



## Pertussis vaccination: vaccines, vaccination scheme

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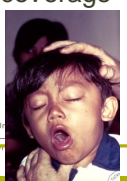


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## Clinical picture

**Pertussis increase**

**Disease affecting all ages – worldwide**  
**Clinical picture depends on age and vaccination status**

Classic pertussis	Atypical pertussis: absence of whoop
<ul style="list-style-type: none"> <li>● unvaccinated child - 6mos-5 yrs</li> <li>● 3 phases (catarrhal, paroxysmal, convalescent)</li> <li>● most in developing countries: low vaccination coverage</li> </ul>	<ul style="list-style-type: none"> <li>● 2 groups:               <ul style="list-style-type: none"> <li>→ child &lt; 2-3 months; unvaccinated: apnoea, hypoxia, cyanosis, « sudden infant death syndrome »</li> <li>→ vaccinated individual: waning protection 2-5 yrs after vaccination: prolonged cough → pauci- asymptomatic</li> </ul> </li> <li>● most in developed countries: high vaccination coverage</li> <li>● clinical diagnosis difficult</li> </ul>

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## Clinical manifestations: atypical disease I

- Unimmunised infant < 6 months, Preterm infant:
    - sudden infant death syndrome-SIDS
    - vomiting, dehydration
    - early apnea, acute life threatening event-ALTE, bradycardia
    - respiratory failure → PICU admission, oxygen suppl, feeding suppl, intubation, artificial ventilation
    - absence of whoop and cough, absence of phases
- fatality, unrecognised, severe pertussis



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## Clinical manifestations: atypical disease II

- Age > 5- 10 years primary vaccinated, adolescent, adult → asymptomatic, « common » cold, asthmatic cough ! no diagnosis !
    - few symptoms
    - intense prolonged cough
- variety in clinical picture
- WHO definition: prolonged cough of > 21 days

→ source of infection for unvaccinated infants



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# Prevention by vaccination



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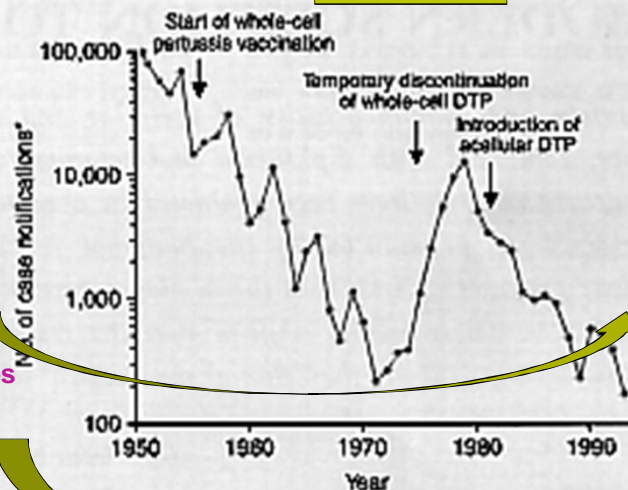
## Vaccination influenced epidemiology

Japanese data

Old vaccines  
« whole cell »  
Pw '50

New acellular  
vaccines for  
pediatric use  
Pa ('90→2001)

Acellular vaccines  
for adult use  
pa (2000→2008)





\*Statistics of Food Poisoning and Infectious Diseases, the Ministry of Health and Welfare






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## Pertussis-vaccines (P)

- whole cell: introduction in the 50ies (*wP - DTwP*)
  - acellular vaccines for pediatric use (*aP - DTap*)
  - adapted “adult” vaccines- reduced quantity AG (*ap - dTap*)
  - Belgium:
    - 2001 DTaP
    - 2003-2004: hexavalent IPV-DTaP-Hib-HBV - start at 8 weeks + IPV-DTaP at 5-6 years
    - 2003: dTap “recommendations” HGR adults
    - 2008: dTap booster at 14 yrs + cocoonstrategy = *vaccination of all infant house hold contacts, caregivers, daycare personnel, pediatric staff ...*
- 
- 
 Université de Leuven  
 → 2013: vaccination during pregnancy week 26-32

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## Acellular Vaccines for pediatric use

Vaccine	Producer	Licensed for	Pertussis toxin (PT), µg	Filamentous hemagglutinin (FHA), µg	Pertactin (PRN), µg	Fimbriae (FIM), µg
INFANRIX	GlaxoSmithKline	6 weeks to 7 years	25	25	8	- 
BOOSTRIX	GlaxoSmithKline	> 10 years > 4 years (Eu)	8	8	2.5	- 
HEXYON	Sanofi Pasteur	6 weeks to 7 years	25	25	-	- 
DAPTACEL	Sanofi Pasteur	6 weeks to 7 years	10	5	3	5
ADACEL	Sanofi Pasteur	11 to 64 years	2.5	5	3	5

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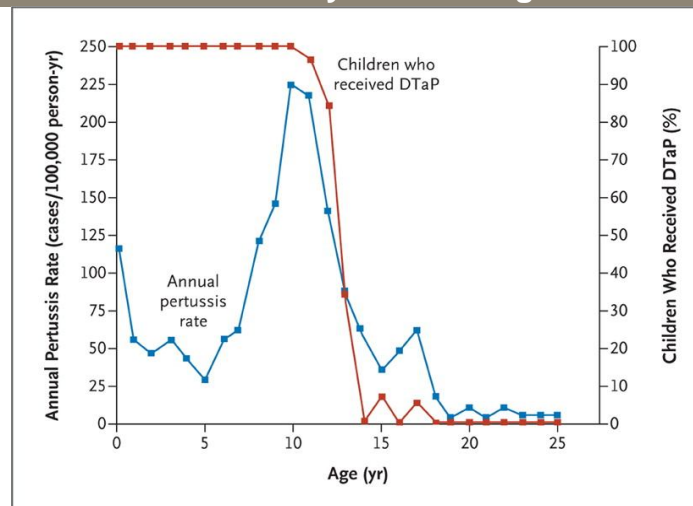
## Belgian Immunization Schedule 2014-2015

VACCINS	Leeftijd	8 WEKEN	12 WEKEN	16 WEKEN	12 MAAND	15 MAAND	5-7 JAAR	10-13 JAAR	14-16 JAAR
Poliomyelitis <sup>(2)</sup>		IPV	IPV	IPV		IPV	IPV		
Difterie-Tetanus-Kinkhoest <sup>(3)</sup>		DTPa	DTPa	DTPa		DTPa	DTPa		dTpa
Haemophilus influenzae type b <sup>(4)</sup>		Hib	Hib	Hib		Hib			
Hepatitis B <sup>(5)</sup>		HBV	HBV	HBV		HBV			
Mazelen Bof en Rubella <sup>(6)</sup>					MMR			MMR	
Meningokok C <sup>(7)</sup>						MenCc			
Pneumokok <sup>(8)</sup>		Pnc13		Pnc13	Pnc13				
Rotavirus <sup>(9)</sup>		ROTA	ROTA	(ROTA) <sup>(9)</sup>					
Humaan papillomavirus <sup>(10)</sup>								HPV	


  
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## Annual Rate of Pertussis and Vaccination History in the Entire Health-Plan Population, According to Age, during the Pertussis Outbreak from January 2010 through June 2011.




  
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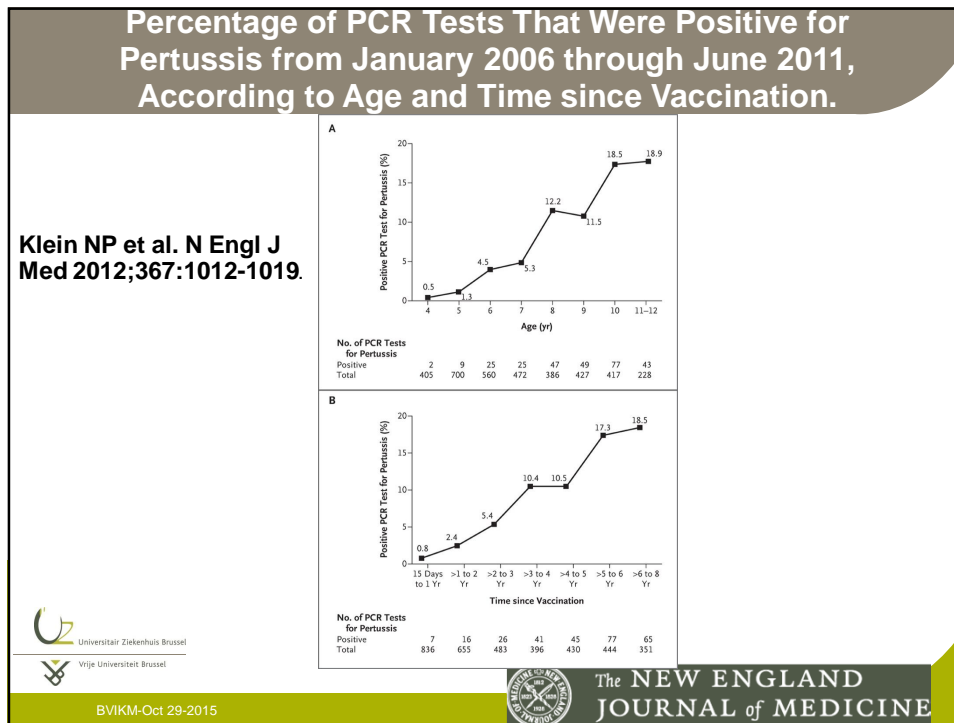
  
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Klein NP et al. N Engl J Med 2012;367:1012-1019.

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The NEW ENGLAND JOURNAL of MEDICINE



## Boosters in adults

- Adolescents and adults are transmitting pertussis to infants
  - due to waning immunity
- Need to reinforce herd immunity
- Booster every 10 years ?

Acellular Vaccines : pediatric and adult						
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## Conclusions: ideal vaccine ?

- Protection from disease after complete pediatric vaccination (5 doses of DTaP) is short-lived and wanes substantially each year.
- Need for boosters
- Durability of protection after adult vaccination???
- Need to develop new pertussis-containing vaccines that will provide long-lasting immunity.