Epidemiologische Entwicklung der invasiven PE

Effekte der PCV10 Einführung in das Nationales Kinderimpfprogramm (NIP)

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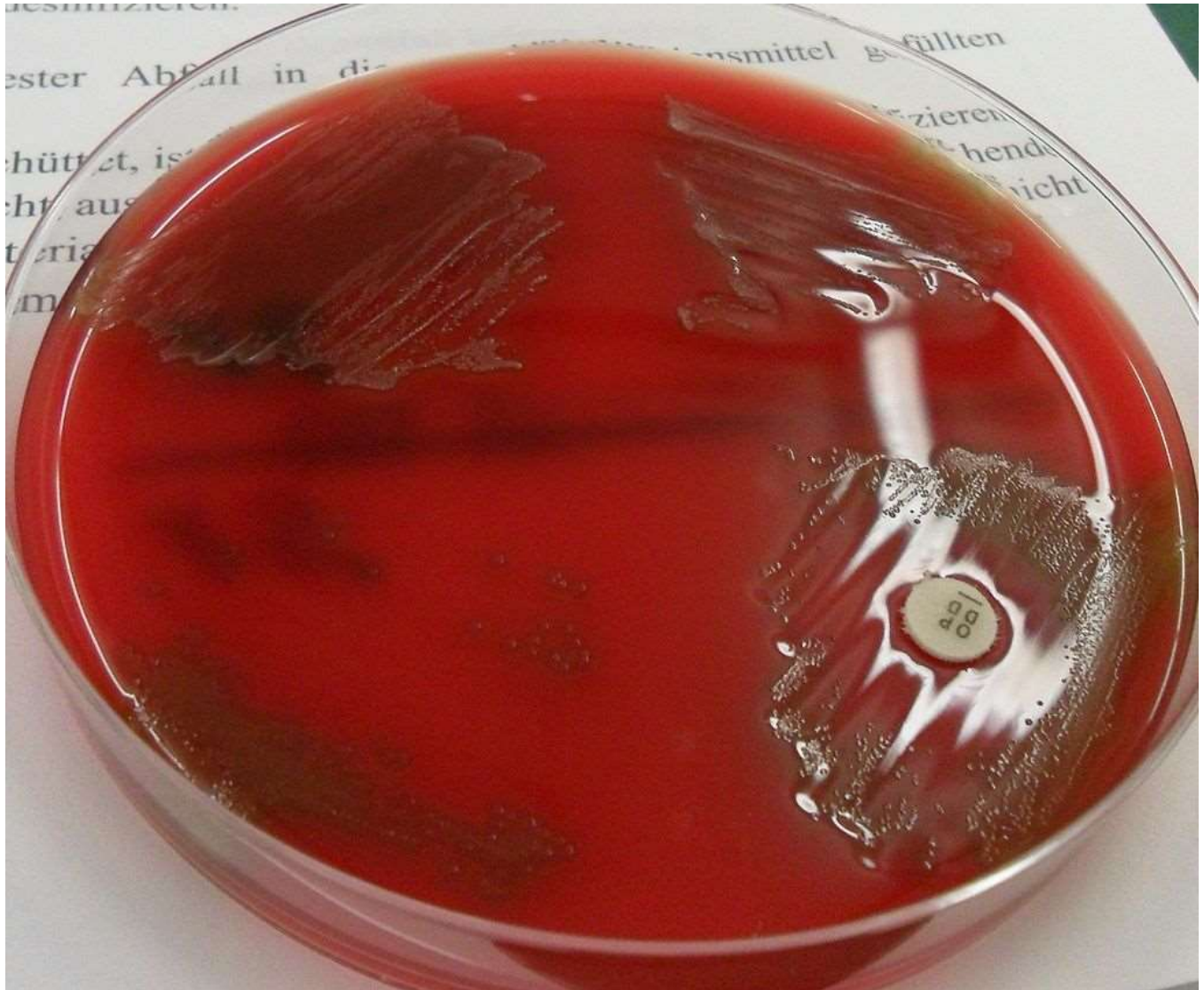
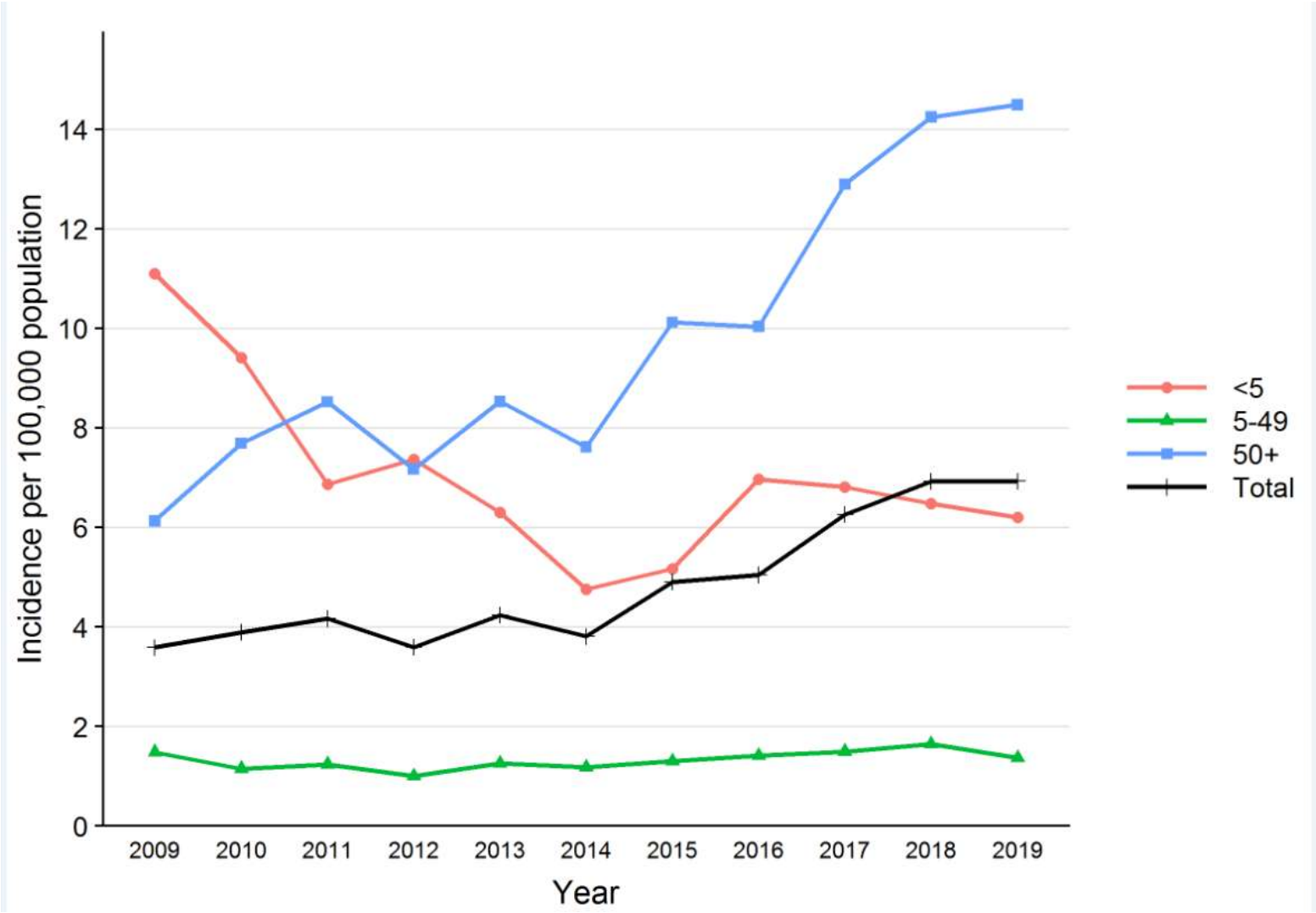
Pneumokokken: Gram+, oft bekapselte Diplokokken, Optochin-empfindlich, auf Blutagar in α-hämolysierenden, grüngelben, eingedellten, bei Bekapselung schleimigen Kolonien



1-Jahres Inzidenz: IPE
< 5, 5-49, 50+ Jährigen, 2009-2019



Effekte einer Universalimpfung mit PCV in < 2 Jährigen

Direkt protektive Effekte – Individualschutz der Geimpften

- Prävention der Infektion mit VaST in Geimpften (Vakzin-Zielgruppe)
- Prävention der (Re) Kolonisation mit VaST in Geimpften ->
  - Reduktion der Anteil der Kolonisierten in Geimpften ->

Indirekter protektiver Effekt – Der „Herdenschutz"

- Durch Schutz vor Kolonisation in Geimpften -> Reservoir Abnahme
  >Reduktion der Transmission von Kolonisierten auf Nicht-Geimpfte
  >indirekter Schutz vor Kolonisation/Infektion in Nicht-Geimpften, jedes Alter

ST-Replacement: *replacement in carriage, replacement in disease*

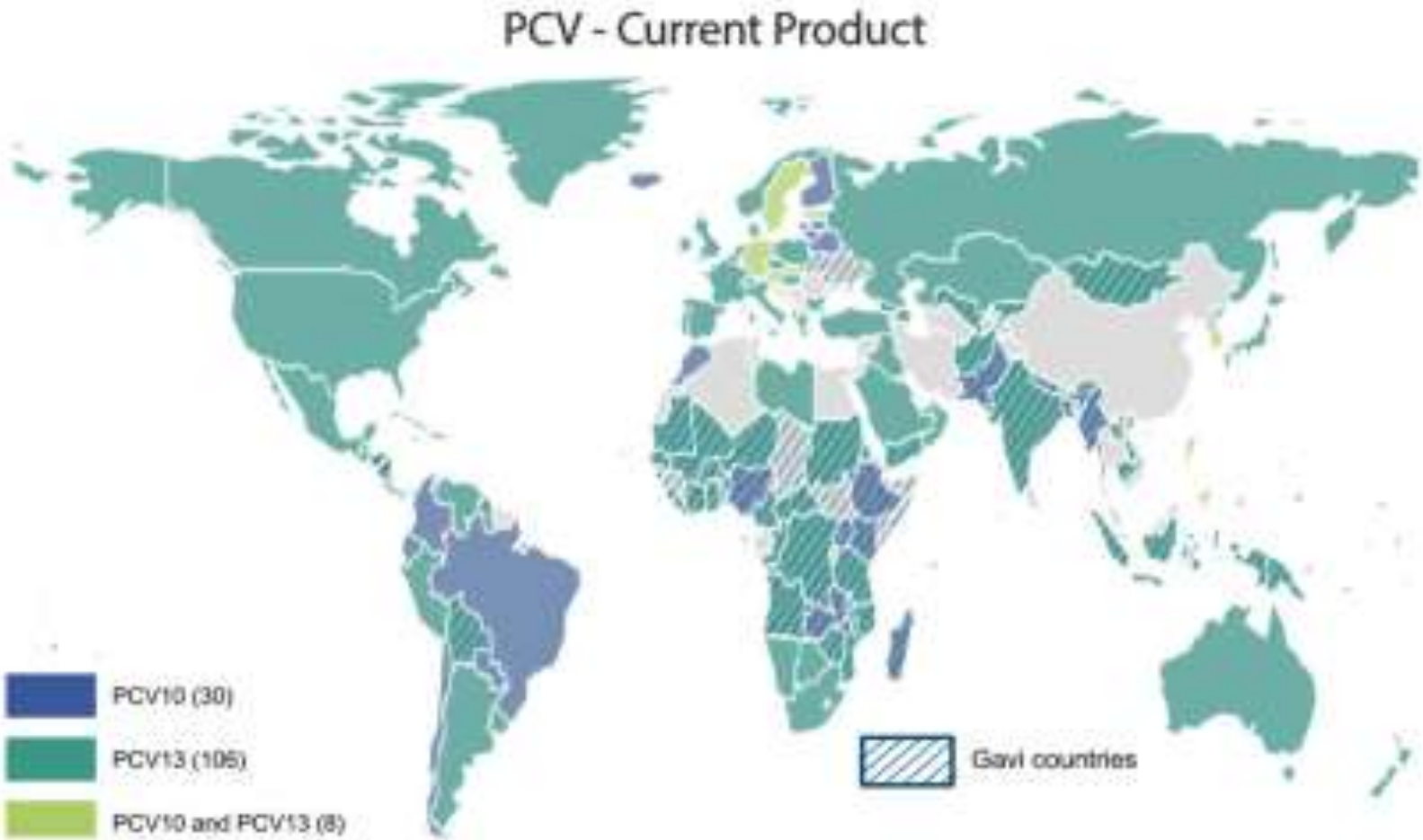
- Auftreten von nonV-ST in ökologischer Nische der V-ST als Kommensale (ausschliesslich) und Infektionserreger:
- Ansteigende NVT: weniger virulent, weniger invasiv

In Ö verfügbare Impfstoffe und abgedeckte Vakzin-Serotypen (VT)

Impfstoff	VT
PCV7 (Prevenar ®)	4, 6B, 9V, 14, 18C, 19F, 23F
PCV10 (Synflorix®)	4, 6B, 9V, 14, 18C, 19F, 23F, 1, 5, 7F
PCV13 (Prevenar 13®)	4, 6B, 9V, 14, 18C, 19F, 23F, 1, 5, 7F, 3, 6A, 19A
PPV23 (Pneumovax 23®)	4, 6B, 9V, 14, 18C, 19F, 23F, 1, 5, 7F, 3, 19A 2, 8, 9N, 10A, 11A, 12F, 15B, 17F, 20, 22F, 33F

PCV13 seit 2013 verfügbar für alle Altersgruppen

Globale Verbreitung nach Impfstoff



Studien Ziel

Evaluation der Effekte, direkte und indirekte, des nationalen PCV10 Kinderimpfprogrammes, eingeführt in 2012

Invasive pneumococcal diseases in children and adults before and after introduction of the 10-valent pneumococcal conjugate vaccine into the Austrian NIP

Updated analysis according to Richter et al [1]
Data used for analysis: Surveillancedata as of 02.09.2019

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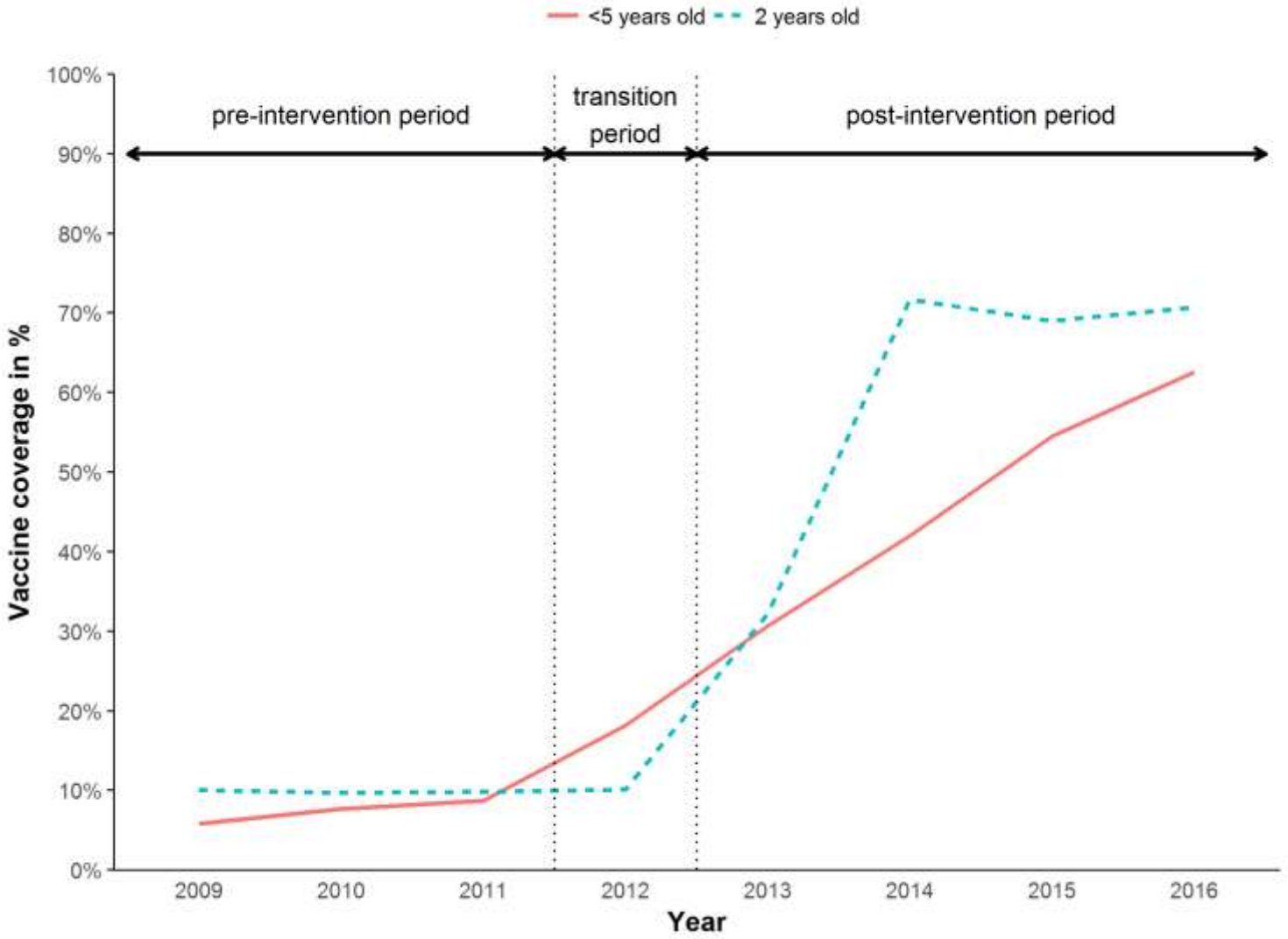
Annual VC by at least two doses of PCV10 in the <5 years old and in the 2 years old in 2009-2016 in AT



Methodik Statistical Analyses

Pre-post comparison of monthly average incidence rates (IR)

Measures:

For all outcomes, for all age-groups

pre-post IR difference: $IR_{pre} - IR_{post}$

pre-post IR ratio (IRR): $\frac{IR_{post}}{IR_{pre}}$

For intervention outcome and net change outcomes

Vaccine effectiveness: $VE(\%) = (1 - \left(\frac{IR_{post}}{IR_{pre}}\right)) \cdot 100$

Among the <5 and age-subgroup <2 yrs old: proportionate reduction in the post-period IR, relative to the pre-period

Methodik Statistical Analyses

Interrupted time series regression

Measures:

For all outcomes, for 5-49, ≥50 yrs old, and 50-59, ≥ 60 yrs old

Pre-post % trend change/month, pre-post % level change:

$$f(x) = (\exp(x) - 1) * 100$$

% change in post-period trend and post-period level, relative to the pre-period trend and level of the monthly incidence

For intervention outcome and net change outcomes

Vaccine effectiveness: $VE\ (\%) = \frac{n_{noVP} - n_{VP}}{n_{noVP}}\ x\ 100.$

Among the ≥50 and ≥ 60 yrs old: proportionate reduction in the post-period IPD number, relative to the pre-period

Methodik Statistical Analyses

Serotyp-specific Analyses
for describing pre-post changes in occurrence of ST-specific IPDs

Measures

For <5 years old and ≥50 years old

annual average period-specific IR/10^6 pm of ST-specific IPDs

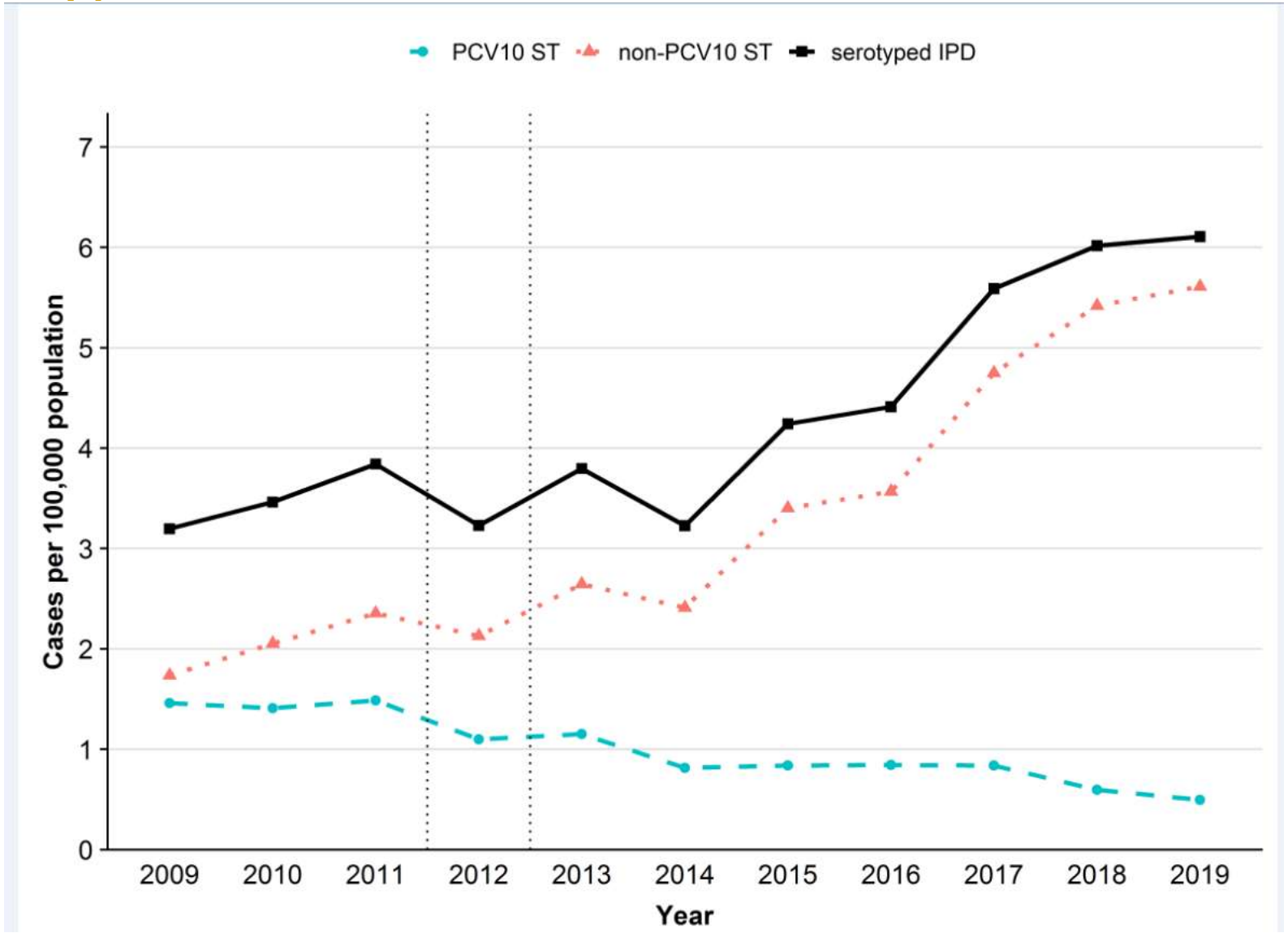
Ranking 10 most frequent IPD-causing STs of the
pre-period (2009-2011), early post-period (2013-2015) and
late post-period (2016-Qu2/2019)
from R1 to R10 by IR/10^6 pm or alphanumerically, in case of equal IR.

pre-late post IR ratio (IRR): $\frac{IR_{post}}{IR_{pre}}$

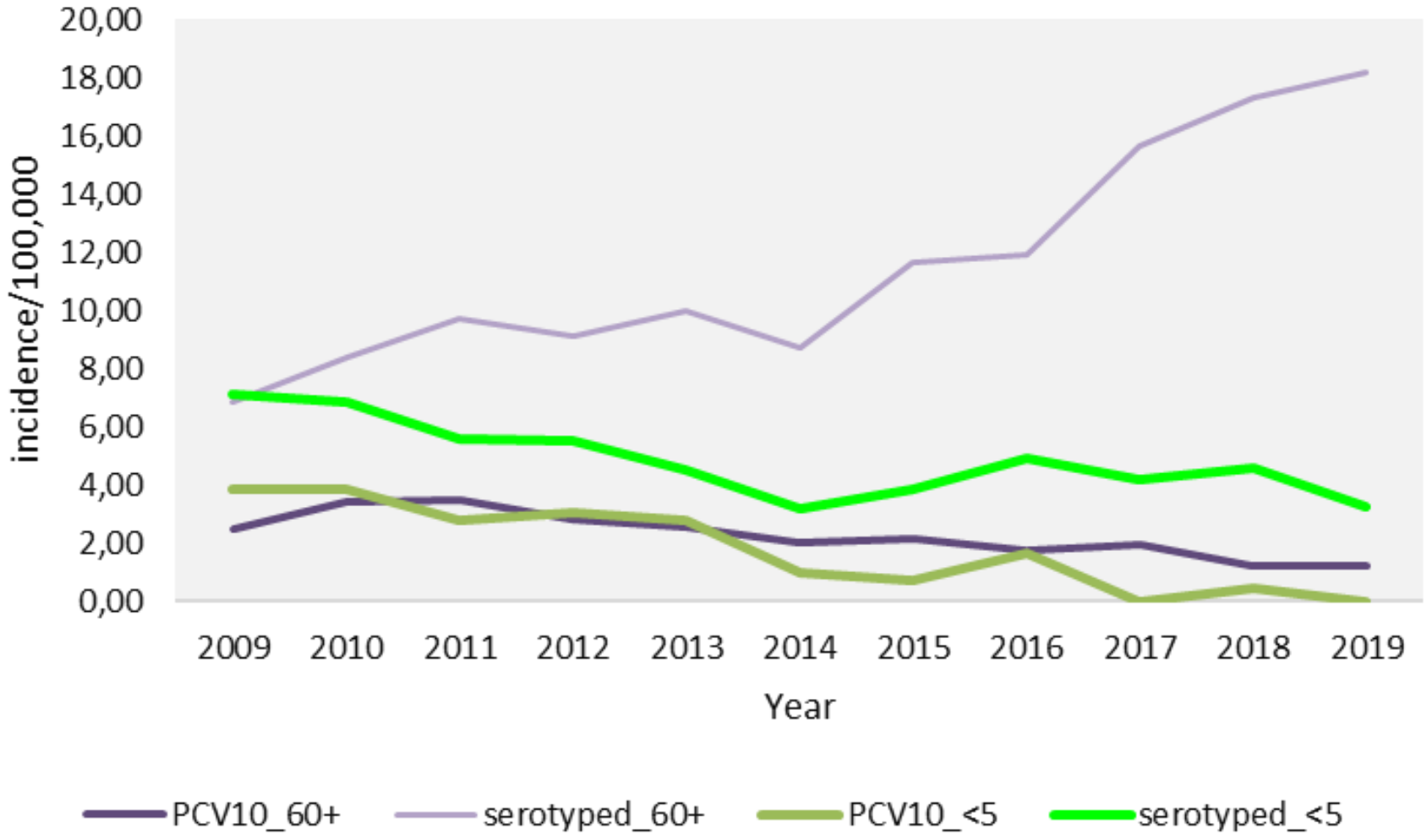
Pneumokokken Studie

RESULTATE

1-Jahres Inzidenz, gesamt: PCV10-IPD, non-PCV10-IPD, serotypisierte IPD total, 2009-2019, Ö



1-Jahres Inzidenz, <5 und 60+ Jährigen: PCV10-IPD, serotypisierte IPD total, 2009-2019, Ö



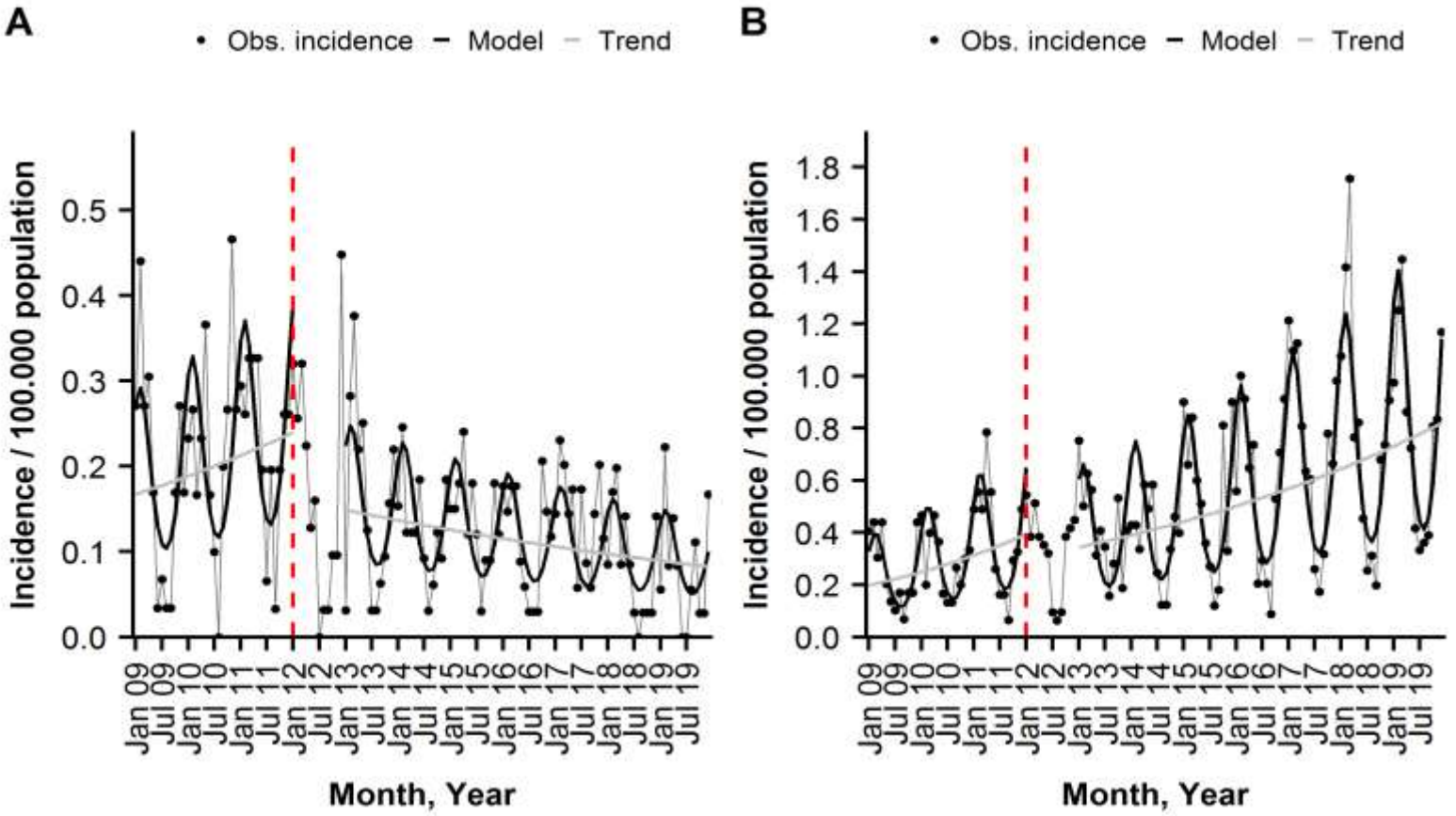
I Pre-post comparison of monthly average Irates:
pre-post IRD/100,000 pm, 95% CI
for intervention, replacement and net change outcomes

Age-group	Outcome category	IPD by ST	IRpre	IRpost	IRD (95% CI)
<5	intervention	PCV10 ST-IPD	0.29	0.08	-0.21 (-0.31; -0.12)
	intervention-related	6A IPD	0.02	0.01	-0.01 (-0.04; 0.01)
	intervention-related	19A IPD	0.04	0.07	0.03 (-0.01; 0.07)
	replacement	non-PCV10 ex ST 6A-/19A-IPD	0.19	0.18	-0.01 (-0.09; 0.08)
	replacement	3 IPD	0.06	0.05	-0.01 (-0.06; 0.04)
	net change I	serotyped IPD	0.54	0.34	-0.20 (-0.34; -0.07)
	net change II	overall IPD	0.76	0.51	-0.25 (-0.42; -0.09)
	net change III	serotyped IPD ex ST 3-/6A-/19A-IPD	0.42	0.21	-0.21 (-0.32; -0.09)
<2	intervention	PCV10 ST-IPD	0.54	0.07	-0.47 (-0.67; -0.27)
	replacement	non-PCV10 ex ST 6A-/19A-IPD	0.27	0.24	-0.03 (-0.19; 0.13)
	net change I	serotyped IPD	0.92	0.42	-0.50 (-0.77; -0.22)
	net change II	overall IPD	1.19	0.65	-0.53 (-0.85; -0.22)
	net change III	serotyped IPD ex ST 3-/6A-/19A-IPD	0.72	0.26	-0.46 (-0.70; -0.23)

Interrupted TS regression in >=50 yrs old

Monthly incidence of (A) intervention outcome PCV10 ST-IPD and (B) replacement outcome non-PCV10 ex ST 6A-/19A-IPD

observed and modelled by a segmented negative binominal regression, with overall and seasonal trends.



Resultat – VE%

in <5, and <2 yrs, estimated by pre-post rate comparison, and
in >=50 and >=60 yrs, estimated by segmented TS regression models

Age-group	Outcome category	IPD by ST	VE (95%CI)
<5	intervention	PCV10 ST-IPD	73 (57; 84)
	net change I	serotyped IPD	37 (17; 53)
	net change II	overall IPD	33 (15; 47)
	net change III	serotyped IPD ex ST 3-/6A-/19A-IPD	50 (29; 64)
<2	intervention	PCV10 ST-IPD	87 (73; 94)
	net change I	serotyped IPD	54 (34; 69)
	net change II	overall IPD	45 (24; 60)
	net change III	serotyped IPD ex ST 3-/6A-/19A-IPD	64 (44; 77)
≥ 50	intervention	PCV10 ST-IPD	74 (30; 91)
	net change I	serotyped IPD	55 (-2; 81)
	net change II	overall IPD	56 (-3; 82)
	net change III	serotyped IPD ex ST 3-/6A-/19A-IPD	64 (18; 86)
≥ 60	intervention	PCV10 ST-IPD	79 (39; 93)
	net change I	serotyped IPD	55 (-11; 83)
	net change II	overall IPD	53 (-17; 82)
	net change III	serotyped IPD ex ST 3-/6A-/19A-IPD	63 (4; 87)

Serotyp-specific Analyses

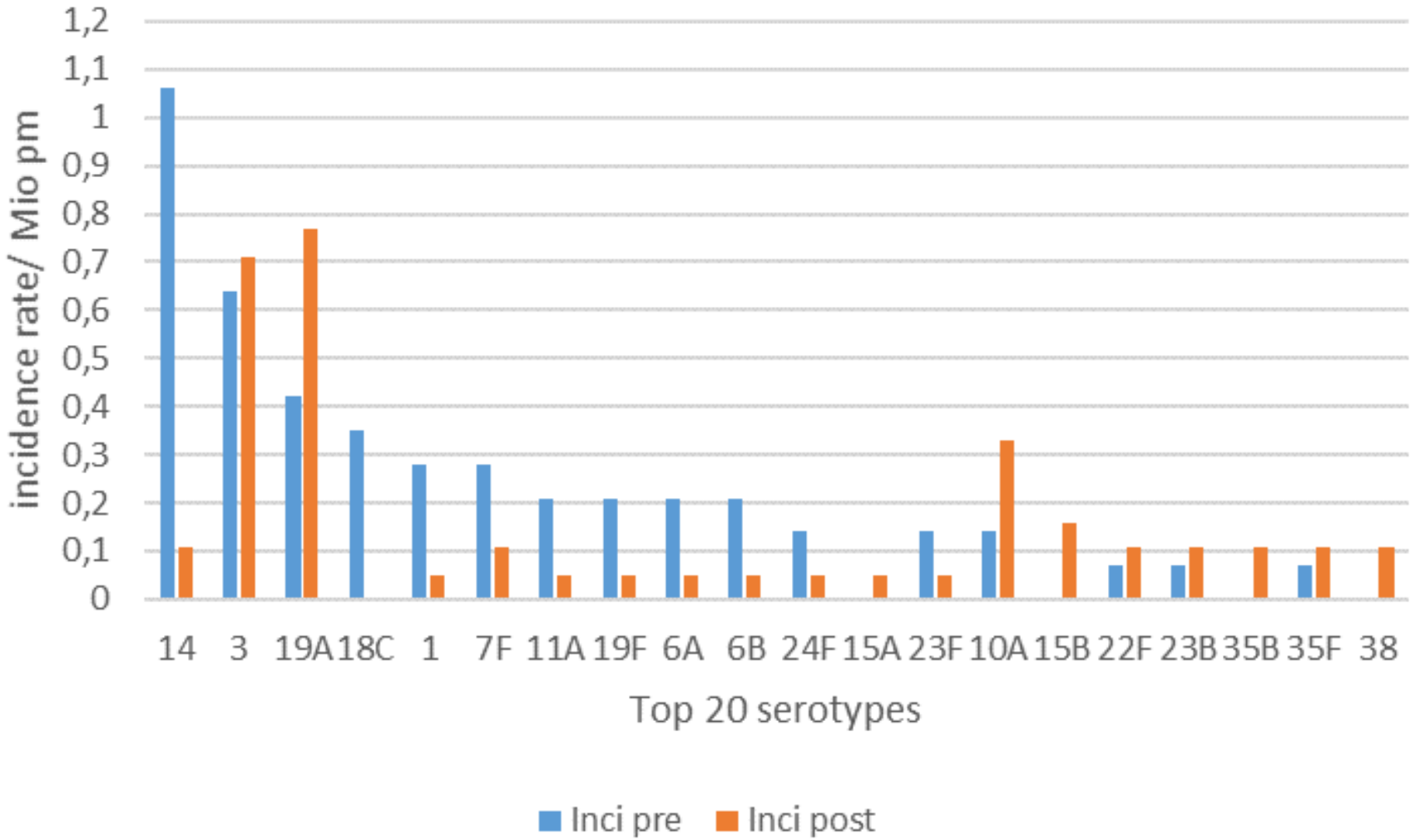
pre-post changes in occurrence of the top 10 STs in IPDs

Age	Study period	Overall IPD		Serotyped IPD		Portion of non-PCV10 IPD	Serotype-specific IPD									
							R1	R2	R3	R4	R5	R6	R7	R8	R9	R10
		N	IR/ 10^6	n_{ST}	IR/ 10^6	$n_{non\text{-}PCV10}$/ n_{ST} in %	IR / 10^6 pm									
<5	Pre						**14**	**3**	**19A**	**18C**	**1**	**7F**	**11A**	**19F**	**6A**	**6B**
		108	7.63	77	5.44	46.8	1.06	0.64	0.42	0.35	0.28	0.28	0.21	0.21	0.21	0.21
	Early post						**14**	**19A**	**3**	**19F**	**24F**	**1**	**15A**	**23F**	**6A**	**7F**
		65	4.45	46	3.15	60.9	0.48	0.48	0.34	0.21	0.21	0.14	0.14	0.14	0.14	0.14
	Late post						**19A**	**3**	**10A**	**15B**	**14**	**15C**	**22F**	**23B**	**35B**	**35F**
		113	5.43	73	3.51	87.7	0.86	0.62	0.29	0.14	0.1	0.1	0.1	0.1	0.1	0.1
≥50	Pre						**3**	**14**	**7F**	**19A**	**4**	**6A**	**19F**	**22F**	**9N**	**9V**
		673	6.1	633	5.74	63.3	1.07	0.47	0.42	0.34	0.26	0.26	0.25	0.24	0.21	0.18
	Early post						**3**	**19A**	**14**	**22F**	**7F**	**9N**	**6C**	**4**	**23B**	**11A**
		857	7.15	761	6.35	78.3	1.6	0.44	0.28	0.27	0.27	0.26	0.24	0.23	0.19	0.18
	Late post						**3**	**19A**	**8**	**22F**	**6C**	**9N**	**23A**	**14**	**11A**	**15A**
		1812	10.6	1652	9.66	89.2	2.41	1.35	0.73	0.57	0.39	0.31	0.29	0.24	0.23	0.22

- IR of overall IPD and serotyped IPD/10^6 pm,
- % of nonPCV10-IPD among serotyped IPDS
- Ranking of ST-specific IPD by IR/10^6 pm

Serotyp-specific Analyses: relevant 20 STs in < 5

IR pre to IR late post



Schlussfolgerung

Unsere “Population-based Vaccine effectiveness” Studie und die laufenden “Up dates” liefern verläßliche Evidenz für eine direkte und indirekte Effektivität des KIP PCV10 –

- Protektiver Effekt für < 5 und 50+ Jährige
- Insbesondere für <=2 und 60+ Jährige

Invasive meningokokken Erkrankung 2009-2019

AGES/Abt. Infektionsepidemiologie & Surveillance

Lukas Richter, Daniela Schmid

Falldefinition

- **Klinische Kriterien**

Jede Person mit mindestens einem der folgenden Symptome

- Meningitis
- hämorrhagisches Exanthem
- Sepsis
- Septische Arthritis

- **Laborkriterien**

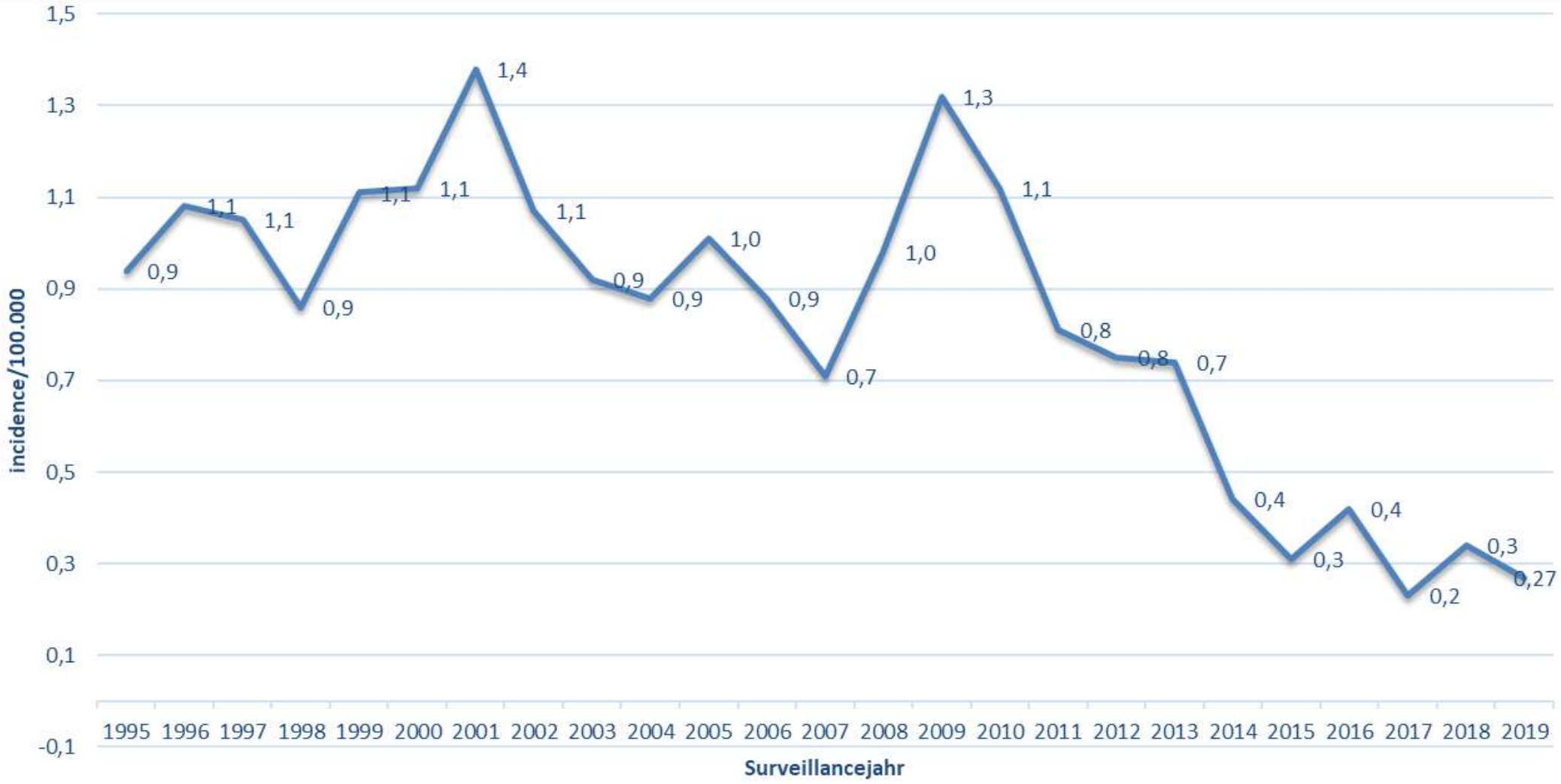
Mindestens einer der folgenden vier Labortests:

- Isolierung von *N. meningitidis* aus einer normalerweise sterilen Probe oder aus Hautblutungen
- Nachweis von *N. meningitidis*-Nukleinsäure in einer normalerweise sterilen Probe oder in Hautblutungen
- Nachweis des *Neisseria-meningitidis*-Antigens im Liquor cerebrospinalis

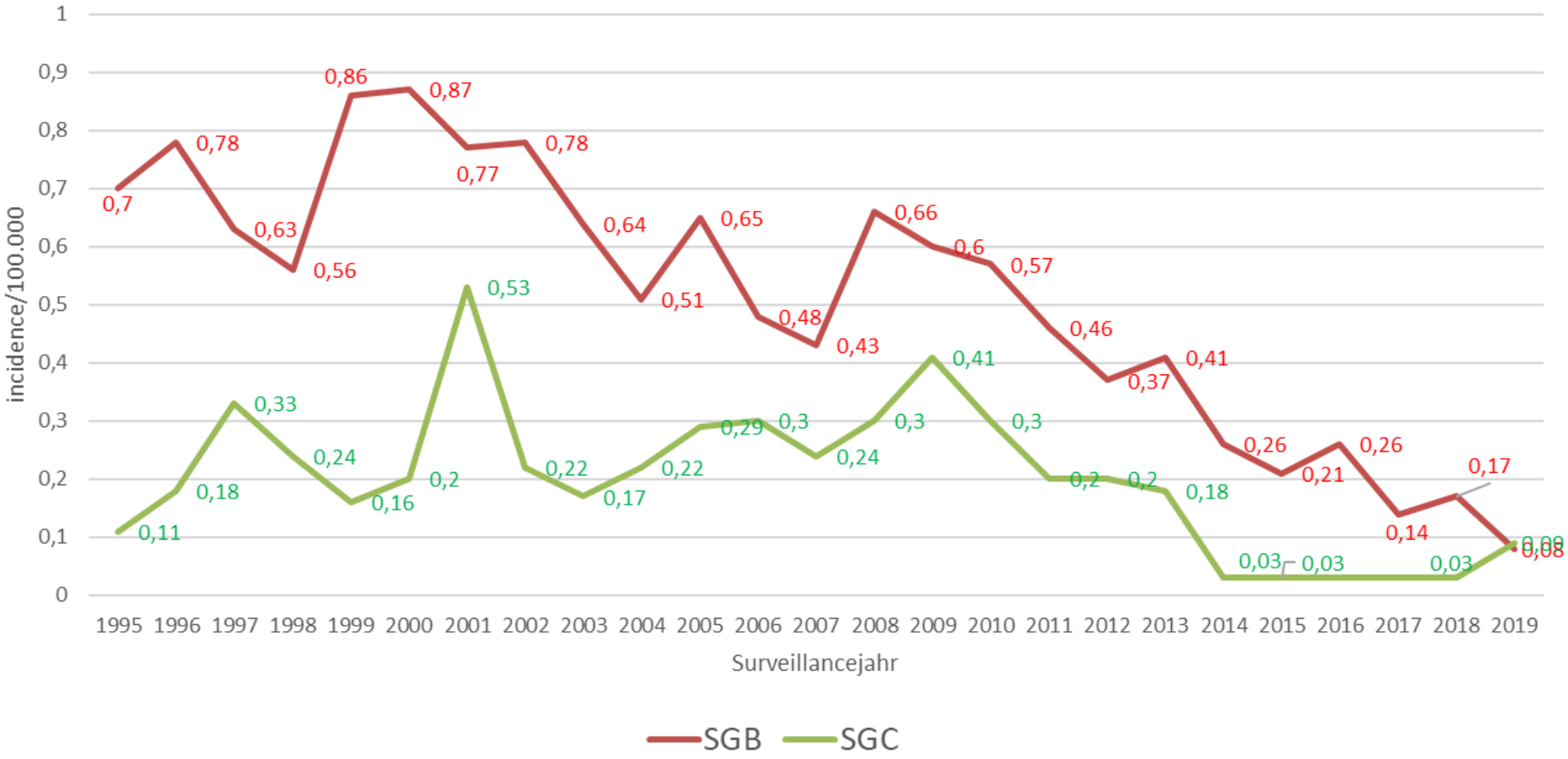
Daten Quellen

- NRZ für Menigokokken, AGES IMED Graz, 1995-2008
- Surveillancedaten, 2009-2018 ergänzt mit Daten der NRZ

Inzidenz/100.000, gesamt, 1995-2019



Jährliche Inzidenz/100.000 gesamt: SG B IME, SG C IME, 1995-2020



Jährliche Inzidenz/100.000: SG A, C, W, Y IME, 1995-2019