

Molecular epidemiology of invasive meningococcal disease and recommended vaccination strategy in the Czech Republic in 2009



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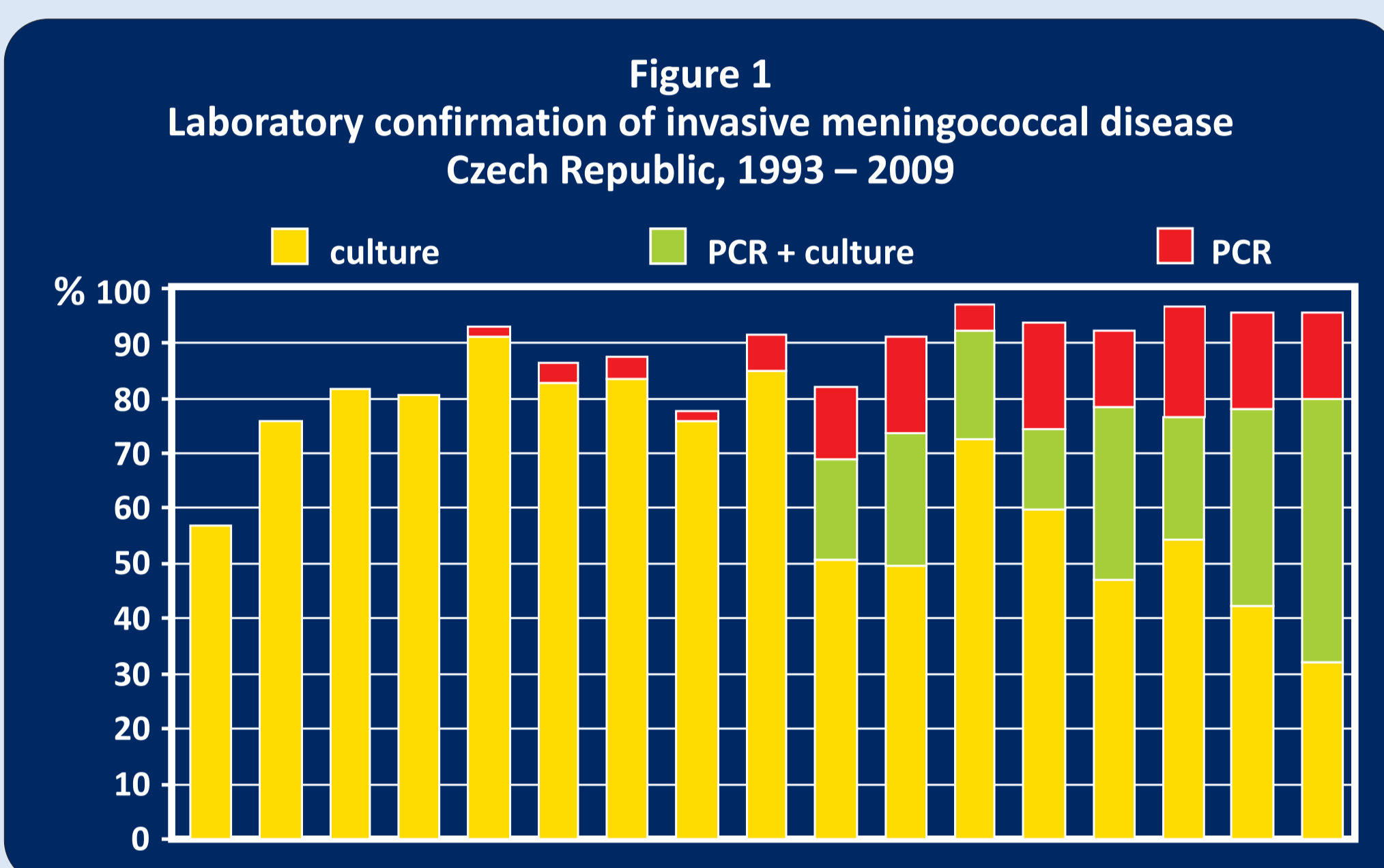
Background

Enhanced surveillance of invasive meningococcal disease has been conducted in the Czech Republic since 1993. Molecular methods for the characterization of *Neisseria meningitidis* used in the National Reference Laboratory for Meningococcal Infections allow precise assessment of the epidemiological situation.

Methods

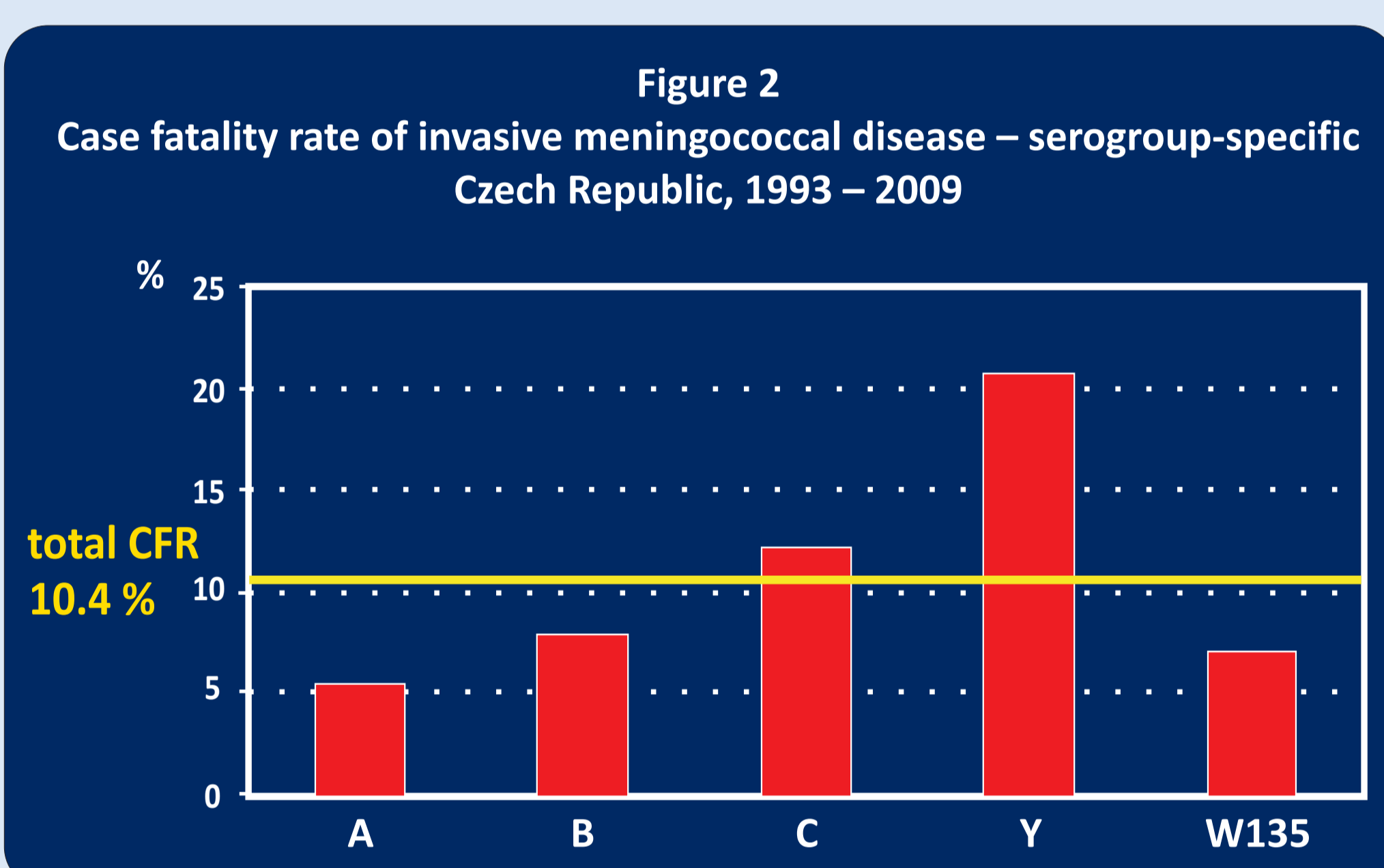
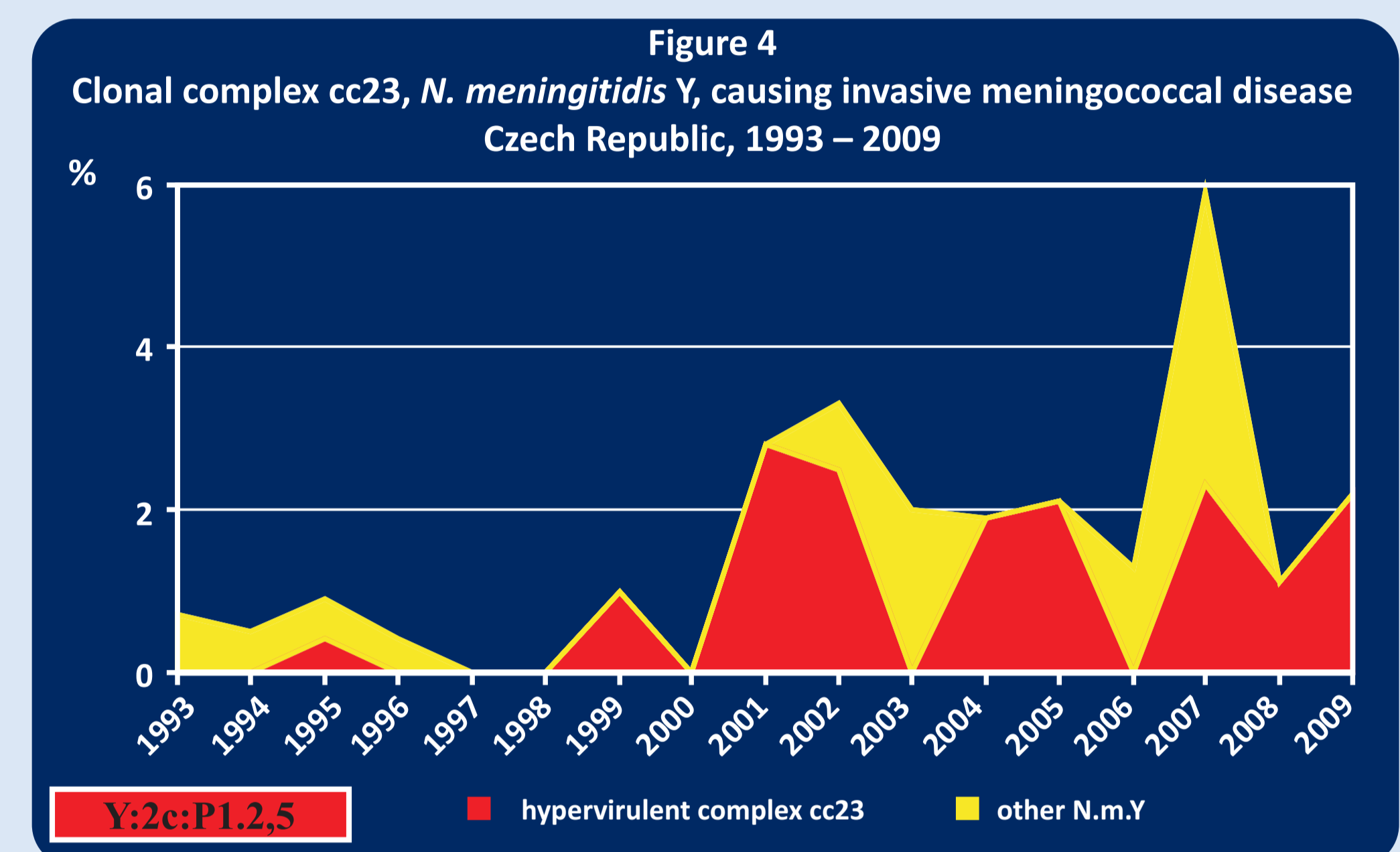
The case definition is consistent with the EU case definition. Notification is compulsory and is performed by local epidemiologists. Strains of *N. meningitidis* isolated from invasive meningococcal disease cases are referred by the field laboratories to the National Reference Laboratory for Meningococcal Infections to be characterized by serogrouping, *PorA* and *FetA* sequencing and multilocus sequence typing (MLST) (<http://pubmlst.org/neisseria/>).

Results

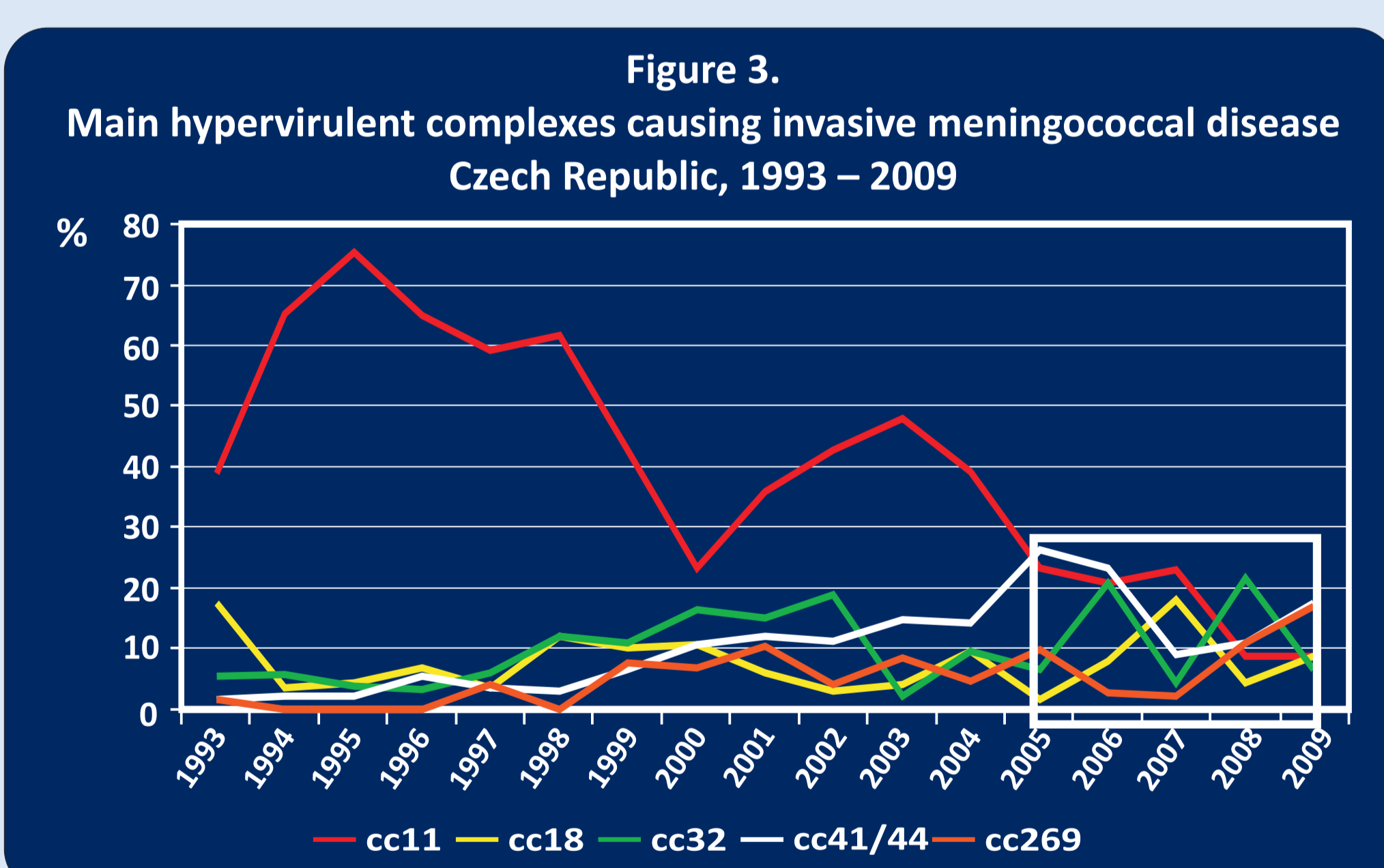
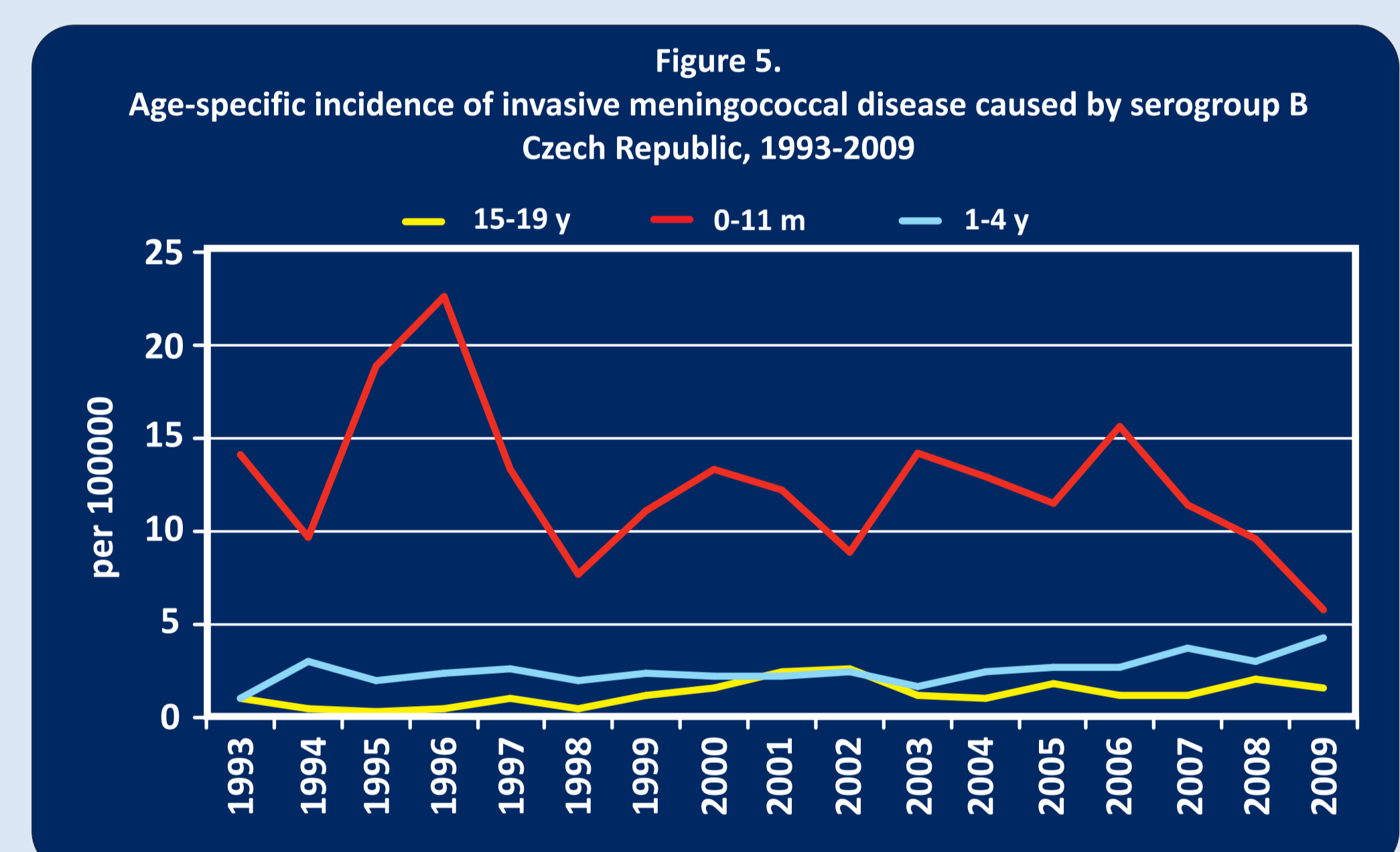


The etiology of invasive meningococcal disease was laboratory confirmed in 95.2 % of cases in 2009: by culture only in 31.8 %, by culture and PCR in 48.2 %, and by PCR only in 15.2 % of cases - **Figure 1**. The disease was caused mainly by serogroup B meningococci (69.4 %) in 2009, followed by serogroups C (11.8 %) - **Table 1**.

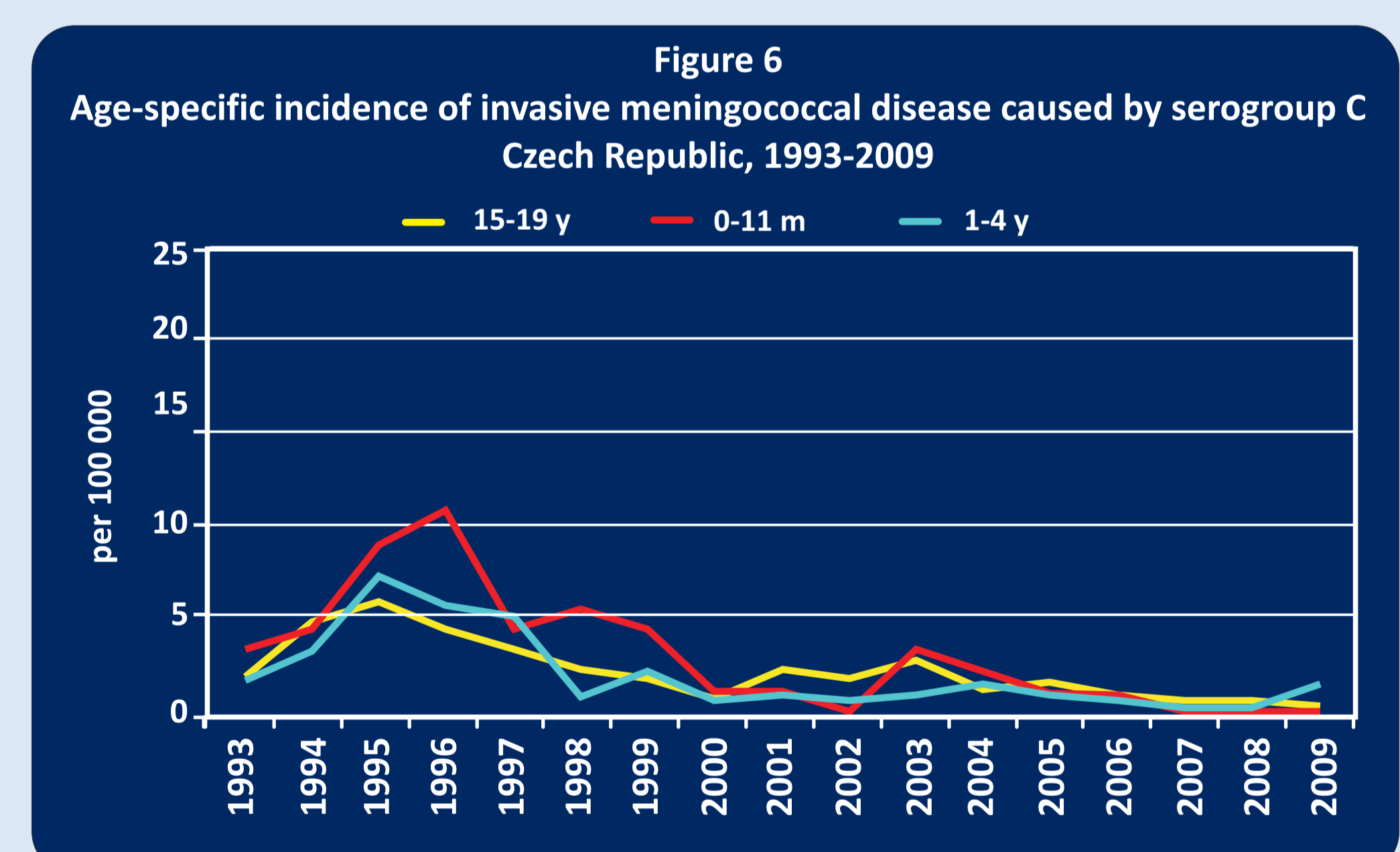
Serogroup Y was found in a low percentage of invasive meningococcal disease cases (1.2 %), but caused a high case fatality rate in the period of active surveillance (20.7 %) - **Figure 2**. The most frequent clonal complexes in 2009 were cc41/44 (17.4 %), cc269 (17.0 %), cc18 (8.7 %), and cc32 (6.5 %) - **Figure 3**, all typical for serogroup B. Clonal complex cc11 (typical for serogroup C) was only found in 8.7 % of isolates.



Age	Serogroup of <i>Neisseria meningitidis</i>						Total	per 100000		
	A	B	C	Y	W135	ND		total	N.m.B	N.m.C
0-11 m	7					1	8	6.7	5.8	0
1-4 y	18	6				3	27	6.4	4.3	1.4
5-9 y	5					2	7	1.5	1.1	0
10-14 y	2					1	3	0.6	0.4	0
15-19 y	10	2	1			3	16	2.5	1.6	0.3
20-24 y	1					1	1	0.1	0.1	0
25-34 y	4					3	7	0.4	0.2	0
35-44 y	5	1					6	0.4	0.3	0.06
45-54 y	3	1					4	0.3	0.2	0.07
55-64 y	4					1	5	0.3	0.3	0
65+ y					1		1	0.06	0	0
Total	59	10	1	1	14	85	85	0.8	0.6	0.1
%	69.4	11.8	1.2	1.2	16.4	100				



The highest case fatality rate (CFR) of invasive meningococcal disease was caused by *N. meningitidis* Y belonging to the clonal complex cc23, with CFR reaching more than 50 % in 15-19-year-old boys. The frequency of cc23 has been continuously increasing in recent years - **Figure 4**. In 1993-2009, the highest age-specific and serogroup-specific incidence rates were constantly found for invasive meningococcal disease caused by serogroup B in the age group 0-11 months - **Figures 5 and 6**. A MenB vaccine is needed for infants, but the sero/subtype coverage by the currently developed porin-based vaccines is low for the Czech meningococcal isolates. A vaccine other than these porin-based ones is to be developed that would be effective against *N. meningitidis* B.



Conclusion

- There is no indication for mass vaccination with a MenC conjugate vaccine in the Czech Republic, but a MenB vaccine and tetravalent conjugated ACYW135 vaccines are required.
- A vaccine other than the porin-based ones needs to be developed that would be effective against *N. meningitidis* B.

Acknowledgements

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