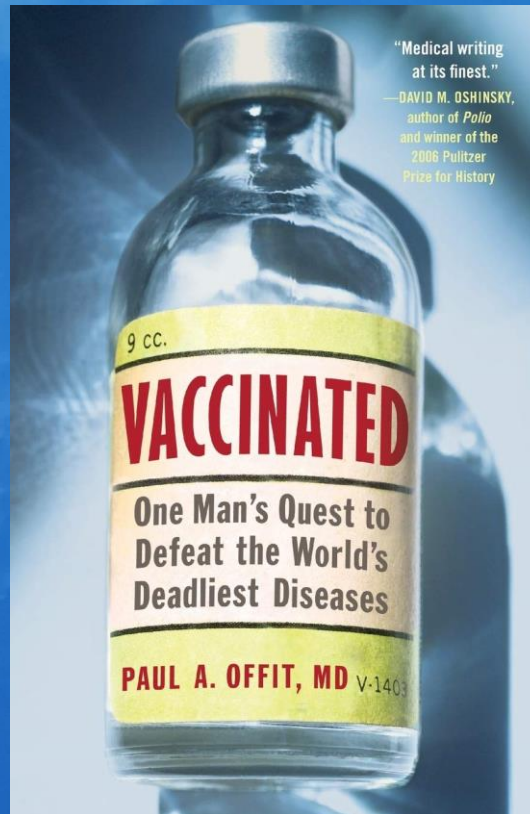


# Að koma í veg fyrir sjúkdóma Um bólusetningar barna



# Að koma í veg fyrir sjúkdóma Um bólusetningar barna

## Bólusetningar á Ísland

# Bólusetningar



Embætti landlæknis  
Söttvarnalæknir

## Almennar bólusetningar barna á Íslandi frá júlí 2023

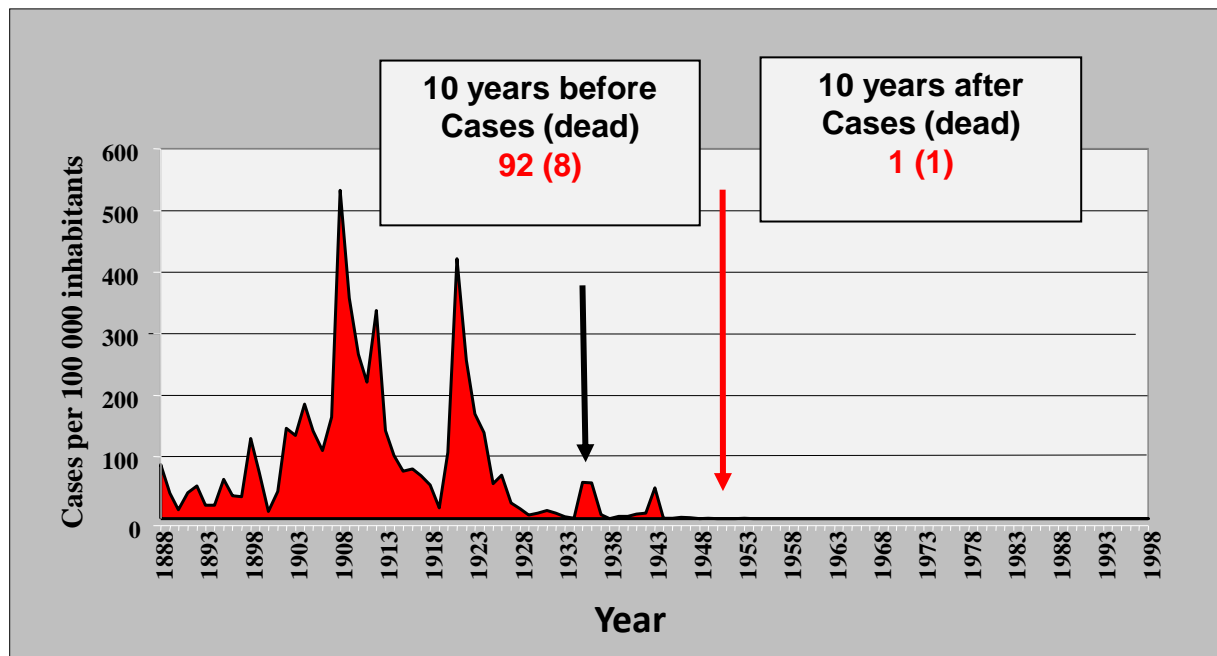
| Aldur:    | Bólusetning gegn:  |
|-----------|--|
| 3 mánaða  | Kíghósta, barnaveiki, stífkrampa, Haemofilus influenzae sjúkdómi af gerð b (Hib) og mænusótt í einni sprautu (Pentavac). Pneumókokkum í annarri sprautu (Vaxneuvance).   |
| 5 mánaða  | Kíghósta, barnaveiki, stífkrampa, Haemofilus influenzae sjúkdómi af gerð b (Hib) og mænusótt í einni sprautu (Pentavac). Pneumókokkum í annarri sprautu (Vaxneuvance).   |
| 12 mánaða | Kíghósta, barnaveiki, stífkrampa, Haemofilus influenzae sjúkdómi af gerð b (Hib) og mænusótt í einni sprautu (Pentavac). Pneumókokkum í annarri sprautu (Vaxneuvance). Meningókokkum í þriðju sprautu (MenQuadfi). |
| 18 mánaða | Mislingum, hettusótt og rauðum hundum í einni sprautu (M-M-RVAXPRO). Hlaupabólu í annarri sprautu (Varilrix).  |
| 2,5 árs   | Hlaupabólu (Varilrix)  |
| 4 ára     | Barnaveiki, stífkrampa og kíghósta í einni sprautu (Boostrix).   |
| 12 ára    | Mislingum, hettusótt og rauðum hundum í einni sprautu (M-M-RVAXPRO). HPV, tvær sprautur gefnar með a.m.k. 6 mánaða millibili ( <b>Gardasil 9</b> ).  |
| 14 ára    | Barnaveiki, stífkrampa og kíghósta ásamt mænu-sótt í einni sprautu (Boostrix Polio).   |

Frekari upplýsingar um bólusetningar barna má finna á vef embættis landlæknis ([www.landlaeknir.is](http://www.landlaeknir.is)) og á heilsugæslustöðvum.

**Fyrirkomulag barnabólusetninga á Íslandi frá júlí 2023**

<https://www.landlaeknir.is/smit-og-sottvarnir/bolusetningar/bolusetningar-barna/>

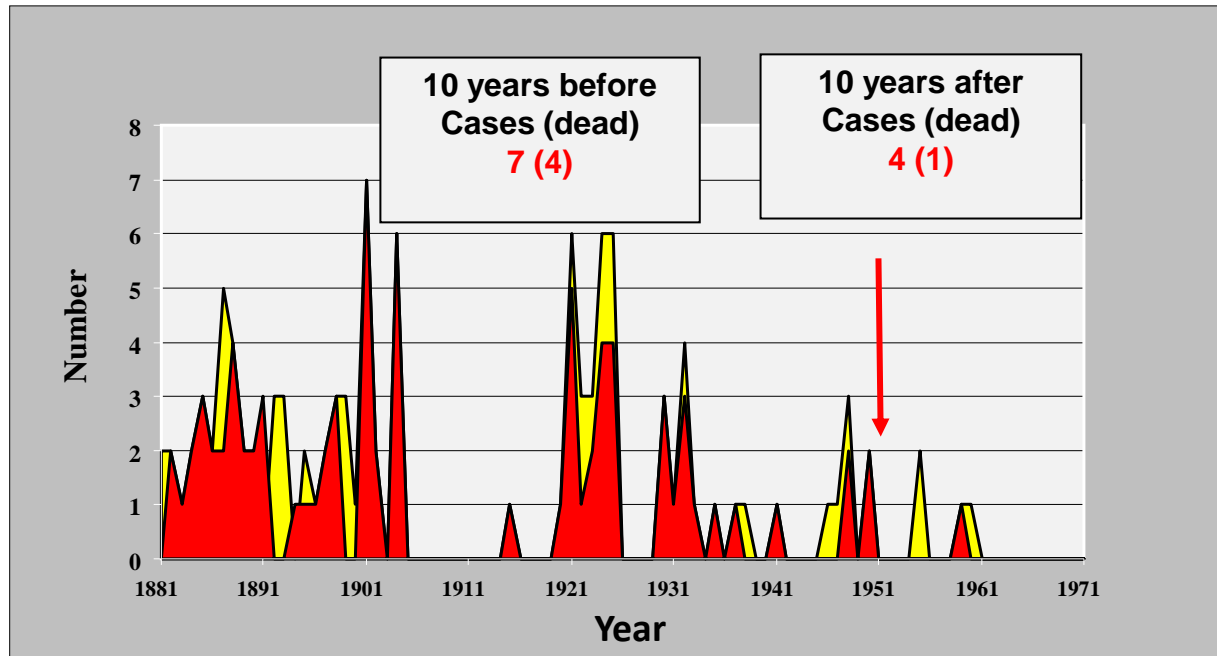
# Diphtheria in Iceland



**First tried in 1935, probably stopped an epidemic**  
**1950: All infants offered immunisation against diphtheria**

Dórólfur Guðnason/Haraldur Briem  
Directorate of Health

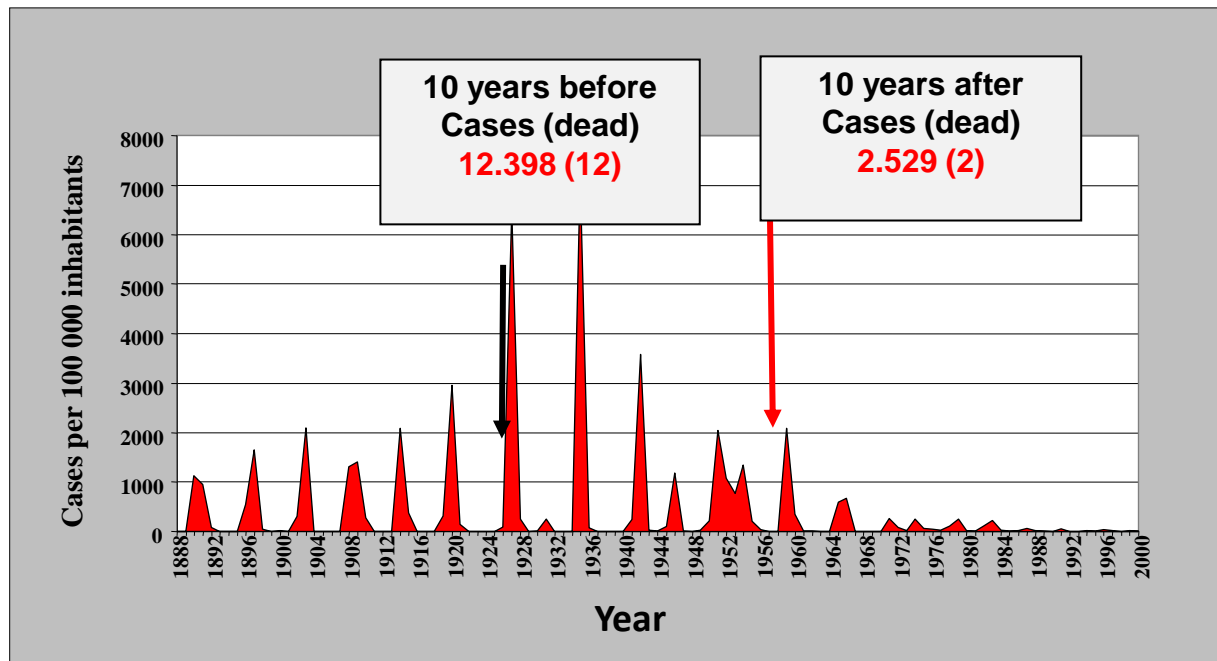
# Tetanus in Iceland



**1953 Immunisation started**  
**Last case: 2008**

Dórólfur Guðnason/Haraldur Briem  
Directorate of Health

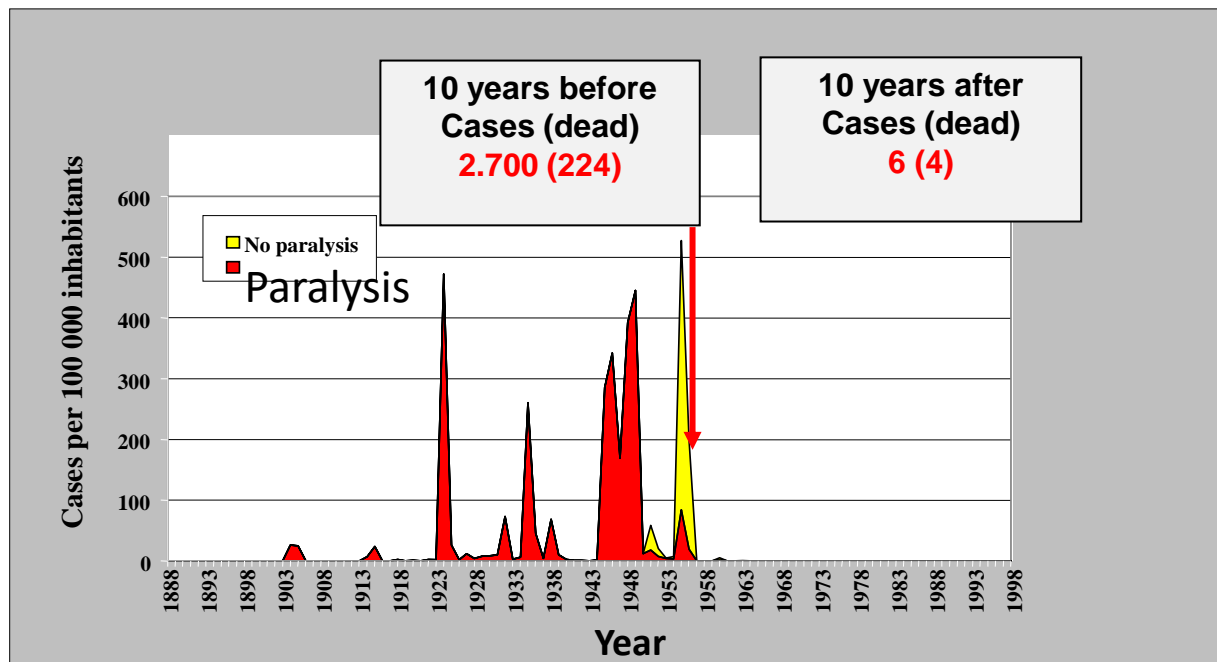
# Pertussis in Iceland



**1927 Immunisation tried. Infant immunisation from 1959**  
**2000: Acellular pertussis, 2007 added to immunisation at 14 y**

Pórolfur Guðnason/Haraldur Briem  
Directorate of Health

# Poliomyelitis in Iceland

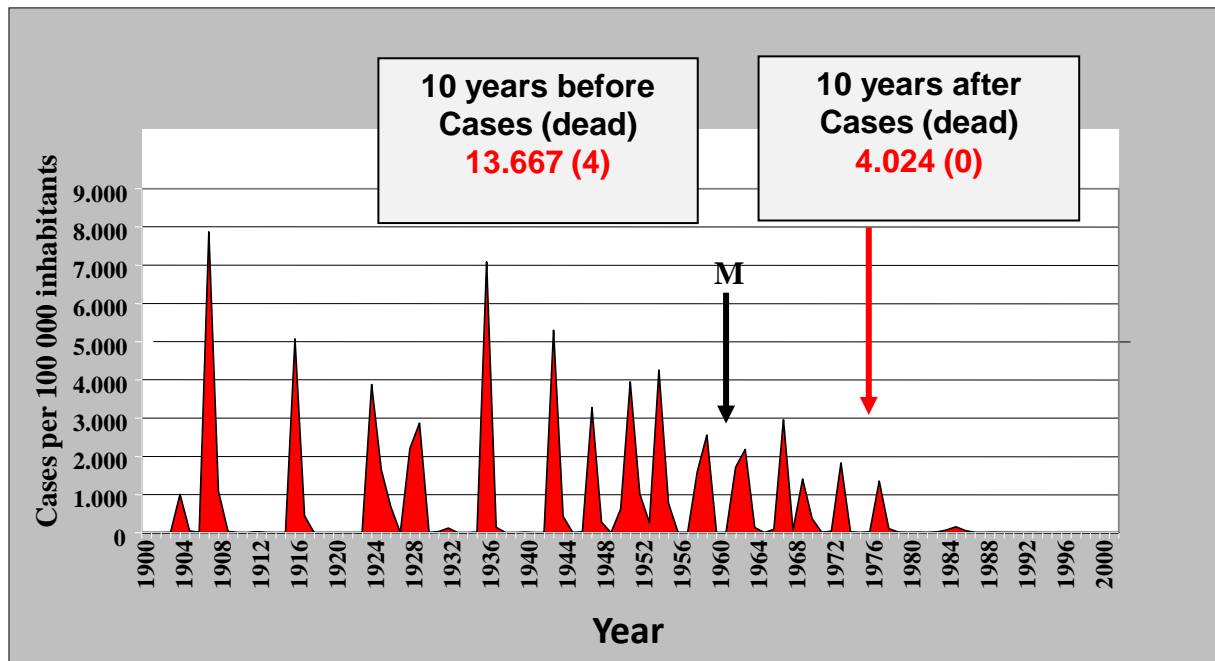


**1956 Immunisation started**

**1960: Last cases with paralysis, 1963: Last case (foreign origin)**

Þórólfur Guðnason/Haraldur Briem  
Directorate of Health

# Measles in Iceland

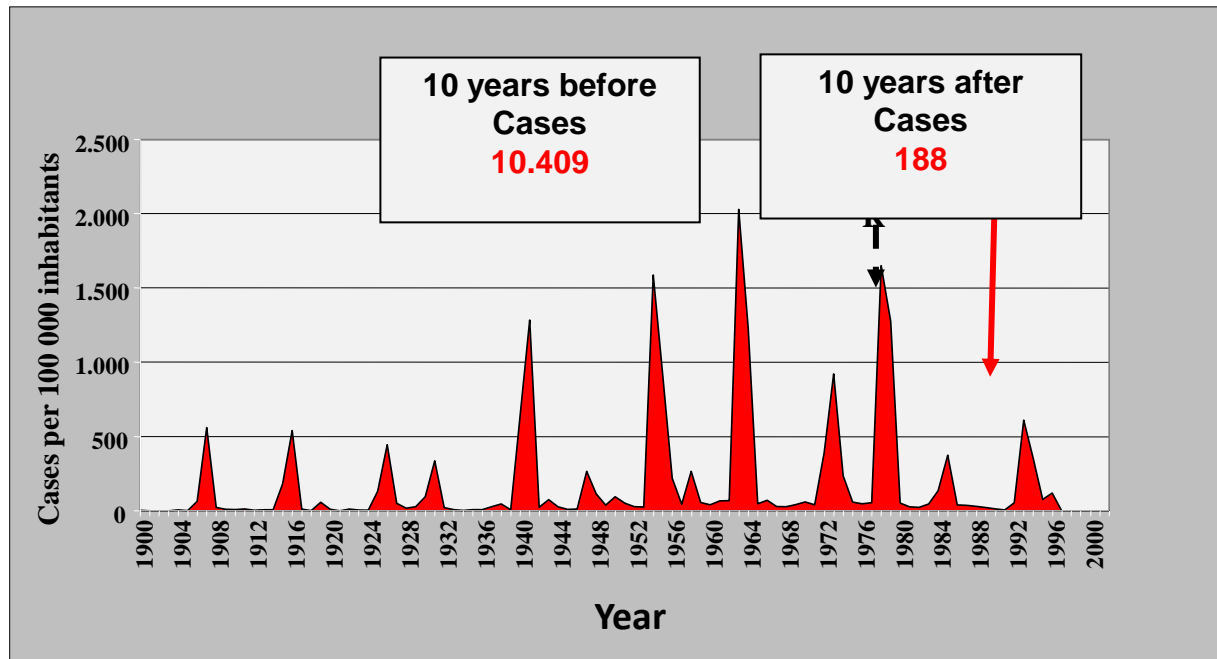


**1960: Immunisation started, 1976: Started at 2 years of age  
1989: Immunisation with MMR at 18 months of age started**

Pórolfur Guðnason/Haraldur Briem  
Directorate of Health



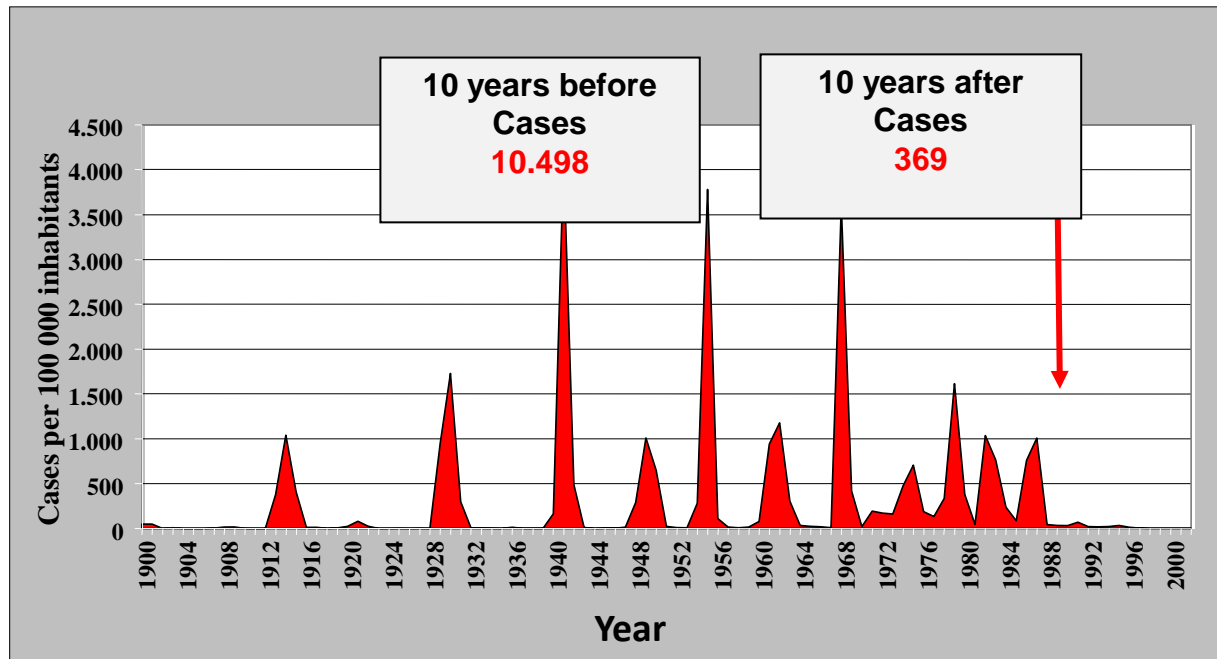
# Rubella in Iceland



**1977: Immunisation started, girls at 12 years of age**  
**1989: Immunisation with MMR at 18 months of age started**

Pórolfur Guðnason/Haraldur Briem  
Directorate of Health

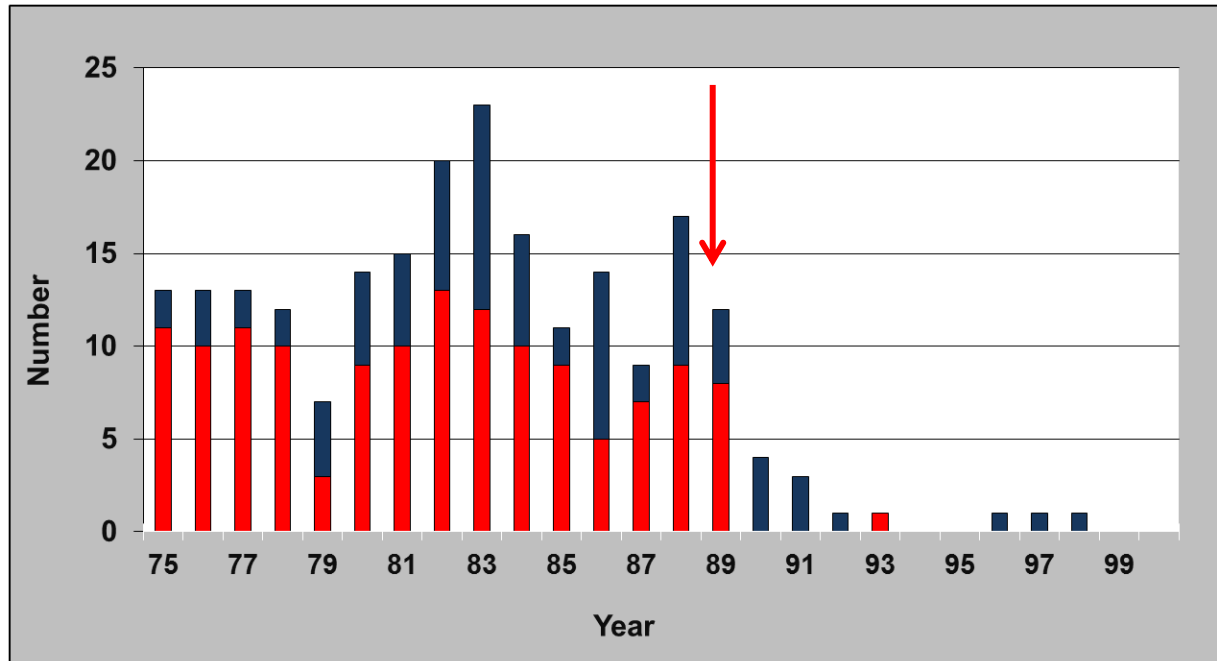
# Mumps in Iceland



**1989: Immunisation with MMR at 18 months of age started  
Booster at 12 years of age**

Pórolfur Guðnason/Haraldur Briem  
Directorate of Health

# Hib in Iceland



**1989: Immunisation against *Haemophilus influenzae* type b starts**



**Meningitis**

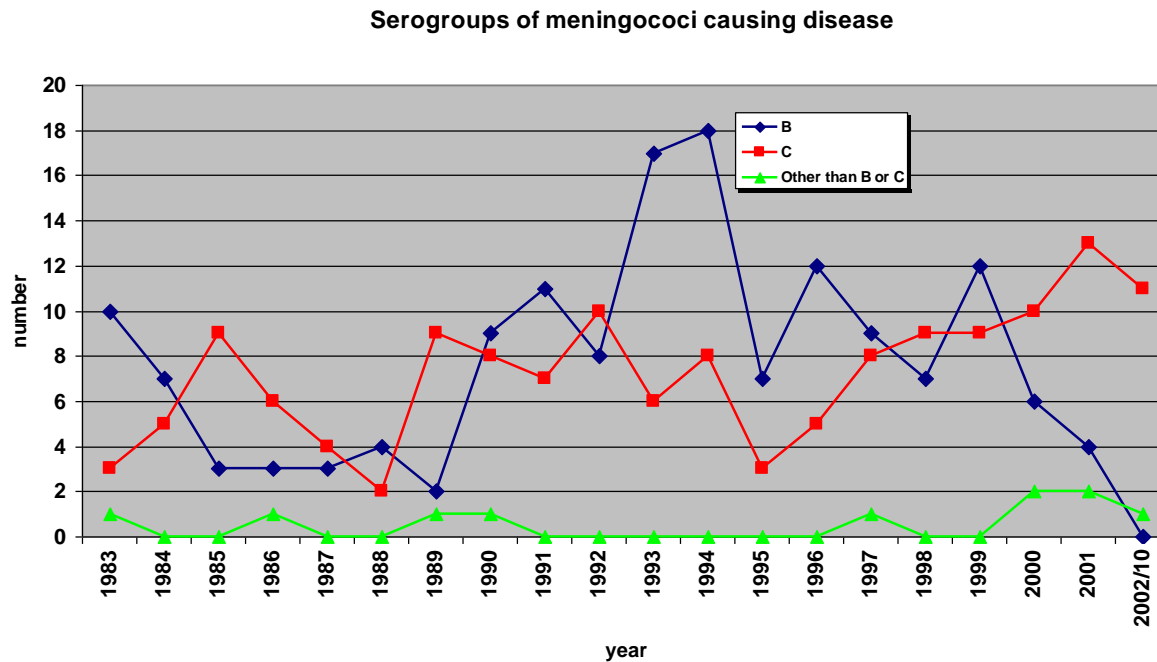


**Sepsis/blood stream infections**

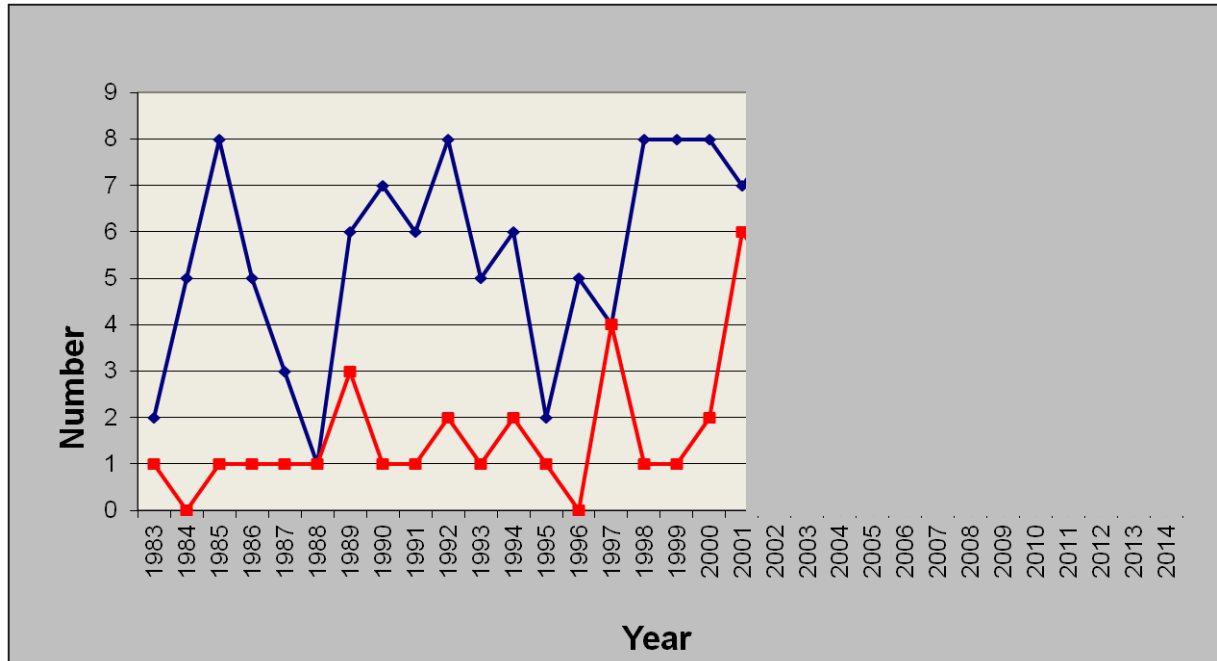
Pórolfur Guðnason/Haraldur Briem  
Directorate of Health

# Meningococcal serogroups

- in Iceland (until Oct. 2002) -



# Men C in Iceland



**1989: Immunisation against *Str Meningitidis* serotype C starts**

**— < 20 years of age**

**— > 20 years of age**

Pórolfur Guðnason/Haraldur Briem  
Directorate of Health

Að koma í veg fyrir sjúkdóma  
Um bólusetningar barna

Lömunarveiki  
Mænusótt

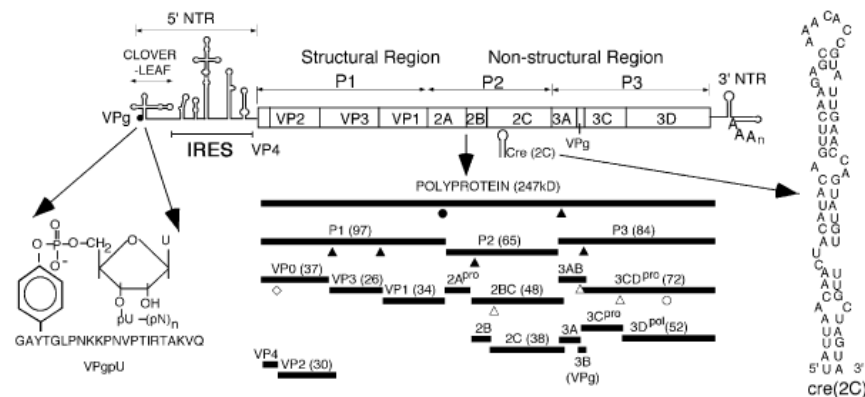
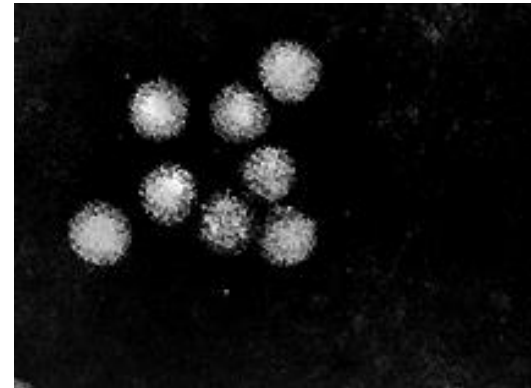
# Egypt – 1000 to 2000 years AD



Egypt, 1300 yrs AD

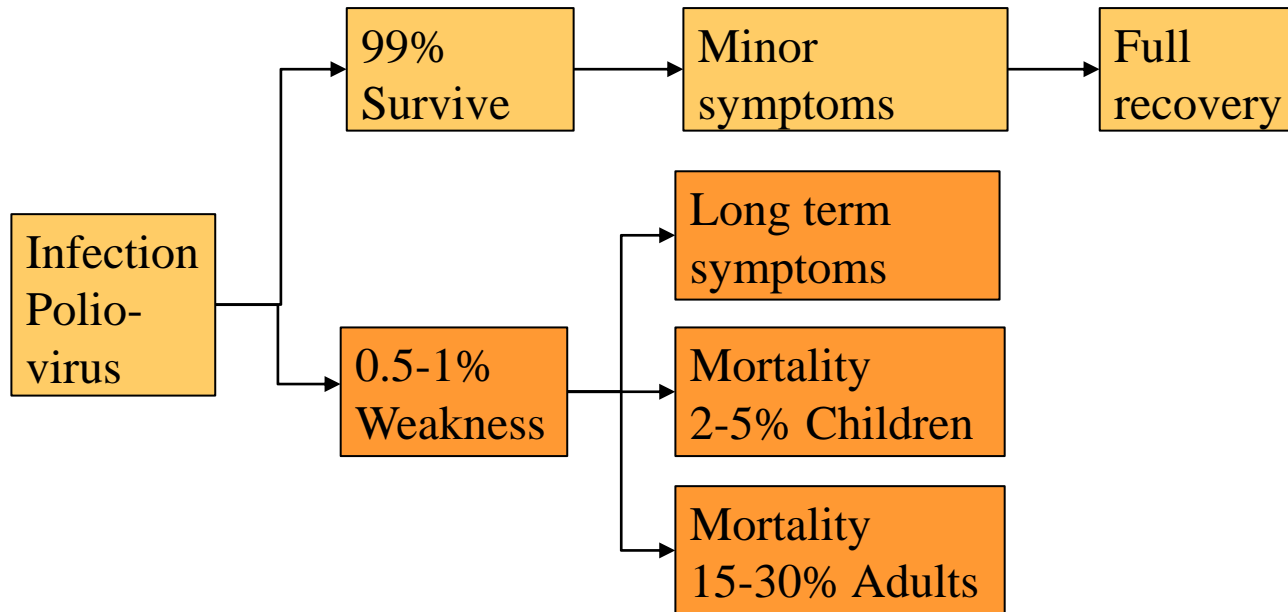
# Lömunarveikiveiran

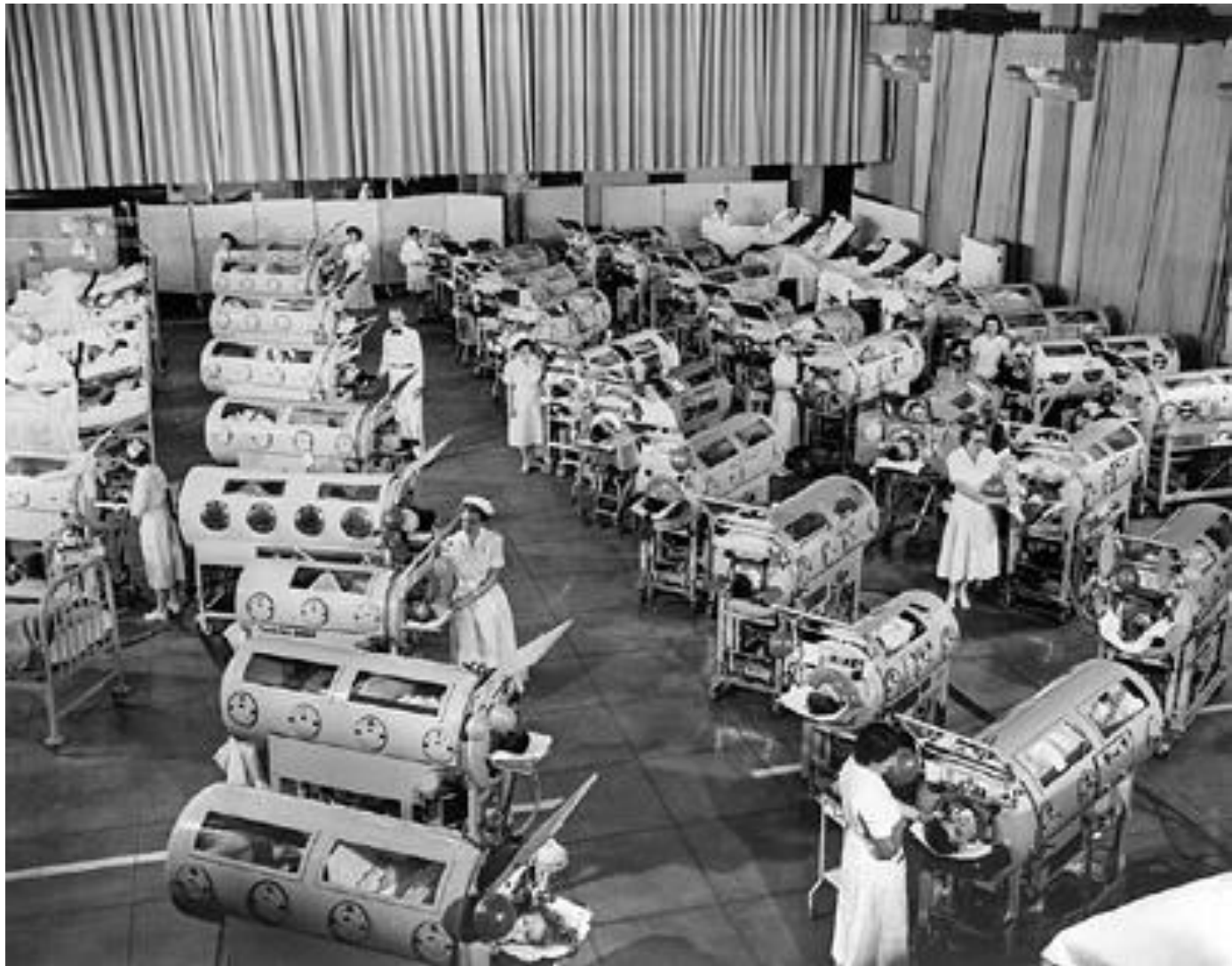
- Poliovirus
  - Greinist fyrst fyrir um 100 árum (Landsteiner og Popper 1908)
  - RNA veira
  - Enteroveira
  - Picornaveira (dýr og menn)
  - Þrjár tegundir, 1,2 og 3
- Eingöngu í mönnum (?)
  - “transgenic” mýs til





# Poliomyelitis







# Úrræði nauðsynleg

Leit að bóluefnum gegn polioveiru

# Fjöldabólusetning



# Mænusótt á Íslandi

10 ár fyrir

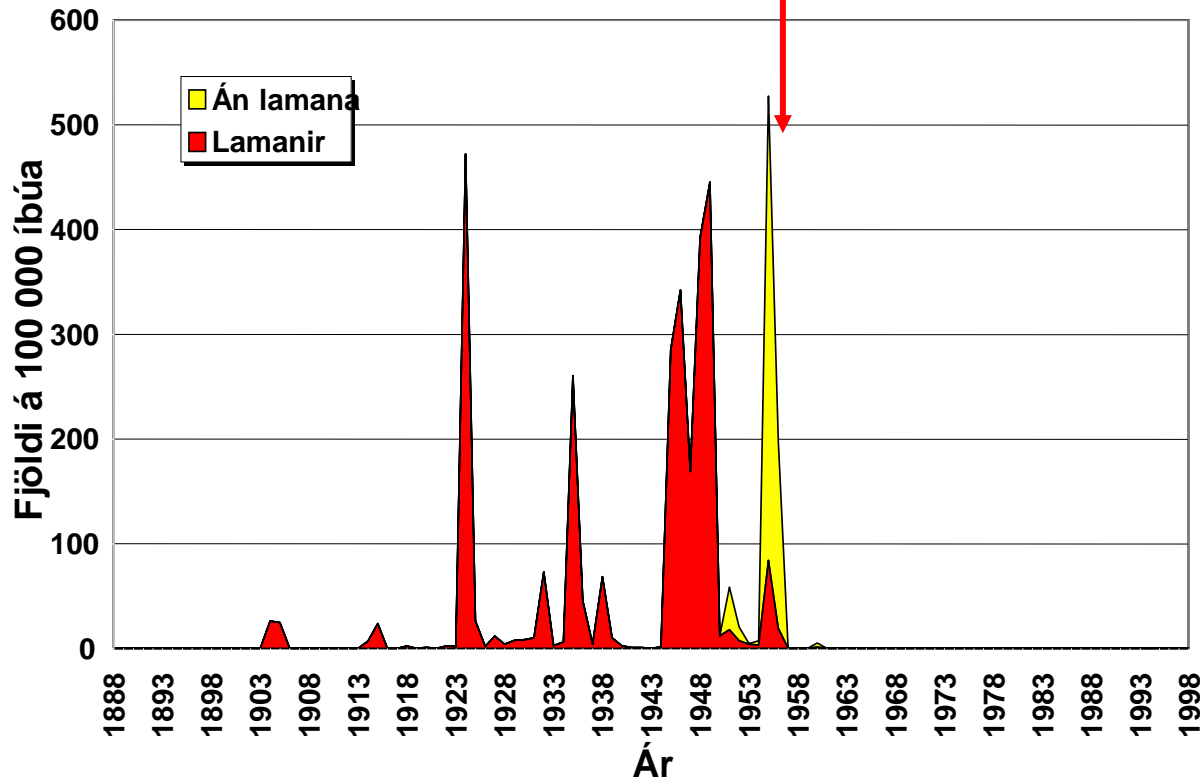
Sjúkdómstilfelli (lamaðir)

2.700 (224)

10 ár eftir

Sjúkdómstilfelli (lamaðir)

6 (4)



- **1956** Bólusetning gegn mænusótt hafin
- **1960** Síðustu mænusóttartilfellið með lömunum greind á Íslandi
- **1963** Síðasta mænusóttartilfellið greint á Íslandi (erlent barn)



# Polio vaccine for everyone !







When eradication is achieved, all children — the rich, poor, educated, illiterate, rural, urban, black, brown, yellow, white, male, female, illegal immigrant, political elite, nomad, slum dweller, refugee, animist, Buddhist, Christian, Hindu, and Muslim — will be protected from polio

The costs are limited, but the benefits are infinite.

Að koma í veg fyrir sjúkdóma  
Um bólusetningar barna

Kíghósti – kikhósti  
Pertussis

# Kíghósti

(Kikhósti, pertussis, whooping cough, 100 daga hósti)

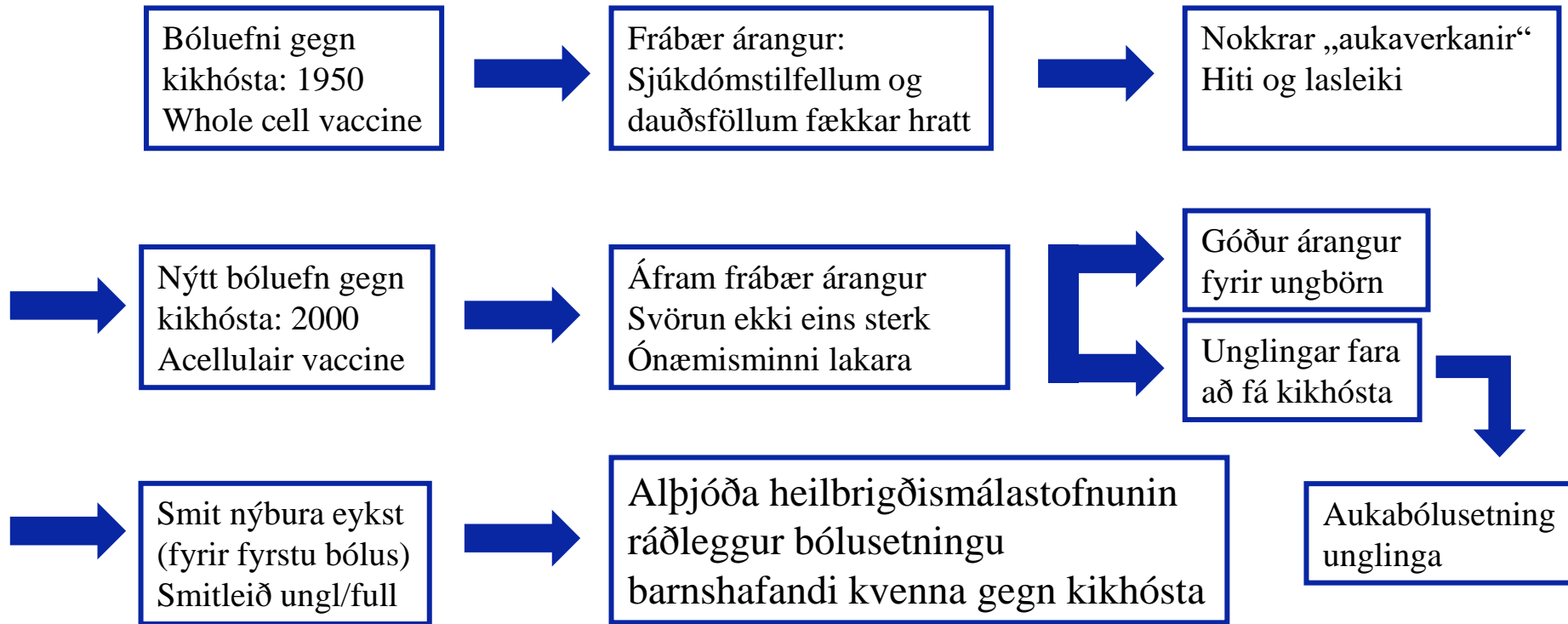
- *Bordatella pertussis*
- Meðg. 7-10 (20) dagar, smitandi í um 3 vikur
- Kvefstig (catarrhal): 2 v, vaxandi kvef og nefrennsli
- Hóstastig (spasmodic): 2-4 v, hóstaköst í hviðum (kik), enda oft í max útöndun og etv cyanosu. Þegar barnið nær andanum; mikil soghljóð (kíg). Slímuppköst. Oft hitalaus
- Afturbatastig (convalescent): 2 (-8) v, skánandi hósti.
- Fylgikv: lungnabólgur, aðrar efri loftvegasykingar, krampar, encephalopathia o.fl
- Rx: macrolidar



# Faraldsfræði kikhósta

- Afar smitandi – dropasmit  
(90% smithætta fyrir óbólusetta einstaklinga á heimilinu)
- Smita í u.þ.b.  $>3$  vikur
- Unglingar og fullorðnir algengir smitberar  
(um 40% mæður, 15% feður)

# Bólusetningar gegn kikhósta



Magn  
mótefna

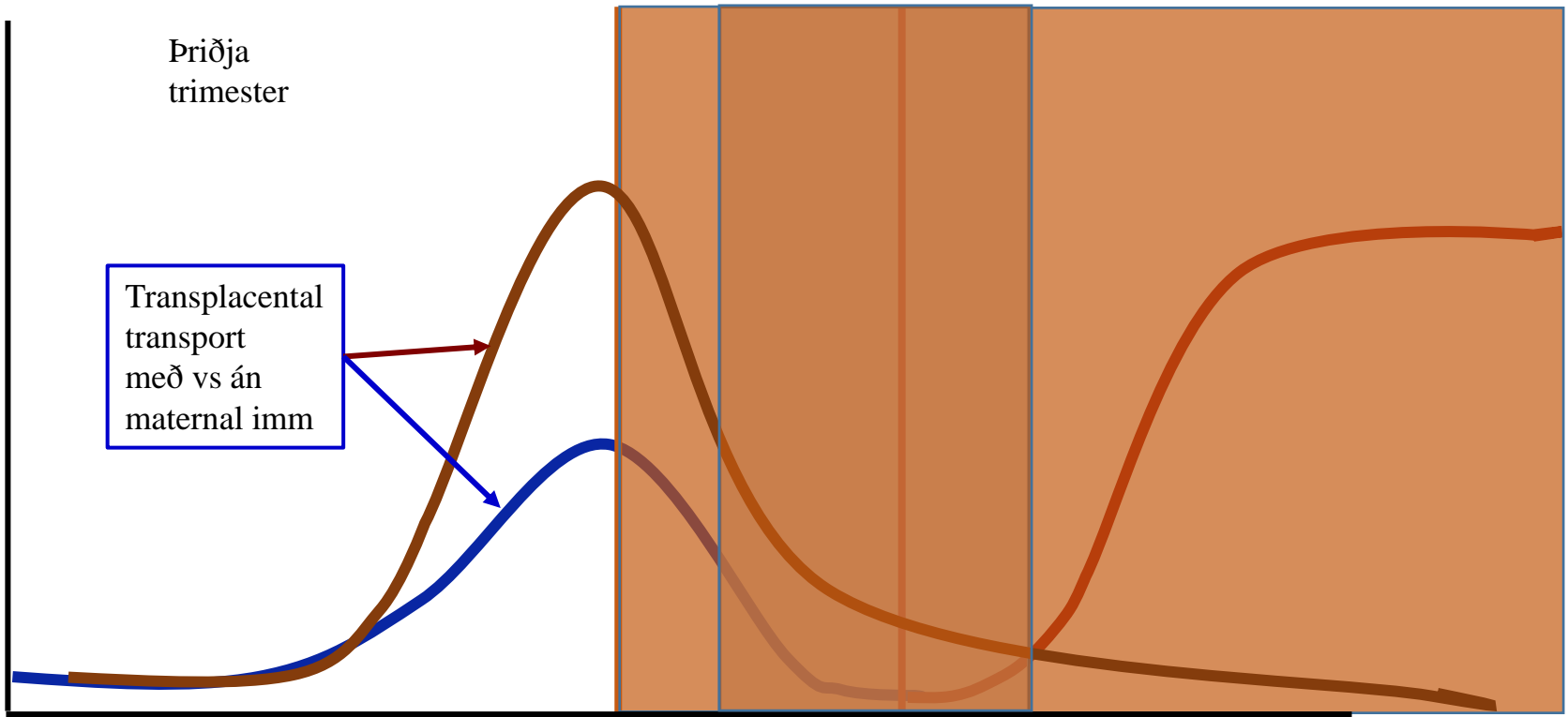
Þriðja  
trimester

Tímabil sem þarf að brúa

Transplacental  
transport  
með vs án  
maternal imm

Fæðing

Fyrsta  
bólusetning



# Tdap á meðgöngu WHO

- Öruggt
- Mjög öflugt (effective) í að vernda nýbura fyrir kikhósta  
>7 dögum fyrir fæðingu => >90% vörn (effectiveness)
- Mikil áhrif á afleiðingar og dauðsföll  
(high impact on morbidity and mortality in infants too young to have been vaccinated)

# Að koma í veg fyrir sjúkdóma Um bólusetningar barna

Mislingar

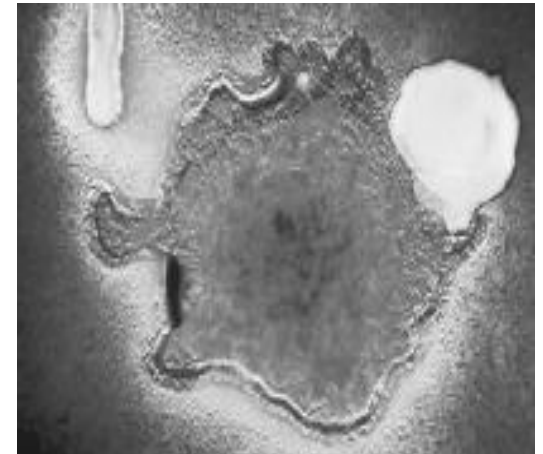


# Mislingar

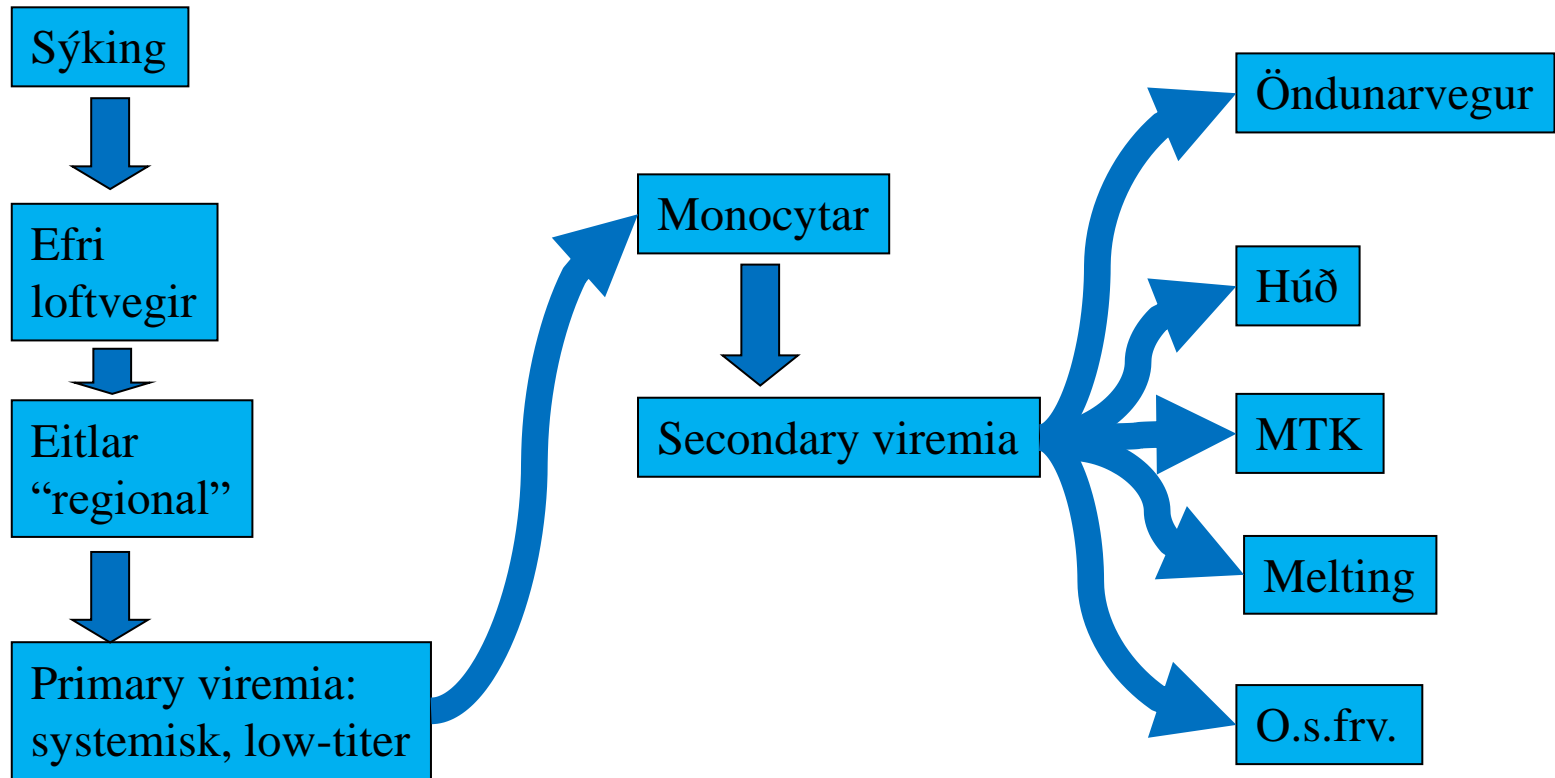
- ✓ Ein helsta ástæða dauða ungra barna í heiminum
- ✓ Er eingöngu í mönnum – ekki í dýrum eða fuglum

# Mislingar - veiran

- Mislingaveiran er af ættkvísl *Morbillivírusa* af ætt Paramyxoviridae
- *Paramyxovírusar* og *Pneumovírusar* tilheyra sömu ætt
- Stór pleomorphic single stranded antisense RNA veira
- **Eingöngu í mönnum !!!**



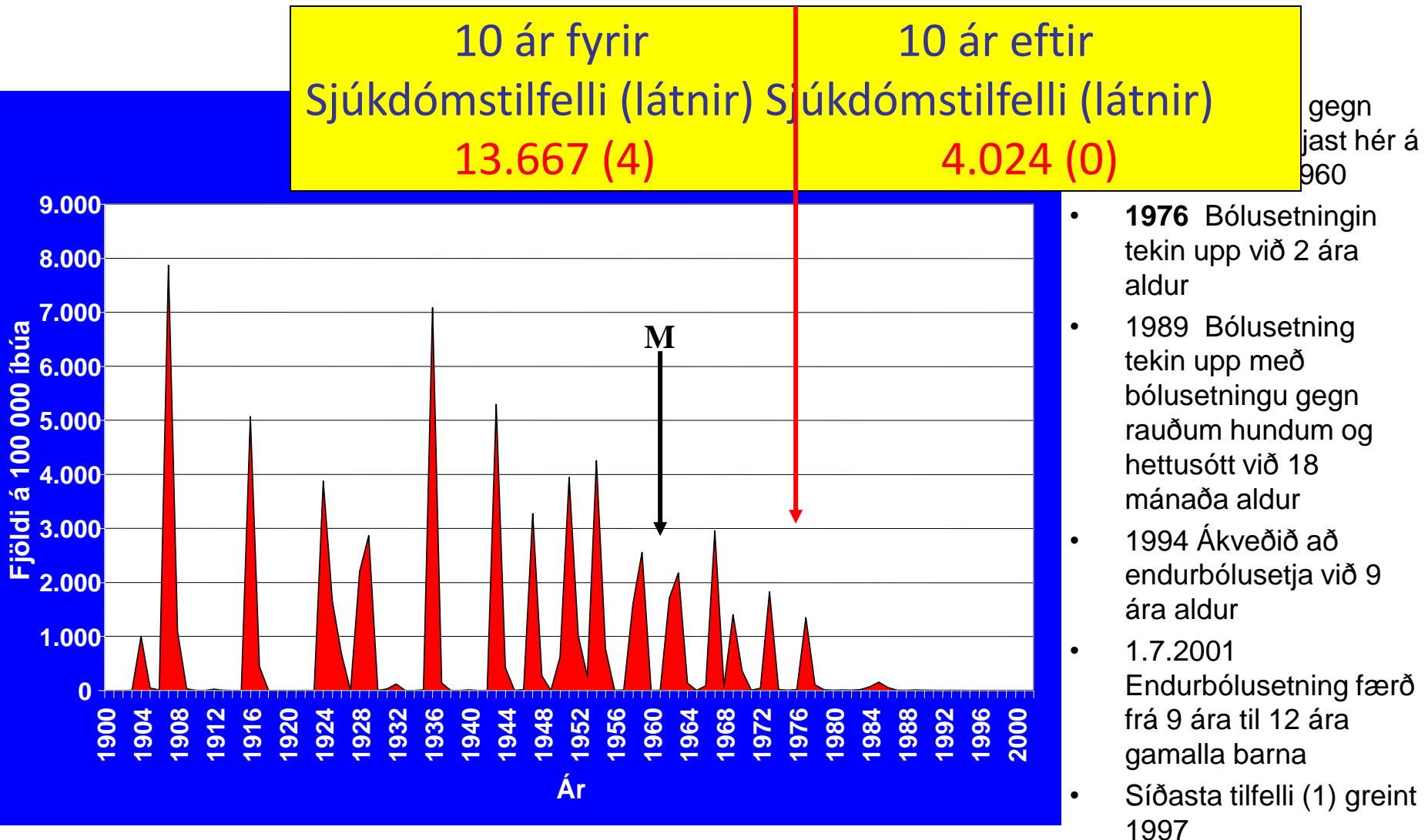
# Mislingar - virusinn



# Mislingar



# Mislingar á Íslandi



# Andrew Wakefield



# The Lancet, feb 1998

EARLY REPORT

## Early report

### Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

Background: We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

Methods: 12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology.....

Findings: Onset of behavioural symptoms was associated, by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, .....

Interpretation: We identified associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.....

## Early report

## Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith

### Summary

**Background** We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

**Methods** 12 children (mean age 6 years [range 3–10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Biochemical, haematological, and immunological profiles were examined.

**Findings** Onset of behavioural symptoms was associated by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, with measles infection in one child, and otitis media in seven. All 12 children had intestinal abnormalities ranging from lymphoid nodular hyperplasia to granuloid ulceration. Histology showed patchy chronic inflammation in seven of 11 children and reactive ileal lymphoid hyperplasia in seven, but no granulomas. Behavioural disorders included autism (nine), disintegrative psychosis (one), and possible postviral or vaccinal encephalitis (two). There were no focal neurological abnormalities and MRI and EEG tests were normal. Abnormal laboratory results were significantly raised urinary methylmalonic acid compared with age-matched controls (mean 0.3), low haemoglobin in four children, and low serum IgA in 11 children.

**Interpretation** We identify associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time with possible environmental triggers.

Lancet 1998; 351: 637–41

See Commentary page

Inflammatory Bowel Disease Study Group, University Departments of Medicine and Histopathology (A J Wakefield msc, A Anthony mb, J Linnell mc, A P Dhillon msc, S E Davies msc) and the University Departments of Paediatric Gastroenterology (S H Murch mb, D M Casson msc, M Malik msc, M A Thomson msc, J A Walker-Smith msc), Child and Adolescent Psychiatry (M Berelowitz msc), Neurology (P Harvey msc), and Radiology (A Valentine msc), Royal Free Hospital and School of Medicine, London NW3 2QG, UK

Correspondence to: Dr A J Wakefield

### Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, including communication. They all had gastrointestinal symptoms, including abdominal pain, diarrhoea, and vomiting and, in some cases, food intolerance. We describe clinical findings, and gastrointestinal features of these children.

### Patients and methods

12 children, consecutively referred to the department of paediatric gastroenterology with a history of a pervasive developmental disorder with loss of acquired skills and intestinal symptoms (abdominal pain, bloating and food intolerance), were investigated. All children were admitted to the ward for 1 week, accompanied by their parents.

### Clinical investigations

We took histories, including details of immunisations and exposure to infectious diseases, and assessed the children. In 11 cases the history was obtained by the senior clinician (AW-S). Neurological and psychiatric assessments were done by consultant staff (PH, MB) with HMS-4 criteria.<sup>1</sup> Developmental records included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by SIM or MAT under sedation with midazolam and pethidine. Paired frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum; ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and were compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearances in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under sedation, cerebral magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

### Laboratory investigations

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously.<sup>2</sup> Chromatograms were scanned digitally on computer, to analyse the methylmalonic-acid zones from cases and controls. Urinary methylmalonic-acid concentrations in patients and controls were compared by a two-sample *t* test. Urinary creatinine was estimated by routine spectrophotometric assay.

Children were screened for antiendomyxal antibodies and boys were screened for fragile-X if this had not been done



# Frekari rannsóknir ....

- Aukning á einhverfur eftir 1988  
þegar MMR kom á markað? **Nei !**
- Er einhverfa sjaldgæfari hjá  
börnum sem fá ekki MMR? **Nei !**
- Veldur MMR bólgu í þörmum? **Nei !**
- Hefur tekist að endurtaka  
rannsóknir Wakefields? **Nei !**

# Mislingar

- ✓ 2000-2016, measles vaccination prevented >20 million deaths
- ✓ The risk of death from measles is usually 0.2% but up to 10%
- ✓ In 2016, there were 90.000 measles deaths globally –the first below 100.000 per year
- ✓ Now again >100.000 per year

**(>10 deaths / hour!)**

# Mislingar

- ✓ The number of measles cases in Europe 2017:  
24.000 cases / 30.000 suspected
- ✓ The number of measles cases in Europe, 2018 and 2019: around 100.000 and increasing!
- ✓ Measles induced immunosuppression!

# Mislingar



Kostnaður við bóluefni gegn mislingum er um ein evra!

Bóluefnið er öruggt, vel virkt og mjög “cost-effective!

# Að koma í veg fyrir sjúkdóma Um bólusetningar barna

Hlaupabóla  
Varicella



# Hlaupabóla

(varicella, chickenpox)

- HHV 3, varicella zoster virus (human herpes virus)
- Hálssærindi og hitavella í upphafi
- Meðg. 4-16 d (allt að 21 d).
- Prevalence: við 12 ára hafa um 90% fengið hlaupabólu
- Smita 1-2d f útbrot og þar til lesionir eru þurrar (vika)
- Útbr: ávalar lesionir
- Macula →papula →vesicula →pustula →crust **(allar í einu)**
- Ath hársvörð, munn/slímhúðir, lófar/iljar.
- Centripedal dreifing, birtast á 3-5d, mikill kláði

# Hlaupabóla

(varicella, chickenpox)

- Alvarlegur sjd fyrir ónæmisbælda
- Sec sýkingar (MTK, öndunarvegir, staph/invas GABS (necrot fasciitis))
- Acyclovir? 20mg/kg x 4 í 5 daga
- V-zoster immunoglobulin (1.0 g/kg) ef snemma eftir smit.
- Rx: ekki aspirin, ath neglur, hreinlæti, kláðastillandi lyf (bað+matarsóði+haframjöl!)
- NB post inf compl. þ.m.t. acut cerebellar ataxia o.m.fl

# Alvarleiki

- Nýburar
- Ungbörn
- Aldraðir
- Barnshafandi konur
- Ónæmisbældir
- Aðrir undirliggjandi sjúkdómar



# MTK einkenni

- Cerebellar ataxia (approximately one in 4000 cases),
- Meningoencephalitis,
- Meningitis
- Vasculitis (getur valdið stróki)
  
- Annað ??
  - ITP?
  - Neutropeniur?
  - Arthritar?
  - O.s.frv.

# Faraldsfræði hlaupabólu og alvarlegir fylgikvillar hennar

Hildur Þórarinsdóttir, læknanemi

| Ástæða innlagnar | Fjöldi |
|------------------|--------|
| Húðsýkingar      | 16     |
| Ataxia           | 7      |
| Hár hiti         | 6      |
| Ónæmisbæling     | 5      |
| Vannæring        | 4      |
| Blóðsýking       | 3      |
| Annað            | 17     |
| Alls             | 58     |

| Meinvaldar                            | Fjöldi | Hlutfal I |
|---------------------------------------|--------|-----------|
| Staphylococcus aureus                 | 8      | 53%       |
| Staphylococcus aureus og pneumococcar | 2      | 13%       |
| Staphylococcus aureus og enterococcar | 1      | 7%        |
| Sterptococcus hem. Gr A               | 4      | 27%       |

# Varicella vaccination

- Verndar gegn hlaupabólu í 85% tilfella
- Verndar gegn alvarlegum veikindum í 97% tilfella
  
- Japan (> 20 ár)
- USA, 48 af 50 fylkjum (> 10 ár)
- Canada
- Australia
- Finland
- Þýskaland .....o.s.frv.
  
- Ísland frá 2020

Að koma í veg fyrir sjúkdóma  
Um bólusetningar barna

Meningococcar hjúngerð C



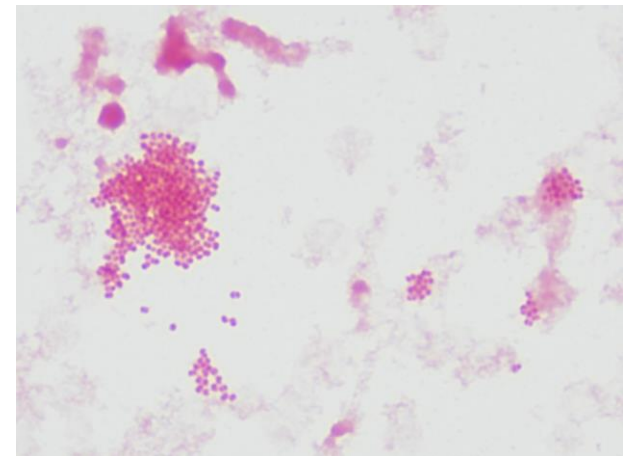
*N meningitidis!*





# *N meningitidis!*

- Neisseria meningitides causes approx 500.000 cases of meningitis
- Especially young children and teenagers
- Fatality rate 10% in resource-rich countries
- Fatality rate virtually unchanged for decades
- 30% of survivors with severe long-term (deafness, amputation and cognitive impairment)

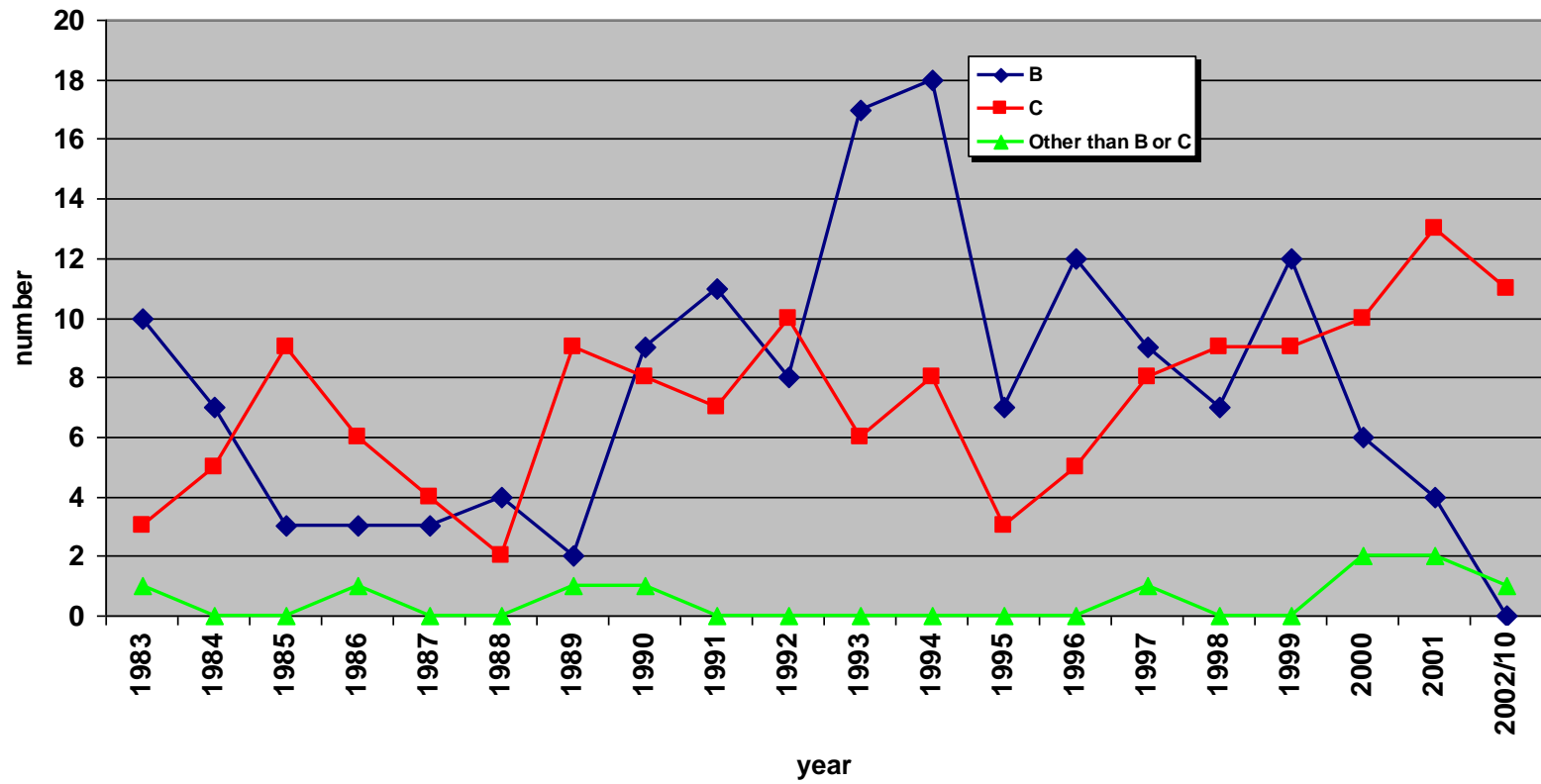




# Meningococcal serogroups

## - in Iceland (until Oct. 2002) -

Serogroups of meningococci causing disease

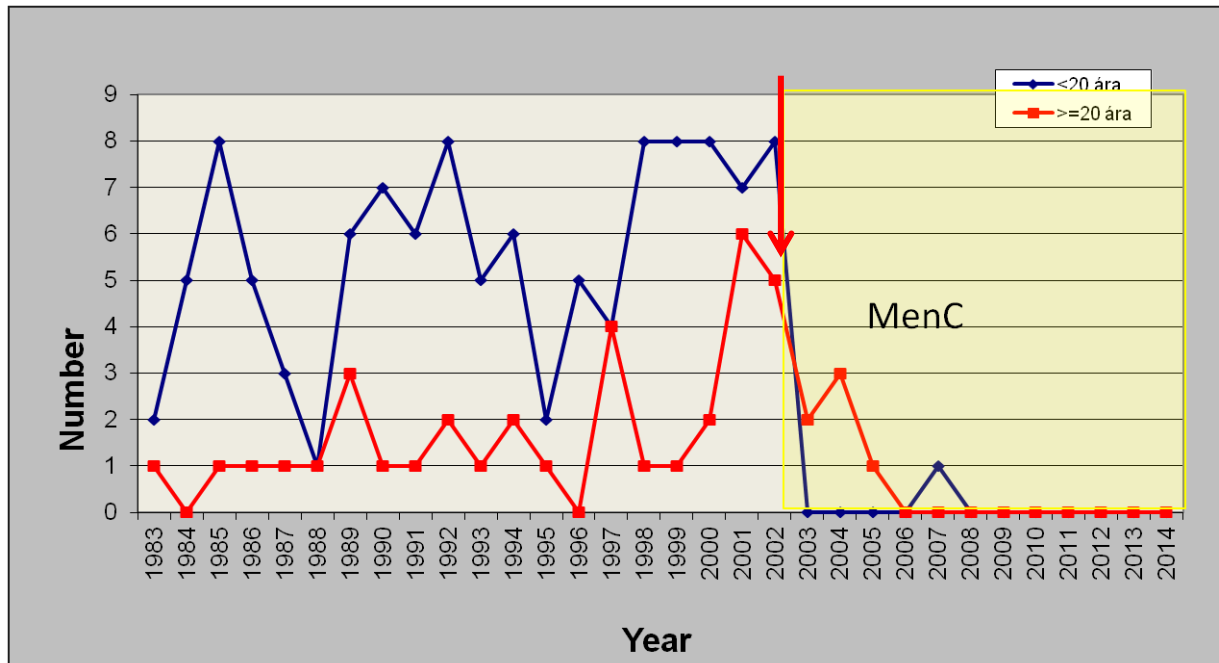


# MCC vaccination plan - Iceland -

Vaccination campaign,  
started October 2002

- 6 months-19 years
- < 12 months, two injections
- $\geq$ 12 months, one injection
- ~ 88.000 individuals
- Finish < 1 year

# Men C in Iceland



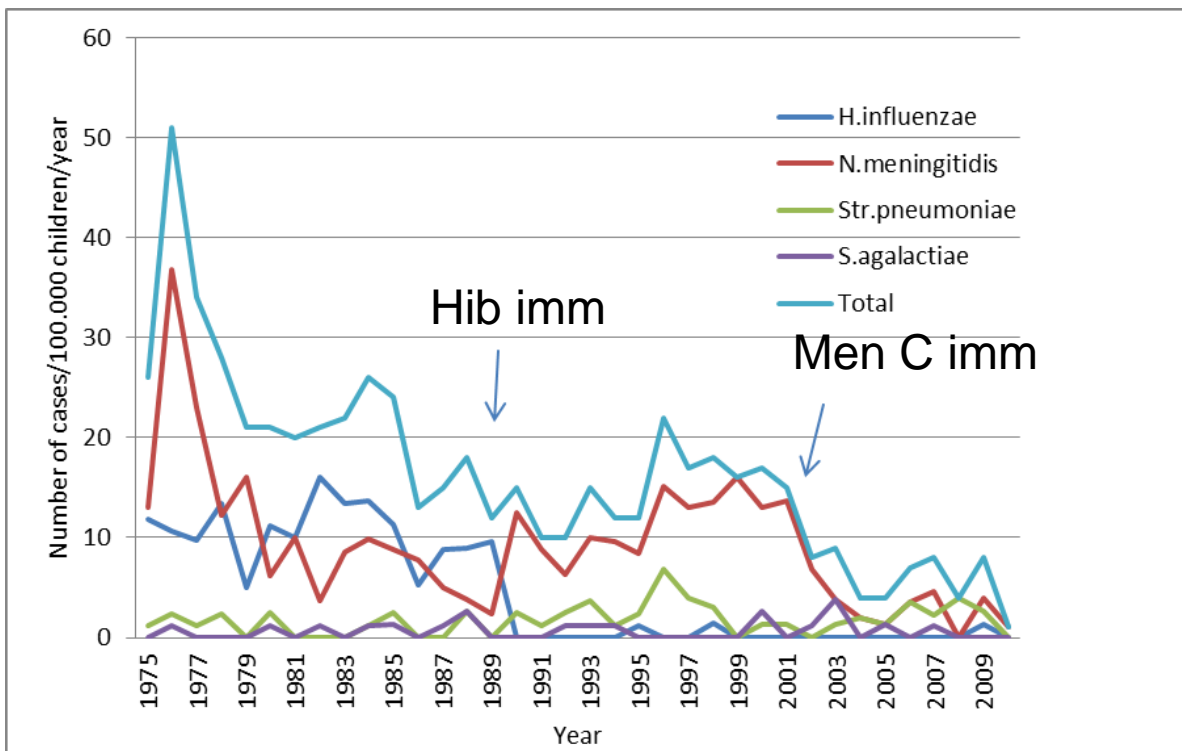
**1989: Immunisation against *Str Meningitidis* serotype C starts**

**— < 20 years of age**

**— > 20 years of age**

Þórólfur Guðnason/Haraldur Briem  
Directorate of Health

# Meningitis in Icelandt



## Bacterial meningitis in children in Iceland, 1975–2010: A nationwide epidemiological study

KOLFINNA SNAEBJARNARDÓTTIR<sup>1</sup>, HELGA ERLENDSDÓTTIR<sup>1,2</sup>,  
INGI KARL REYNNISSON<sup>1</sup>, KARL KRISTINSSON<sup>1</sup>, SANDRA HALLDÓRSDÓTTIR<sup>1</sup>,  
HJÖRÐÍS HARDARDÓTTIR<sup>2</sup>, THÓRÓLFUR GUDNASON<sup>1,3,4</sup>,  
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*Scandinavian Journal of Infectious Diseases*, 2013

# Að koma í veg fyrir sjúkdóma Um bólusetningar barna

## Pneumókokkar

A scanning electron micrograph (SEM) of Streptococcus pneumoniae bacteria. The image shows numerous chains of spherical, Gram-positive cocci. The bacteria are arranged in various lengths and orientations, some appearing as single pairs or small groups. The surface of the bacteria has a textured, granular appearance. The background is dark, making the light-colored bacteria stand out.

*S. pneumoniae!*

# The effect of vaccination in Iceland – The Vice study

Aim:

To investigate the effect  
of immunisation against  
*Streptococcus pneumoniae*  
in Iceland (PHiD-CV 10)



# The impact of PCV-10 in Iceland

Results from The Vice study - Iceland

|                                      |       |
|--------------------------------------|-------|
| Nasopoharyngeal carriage             | ↓ +/- |
| Acute otitis media                   | ↓↓    |
| Antibiotic usage and resistance      | ↓↓    |
| Hospitalisations for pneumonia       | ↓↓    |
| Invasive pneumococcal disease        | ↓↓    |
| Cost/effectiveness - saving analysis | +++   |



# Prevention of Otitis Media and effect on Antibiotic use/resistance

## Vaccine impact all-cause AOM

22% (95%CI 12-31%)

## Delayed first episode of AOM

Difference: 122 days between the groups

## Mean number of visits per child

1.61 → 1.37

# Prevention of Otitis Media and effect on Antibiotic use/resistance

Reduction in all-cause antimicrobial prescriptions

6,8% (95% CI 2.7-10.7%)

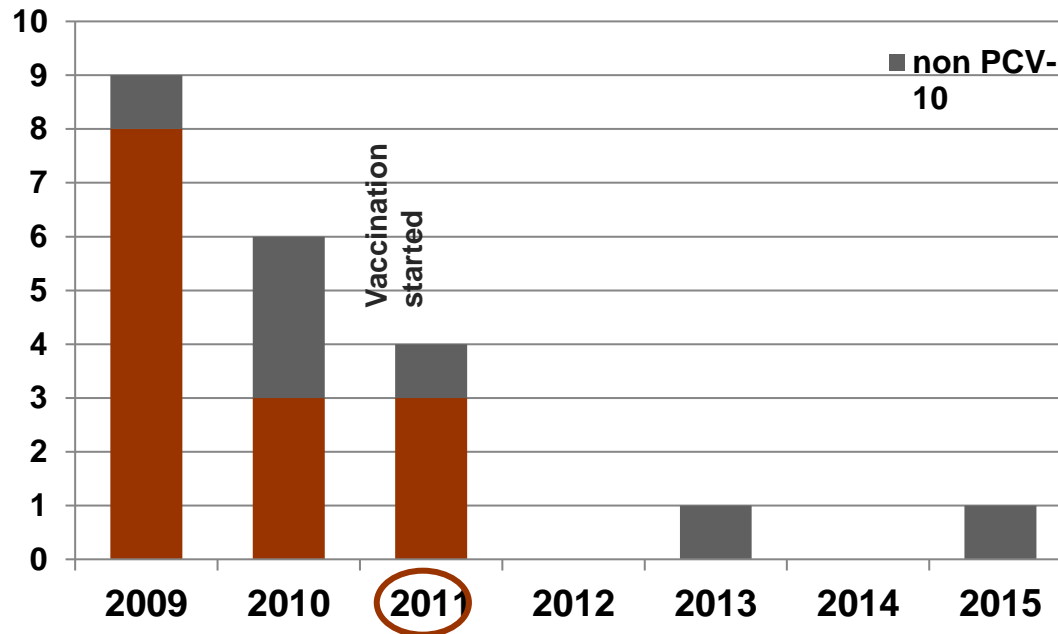
Fewer antibiotic prescriptions per child

Prevented prescriptions 2011-2015: 12,498

Impact on AOM related antimicrobial prescriptions

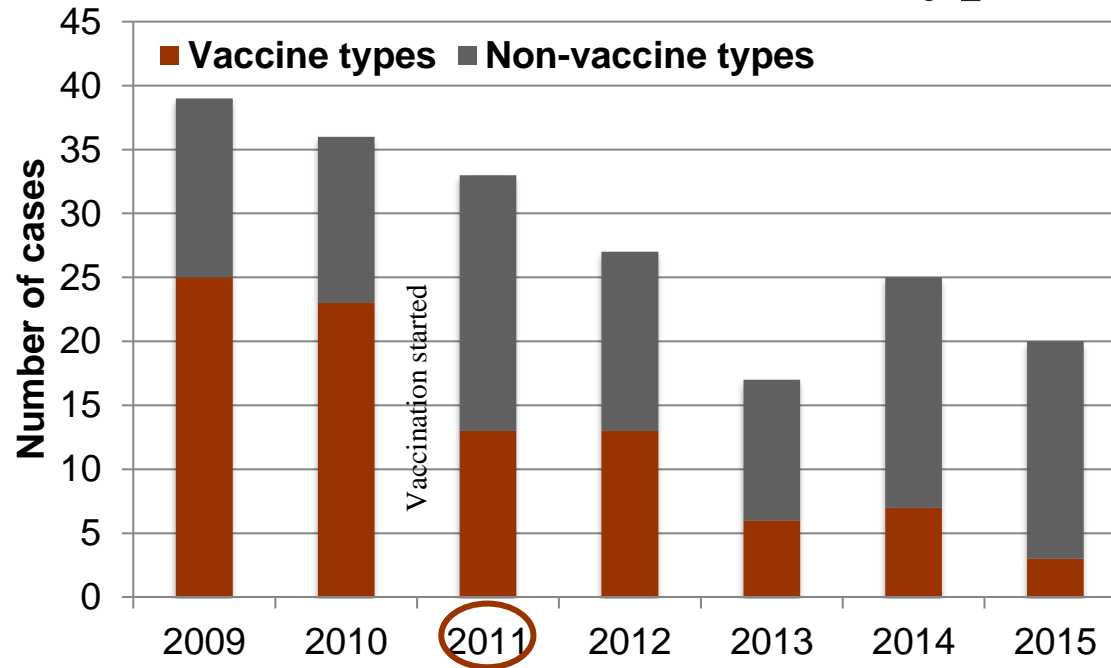
19.8% (95%CI 14.8-24.6%)

## Children < 18 years Iceland 2009-2014



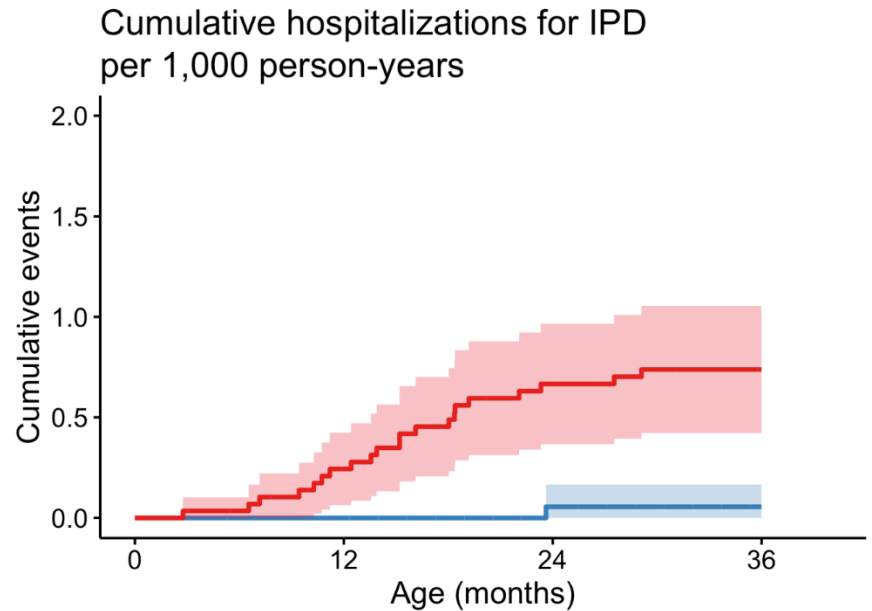
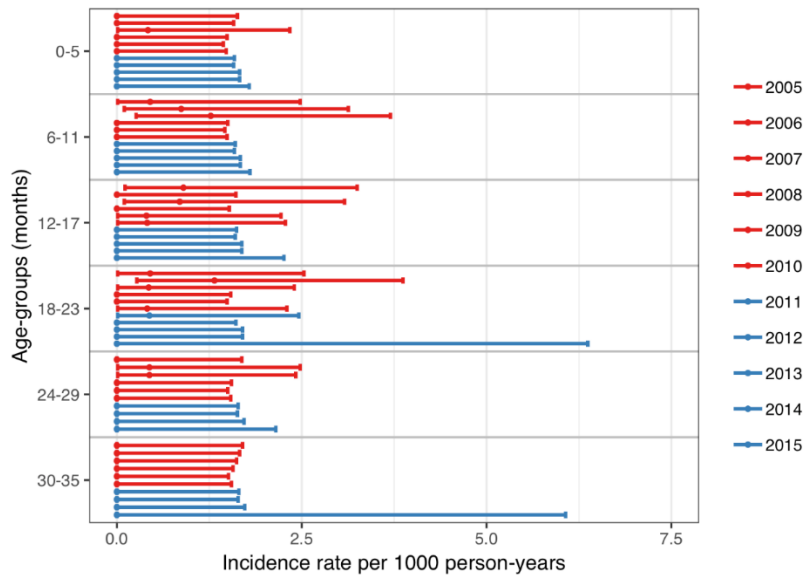
The only non-vaccine serotype that increased in incidence was serotype 22F ?

## Vaccine and non-vaccine types



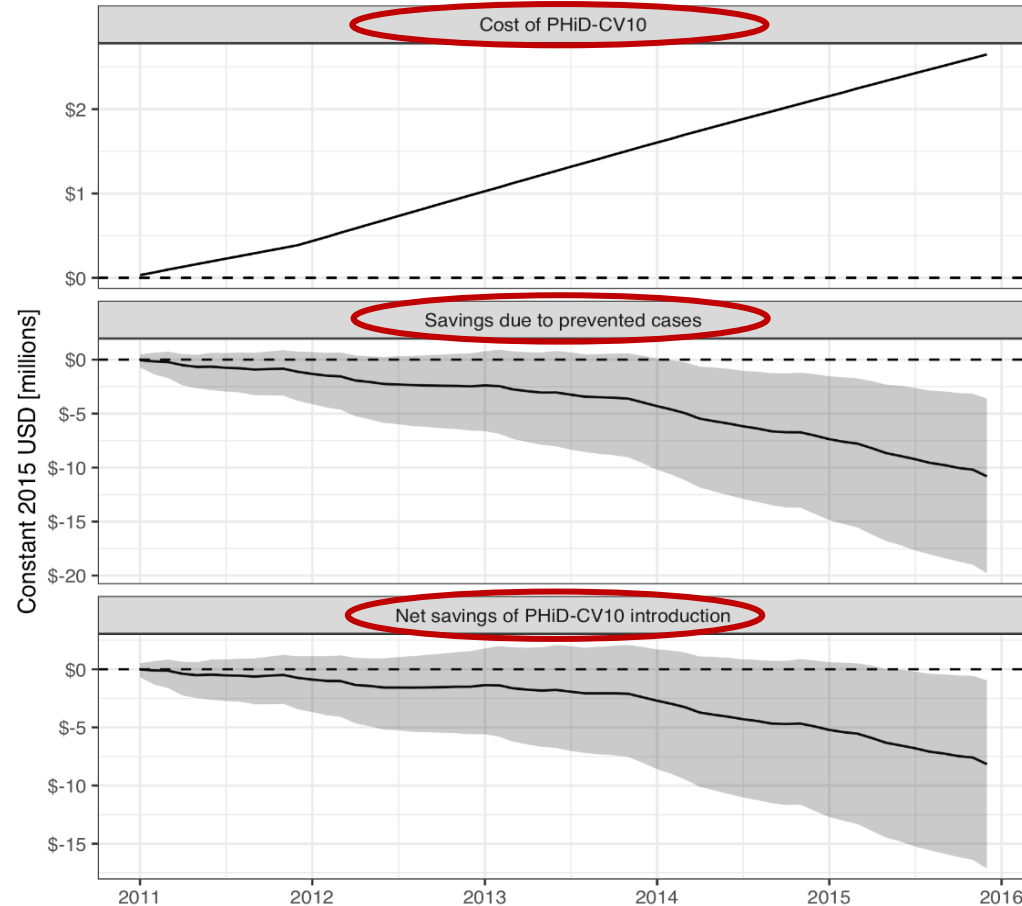
The only non-vaccine serotype that increased in incidence was serotype 22F ?

# Cumulative hospitalisations for IPD per 1,000 person-years (vaccine-eligible vs vaccine non-eligible cohorts)



# Cost, savings and cost-effectiveness of PHiD-CV10

(USD 2015)



$2,6 \times 10^6$

$-10 \times 10^6$

$-7,4 \times 10^6$

# Conclusions

PHiD-CV10 in Iceland was .....

Effective against carriage, AOM, respiratory tract infections and IPD

Reduced antibiotic usage and AB resistance

Was cost saving (1→3)



Að koma í veg fyrir sjúkdóma  
Um bólusetningar barna

Inflúensa



# Influenza

Haemagglutinin – eighteen types!!

Neuraminidase – eleven types!

HxNy

Influenza infects humans, birds, pigs, cattle, horses,  
dogs, camel, cats, bats, seals, whales .....

# Influenza

Influenza A

Influenza B

Influenza C

~~Influenza D~~

# Influenza



Influenza A

Infects humans and birds

Influenza B

HxNy

Variable

Influenza C

**H1N1:** Spanis flu 2018 og swine flu 2009

H2N2: Asian influenza 1950

~~Influenza D~~

**H3N2:** Hong Kong influenza 1960

H7N9: Circulating in China, possible panedemi

H1N1, H1N2 og H3N2 circulating in humans for years

# Influenza

Influenza A

Influenza B

Influenza C

~~Influenza D~~

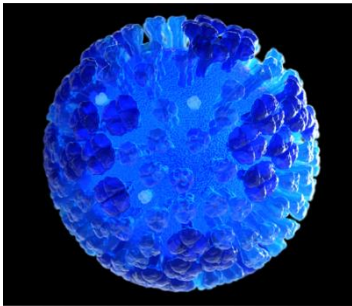
→  
Infects humans (and seals!)  
Mutates slower than infl A  
Two main types:

- B/Yamagata/16/88
- B/Victoria/2/87



# Influenza – the virus

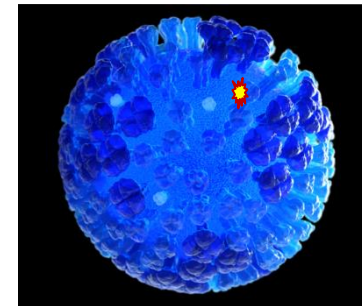
## Antigenic drift



RNA polymerase:  
Copies the viral genome



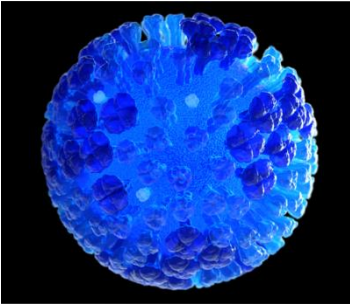
Errors ( $1:10^4$  nucleotide)  
= the RNA of the influenza virus  
=> Most viruses are mutants!



**=> Antigenic drift**

# Influenza – the virus

## Antigenic shift

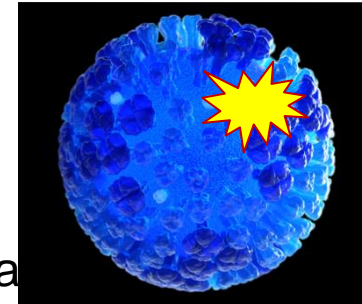


The influenza viral genome has 8 segments

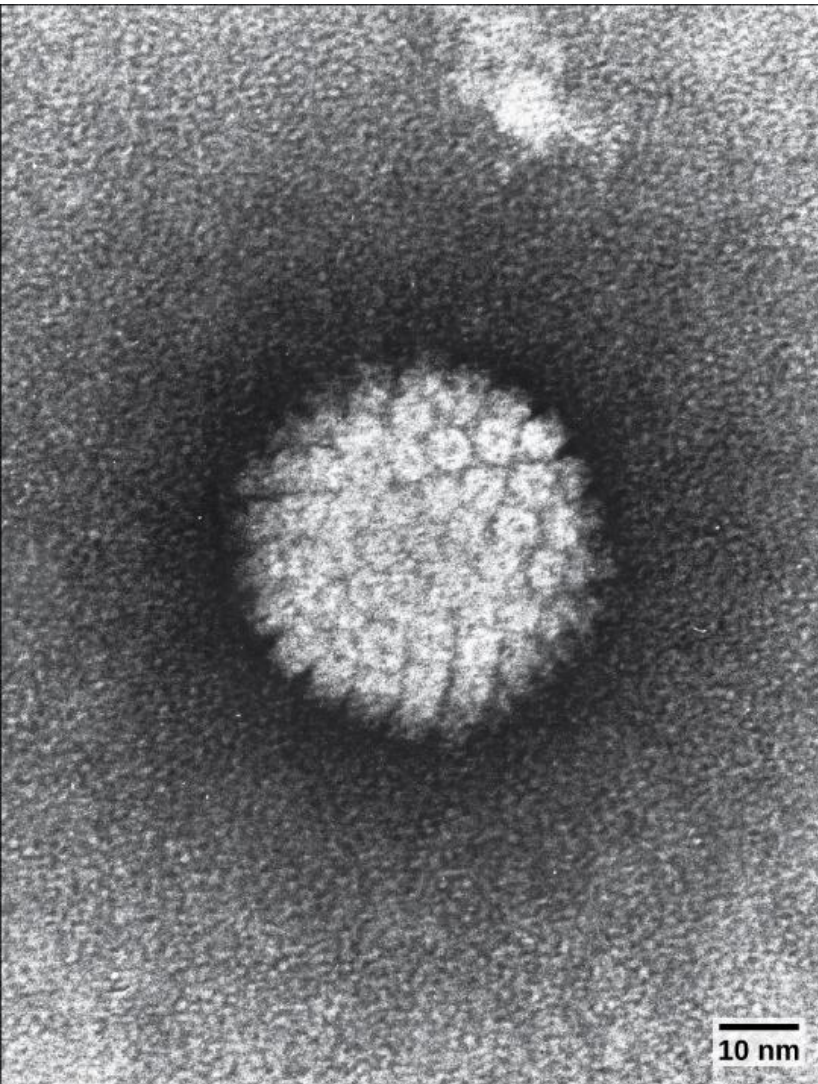


When one cell is infected with two  
Different types these segments may  
Be rearranged

=> **Antigenic shift**



# Influenza

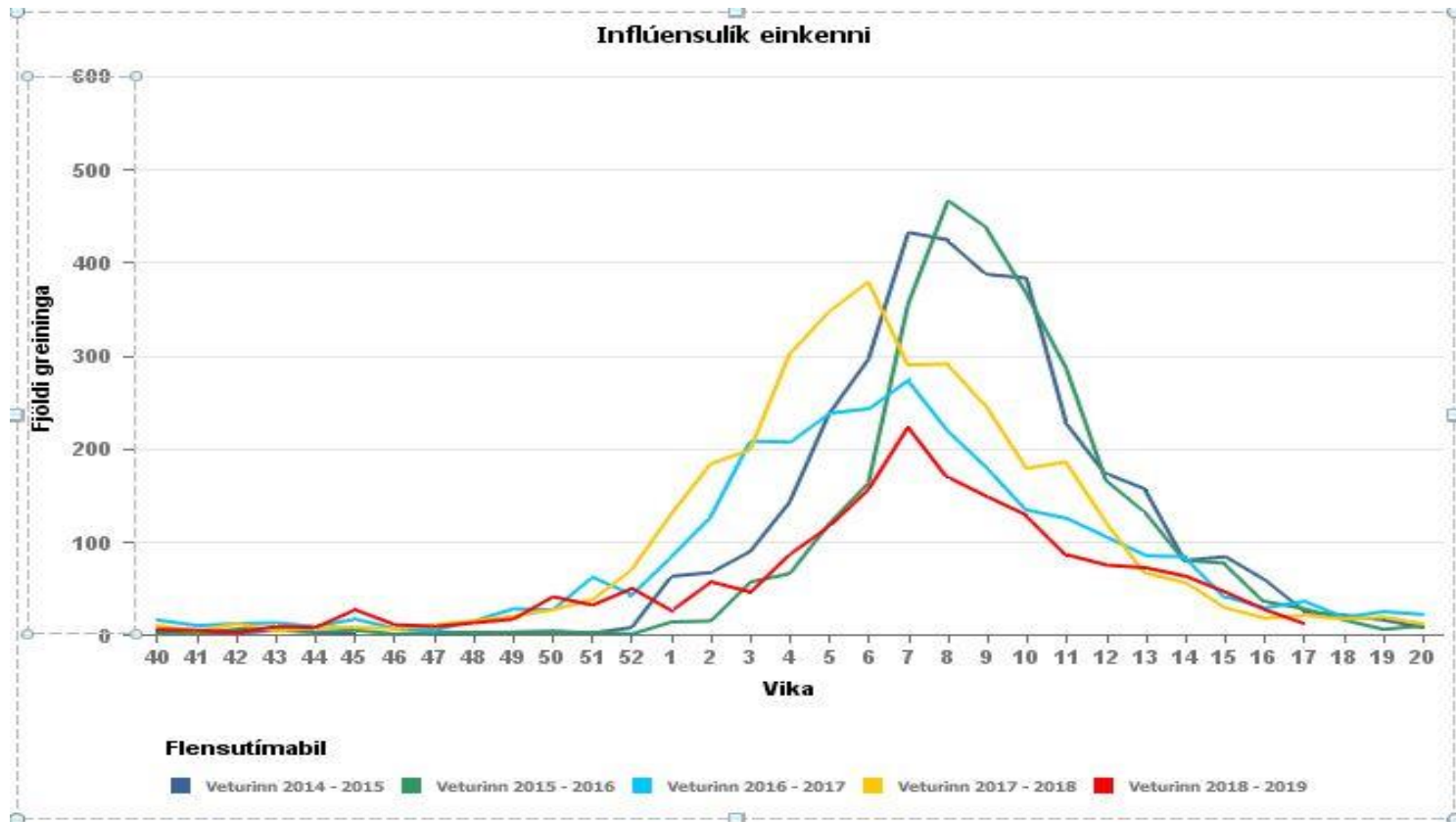


Global annual influenza infection rate:  
Adults 5%–10%  
Children 20%–30%

Global annual mortality:  
300,000 – 500,000

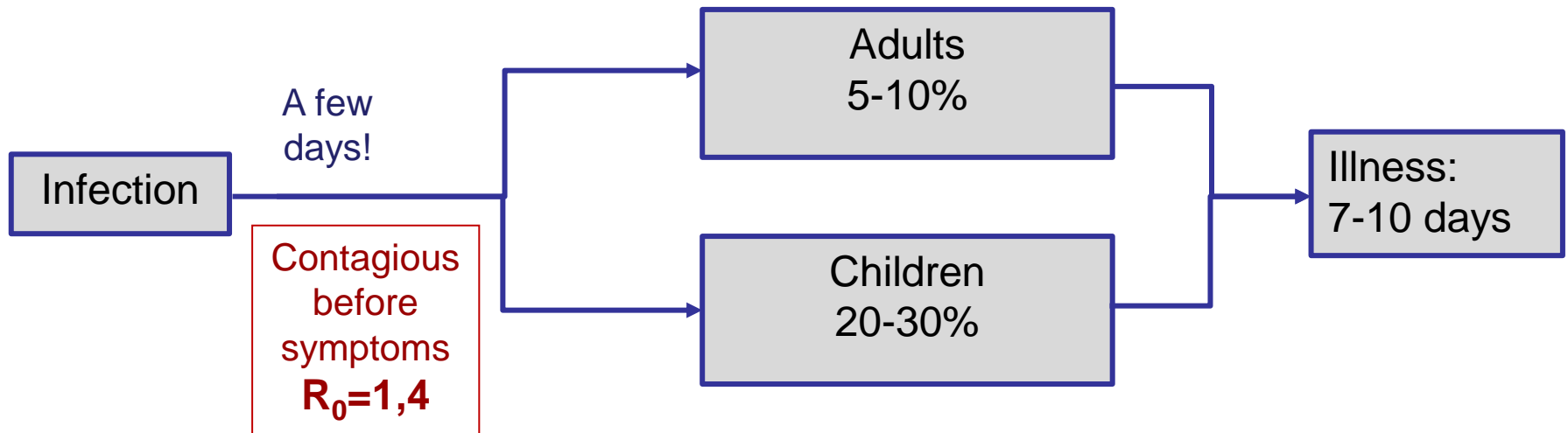
Influenza vaccine:  
Available from 1930-1940

# Influenza - epidemiology

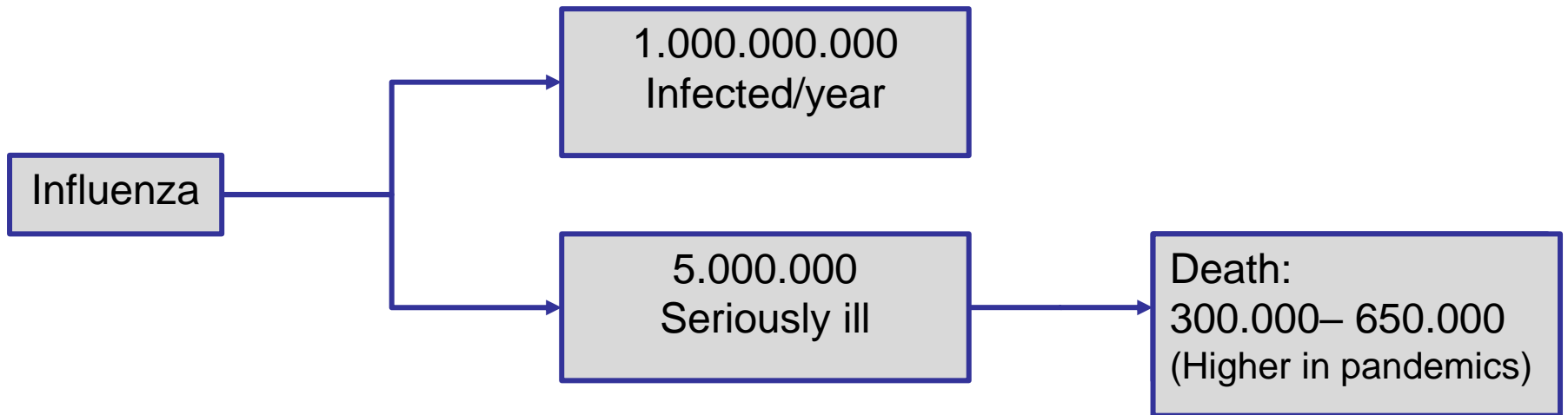




# Influenza



# Influenza



# Influenza - immunisation

1918: Try anything! Blood transfusions from recovered patients



1931: Virus cultured in eggs !! Still used!!!



1940: Vaccine used (soldiers during the second WW)



2012: Viruses cultured in media !



Recently: Recombinant techniques

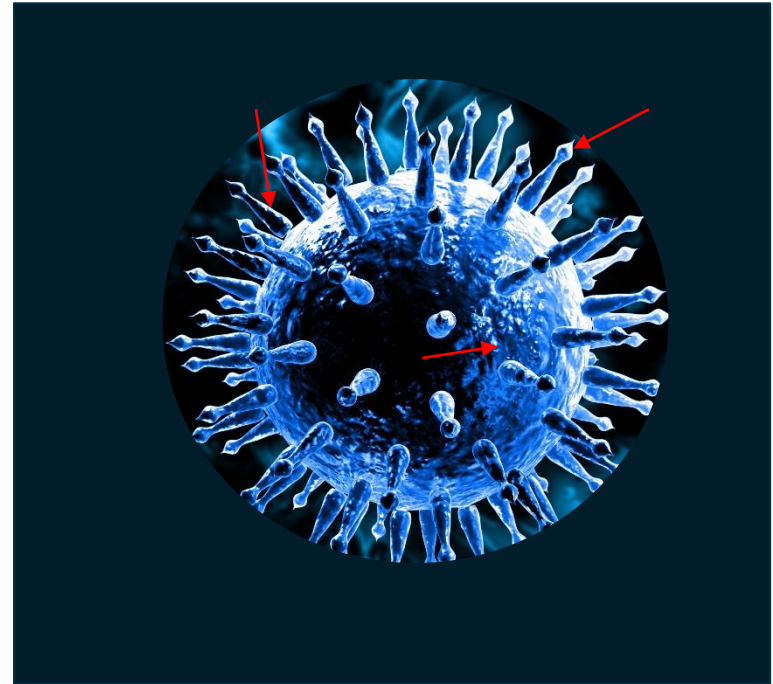
# Influenza - immunisation

Trivalent vaccine

Quadrivalent vaccine

Quadrivalent (nasal) LAV

Universal vaccine ?



# Influenza - immunisation

WHO recommends annual vaccination for:

- ✓ Pregnant women at any stage of pregnancy
- ✓ Children aged between 6 months to 5 years
- ✓ Elderly individuals (aged more than 65 years)
- ✓ Individuals with chronic medical conditions
- ✓ Health-care workers

# Að koma í veg fyrir sjúkdóma Um bólusetningar barna

Árangur bólusetninga er ótvíræður

Ekki hika !!!

# Where do we stand today ?

Immunisation coverage .....

130.000.000 children born /

| Vaccine     | Coverage | Note                      |
|-------------|----------|---------------------------|
| DTP x 3     | 85%      |                           |
| Measles x 1 | >80%     | At least x 1              |
| Hib x 3     | >70%     | Variation ↑               |
| Polio x 3   | >85%     | Conflict and instability? |
| PCV         | <50%     | x 2? x 3?                 |
| Hepatitis   | >80%     | x 3 (neonatal 40%?)       |

# Afstaða til bólusetninga



ELSEVIER

Contents lists available at [ScienceDirect](#)

Vaccine

journal homepage: [www.elsevier.com/locate/vaccine](http://www.elsevier.com/locate/vaccine)

## Public opinion on childhood immunisations in Iceland

Ýmir Óskarsson<sup>a</sup>, Þórólfur Guðnason<sup>a,b</sup>, Guðbjörg Andrea Jónsdóttir<sup>c</sup>,  
Karl G. Kristinsson<sup>a,d</sup>, Haraldur Briem<sup>a,b</sup>, Ásgeir Haraldsson<sup>a,e,\*</sup>



# Afstaða til bólusetninga

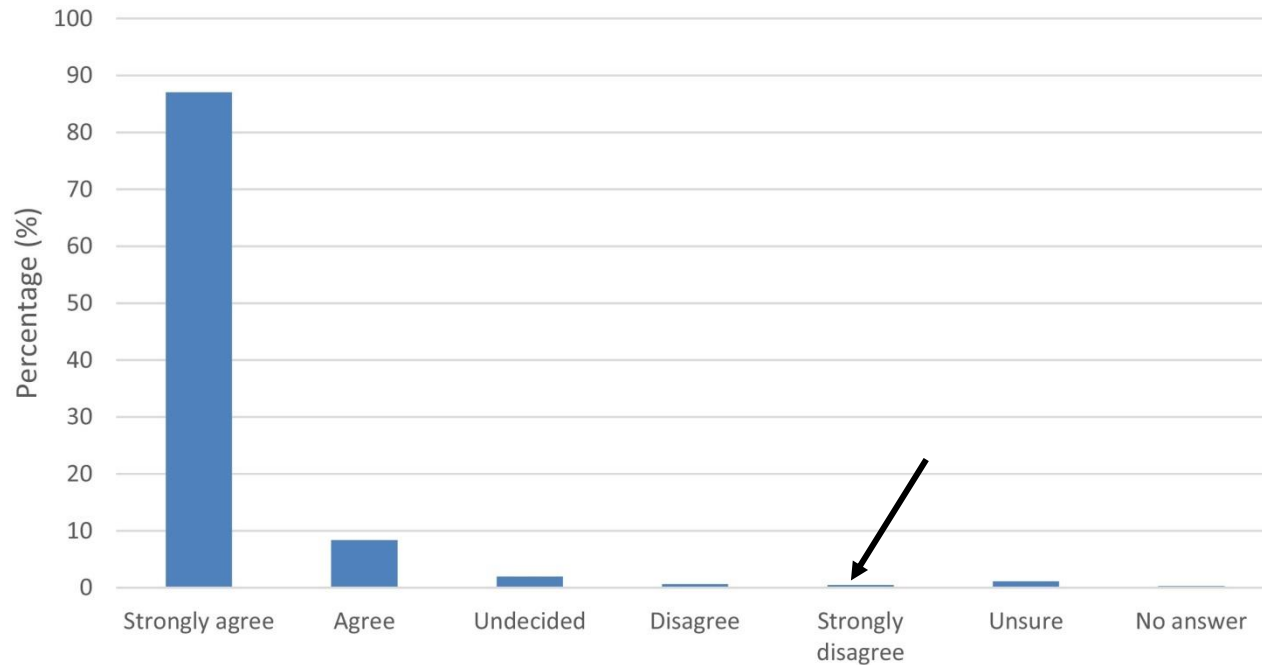


Fig. 1. Attitude towards childhood vaccinations in the first and second years of life from all three cohorts; general public, employees of The University Hospital and employees of The University of Iceland (total 5584 individuals). Answers to the two questions compiled.

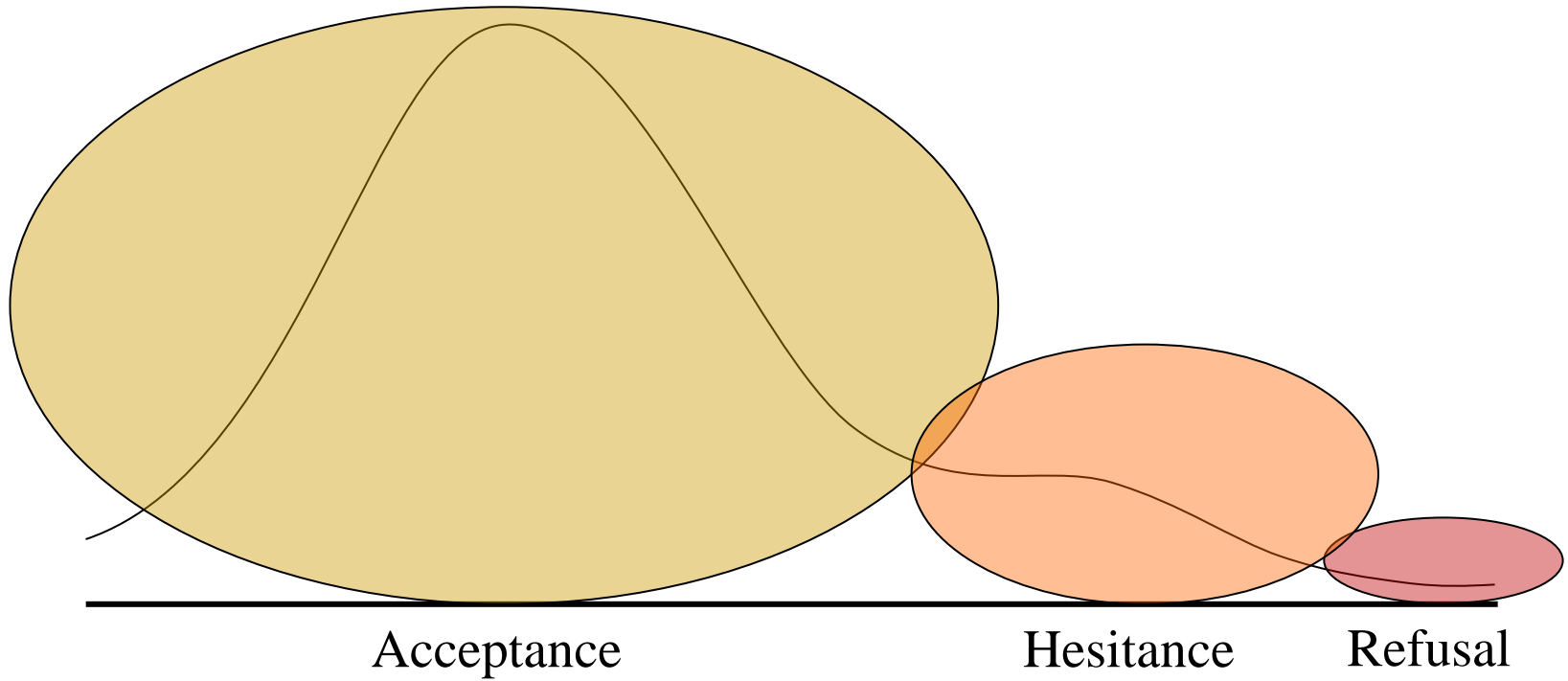
Mysterious.....  
..... unclear.....  
lack of knowledge.....  
.....side effects....

There is no knowledge gap!!!



If I don't do anything,  
I can't do anything  
wrong (Omission bias).

# Acceptance - refusal



# Vaccine preventable diseases

1. Diphtheria
2. Pertussis
3. Tetanus
4. Poliomyelitis
5. Measles
6. Mumps
7. Rubella
8. Hib
9. Meningococcal disease
10. *S. pneumoniae*
11. Varicella and zoster
12. HPV

12. Hepatitis B
13. Hepatitis A
14. Influenza
15. Rotavirus

17. Tuberculosis
18. Typhoid fever
19. Rabies
20. Hepatitis E
21. Yellow fever
22. Tick-borne enceph
23. Japanese enceph
24. Malaria
25. Dengue fever
26. Cholera
  
27. Corona???



Lok!