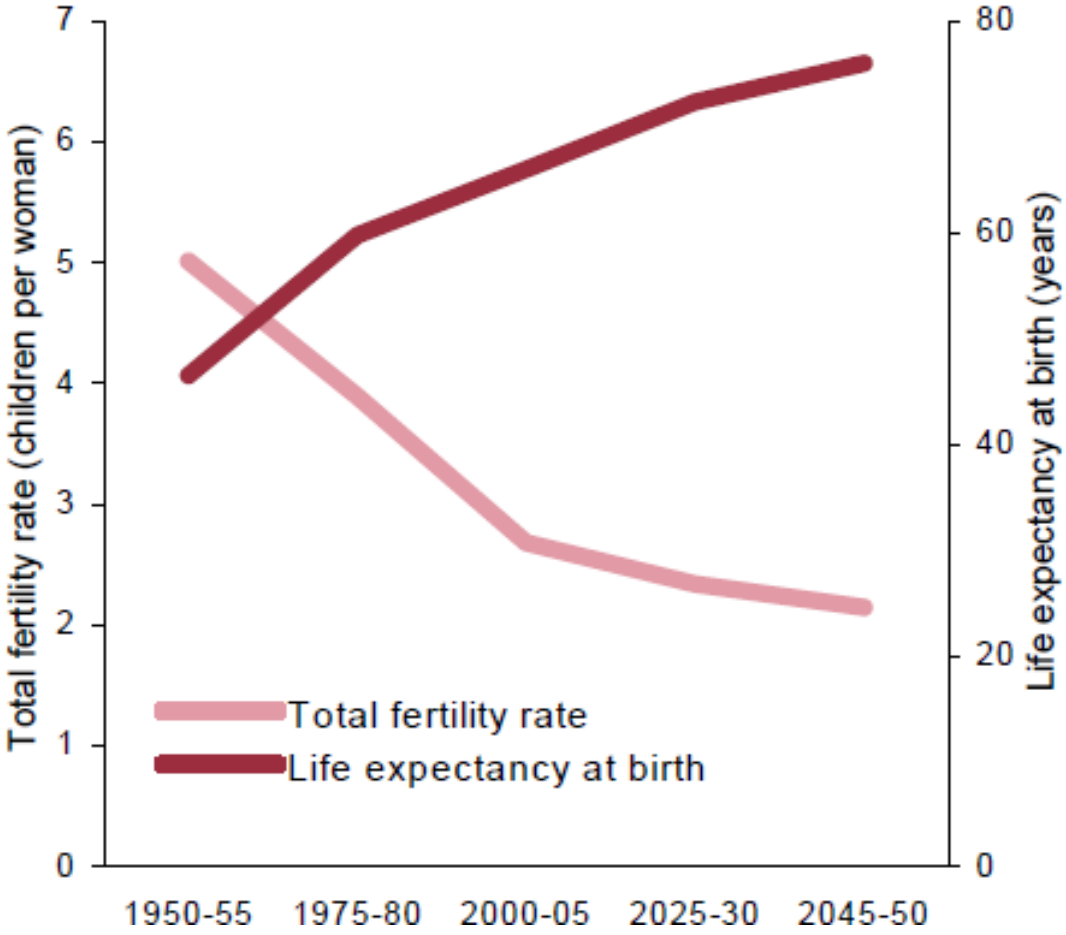
Percentuale di soggetti di età superiore ai 60 anni nel mondo: anni 1950 - 2050



UN report on World Population Ageing: 1950-2050

Cause dell'invecchiamento della popolazione

Figure 1. Total fertility rate and life expectancy at birth: world, 1950-2050

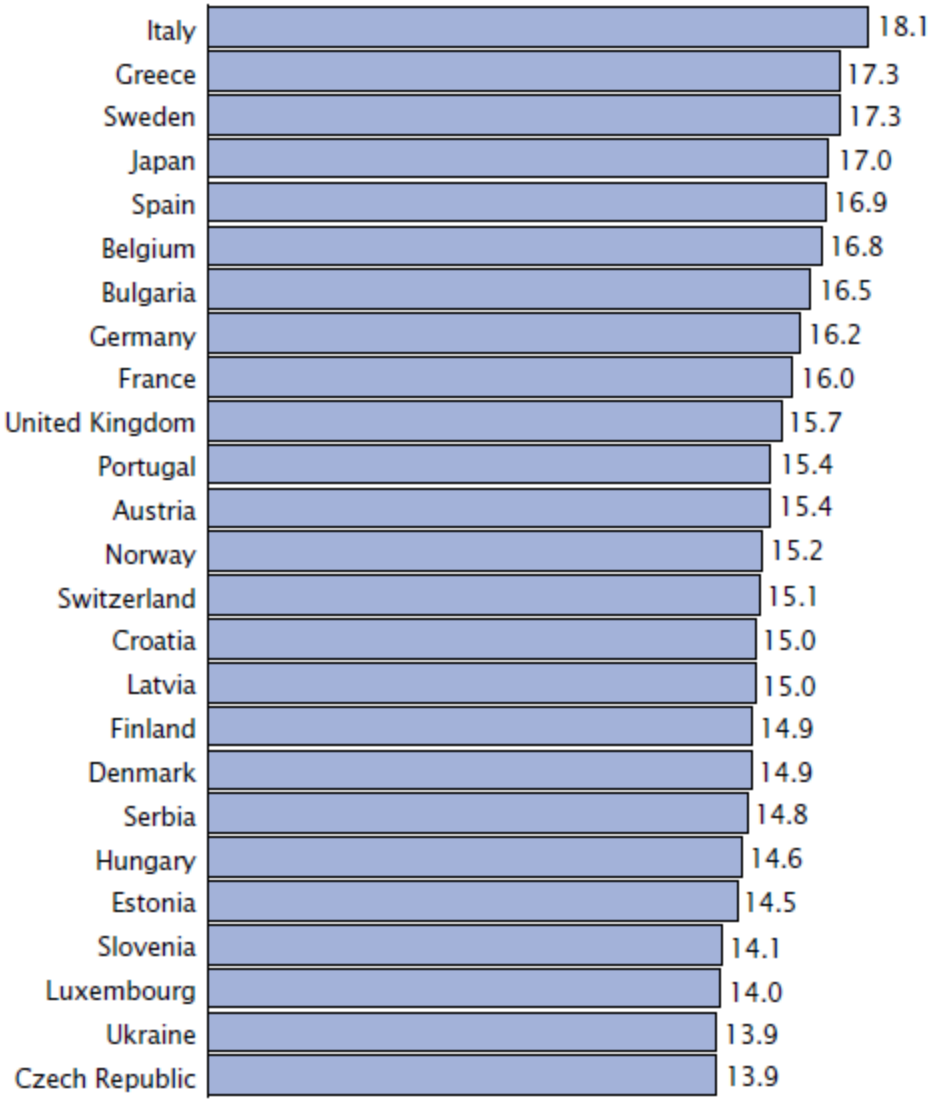


UN report on World Population Ageing: 1950-2050

Figure 2-3.

The World's 25 Oldest Countries: 2000

(Percent of population 65 years and over)

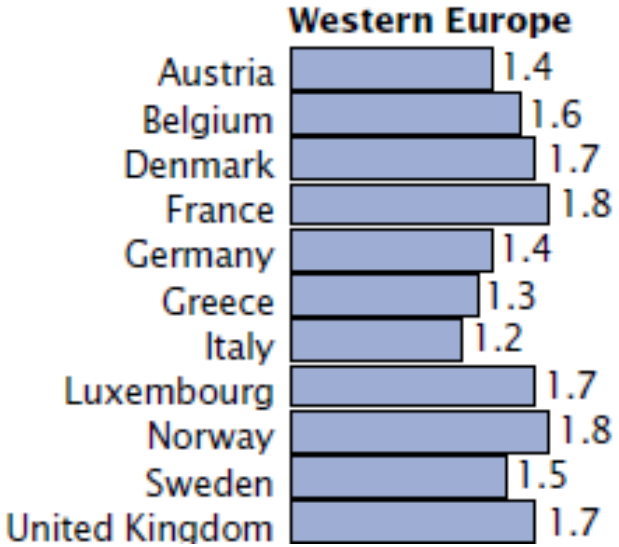


Source: U.S. Census Bureau, 2000a.

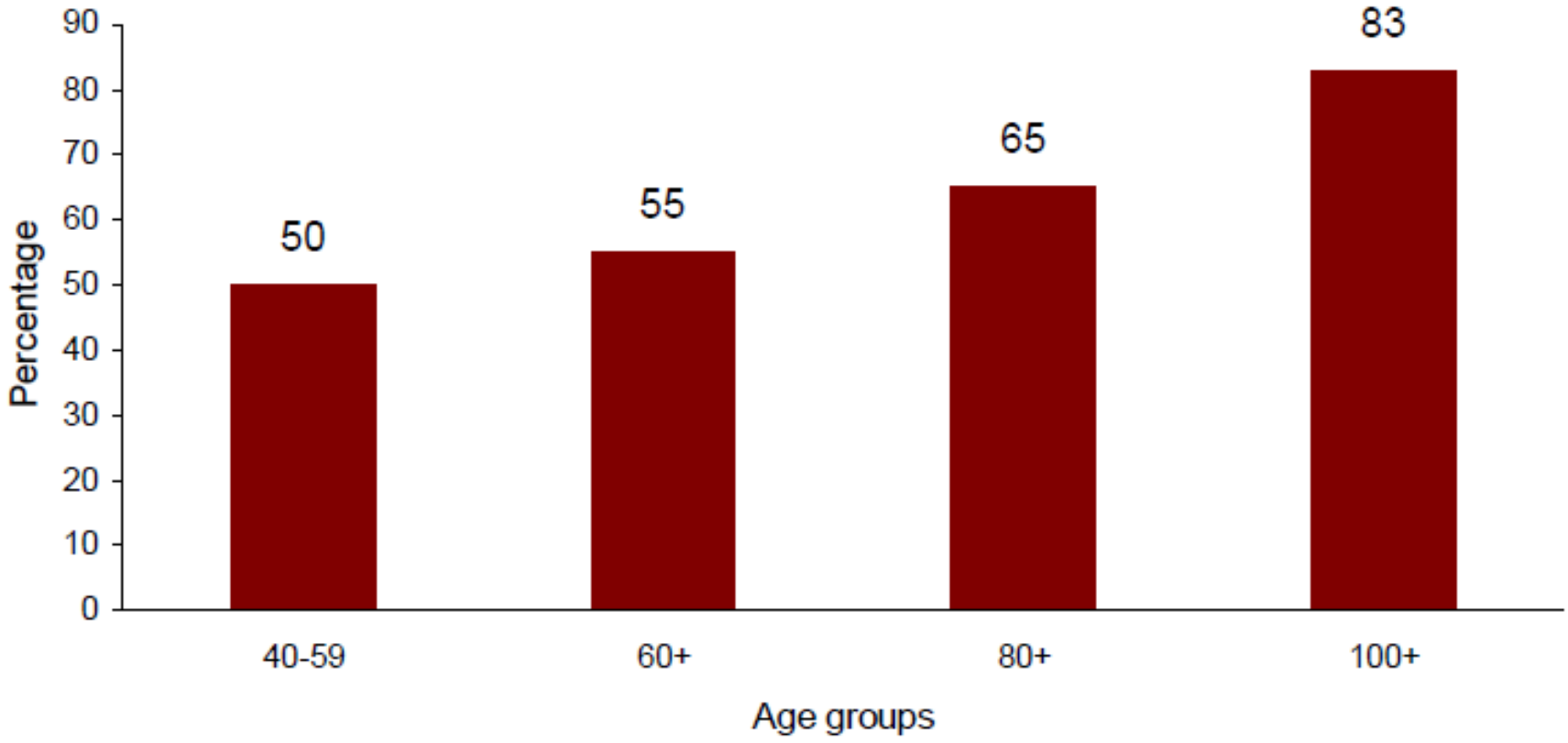
Figure 2-5.

Total Fertility Rate: 2000

(Births per woman)



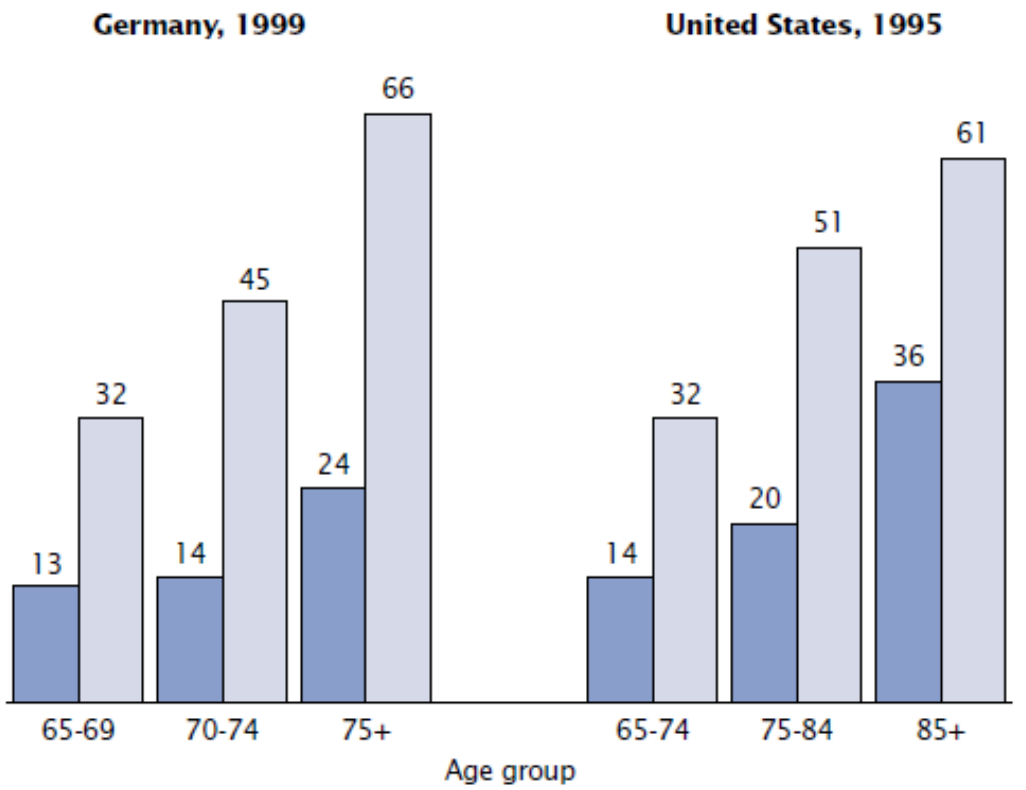
Le donne vivono più a lungo: percetuale di donne nei diversi gruppi di età



UN report on World Population Ageing: 1950-2050

Le donne vivono più a lungo e più spesso restano sole

Figure 7-1.
Percent of Elderly Living Alone in Germany and the United States by Available Age Groups



Source: National sources.

European Heart Journal (2014) **35**, 2950–2959
doi:10.1093/eurheartj/ehu299

SPECIAL ARTICLE

Cardiovascular disease in Europe 2014: epidemiological update

Melanie Nichols[1,2], Nick Townsend[1]*, Peter Scarborough[1], and Mike Rayner[1]

[1]British Heart Foundation Centre on Population Approaches for Non-Communicable Disease Prevention, Nuffield Department of Population Health, University of Oxford, Old Road Campus, Oxford OX3 7LF, UK; and [2]Population Health Strategic Research Centre, Faculty of Health, Deakin University, Geelong, Australia

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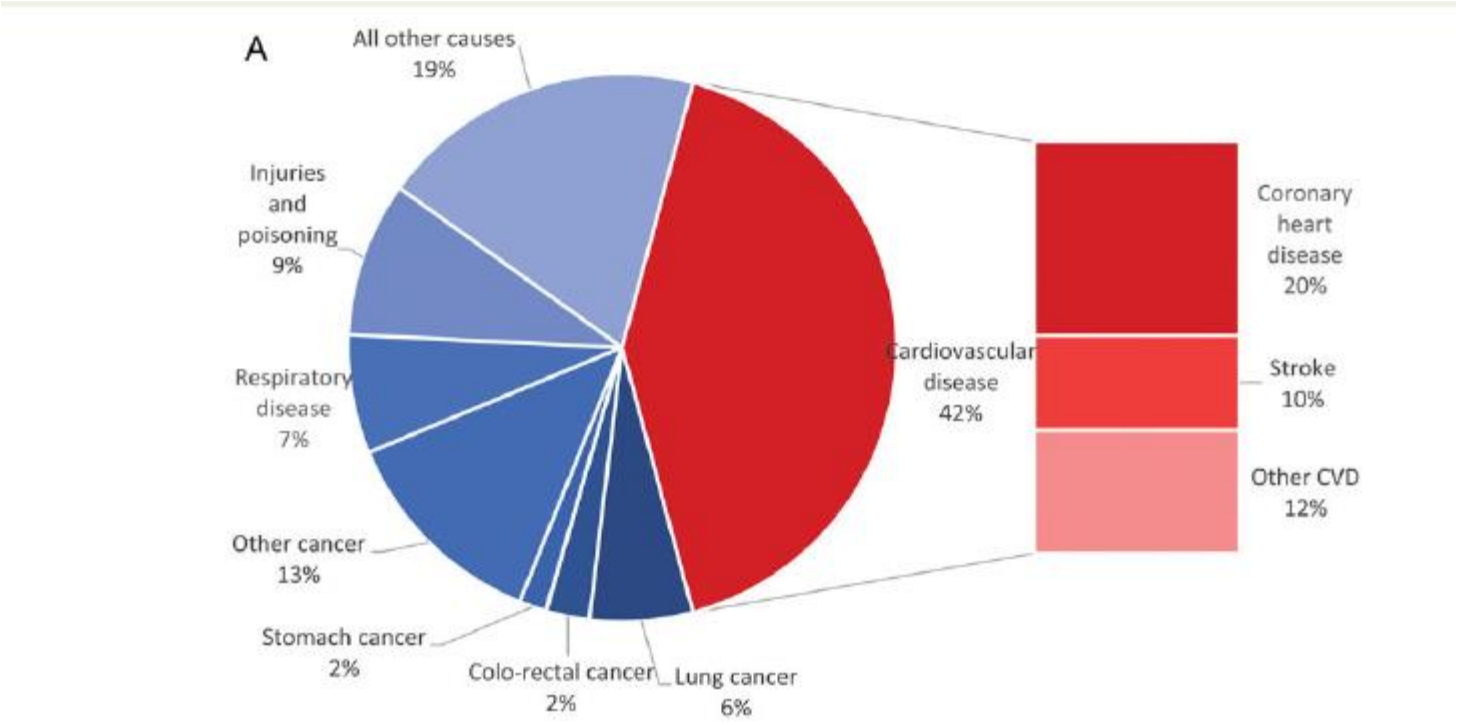

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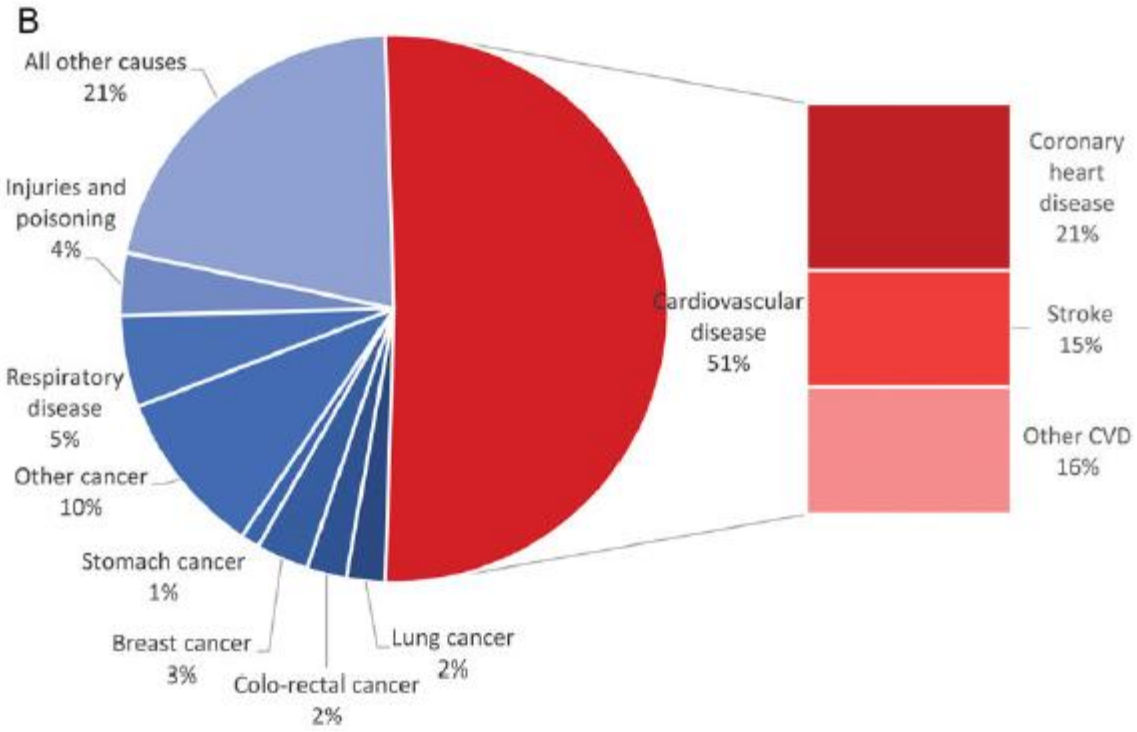


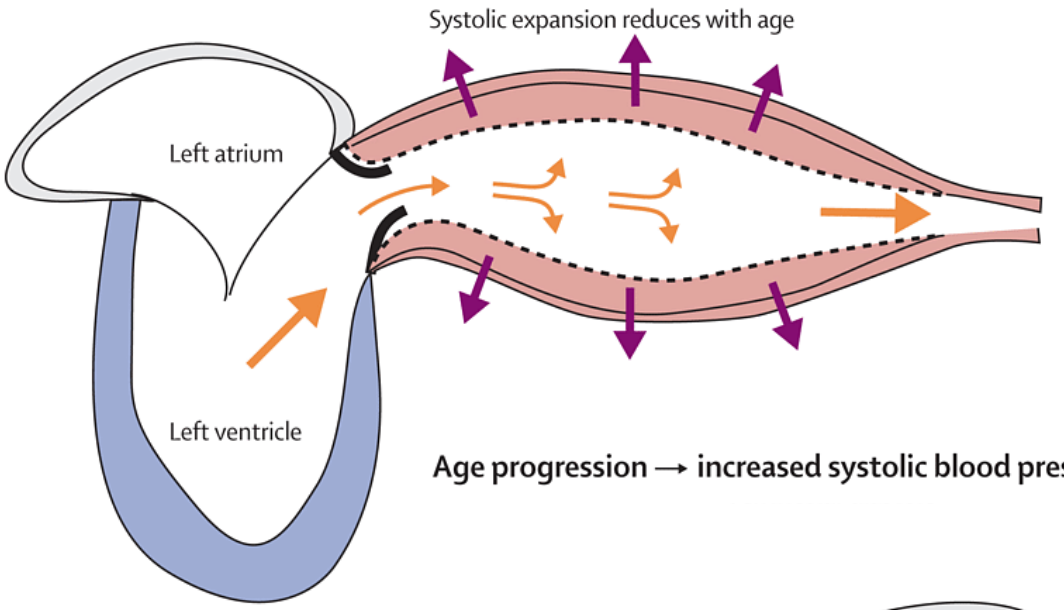
Modificazioni Cellulari Miocardiche Provocate dall'Invecchiamento

- Meccanismi molecolari
  - ↓ SR Ca^{++} ATPasi
  - ↑ pompa Na/Ca
  - ↓ α-MHC (catena pesante della miosina)
  - ↑ β-MHC (catena pesante della miosina)
  - ↓ RxR β1 (recettore della rianodina)
  - ↓ recettori ormone tiroideo
  - ↓ recettori β_1-adrenergici
  - ↓ fosforilazione fosfolambano
  - ↓ fosforilazione troponina I ↑ durata contrazione miocardica
- Contrazione miocardica
  - ↓ velocità di contrazione
  - ↑ durata potenziale d'azione
  - ↓ incremento Ca intracellulare durante la sistole

Modificazioni Vascolari con l'Invecchiamento

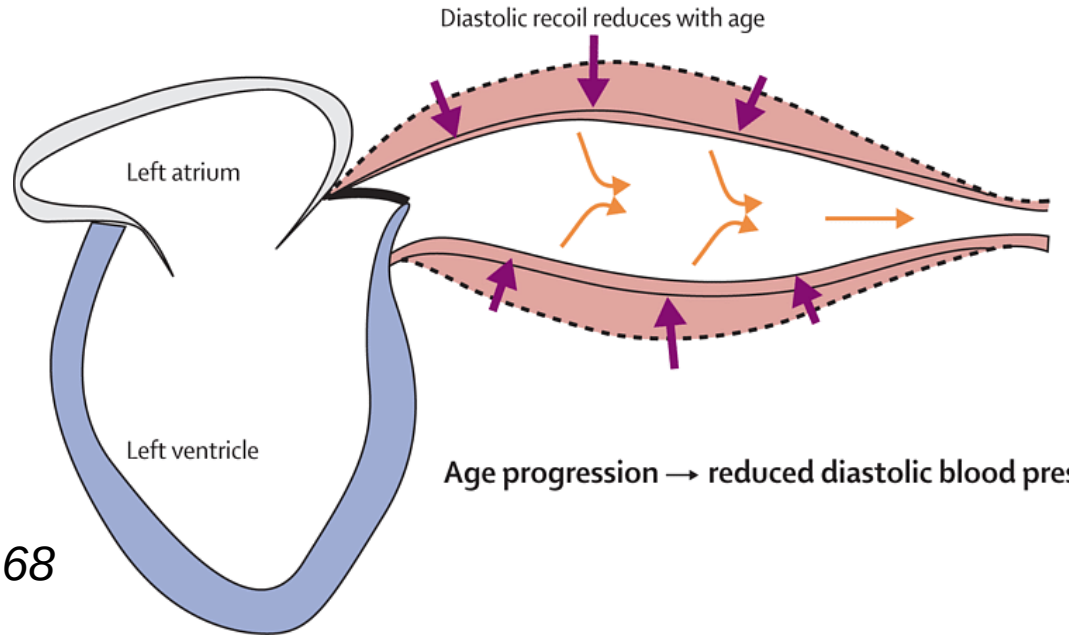
- **Danno funzionale**
  - ↓ produzione di NO: ↓ vasodilatazione endotelio-dipendente
- **Danno strutturale**
  - ↑ spessore intimale
  - ↑ rigidità vascolare
    - ↑collageno, ↓ elastina, fratture elastina, calcificazioni
    - ↓ pressione diastolica, ↑ pressione sistolica e differenziale
    - ↑ velocità dell'onda pulsatoria

Role of arterial compliance on blood pressure and effect of aging



Ventricular systole

Age progression → increased systolic blood pressure

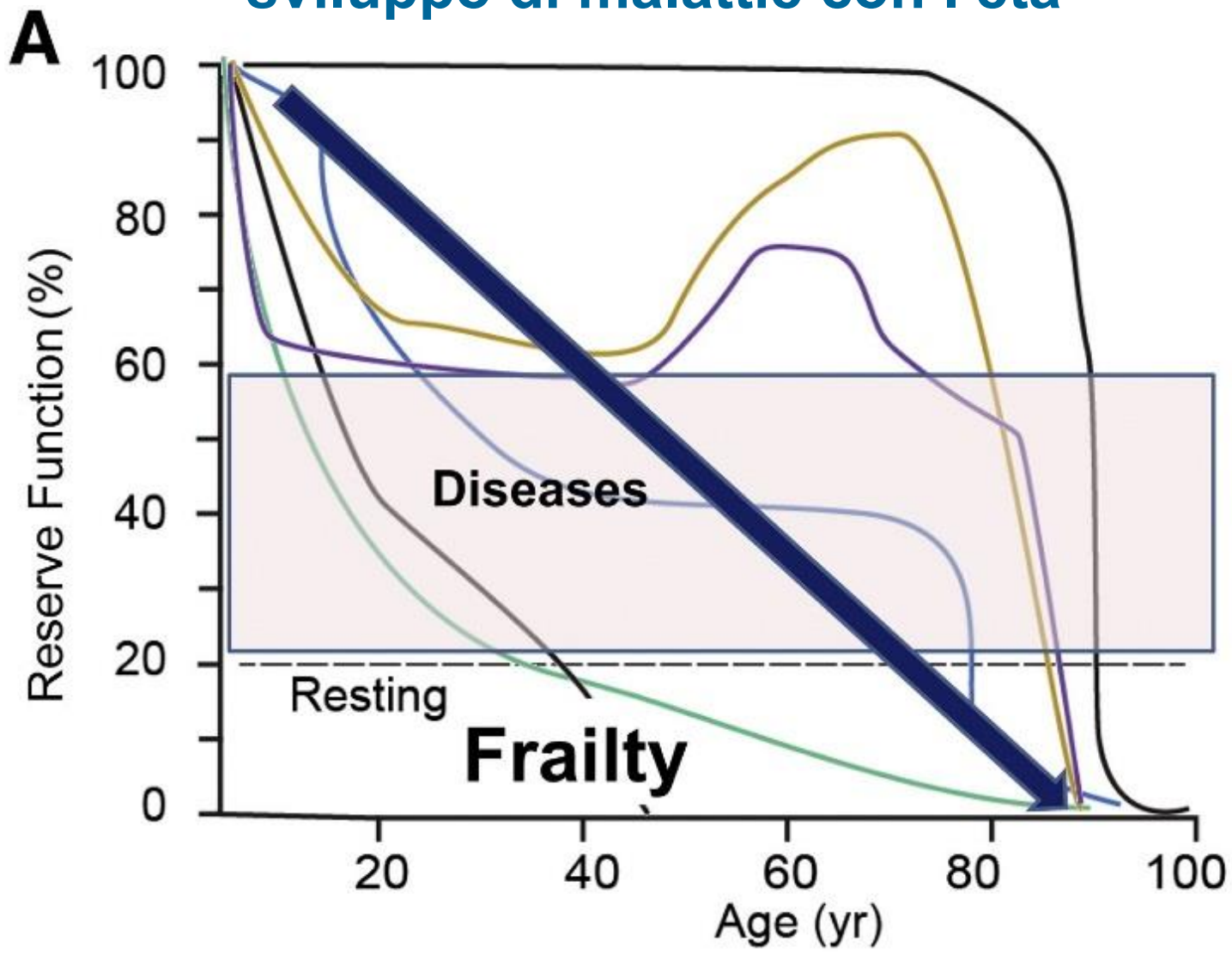


Ventricular diastole

Age progression → reduced diastolic blood pressure

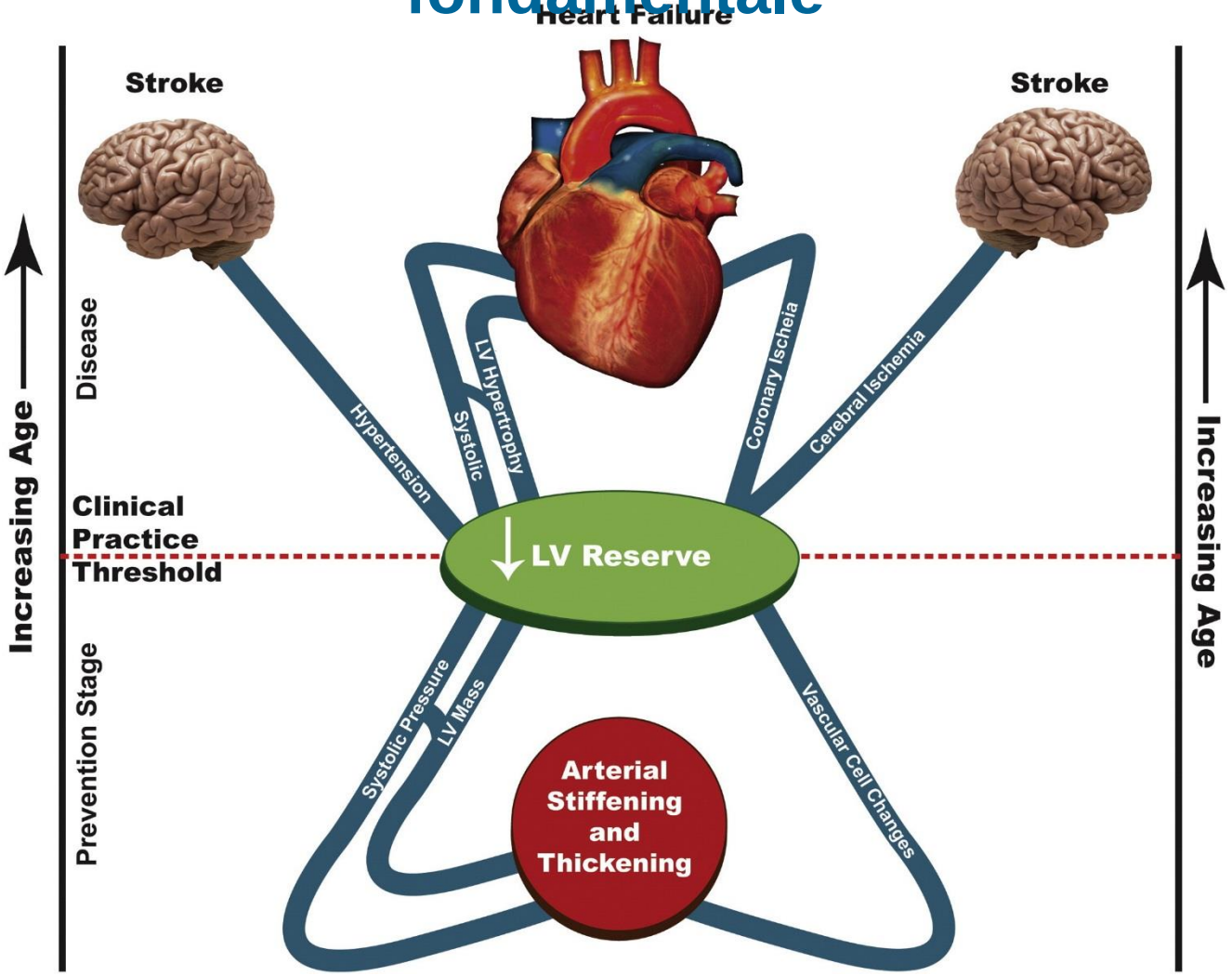
Kaplan & Opie Lancet 2006; 367:168

Aumentata fragilità e ridotta soglia per lo sviluppo di malattie con l'età



Journal of Molecular and Cellular Cardiology 2015 83, 1-13DOI: (10.1016/j.yjmcc.2015.04.005)

L’età aumenta il rischio di malattie cardiache e di ictus e l’irrigidimento dei vasi ha un ruolo fondamentale



Journal of Molecular and Cellular Cardiology 2015 83, 1-13DOI: (10.1016/j.yjmcc.2015.04.005)

The New England Journal of Medicine

Special Article

SHATTUCK LECTURE — CARDIOVASCULAR MEDICINE AT THE TURN OF THE MILLENNIUM: TRIUMPHS, CONCERNS, AND OPPORTUNITIES

EUGENE BRAUNWALD, M.D.

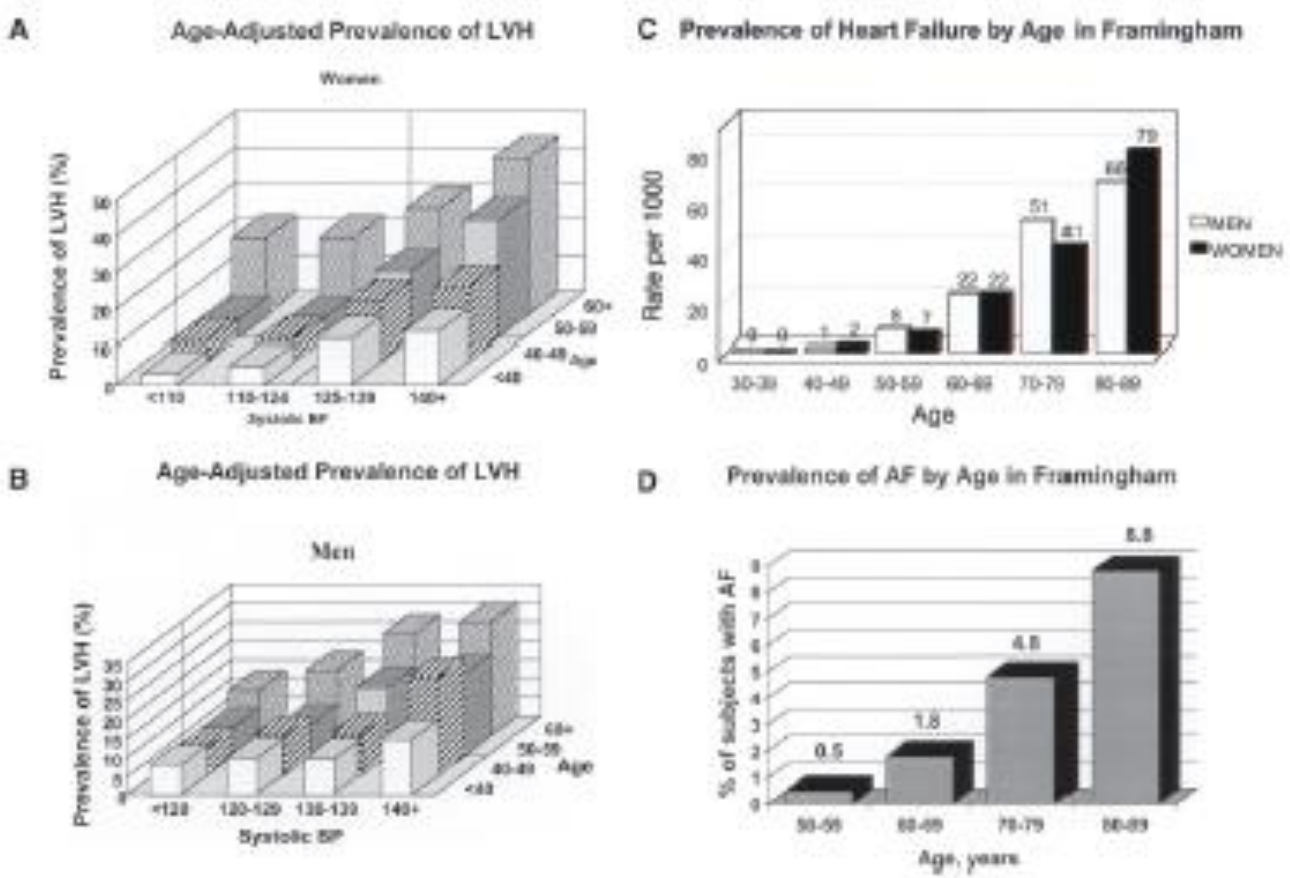
- **Two new epidemics of cardiovascular disease are emerging: heart failure and atrial fibrillation.**
- Hospital admissions for heart failure have climbed steadily, so that this condition has become the single most frequent cause of hospitalization in persons 65 years of age or older (…)
- In addition to heart failure, the number of hospital discharges for atrial fibrillation more than doubled from 111,000 in 1984 to 270,000 in 1994. This is worrisome, because patients with this arrhythmia are at risk of embolic stroke and heart failure, two conditions associated with early death.

Arterial and Cardiac Aging: Major Shareholders in Cardiovascular Disease Enterprises

Part II: The Aging Heart in Health: Links to Heart Disease

Edward G. Lakatta, MD; Daniel Levy, MD

A trilogy of heart disease manifestations with advancing age



Lakatta & Levy. Circulation. 2003;107:346-354

Invecchiamento = ↓ soglia di comparsa di una cardiopatia

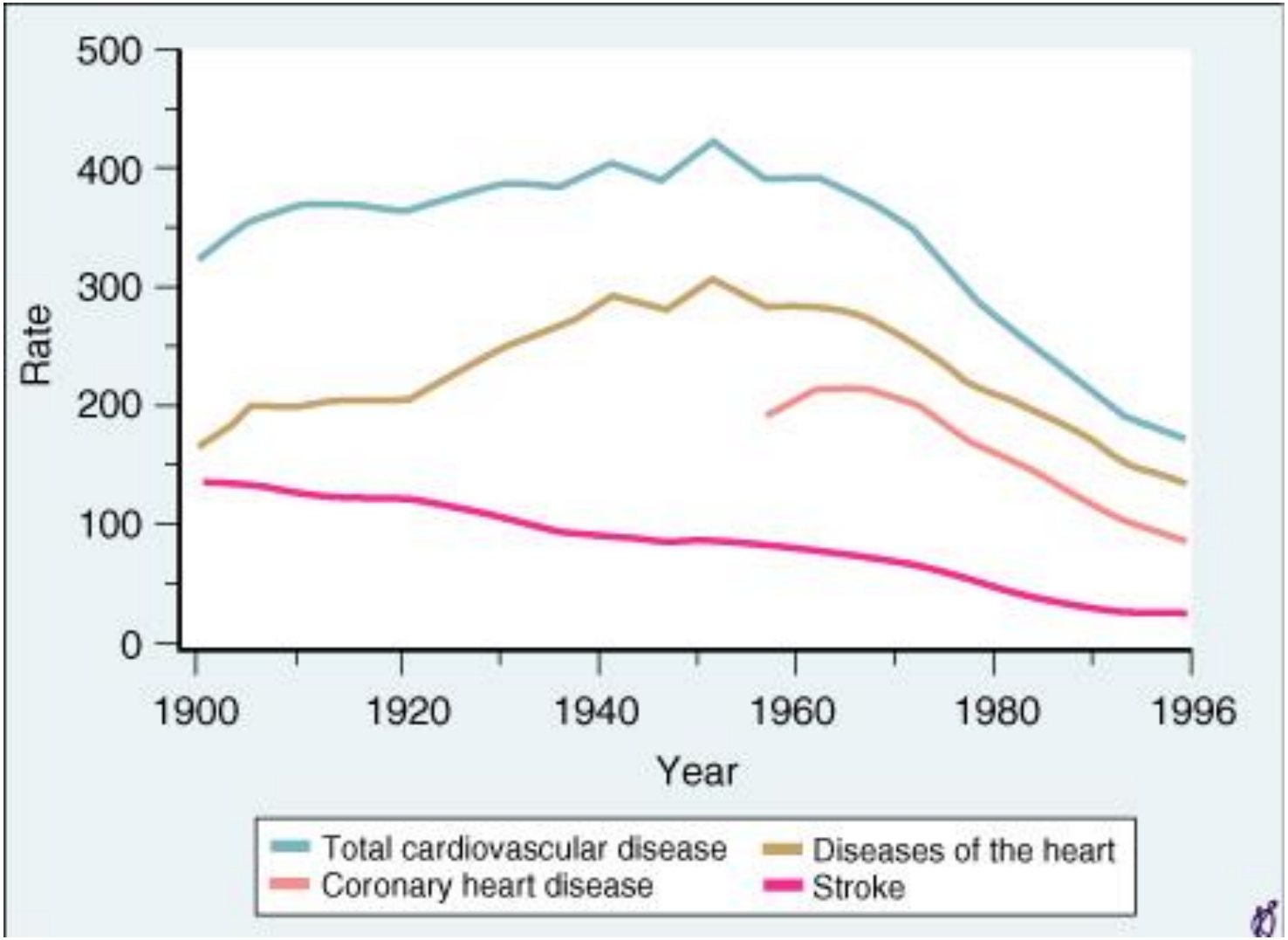
- Ipertrofia / ↓ compliance miocardica
- Ischemia miocardica
- Ipertensione arteriosa
- Fibrillazione atriale → tachicardia / perdita di funzione di pompa atriale
  → **↑ incidenza di insufficienza cardiaca a frazione d'eiezione conservata - HFpEF**

- ↓ Compliance ventricolare → Disfunzione diastolica
  - Sovraccarico → rimodellamento atriale
    → **↑ incidenza di fibrillazione atriale**

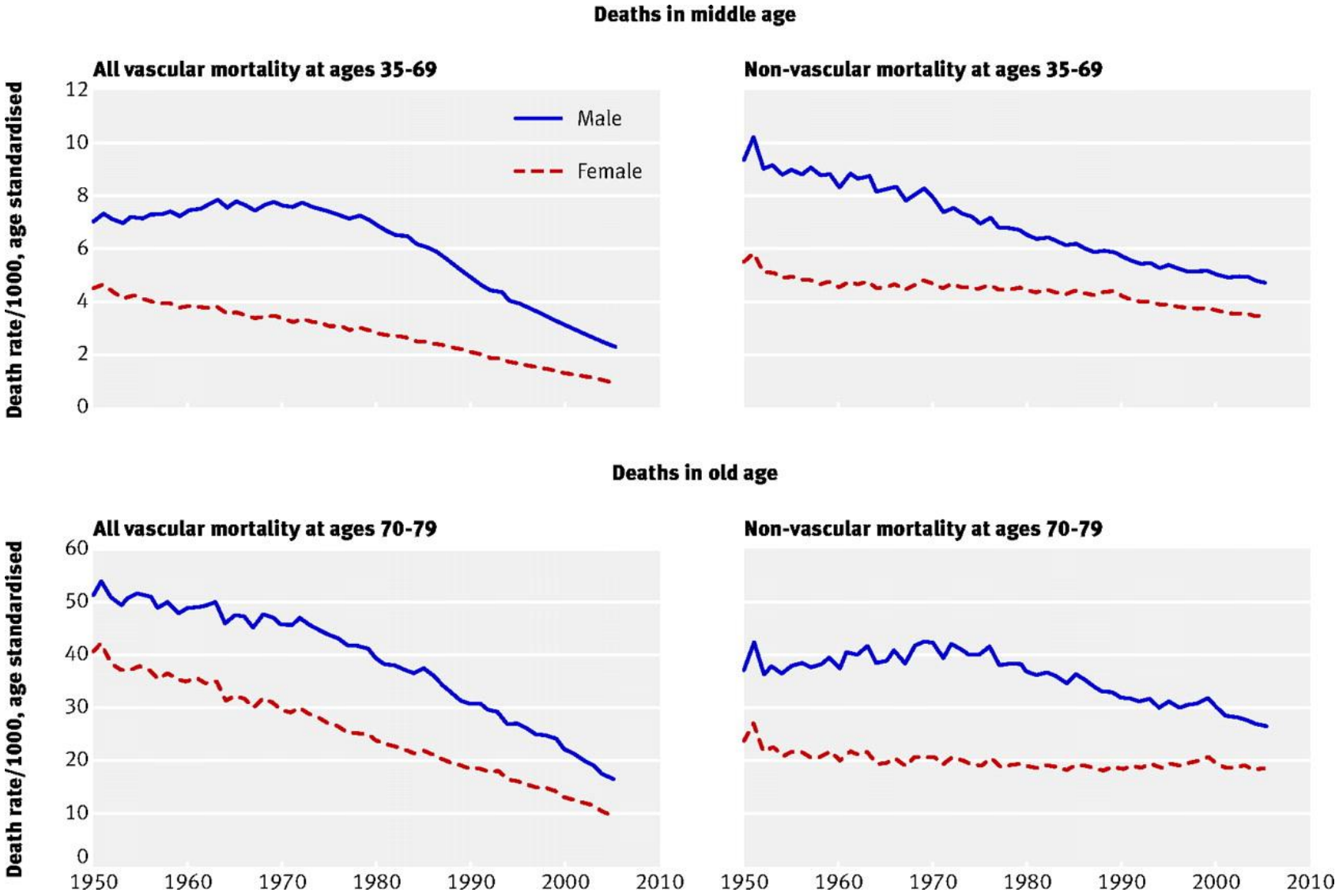
Patologie cardiovascolari: due buone notizie

- Progressiva riduzione della mortalità per patologie cardiovascolari

Prevalenza di decessi per le principali patologie cardiovascolari

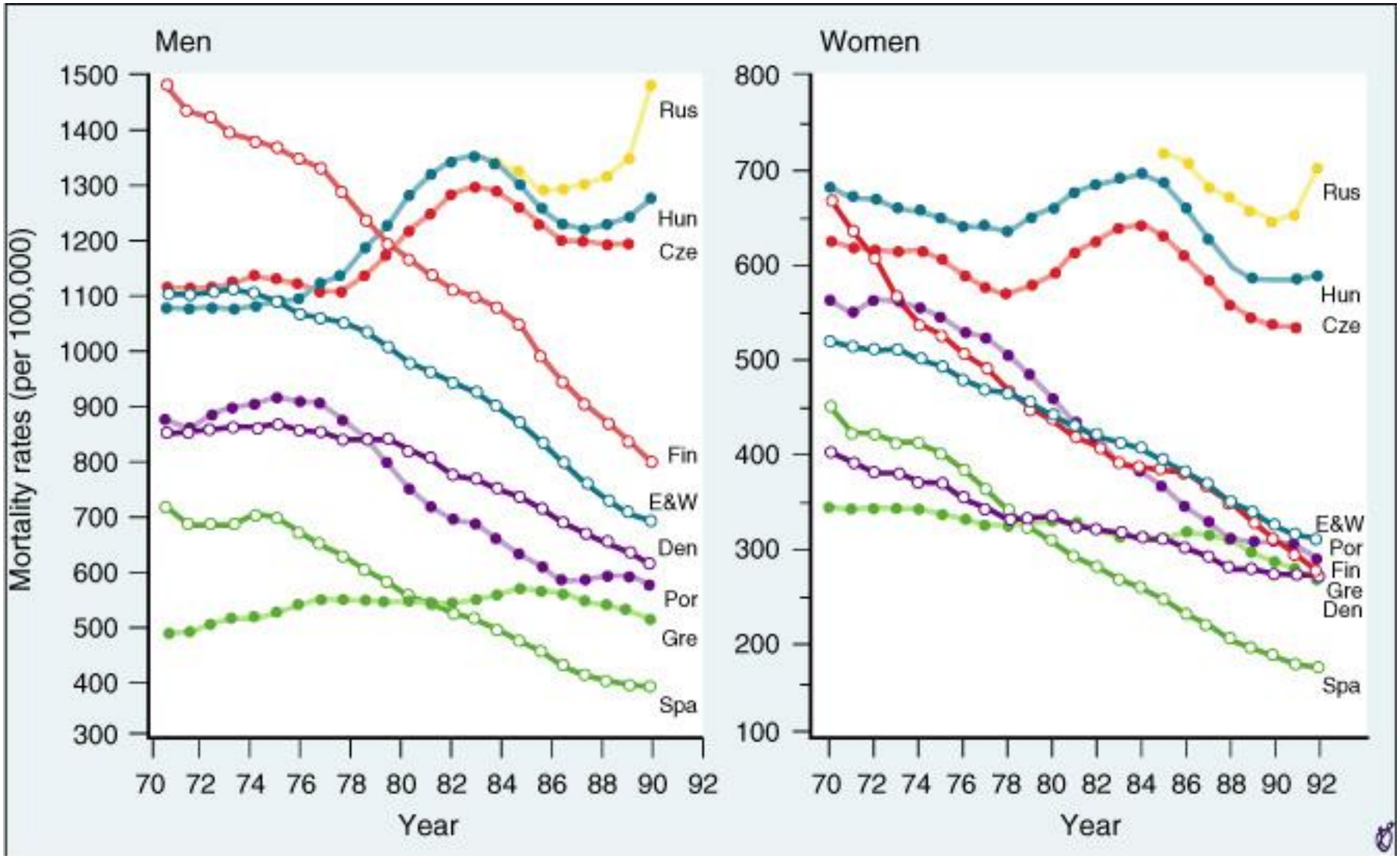


Andamento della mortalità per cause vascolari e non-vascolari standardizzata per sesso ed età



Clarke, R. et al. BMJ 2009;339:b3513

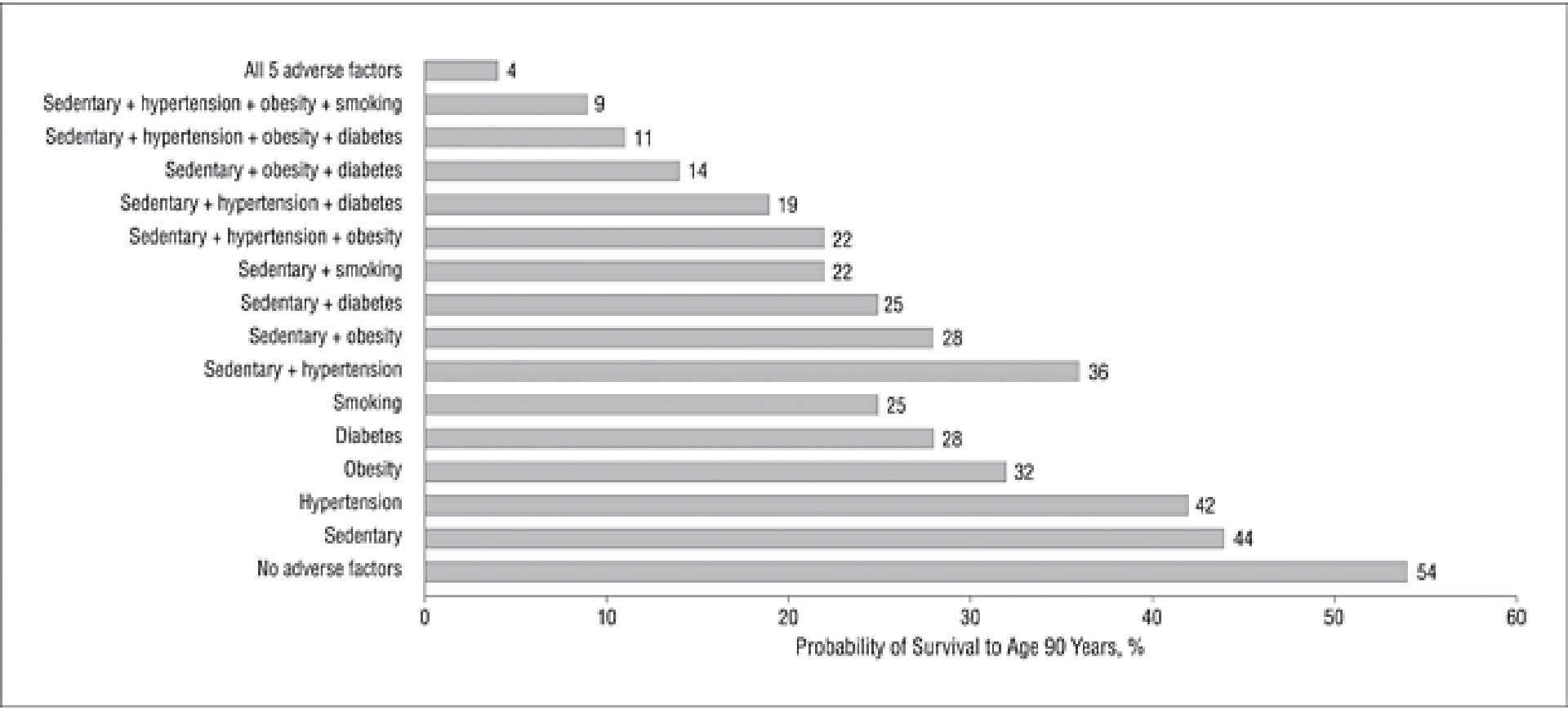
Andamento della mortalità per patologie cardiovascolari in diverse nazioni europee



Patologie cardiovascolari: due buone notizie

- Progressiva riduzione della mortalità per patologie cardiovascolari
- Arrivati a 70 anni si può sopravvivere fino a più di 90 anni!

Probabilità di sopravvivenza fino a più di 20 anni per un Maschio di 70 anni in base alla presenza di da 0 a 5 fattori di rischio modificabili: fumo, diabete, obesità, ipertensione e sedentarietà



Yates, L. B. et al. Arch Intern Med 2008;168:284-290.

2016 European Guidelines on cardiovascular disease prevention in clinical practice

The Sixth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of 10 societies and by invited experts).

Developed with the special contribution of the European Association for Cardiovascular Prevention & Rehabilitation (EACPR).

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Councils: Council on Cardiovascular Nursing and Allied Professions, Council for Cardiology Practice, Council on Cardiovascular Primary Care.
Working Groups: Cardiovascular Pharmacotherapy

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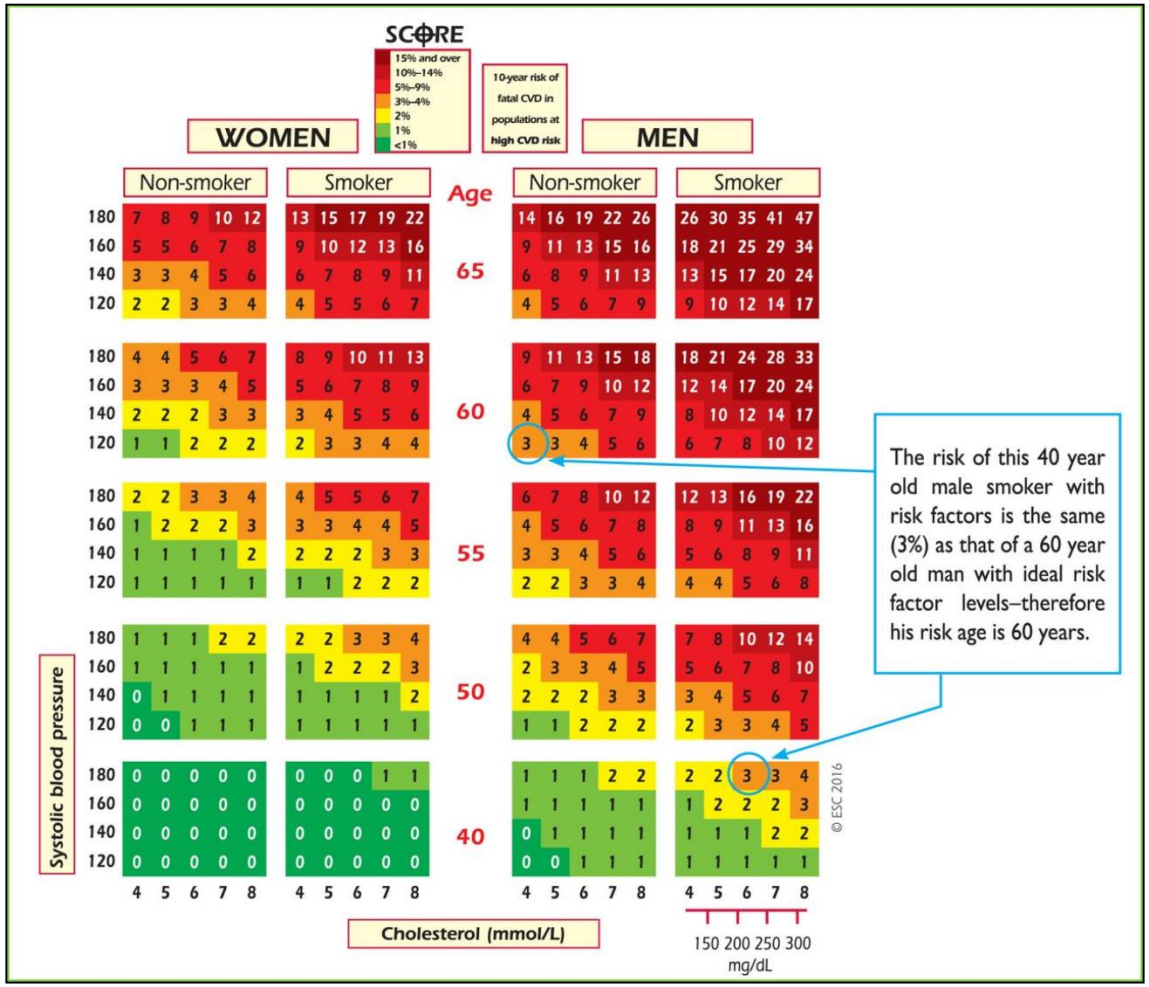
European Heart Journal 2016 ;37:2315–2381-doi:10.1093/eurheartj/ehw106

Impact of combination of risk factors on risk

Gender	Age (years)	Cholesterol (mmol/L)	SBP (mmHg)	Smoker	Risk (10 year risk of fatal CVD)
F	60	7	120	No	2%
F	60	7	140	Yes	5%
M	60	6	160	No	9%
M	60	5	180	Yes	21%

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Età e rischio Cardiovascolare: uso della Carta del Rischio



2016 European Guidelines on cardiovascular disease prevention in clinical practice
Eur Heart J. 2016;37(29):2315-2381. doi:10.1093/eurheartj/ehw106

Risk factor goals and target levels

Smoking	No exposure to tobacco in any form.
Diet	Low in saturated fat with a focus on wholegrain products, vegetables, fruit and fish.
Physical activity	At least 150 minutes a week of moderate aerobic PA (30 minutes for 5 days/week) or 75 minutes a week of vigorous aerobic PA (15 minutes for 5 days/week) or a combination thereof.
Body weight	BMI 20–25 kg/m^2. Waist circumference <94 cm (men) and or <80 cm (women).
Blood pressure	<140/90 mmHg.[a]
Lipid	
LDL [b] is the primary target	**Very high-risk: <1.8 mmol/L (<70 mg/dL)**, or a reduction of at least 50% if the baseline is between 1.8 and 3.5 mmol/L (70 and 135 mg/dL).[d] **High-risk: <2.6 mmol/L (<100 mg/dL)** or a reduction of at least 50% if the baseline is between 2.6 and 5.2 mmol/L (100 and 200 mg/dL). **Low to moderate risk: <3.0 mmol/L (115 mg/dL).**
Non-HDL-C [b]	<2.6, <3.3 and <3.8 mmol/L (<100, <130 and <145 mg/dL) are recommended for very high, high and low to moderate risk subjects, respectively
HDL-C	No target but >1.0 mmol/L (>40 mg/dL) in men and >1.2 mmol/L (>45 mg/dL) in women indicate lower risk.
Triglycerides	No target but <1.7 mmol/L (<150 mg/dL) indicates lower risk and higher levels indicate a need to look for other risk factors.
Diabetes	HbA1c: <7% (<53 mmol/L).

a. The target can be higher in frail elderly patients, or lower in most patients with DM and in some (very) high risk patients without DM who can tolerate multiple blood pressure lowering drugs
b. A view was expressed that primary care physicians might prefer a single general LDL-C goal of 2.6 mmol/L.
c. Non-HDL-C is a reasonable and practical alternative target because it does not require fasting.
d. This is the general recommendation for those at very high risk. It should be noted that the evidence for patients with chronic kidney disease is less strong

Classification of physical activity intensity and examples of absolute and relative intensity levels

Absolute intensity			Relative intensity		
Intensity	**MET**	**Examples**	**%HR max**	**RPE (Borg scale score)**	**Talk Test**
Light	1.1-2.9	Walking <4.7 km/h, light household work.	50-63	10-11	
Moderate	3-5.9	Walking briskly (4.8–6.5 km/h), slow cycling (15 km/h), painting/decorating, vacuuming, gardening (mowing lawn), golf (pulling clubs in trolley), tennis (doubles), ballroom dancing, water aerobics.	64-76	12-13	Breathing is faster but compatible with speaking full sentences.
Vigorous	≥6	Race-walking, jogging or running, bicycling >15 km/h, heavy gardening (continuous digging or hoeing), swimming laps, tennis (single).	77-93	14-16	Breathing very hard, incompatible with carrying on a conversation comfortably.

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Healthy diet characteristics

• Saturated fatty acids to account for <10% of total energy intake, through replacement by polyunsaturated fatty acids.
• Trans unsaturated fatty acids: as little as possible, preferably no intake from processed food, and <1% of total energy intake from natural origin.
• <5 g of salt per day.
• 30–45 g of fibre per day, preferably from wholegrain products.
• ≥200 g of fruit per day (2–3 servings).
• ≥200 g of vegetables per day (2–3 servings).
• Fish 1–2 times per week, one of which to be oily fish.
• 30 grams unsalted nuts per day.
• Consumption of alcoholic beverages should be limited to 2 glasses per day (20 g/d of alcohol) for men and 1 glass per day (10 g/d of alcohol) for women.
• Sugar-sweetened soft drinks and alcoholic beverages consumption must be discouraged.

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Body weight

Recommendations	Class	Level
It is recommended that subjects with healthy weight maintain their weight. It is recommended that overweight and obese people achieve a healthy weight (or aim for a reduction in weight) in order to reduce BP, dyslipidaemia and risk of developing type 2 DM, and thus improve the CV risk profile.	I	A

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Lipid control

Recommendations	Class	Level
In patients at VERY HIGH CV risk, an LDL-C goal <1.8 mmol/L (<70 mg/dL), or a reduction of at least 50% if the baseline is between 1.8 and 3.5 mmol/L (70 and 135 mg/dL) is recommended.	I	B
In patients at HIGH CV risk, an LDL-C goal <2.6 mmol/L (<100 mg/dL), or a reduction of at least 50% if the baseline is between 2.6 and 5.2 mmol/L (100 and 200 mg/dL) is recommended.	I	B
In the remaining patients on LDL-C lowering treatment, an LDL-C goal <3.0 mmol/L (<115 mg/dL) should be considered.	IIa	C

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Intervention stratégies

Total CV risk (SCORE) %	LDL-C levels				
	<70 mg/dL <1.8 mmol/L	70 to <100 mg/dL 1.8 to <2.6 mmol/L	100 to <155 mg/dL 2.6 to <4.0 mmol/L	155 to <190 mg/dL 4.0 to <4.9 mmol/L	≥190 mg/dL ≥4.9 mmol/L
<1	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle advice	Lifestyle advice, consider drug if uncontrolled
Class/Level	I/C	I/C	I/C	I/C	IIa/A
≥1 to <5	Lifestyle advice	Lifestyle advice	Lifestyle advice, consider drug if uncontrolled	Lifestyle advice, consider drug if uncontrolled	Lifestyle advice, consider drug if uncontrolled
Class/Level	I/C	I/C	IIa/A	IIa/A	I/A
≥5 to <10, or high-risk	Lifestyle advice	Lifestyle advice, consider drug if uncontrolled	Lifestyle advice and drug treatment for most	Lifestyle advice and drug treatment	Lifestyle advice and drug treatment
Class/Level	IIa/A	IIa/A	IIa/A	I/A	I/A
≥10 or very high-risk	Lifestyle advice, consider drug	Lifestyle advice and concomitant drug treatment	Lifestyle advice and concomitant drug treatment	Lifestyle advice and concomitant drug treatment	Lifestyle advice and concomitant drug treatment
Class/Level	IIa/A	IIa/A	I/A	IA	I/A

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European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Management of diabetes (1)

Recommendations	Class	Level
Lifestyle changes including smoking cessation, low fat diet, high fibre diet, aerobic physical activity, and strength training are recommended.	I	A
Reduction in energy intake is recommended to patients to help achieve lower weight or prevent weight gain.	I	B
A target HbA1c for the reduction in risk of CVD and microvascular complications in DM of <7.0% (<53 mmol/mol) is recommended for the majority of non-pregnant adults with either type 1 or type 2 DM.	I	A
For patients with a long duration of DM, the elderly, frail, or those with existing CVD, a relaxing of the HbA1c targets (i.e. less stringent) should be considered.	IIa	B
A target HbA1c of ≤6.5% (≤48 mmol/mol) should be considered at diagnosis or early in the course of type 2 DM in patients, who are not frail and do not have CVD.	IIa	B
When screening for DM in individuals with or without CVD, assessment of HbA1c (which can be done non-fasting) or fasting blood glucose should be considered. An oral glucose tolerance test can be offered when there is still doubt.	IIa	A

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Management of hypertension (1)

Recommendations	Class	Level
Lifestyle measures (weight control, increased physical activity, alcohol moderation, sodium restriction, and increased consumption of fruits, vegetables, and low-fat dairy products) are recommended in all patients with hypertension and in individuals with high normal BP.	I	A
All major BP lowering drug classes (i.e. diuretics, ACE-I, calcium antagonists, ARBs, and ß-blockers) do not differ significantly in their BP-lowering efficacy and thus are recommended as BP lowering treatment.	I	A
In asymptomatic subjects with hypertension but free of CVD, CKD, and DM, total CV risk stratification using the SCORE model is recommended.	I	B
Drug treatment is recommended in patients with grade 3 hypertension irrespective of CV risk, as well as in patients with grade 1 or 2 hypertension who are at very high CV risk.	I	B
Drug treatment should be considered in patients with grade 1 or 2 hypertension who are at high CV risk.	IIa	B
In patients at low to moderate total CV risk and with grade 1 or 2 hypertension, lifestyle measures are recommended.	I	B
In patients at low to moderate total CV risk and with grade 1 or 2 hypertension, if lifestyle measures fail to reduce BP, drug treatment may be considered.	IIb	B

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Definition and classification of blood pressure levels

Category	Systolic BP (mmHg)		Diastolic BP (mmHg)
Optimal	<120	and	<80
Normal	120–129	and/or	80–84
High-normal	130–139	and/or	85–89
Grade 1 hypertension	140–159	and/or	90–99
Grade 2 hypertension	160–179	and/or	100–109
Grade 3 hypertension	≥180	and/or	≥110
Isolated systolic hypertension	≥140	and	<90

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Blood pressure thresholds for definition of hypertension with different type of BP measurement

Category	Systolic BP (mmHg)	Diastolic BP (mmHg)
Office or clinic	140	90
24-hour	125–130	80
Day	130–135	85
Night	120	70
Home	130–135	85

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Frailty and risk for heart failure in older adults: The health, aging, and body composition study

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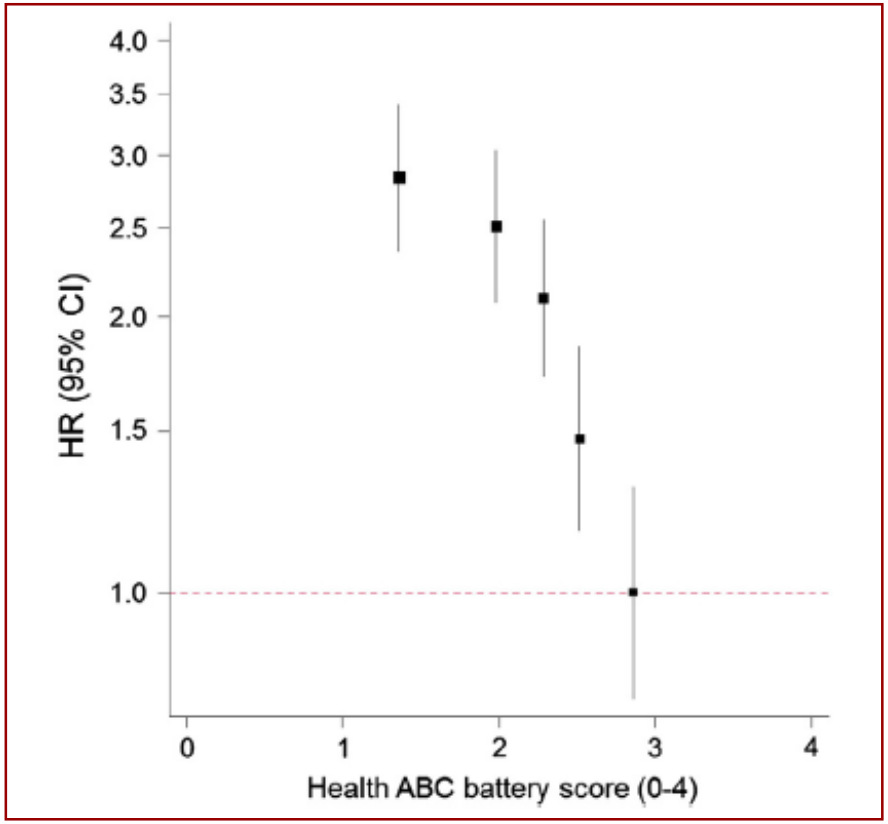
2825 participants aged 70 to 79 years



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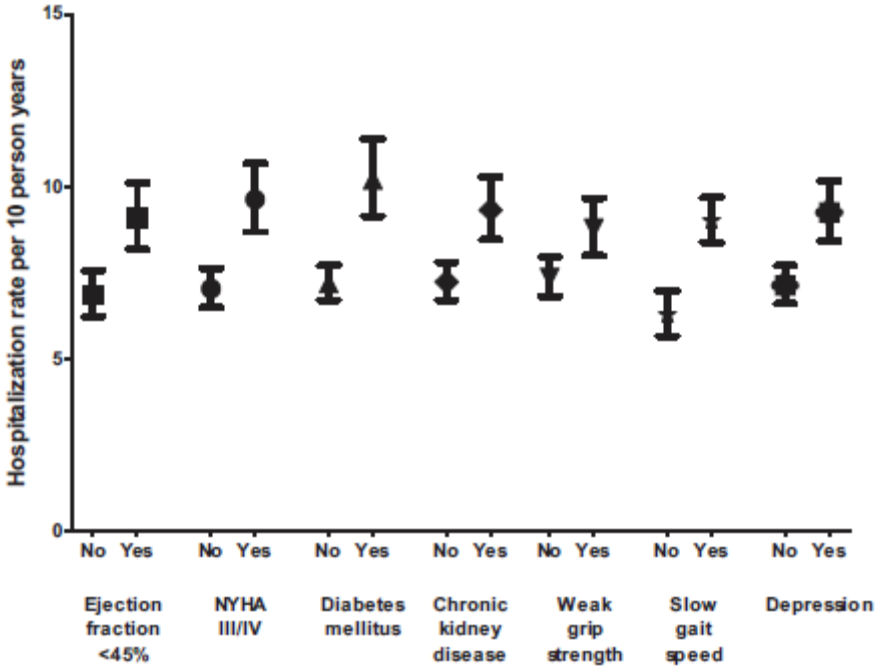
Risk Factors for Hospital Admission Among Older Persons With Newly Diagnosed Heart Failure

Findings From the Cardiovascular Health Study

Sarwat I. Chaudhry, MD,* Gail McAvay, PHD,† Shu Chen, MS,† Heather Whitson, MD,‡ Anne B. Newman, MD, MPH,§ Harlan M. Krumholz, MD, MS,‖¶ Thomas M. Gill, MD†#

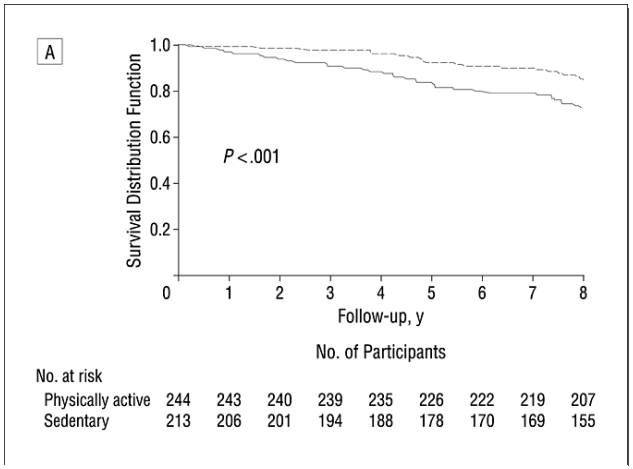
New Haven, Connecticut; Durham, North Carolina; and Pittsburgh, Pennsylvania

5889 men aged ≥65 years followed from 1989 to 2009

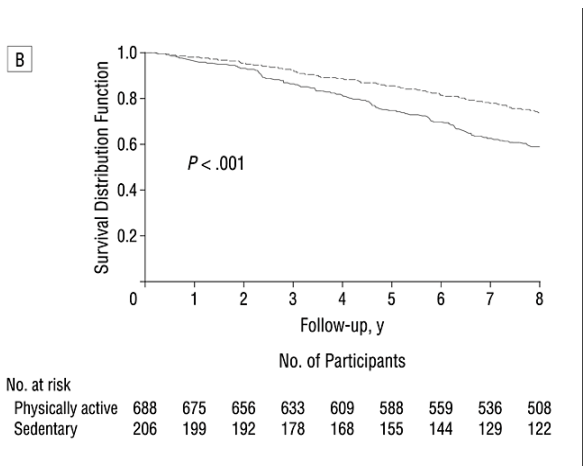


Physical activity is associated with longevity also in the very old: Survival curves

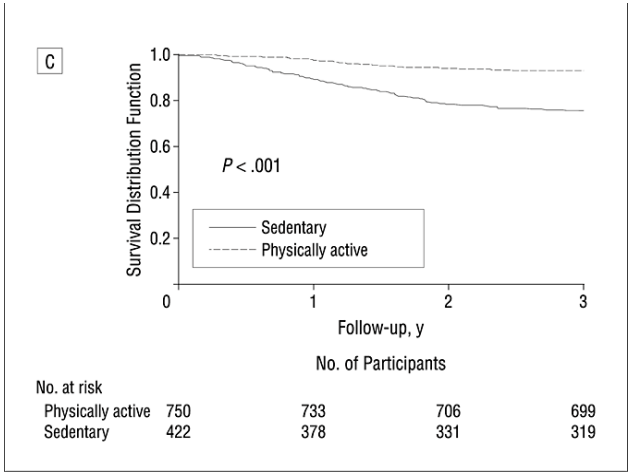
At 70-78 years



At 78 – 85 years



At 85-88 years



Stessman, J. et al. Arch Intern Med 2009;169:1476-1483.

Principles of effective communication to facilitate behavioural change

- Spend enough time with the individual to create a therapeutic relationship – even a few more minutes can make a difference.
- Acknowledge the individual's personal view of his/her disease and contributing factors.
- Encourage expression of worries and anxieties, concerns and self-evaluation of motivation for behaviour change and chances of success.
- Speak to the individual in his/her own language and be supportive of every improvement in lifestyle.
- Ask questions to check that the individual has understood the advice and has any support he or she requires to follow it.
- Acknowledge that changing life-long habits can be difficult and that sustained gradual change is often more permanent than a rapid change.
- Accept that individuals may need support for a long time and that repeated efforts to encourage and maintain lifestyle change may be necessary in many individuals.
- Make sure that all health professionals involved provide consistent information.

European Heart Journal 2016;37:2315–2381-doi:10.1093/eurheartj/ehw106

Ten strategic steps to facilitate behaviour change

1. Develop a therapeutic alliance.
2. Counsel all individuals at risk of or with manifest cardiovascular disease.
3. Assist individuals to understand the relationship between their behaviour and health.
4. Help individuals assess the barriers to behaviour change.
5. Gain commitments from individuals to own their behaviour change.
6. Involve individuals in identifying and selecting the risk factors to change.
7. Use a combination of strategies including reinforcement of the individual's capacity for change.
8. Design a lifestyle-modification plan.
9. Involve other healthcare staff whenever possible.
10. Monitor progress through follow-up contact.

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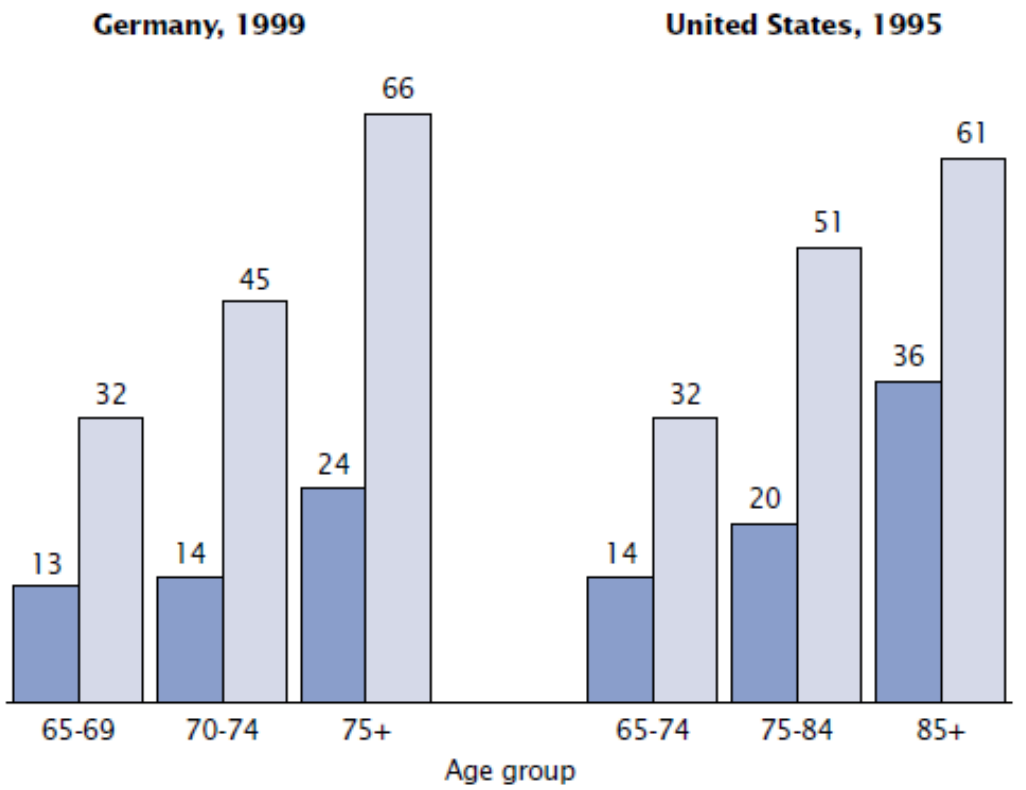
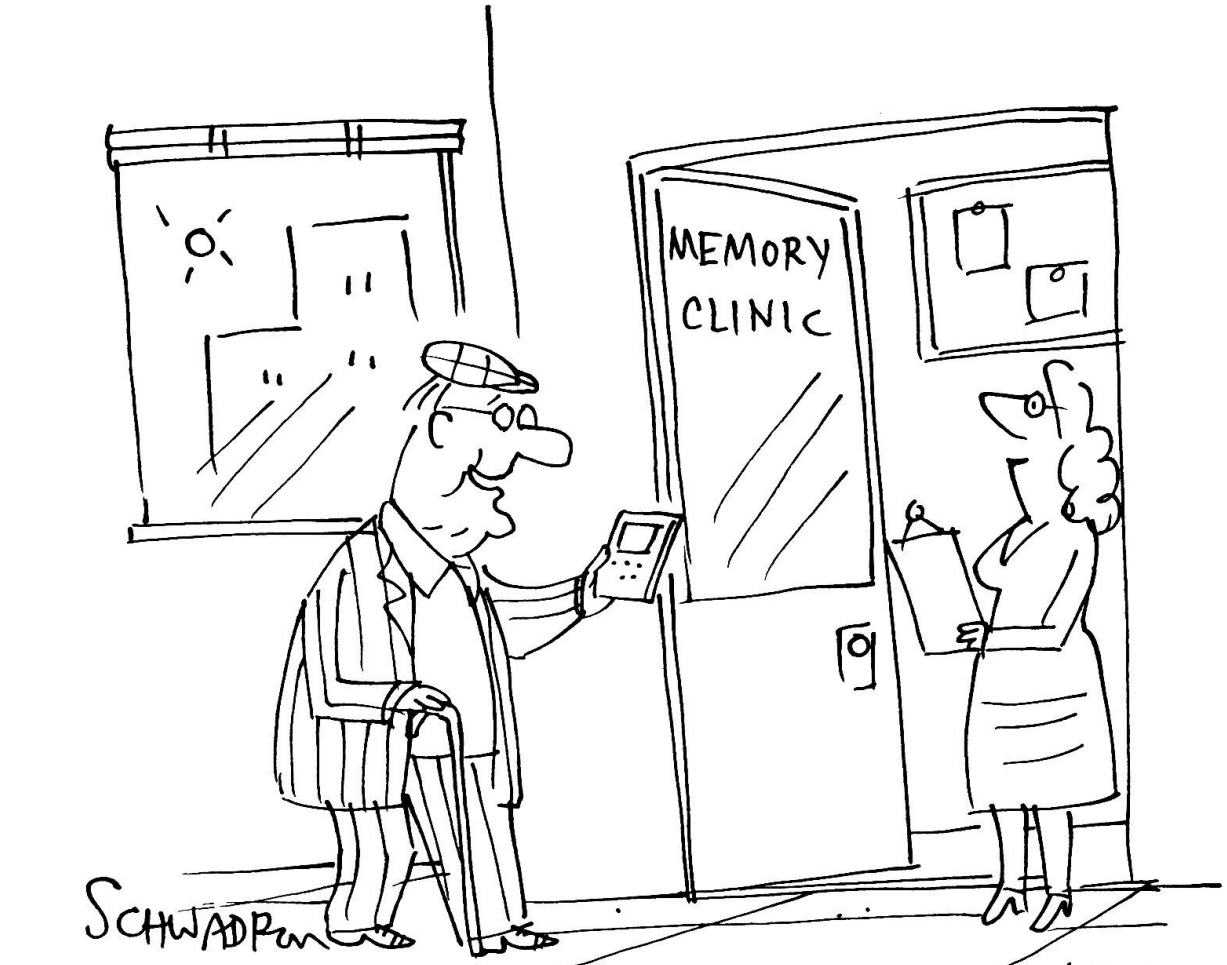
Le donne vivono più a lungo e più spesso restano sole

Figure 7-1.
Percent of Elderly Living Alone in Germany and the United States by Available Age Groups

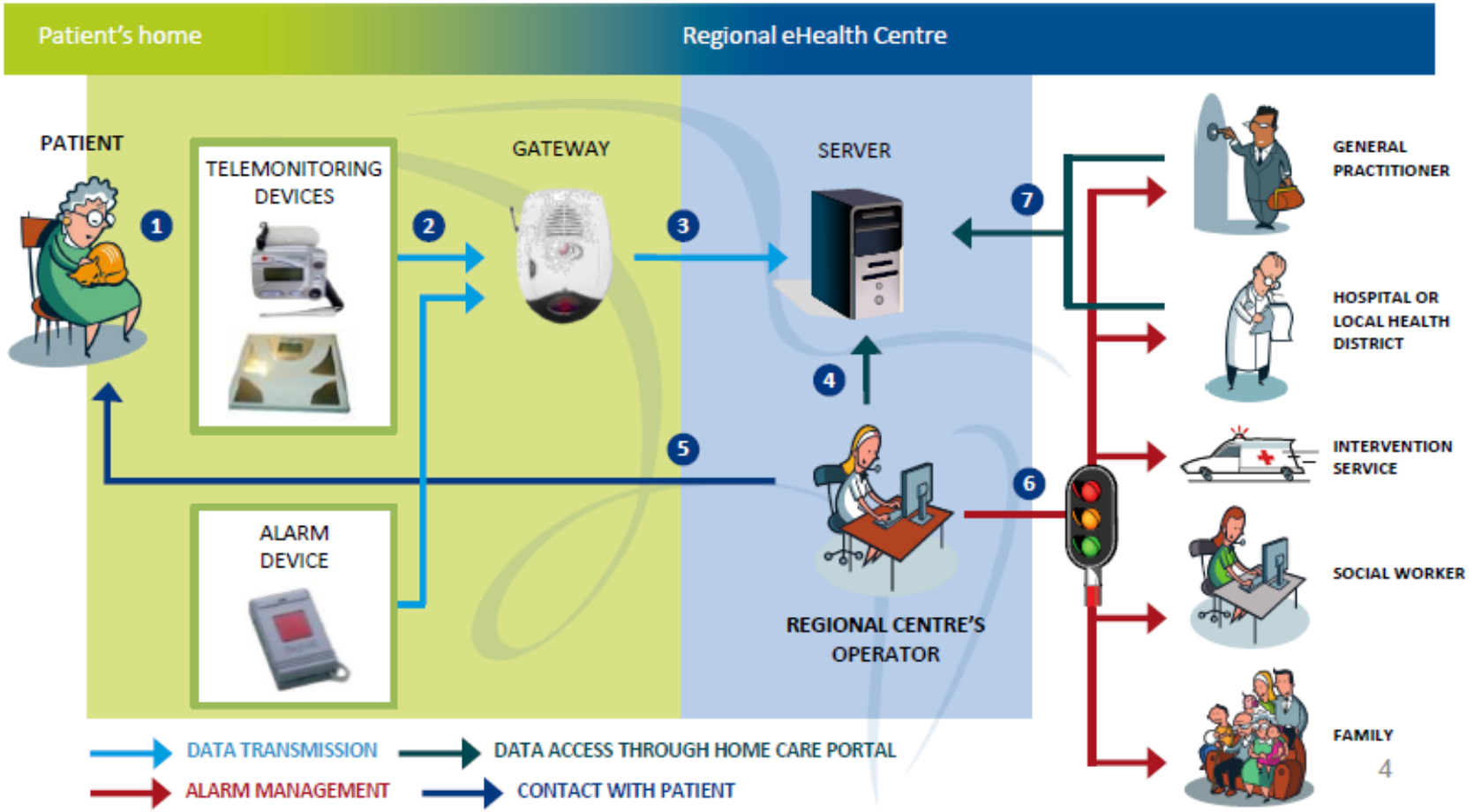


Source: National sources.

Health techonology for the elderly



Cluster 7: CHF Veneto Region (IT)



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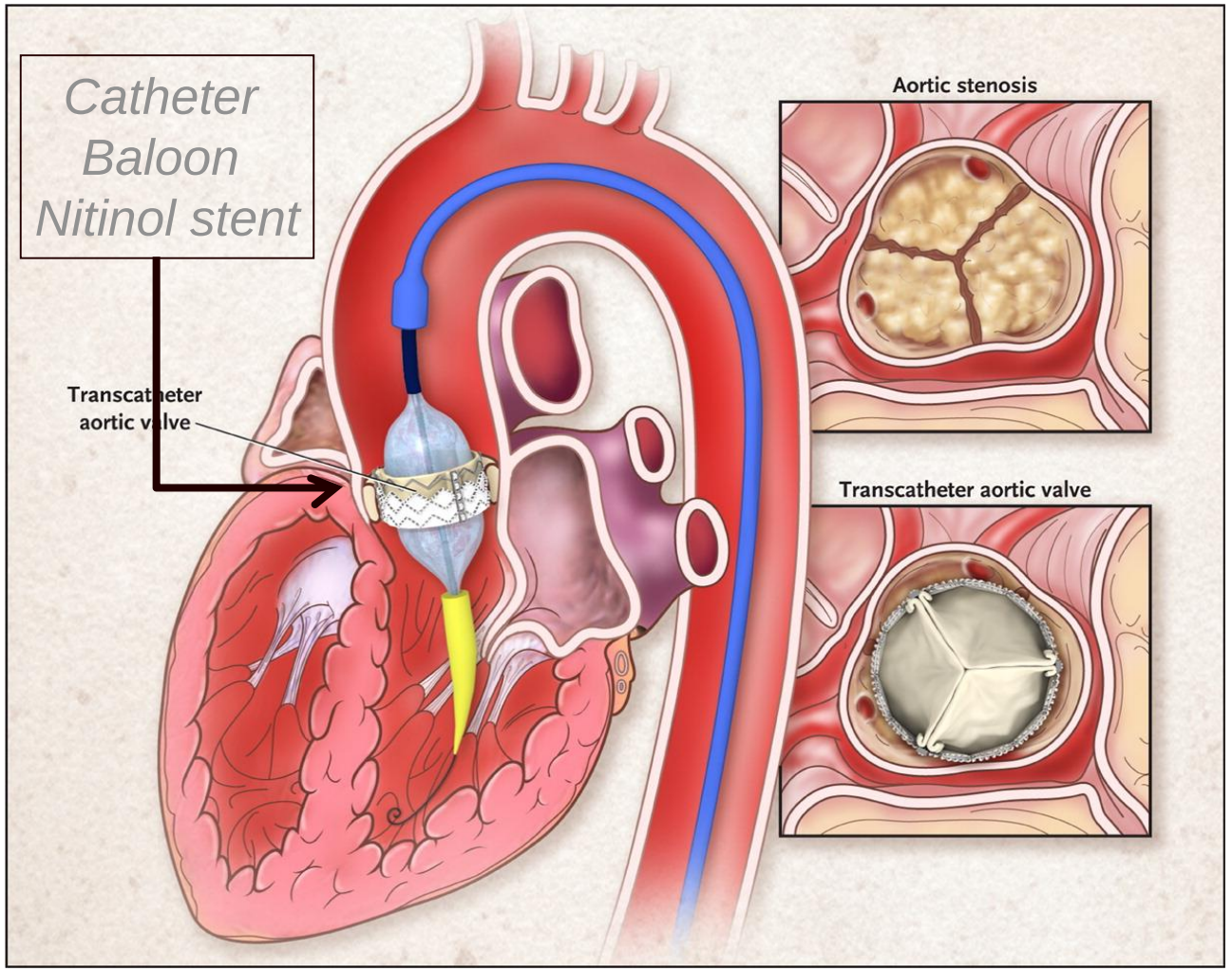
Transcatheter versus Surgical Aortic-Valve Replacement in High-Risk Patients

Craig R. Smith, M.D., Martin B. Leon, M.D., Michael J. Mack, M.D., D. Craig Miller, M.D., Jeffrey W. Moses, M.D., Lars G. Svensson, M.D., Ph.D., E. Murat Tuzcu, M.D., John G. Webb, M.D., Gregory P. Fontana, M.D., Raj R. Makkar, M.D., Mathew Williams, M.D., Todd Dewey, M.D., Samir Kapadia, M.D., Vasilis Babaliaros, M.D., Vinod H. Thourani, M.D., Paul Corso, M.D., Augusto D. Pichard, M.D., Joseph E. Bavaria, M.D., Howard C. Herrmann, M.D., Jodi J. Akin, M.S., William N. Anderson, Ph.D., Duolao Wang, Ph.D., and Stuart J. Pocock, Ph.D., for the PARTNER Trial Investigators*

Table 1. Baseline Characteristics of the Patients.*

Characteristic	Transcatheter Replacement (N=348)	Surgical Replacement (N=351)	P Value
Age — yr	83.6±6.8	84.5±6.4	0.07
Male sex — no./total no. (%)	201/348 (57.8)	198/349 (56.7)	0.82
Society of Thoracic Surgeons score†	11.8±3.3	11.7±3.5	0.61
Logistic EuroSCORE†	29.3±16.5	29.2±15.6	0.93
New York Heart Association class — no./total no. (%)			0.79
II	20/348 (5.7)	21/349 (6.0)	
III or IV	328/348 (94.3)	328/349 (94.0)	

Transcatheter Aortic-Valve Replacement.



Smith CR et al. N Engl J Med 2011;364:2187-2198.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