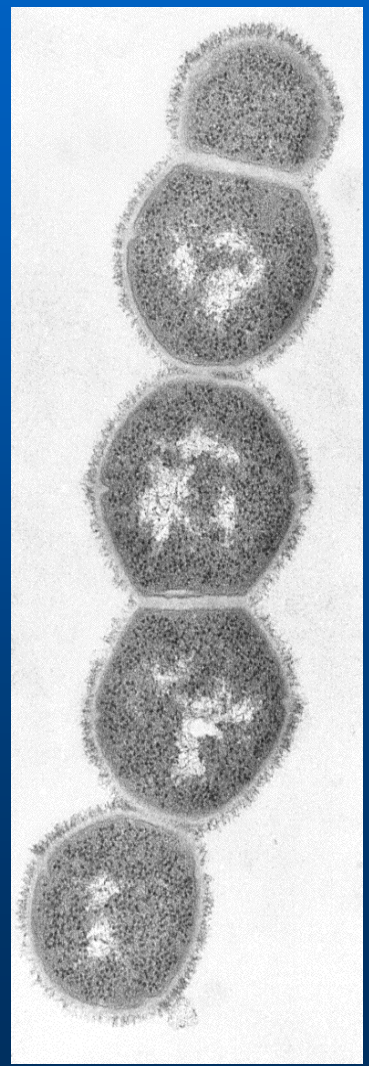
GAS virulence factors

Somatic components

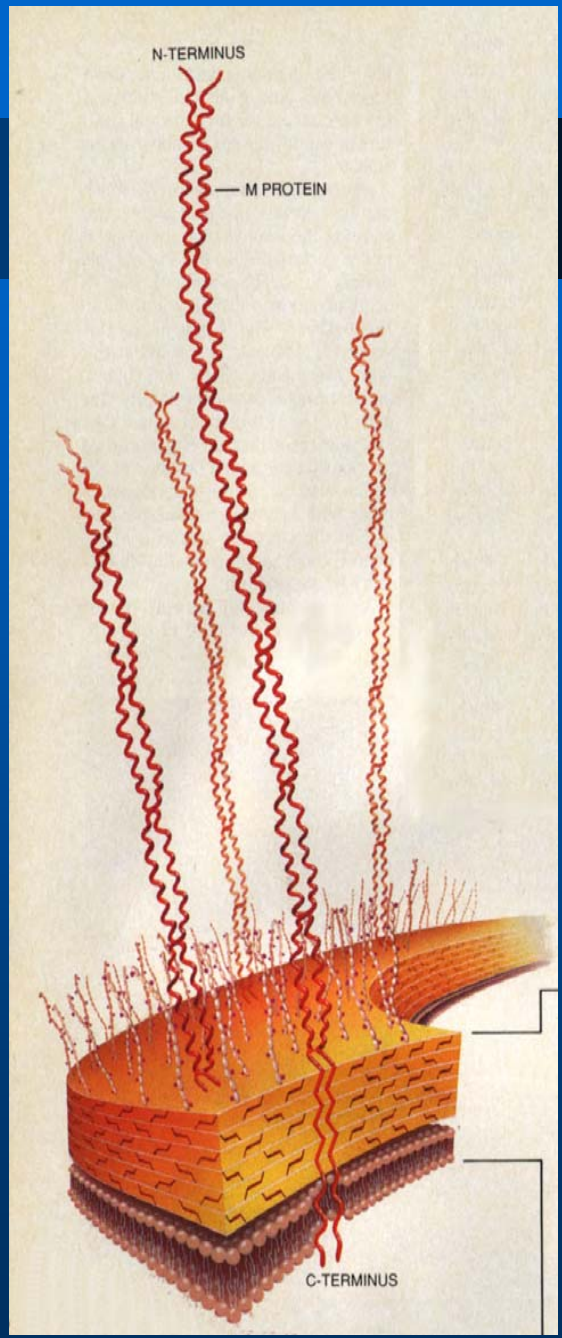
- Protein F
- M-protein
- Capsule

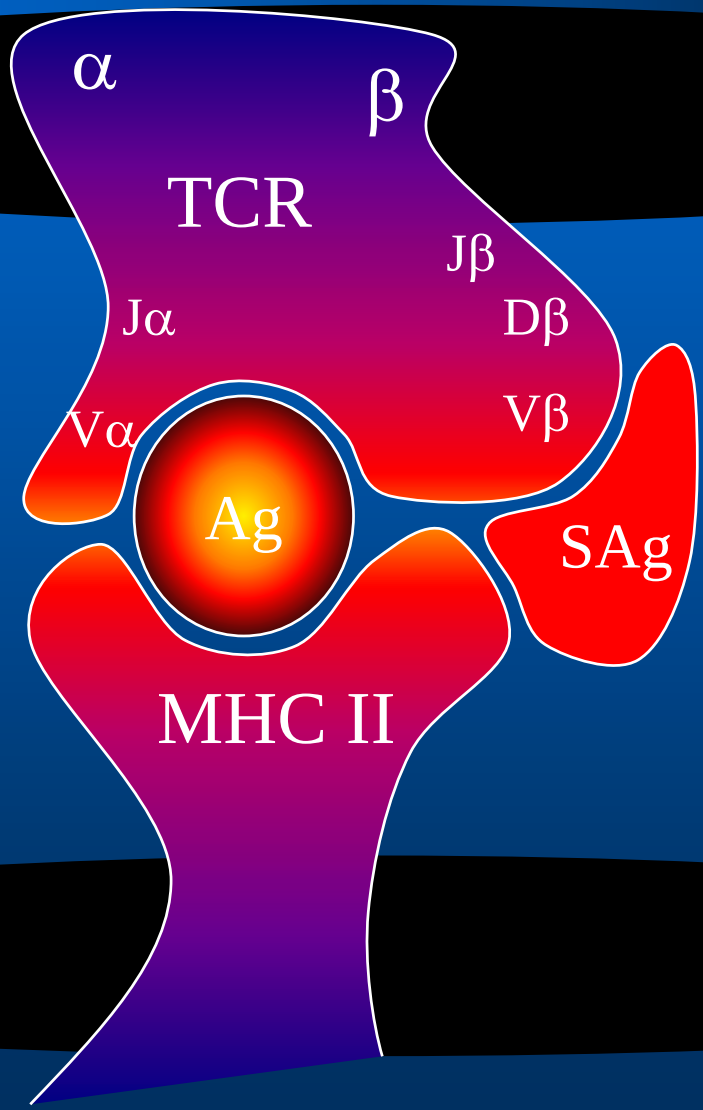
Extracellular components

- C5a peptidase
- Streptolysin O
- Streptolysin S
- Streptococcal pyrogenic exotoxins
- Streptokinase



M-type





T cell

APC

Spe A
Spe B
Spe C
Spe F
Ssa
Spe Z
……

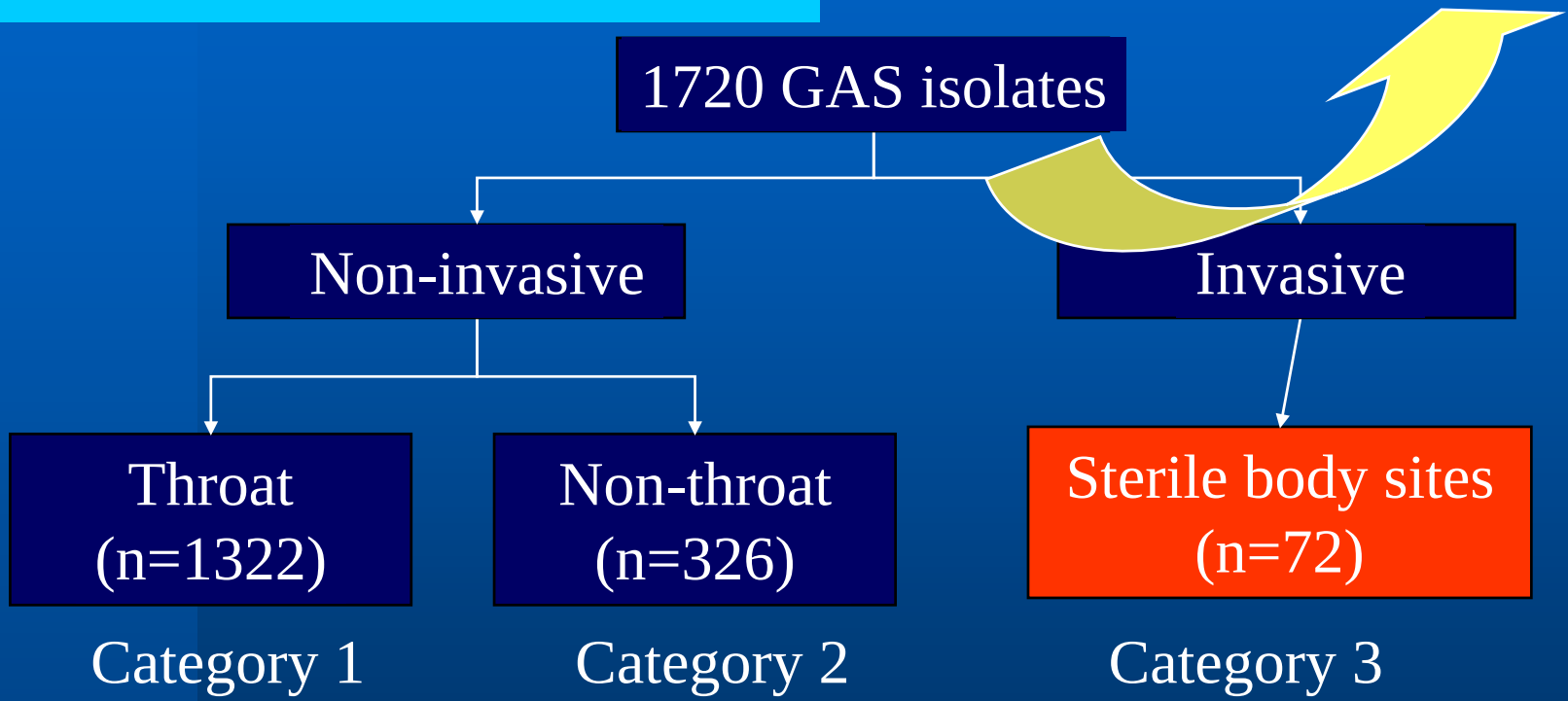
Background of the study

- **Mid 1980s: world-wide increase of severe invasive GAS infections**
- **1987: Description of StrepTSS** (Cone *et al*. NEJM)
- **1993: Definition of StrepTSS** (The Working group. JAMA)

  Hypothesis

  - **world-wide dispersed M1 clone**
  - **SPE A causative role in StrepTSS**
- **Increasing incidence of macrolide-R**

GAS strains studied Ery-R



Molecular techniques	102	326	72

Methods used

- **Pulsed-field gel electrophoresis**
- ***emm*-genotyping (PCR+ reversed line blot)**
- **Superantigen and resistance genes detection (PCR)**
  - ***speA*, *speB*, *speC*, *speF*, *ssa***
  - ***ermB, mef A/E***
- **Disk diffusion and agar dilution**

Results PFGE-analysis (*SmaI*)

500 invasive and non-invasive isolates analysed

Clone 001 13.2 %

M1 ; *speA* pos ; *speC* pos ; *ssa* neg

Clone 002 8.8 %

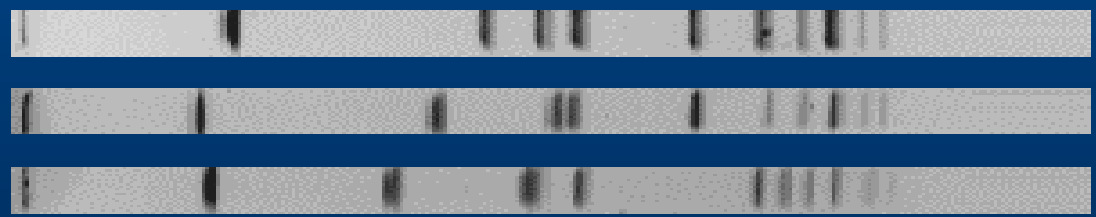
M12 ; *speA* neg ; *speC* pos ; *ssa* neg

Clone 003

↓

Clone 170

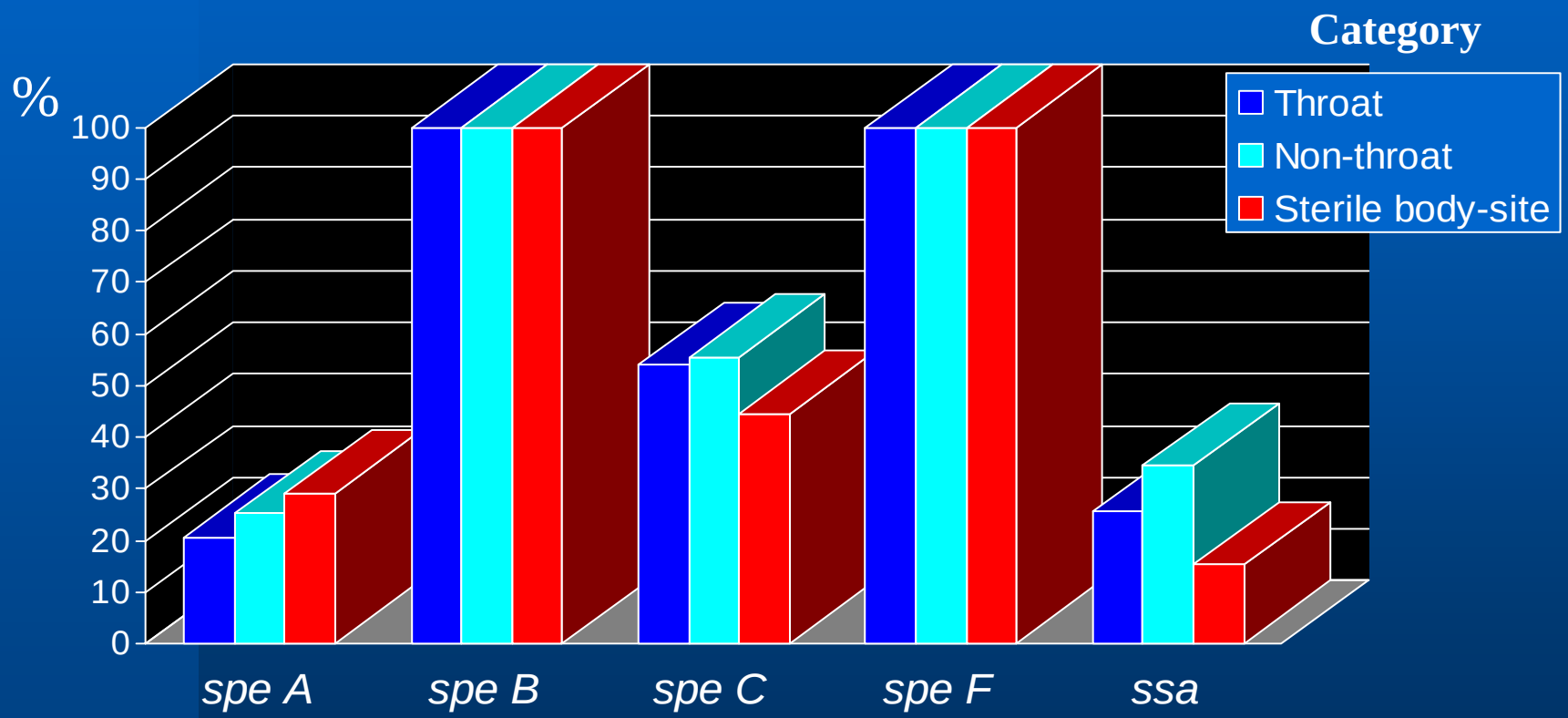
< 5%



Different M-types and superantigen genes

Descheemaeker et al. *J. Med. Microbiol*. 2000;**49**:1-5.

Superantigen gene detections



Descheemaeker et al. *J. Med. Microbiol*. 2000;**49:**1-5.

Superantigen gene detections

Superantigen gene detection			Category		
spe A	*spe C*	*ssa*	1	2	3
-	**-**	**-**	**18.6 % (19)**	**16.6 % (54)**	**34.7% (25)**
-	-	+	7.8 % (8)	8.6 % (28)	5.6 % (4)
-	+	-	38.2 % (39)	30.1 % (98)	23.6 % (17)
-	+	+	14.7 % (15)	19.6 % (64)	6.9 % (5)
+	-	-	16.7 % (17)	14.7 % (48)	12.5 % (9)
+	-	+	2.9 % (3)	4.6 % (15)	1.4 % (1)
+	+	-	1.0 % (1)	4.3 % (14)	13.9 % (10)
+	+	+	0.00 % (0)	1.5 % (5)	1.4 % (1)
total number of strains			102	326	72

Descheemaeker et al. *J. Med. Microbiol*. 2000;**49:**1-5.

Conclusions (GAS)

- **Two world-wide dispersed genotypes are also highly prevalent in Belgium.**
- **Not a single genetic clone, M-type, nor superantigen profile is exclusively correlated with invasive disease.**
- **The clinical outcome of a GAS infection is probably due to an interaction between strain and host factors. ⇦⇦⇦ Study of host factors**

Definitie STSS

- I. Isolation of a group A streptococcus (*S. pyogenes*)
  - A. From a normally sterile site (e.g. blood, cerebrospinal, pleural, or peritoneal fluid, tissue biopsy, surgical wound, etc.)
  - B. From a non-sterile site (e.g. throat, sputum, vagina, superficial skin lesion, etc.)
- II. Clinical signs of severity.
  - A. hypotension and
  - B. ≥ 2 of the following signs
    - 1. Renal impairment
    - 2. Coagulopathy
    - 3. Liver involvement
    - 4. Adult respiratory distress syndrome
    - 5. Generalised erythematous macular rash that may desquamate
    - 6. Soft-tissue necrosis, including necrotising fasciitis or myositis, or gangrene