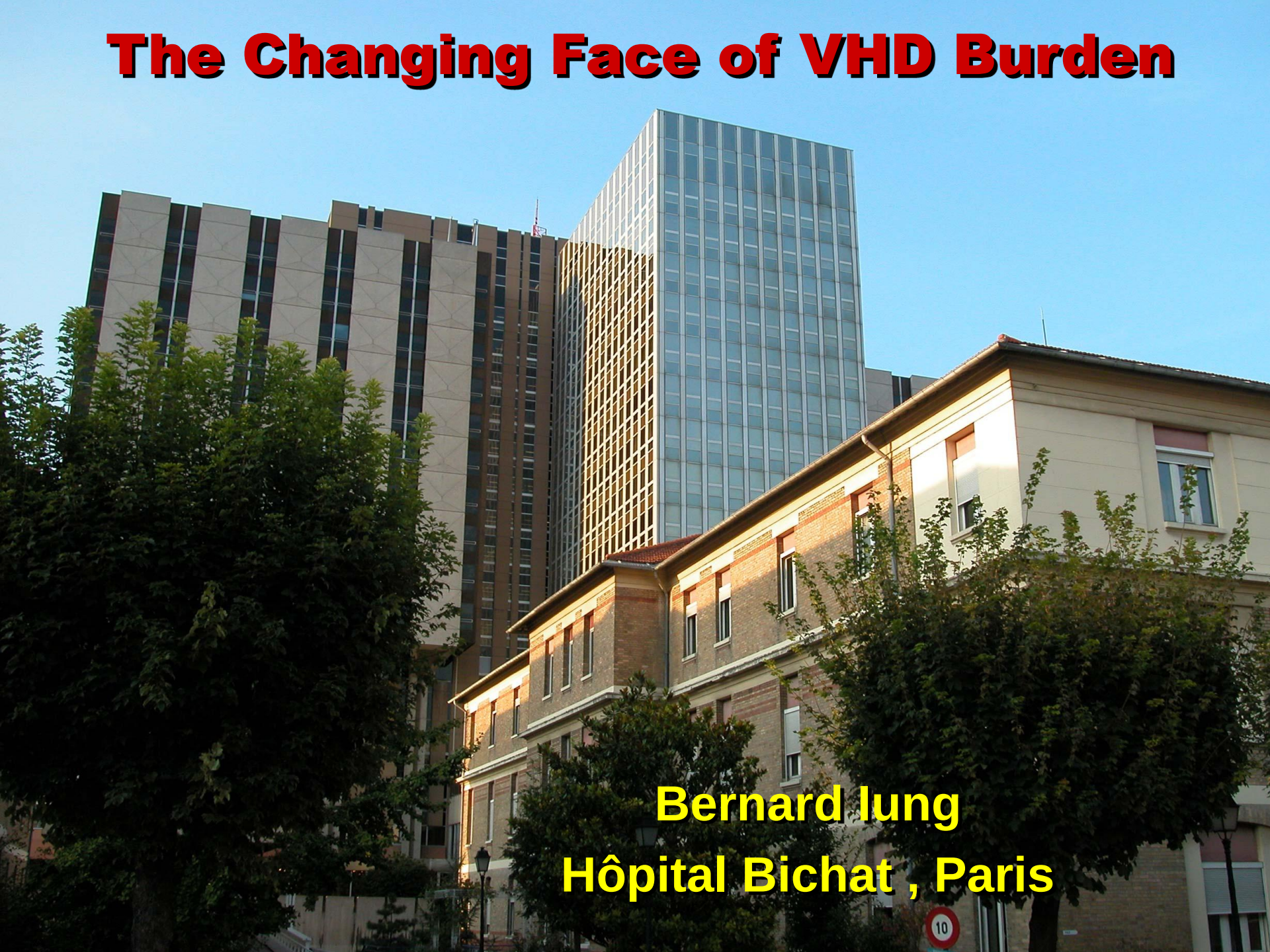
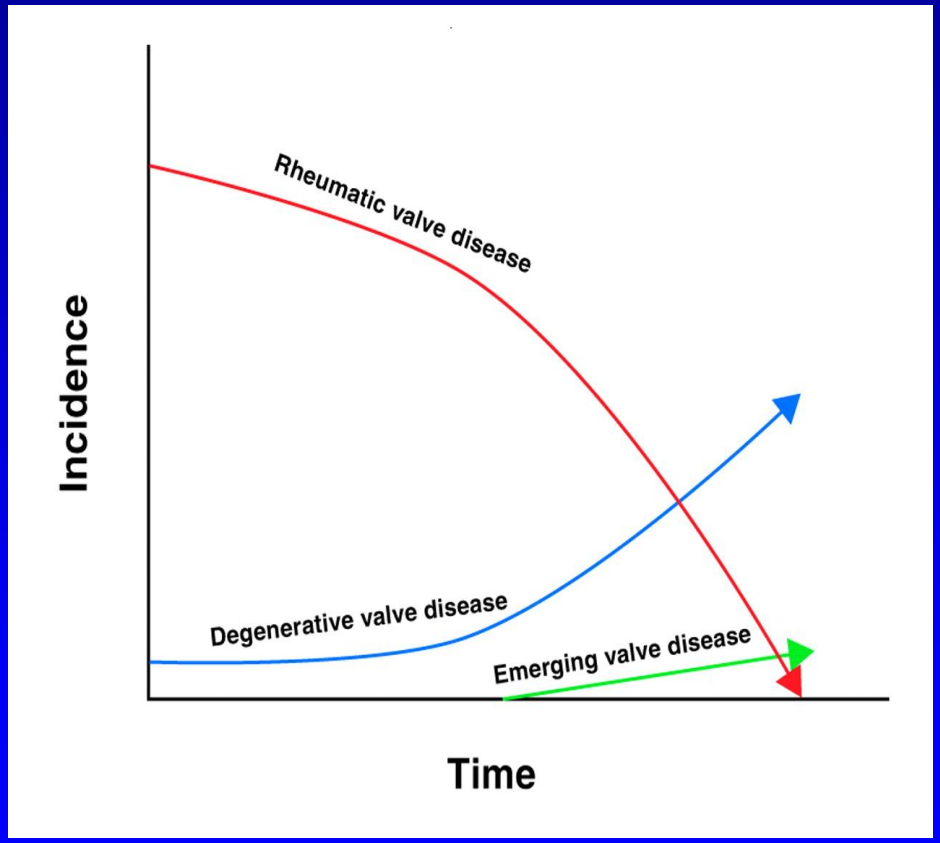
The Changing Face of VHD Burden



Bernard Iung
Hôpital Bichat , Paris

Changing Pattern of Valvular Disease in Industrialised Countries

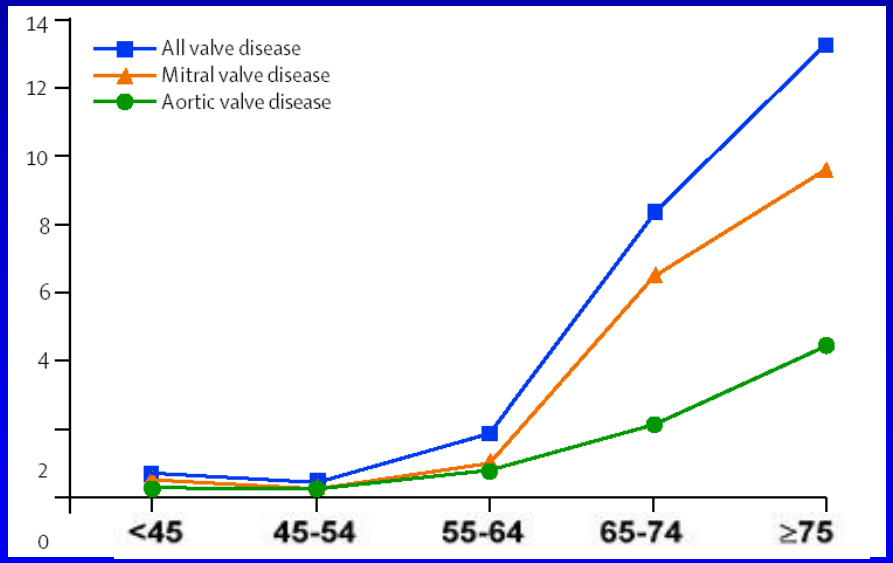


(Soler-Soler J, Galve E Heart 2000;83:721-5)

Prevalence of Valvular Heart Disease

- 11 911 randomly selected patients with echo
- Age-adjusted prevalence of valvular disease

  2.5% [95% CI 2.2-2.7]

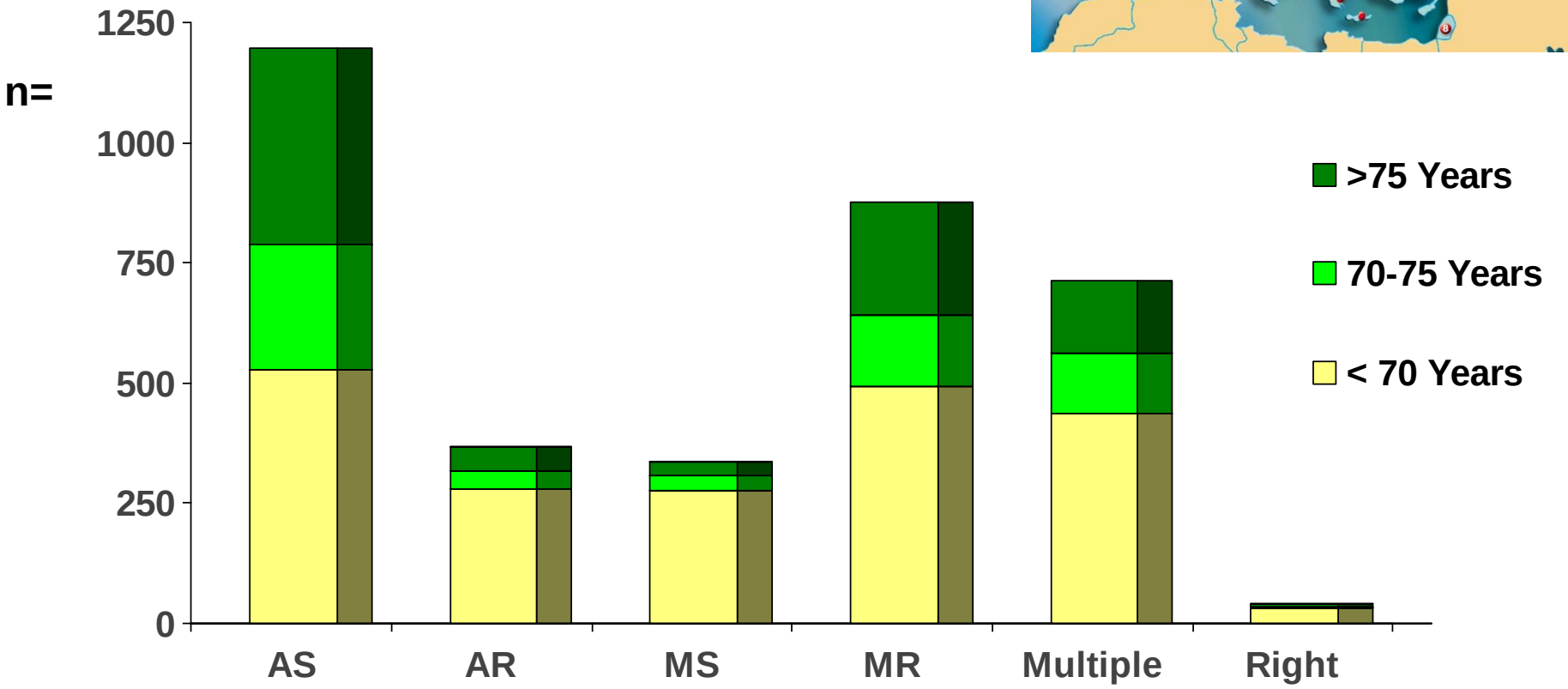


- Prevalence 1.8% in a community-based study

(Nkomo et al. Lancet 2006;368:1005-11)

Euro Heart Survey on Valvular Diseases

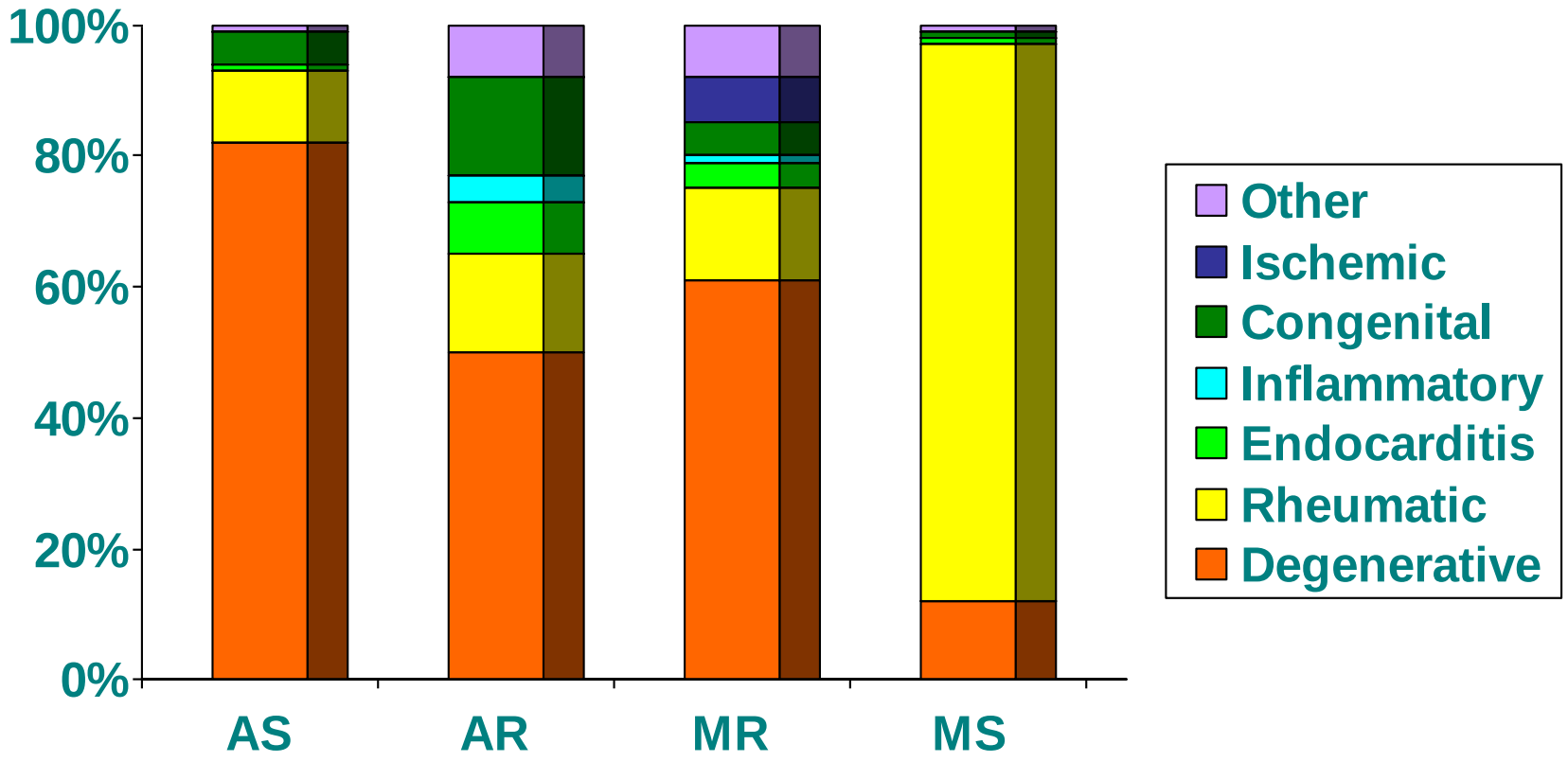
3547 Patients with Native Valve Disease (2001)



(Iung et al. Eur Heart J 2003;24:1244-53)

Single Native Valve Disease

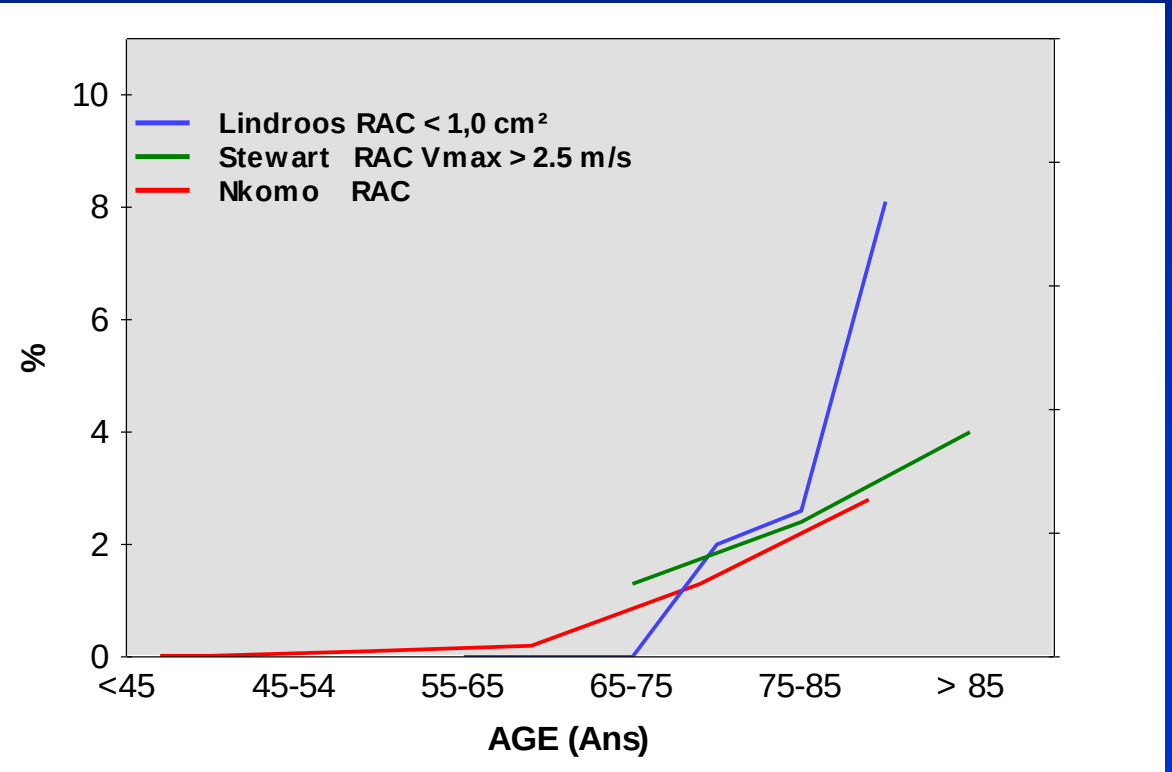
Etiology



Prevalence of Aortic Stenosis

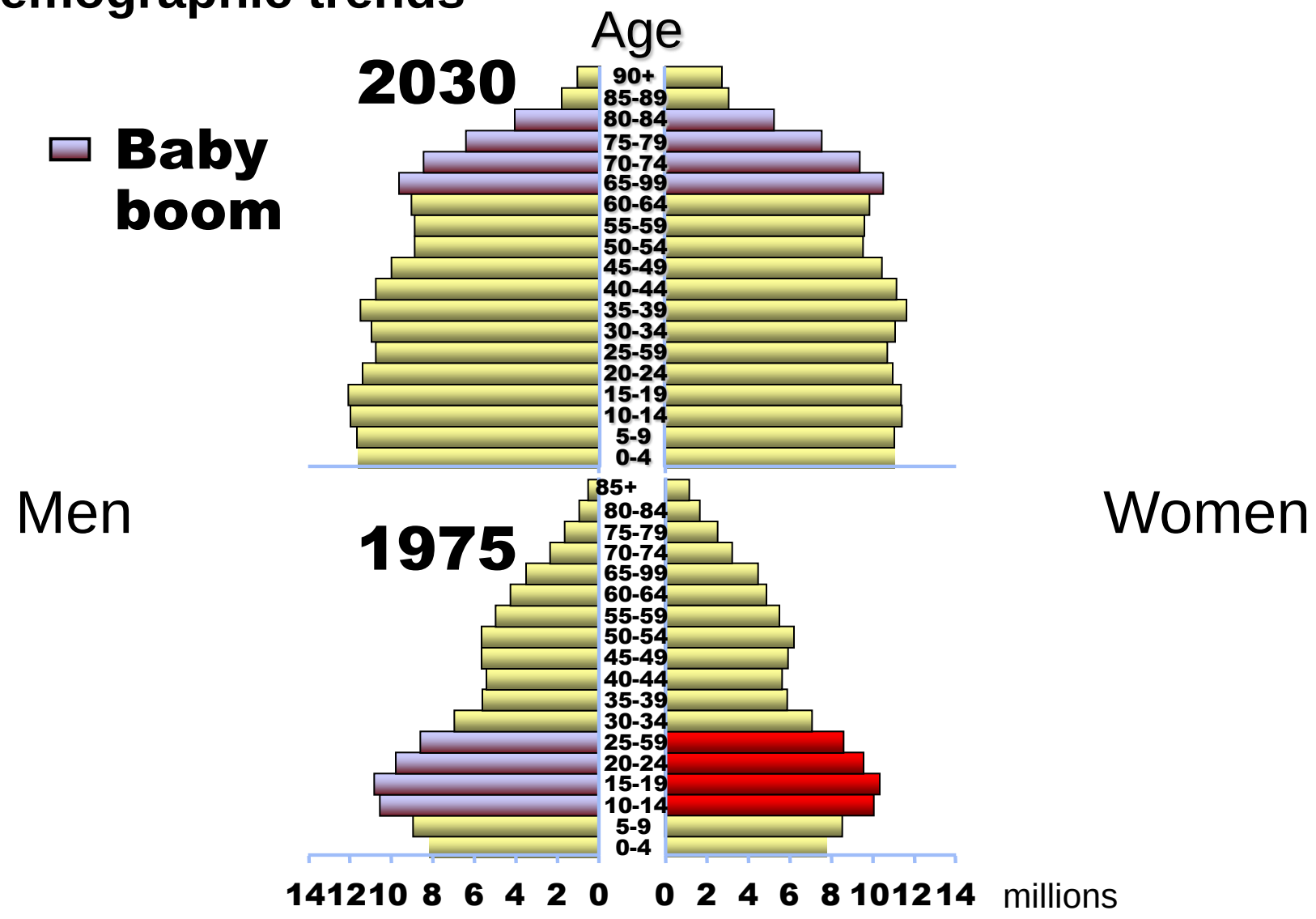
- 11 911 patients *(Nkomo et al. Lancet 2006;368:1005-11)*
- 5 201 patients ≥ 65 years
  (Stewart et al. J Am Coll Cardiol 1997;29:630-4)
- 577 patients ≥ 55 years
  (Lindroos et al. J Am Coll Cardiol 1993;21:1220-5)

*(Iung and Vahanian
Nat Rev Cardiol 2011;8:162-72)*



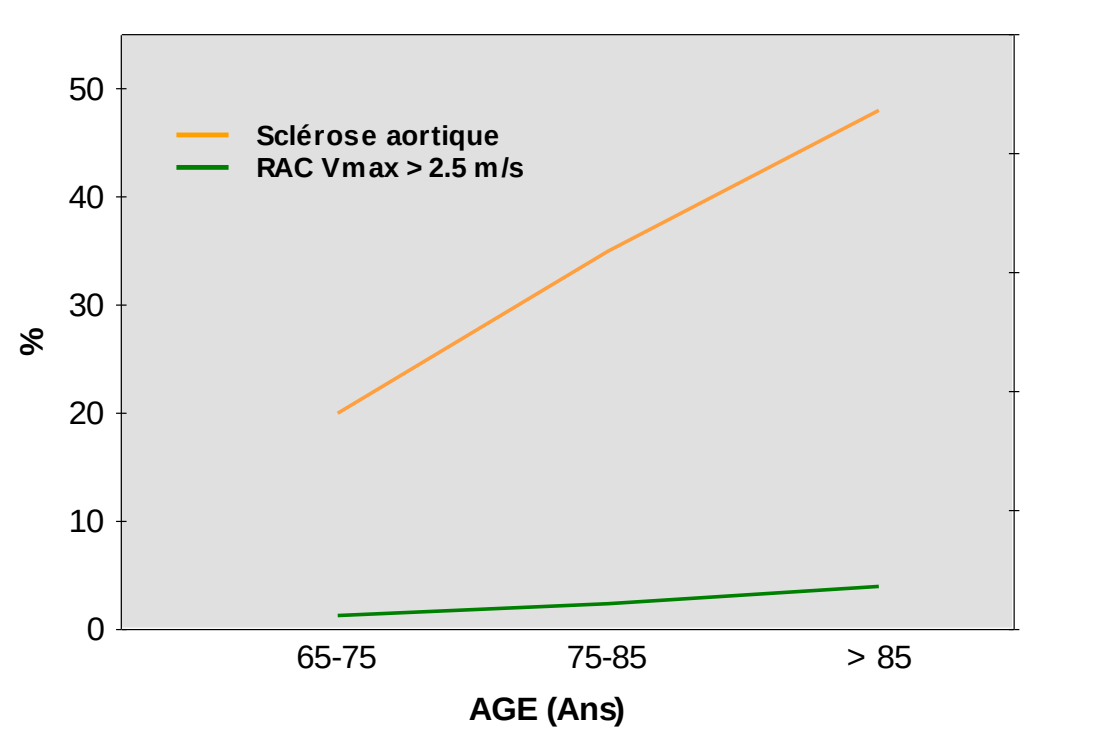
Prevalence of AS : Perspectives

- Lack of validated prevention strategies
- Demographic trends



Prevalence of Aortic Sclerosis

- Thickening of aortic valve without obstruction (v. max < 2.5 m/sec.)
- Prevalence in 5 201 patients ≥ 65 years : 26% (men 31%, women 22%)



(Stewart et al. J Am Coll Cardiol 1997;29:630-4)

Progression of Aortic Sclerosis

- 2131 patients with aortic sclerosis (valve thickening with v. max <2 m/sec.)
- Progression toward AS in 15.9% of cases (mean FU 7 years) vs. 1% in patients with non-thickened aortic valves:
  - 10.5% mild AS (mean gradient < 25 mmHg)
  - 2.9% moderate AS (mean gradient 25-45 mmHg)
  - 2.5% severe AS (mean gradient $\geq$ 45 mmHg)
- Predictive factor: calcification of mitral annulus

(Cosmi et al. Arch Intern Med 2002;162:2345-7)

Aortic Sclerosis
Predictive Factors

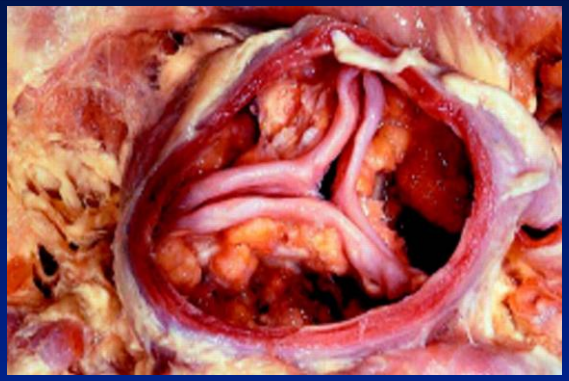
Cardiovascular Health Study

	OR [IC 95%]	p
Age (yrs)	2.2 [2.1-2.2]	<0.001
Male gender	2.0 [1.7-2.5]	<0.001
Lp(a)	1.2 [1.1-1.3]	<0.001
Height (cm)	0.84 [0.78-0.93]	0.001
Hypertension	1.2 [1.1-1.4]	0.002
Active smoking	1.4 [1.1-1.7]	0.006
LDL (mg/dl)	1.12 [1.03-1.23]	0.008

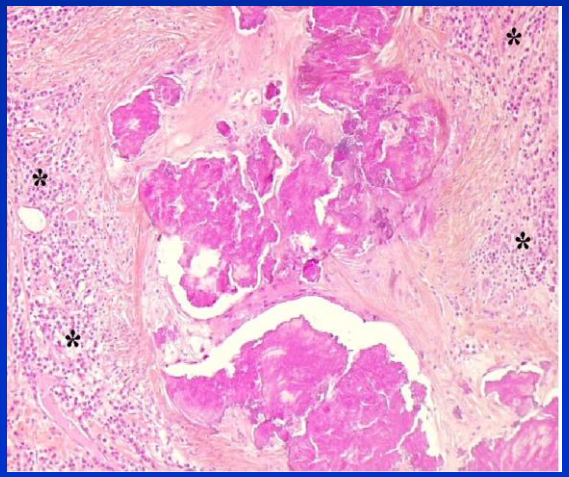
(Stewart et al. J Am Coll Cardiol 1997;29:630-4)

Calcific Aortic Valve Disease and Atherosclerosis

- Common risk factors
  (*Age, HTA, smoking, LDL, diabetes)*



- Histologic and histochemical abnormalities



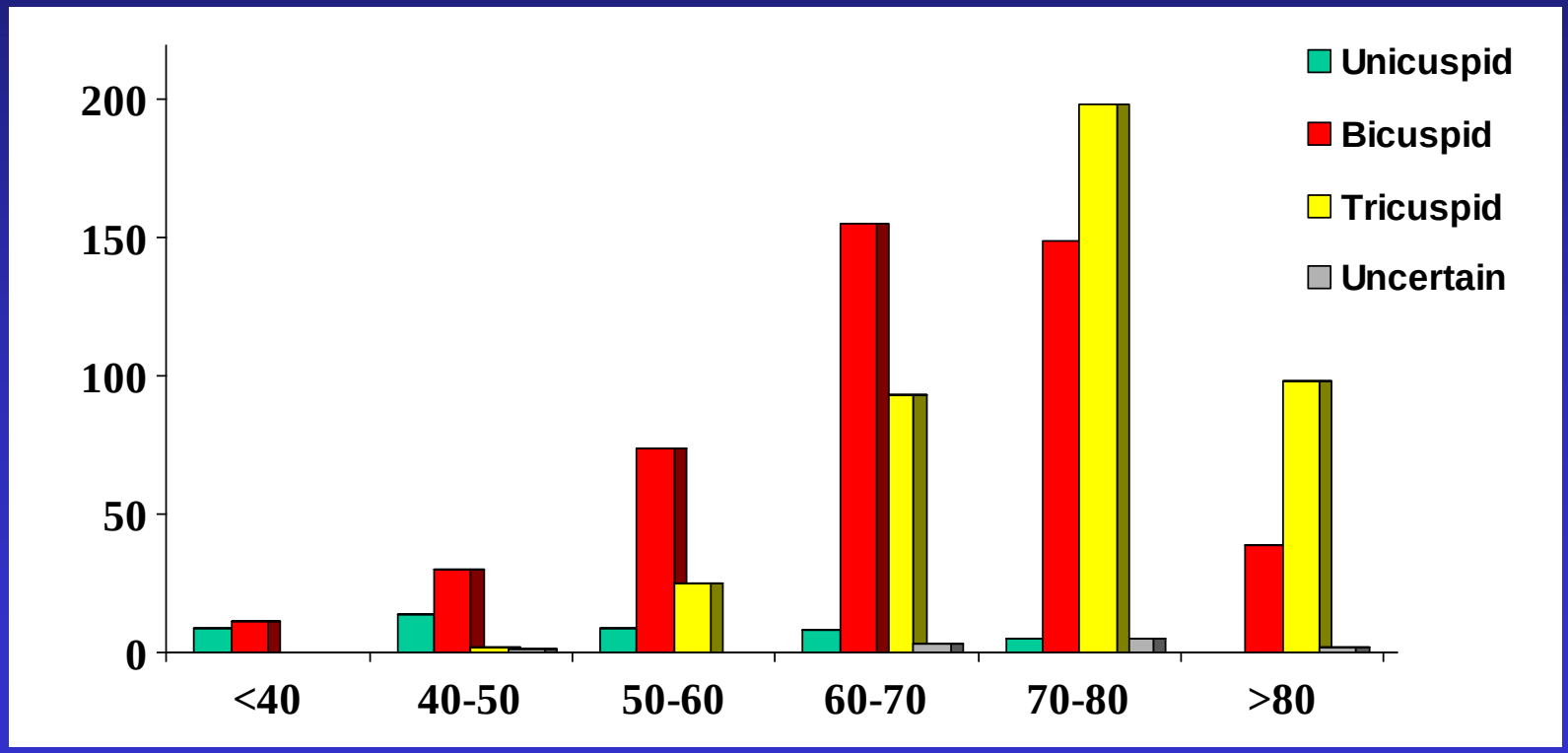
- Aortic sclerosis and cardiovascular risk
  (Otto et al. N Engl J Med 1999; 341:142-7)

INSERM U698 Bichat

AS and Valve Morphology According to Age

932 aortic valves excised during AVR for AS (1993-2004)

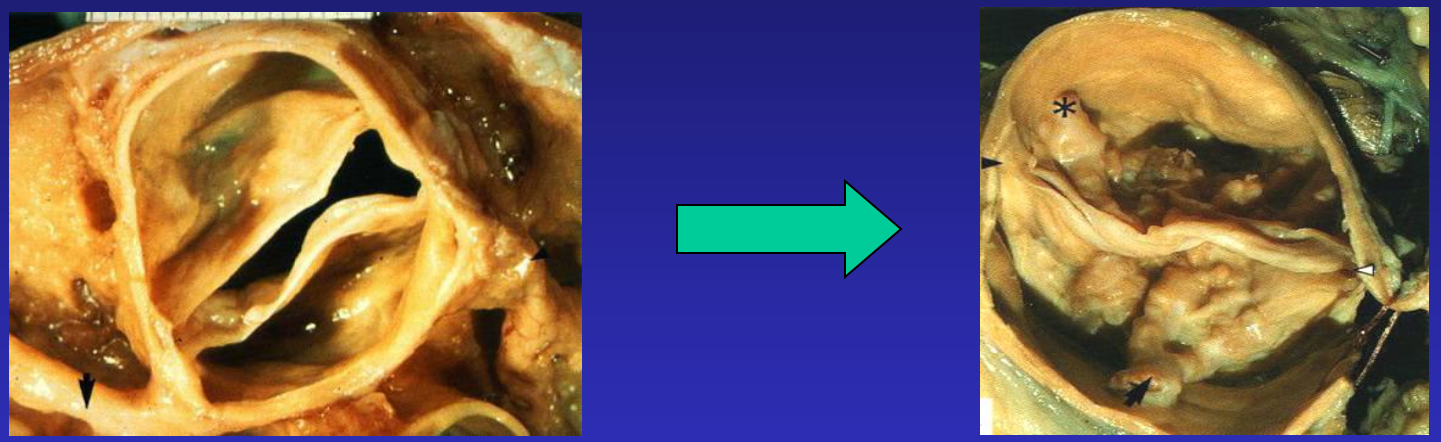
- 49% had bicuspid aortic valves
- Age at intervention
  - bicuspid 67 ± 11 (27-91)
  - tricuspid 74 ± 8 (45-91)



(Roberts et al. Circulation 2005;111:920-5)

Progression of Aortic Stenosis in BAV

- In most cases, aortic stenosis is the consequence of a superimposed « degenerative » process



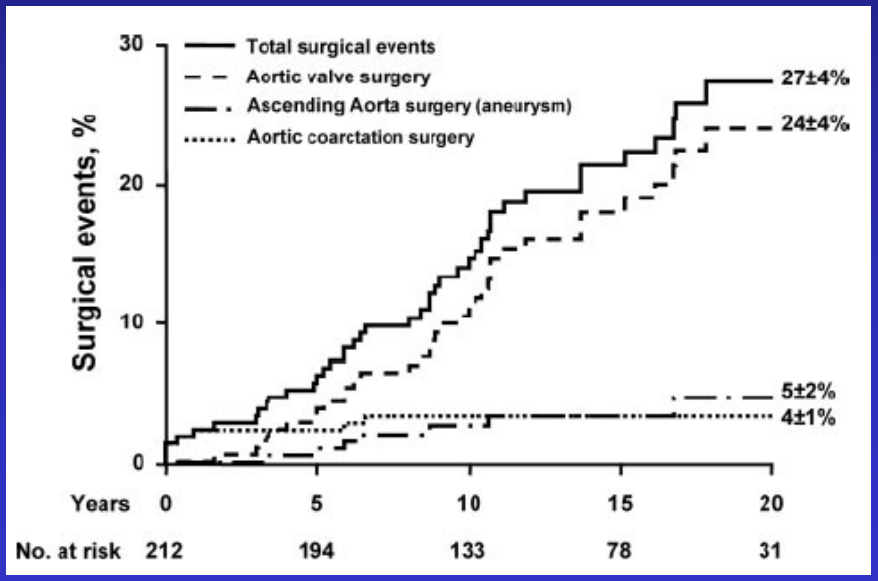
- Development of AS is also linked to cardiovascular risk factors in patients with BAV
  - Hypercholesterolemia OR 1.8 [1.1-2.8]
  - Hypertension OR 2.6 [1.1-6.6]

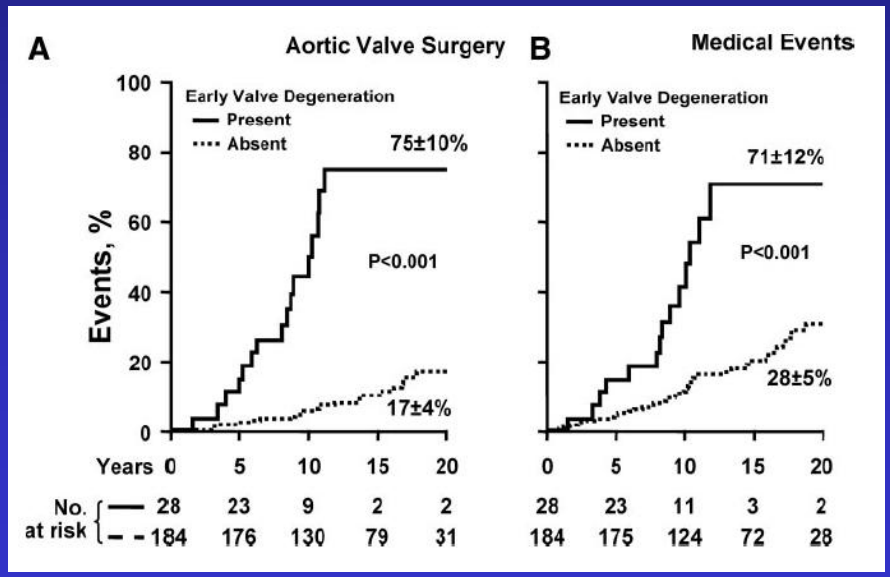
(Chan et al. Am J Cardiol 2001;88:690-3)

Natural History of Bicuspid Aortic Valve

212 patients (32 ± 20 yrs) with normally functioning bicuspid aortic valve (gradient <20 mmHg and AR ≤ 1/4)

- AVR: 39 patients (27 for severe AS)
- Coarctation: 8 patients
- Surgery of ascending aorta: 8 patients

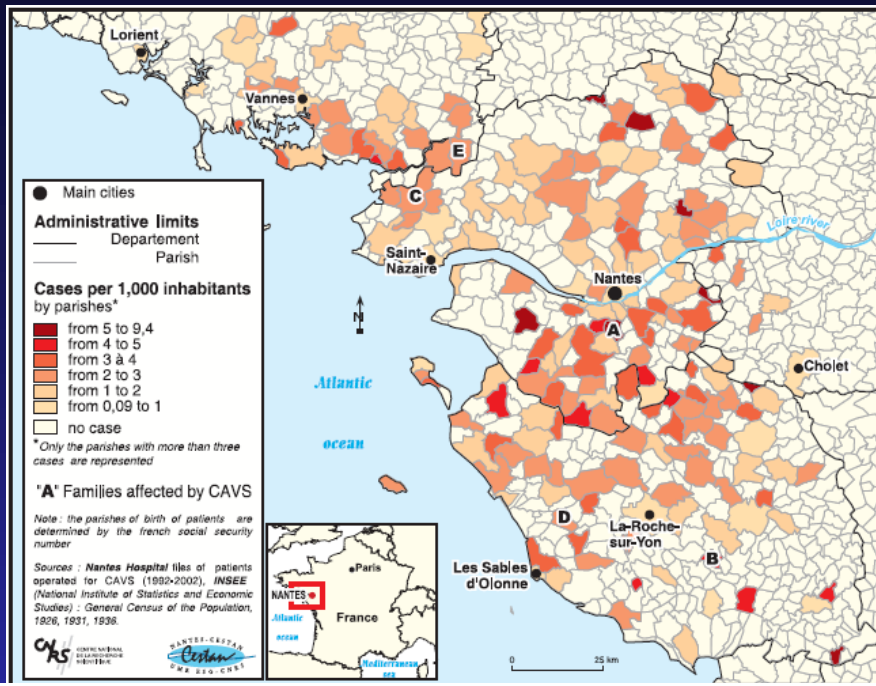


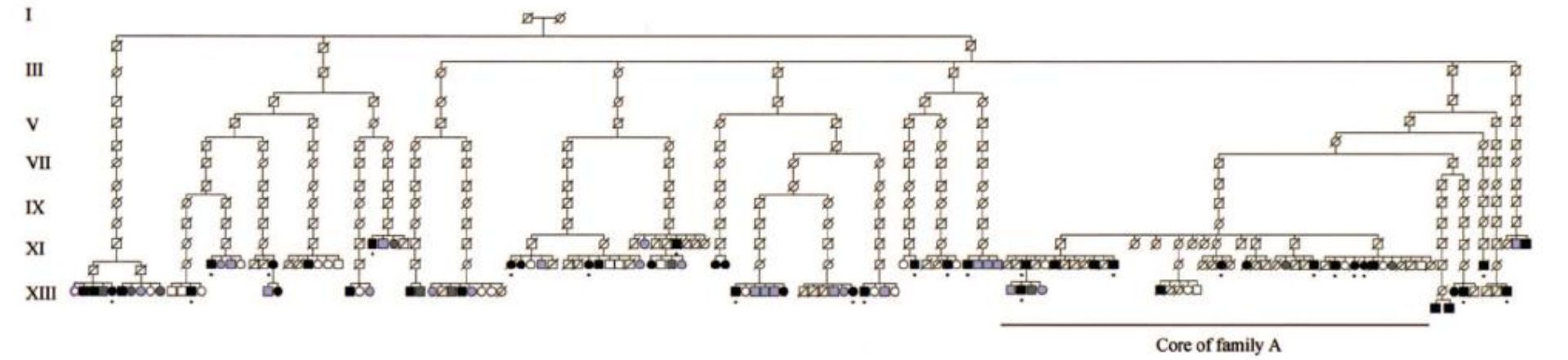


(Michelena et al. Circulation 2008;117:2776-84)

Genetic Component of Aortic Stenosis

From geographic aggregation to genealogy





(Probst et al. Circulation 2006;113:856-60)

Valvular Regurgitations

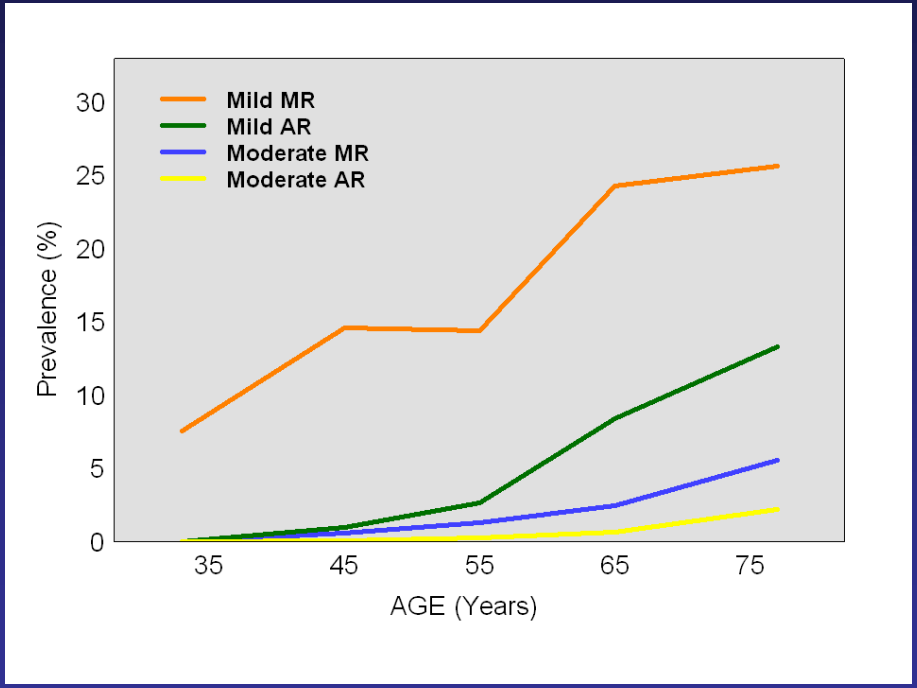
- 2 881 pts from the Framingham cohort
- All had Doppler-echocardiography

	All (%)	≥ Mild (%)	≥ Moderate (%)
Mitral	90	19	1.6
Aortic	11	4	0.5
Tricuspid	84	16	0.8

(Singh et al. Am J Cardiol 1999;83:897-902)

Valvular Regurgitations

- Prevalence according to age



(Singh et al. Am J Cardiol 1999;83:897-902)

Organic MR

3491 pts from the Framingham cohort

- 2.4% had mitral valve prolapse
  (1.3% classic, 1.1% non-classic)
- Mitral regurgitation was severe in 3.5% of them (7% of classic prolapse)
- No relationship with cardiovascular risk factors

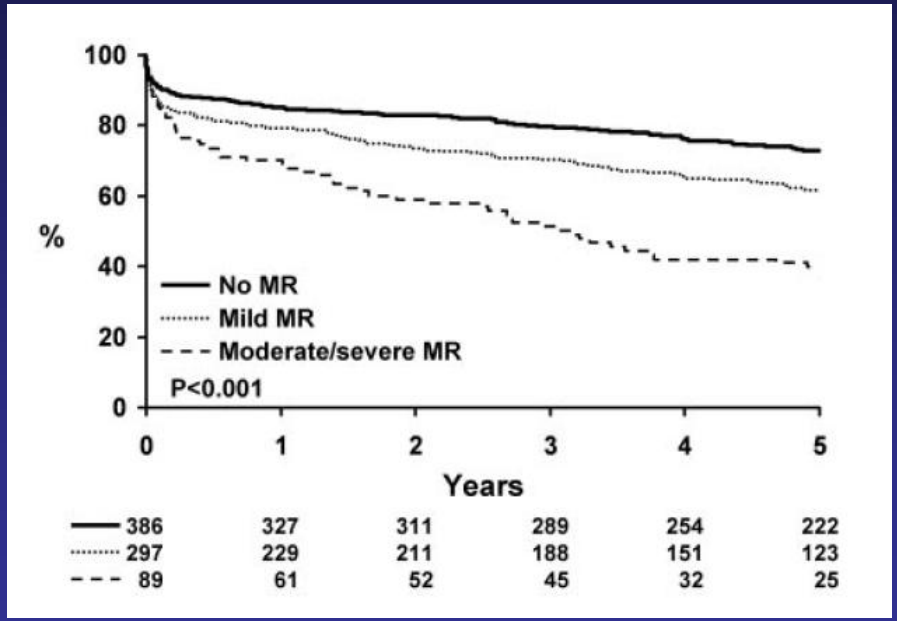
(Freed et al. N Engl J Med 1999;341:1-7)

Ischemic MR After Myocardial Infarction

Community-Based Study

- 773 patients undergoing echocardiography within 30 days following myocardial infarction: 50% ≥ mild MR

- Overall Survival

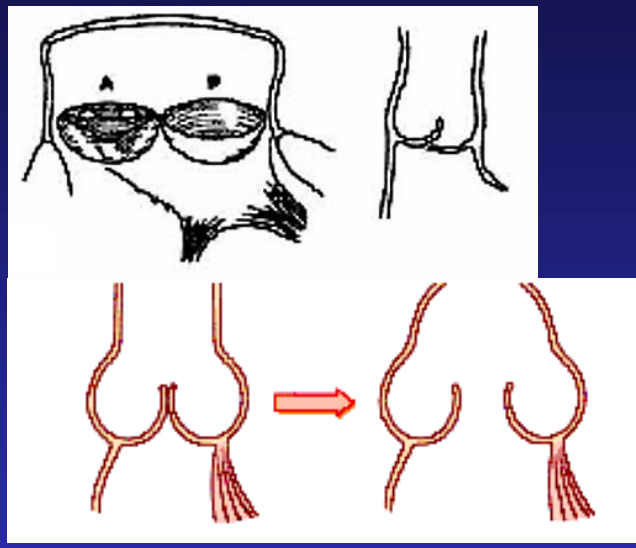


- Ischemic MR was a predictor of death in multivariate analysis: adjusted HR 1.55 [1.08-2.22] p=0.019

(Bursi et al. Circulation 2005;111:295-301)

Aortic Regurgitation

- Degenerative AR
  - Valve prolapse
  - Dilatation of sinotubular junction



- Rheumatic heart disease
- Endocarditis
- Bicuspid valve
- Aortitis

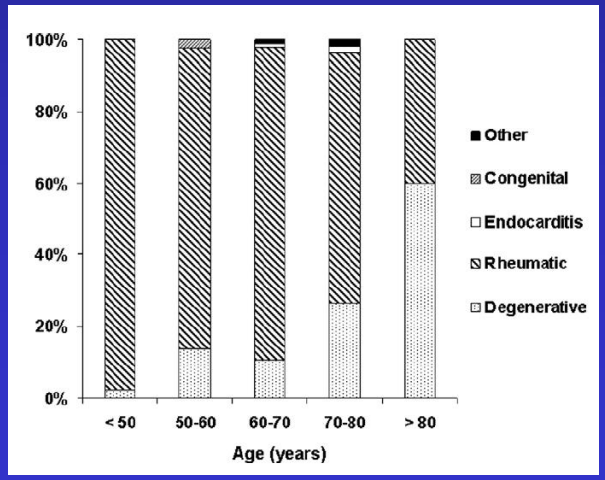
Mitral Stenosis

- The only valvular disease to remain mainly due to rheumatic heart disease (85% of cases in Europe)

- 9% of single-valve disease in the Euro Heart Survey
- Mean age 58 years, 81% women

- 31% had previously undergone commissurotomy (9% percutaneous, 22% surgical)

- Seldom caused by calcific degenerative mitral valve disease (annulus + valve)



(Iung et al. Curr Prob Cardiol 2007;32: 609-61)

Developing Countries

Rheumatic Heart Disease

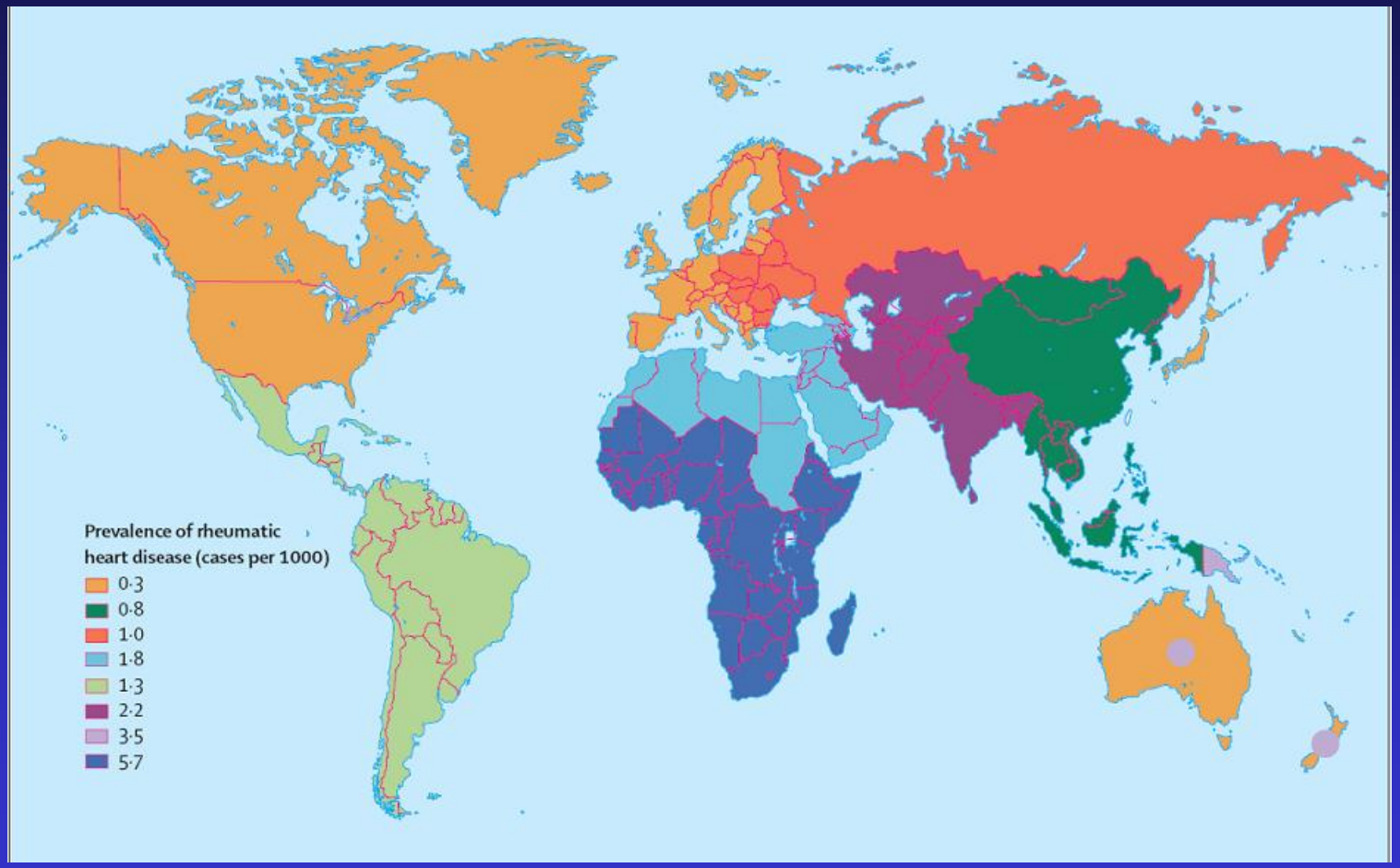
- Prevalence in school-age children when using clinical screening
  - 1-6 / 1000 in Asia *(Carapetis Circulation 2008;118:2748-53)*
  - 2-14 / 1000 in Africa *(Nkomo et al. Heart 2007; 93:1510-9)*
- < 20% of patients aware of valvular disease and 8% under prophylaxis

  (Rizwi et al. Heart 2004;90:394-9)
- Prevalence estimated at 22-30 / 1000 in school-age children when using echocardiographic screening

  (Marijon et al. N Engl J Med 2007;357:470-6)

Developing Countries

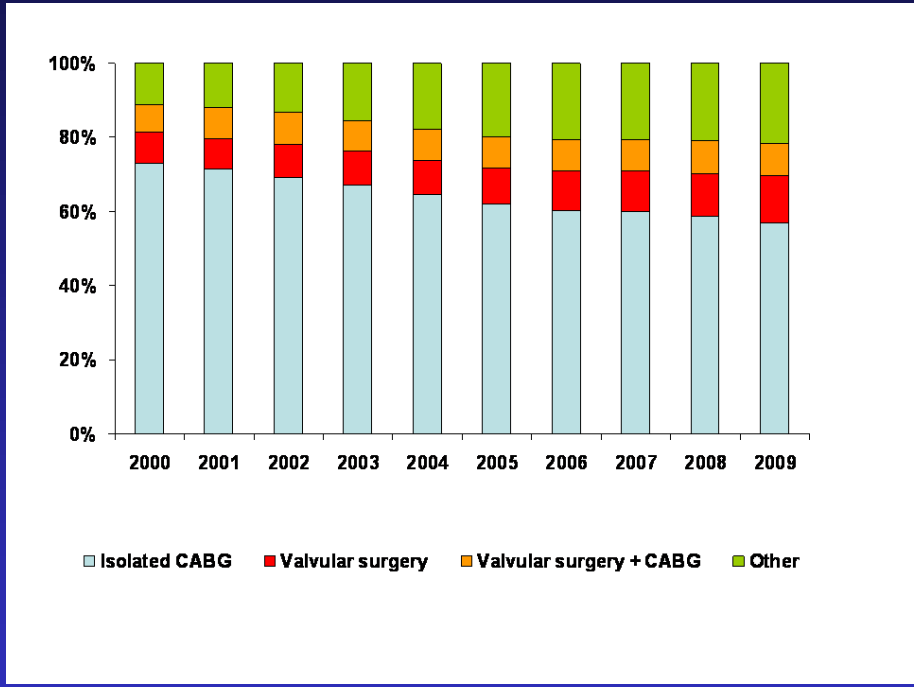
Prevalence of Rheumatic Heart Disease



(Carapetis et al. Lancet Inf Dis 2005;5:685-94)

Operated Patients

STS Database



http://www.sts.org/documents/pdf/ndb2010/1stHarvestExecutiveSummary%5B1%5D.pdf

- Valvular surgery was AVR in 67% of cases in 2009
- Increase in patient age and comorbidities between 1997 and 2006

(Brown et al. JTCS 2009;137:82-90)

Conclusion (I)

- Valvular heart disease remains frequent in industrialised countries, where its prevalence increases in the elderly
- This is the consequence of the predominance of degenerative valvular diseases (mainly AS and MR), which represent a heterogeneous group
- Expected increase in prevalence
  - Population ageing
  - Lack of validated prevention strategies
- Impact on the complexity of decision-making
- Need for improving the understanding of the pathophysiology of degenerative valvular diseases

Conclusion (II)

- Valvular surgery accounts for more than 20% of all procedures of cardiac surgery and its proportion has increased over the last decade
- Need for the development of less invasive interventions
- Persistence of a high burden of rheumatic heart diseases in developing countries
  - Over-mortality in young patients
  - Underestimation from clinical screening
  - Need to implement strartegies of early diagnosis and prevention

Infective Endocarditis

	French Survey (n=390)	ICE (n=2781)	Euro Heart Survey (n=159)
Mean age (yrs)	59	58	56
Male (%)	71	68	70
Prosthetic endocarditis (%)	16	21	26
IV drug use (%)	6	10	5
Microorganisms (%)			
- *streptococci (oral)*	58 *(17)*	39 *(17)*	42 *(13)*
- *staphylococci*	29	42	33
Surgery (%)	49	48	52
In-hospital mortality (%)	16	18	13

Hoen et al. JAMA 2002;288:75-81
Murdoch et al. Arch Intern Med 2009;169:463-73
Tornos et al. Heart 2005;91:571-5

From 1991 to 2008: some trends

Per million	1991	1999	2008
Overall crude incidence	31.4 [28.1-35.0]	31.0 [27.7-34.5]	29.5 [26.4-32.8]
Overall standardized incidence*	35.0 [31.3-39.0]	33.4 [29.9-37.2]	31.7 [28.3-35.2]

Incidences rate were calculated since both common regions to study : Rhône-Alpes, Lorraine and Paris et petite courrone and on a population aged >=20 years old

*standardized on the 2007 French population aged >=20 years old by age and by sex

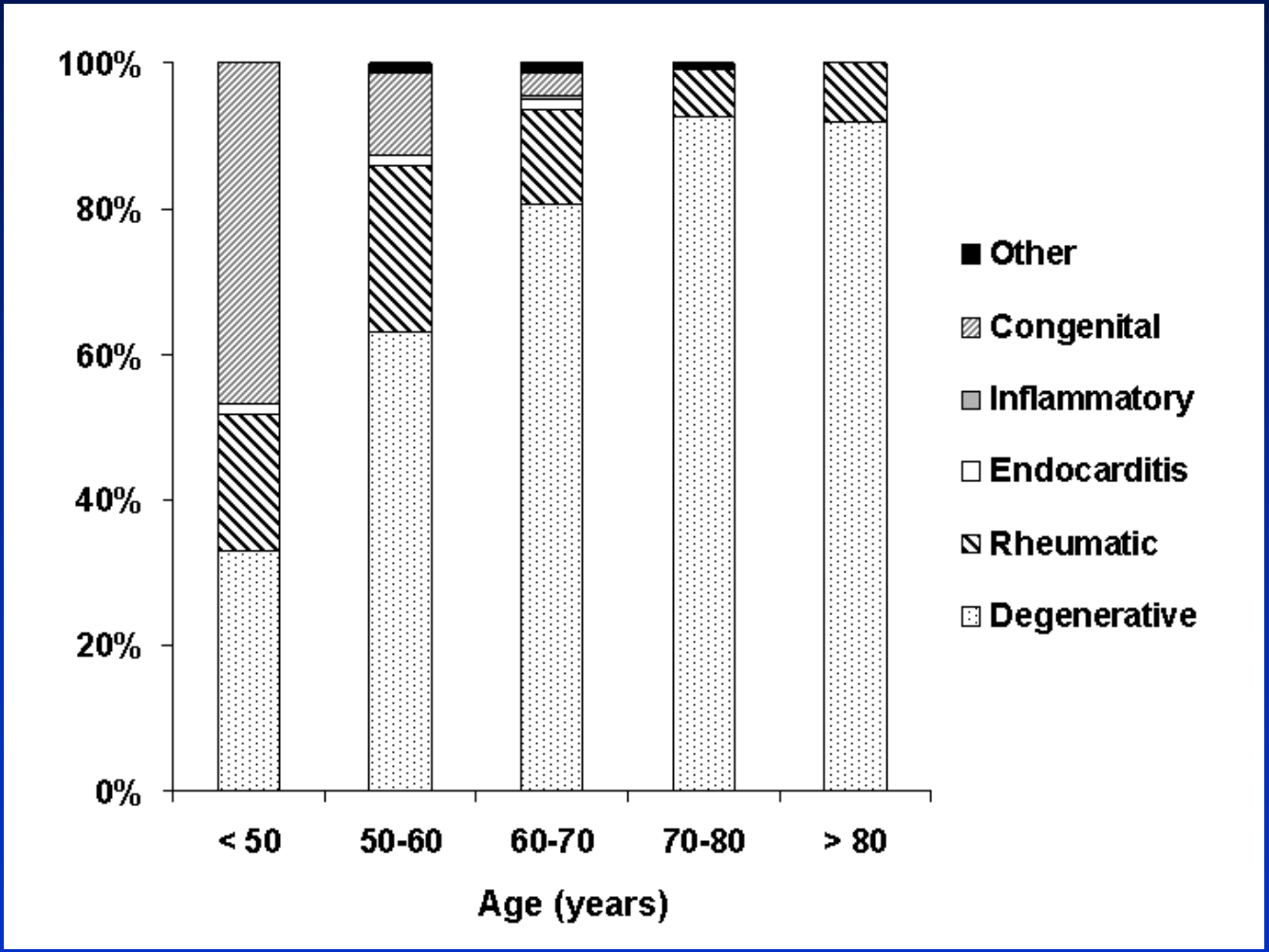
From 1991 to 2008: some trends

Per million	1991	1999	2008
Standardized incidence by causative microorganisms*			
Oral streptococci	8.0 [6.3-10.0]	6.3 [4.8-8.0]	6.3 [4.9-8.0]
Group D streptococci	6.4 [4.8-8.3]	8.4 [6.7-10.5]	4.0 [2.9-5.4]
Staphylococcus aureus	5.2 [3.9-6.8]	6.9 [5.4-8.7]	8.0 [6.3-9.8]

Incidences rate were calculated since both common regions to study : Rhône-Alpes, Lorraine and Paris et petite courrone and on a population aged >=20 years old

*standardized on the 2007 French population aged >=20 years old by age and by sex

Etiologies of Aortic Stenosis



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