



**What to do when country specific data  
are lacking?  
Minimum criteria and procedures  
when developing vaccination  
recommendations  
in Finland**

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Procedures for the Development of Evidence based Recommendations  
for Immunization , Berlin 15 September 2011**

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# Disclosures



@Julia Vuori

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**Holding a position at a governmental research institute THL**

**Long term research funding and collaboration with sanofi pasteur: PCV11 efficacy study in the Philippines (up to 2005)**

**Served as a technical expert in vaccines related matters for private sector: GSK, Novartis, Pfizer / Wyeth, SBL vaccines and public funding bodies ECDC, EU DG Research, SIDA and Finnish Foreign Ministry and WHO, GACVS**

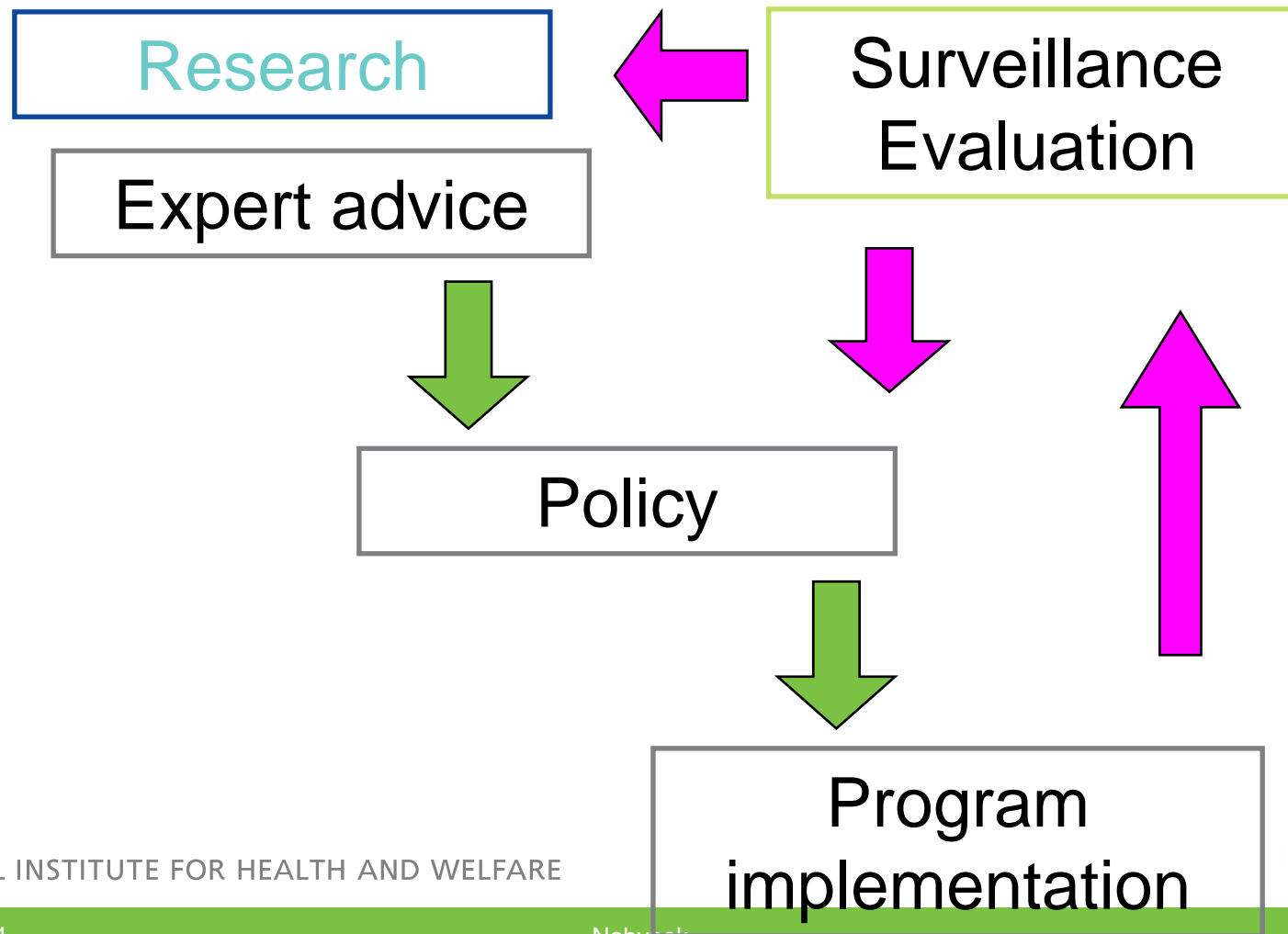


## Martin Friede, WHO

- "Don't do it, if you cannot measure it!"



# Protecting population with vaccination



# Criteria for introducing new vaccine into NIP

In Finland, since year 2000, the introduction of a new vaccine into NIP is evaluated using a 4-step approach<sup>1</sup>:

The vaccine should have

1. considerable impact on disease burden, and
2. demonstrated safety on individual level, and
3. demonstrated / expected safety when used on large scale, and
4. be reasonably cost-effective to justify the public spending.

<sup>1</sup>Nohynek H. Eur J Publ Health 2008;16:275-80





# Evaluated changes in NIP since 2000-

2001 NoGo	Pneumococcal conjugate vaccine
2002	Influenza vaccination for all $\geq 65$ years
2003	DTaP/dtap 6 years fewer IPV boosters
2005	DTaP-Hib-IPV combination vaccine
2006	BCG restricted to risk groups only
2007	Influenza for children 6 to 35 months
2009	Rotavirus vaccine
2010	Pneumococcal conjugate vaccine
2010 NoGo	Varicella
2011 ?	Human papilloma virus vaccine to girls





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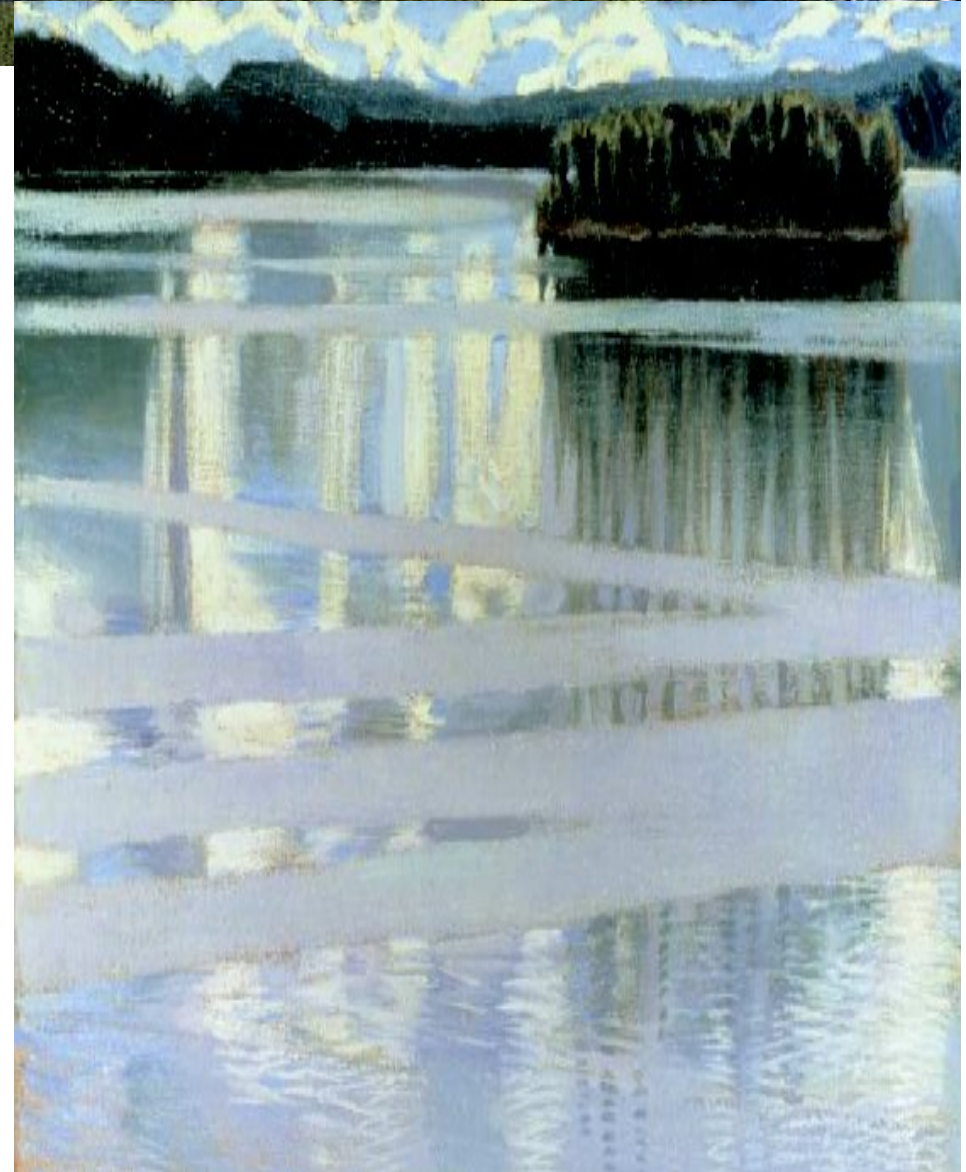
# Examples of data elements and their use in Finland





## Facts about Finland

- Northern European country
- Former colony of Sweden (-1820) and Russia (-1917)
- 5,37 mi inhabitants
- 6,8% foreigners or foreign born
- Population density 15,83 / km<sup>2</sup>
- Birth rate 10,42 / 1000
- GNP /person 35 041 €/y
- Law on Public Health 1974
- Today, 342 communities in charge of public health



# In communities, health centers and well baby clinics

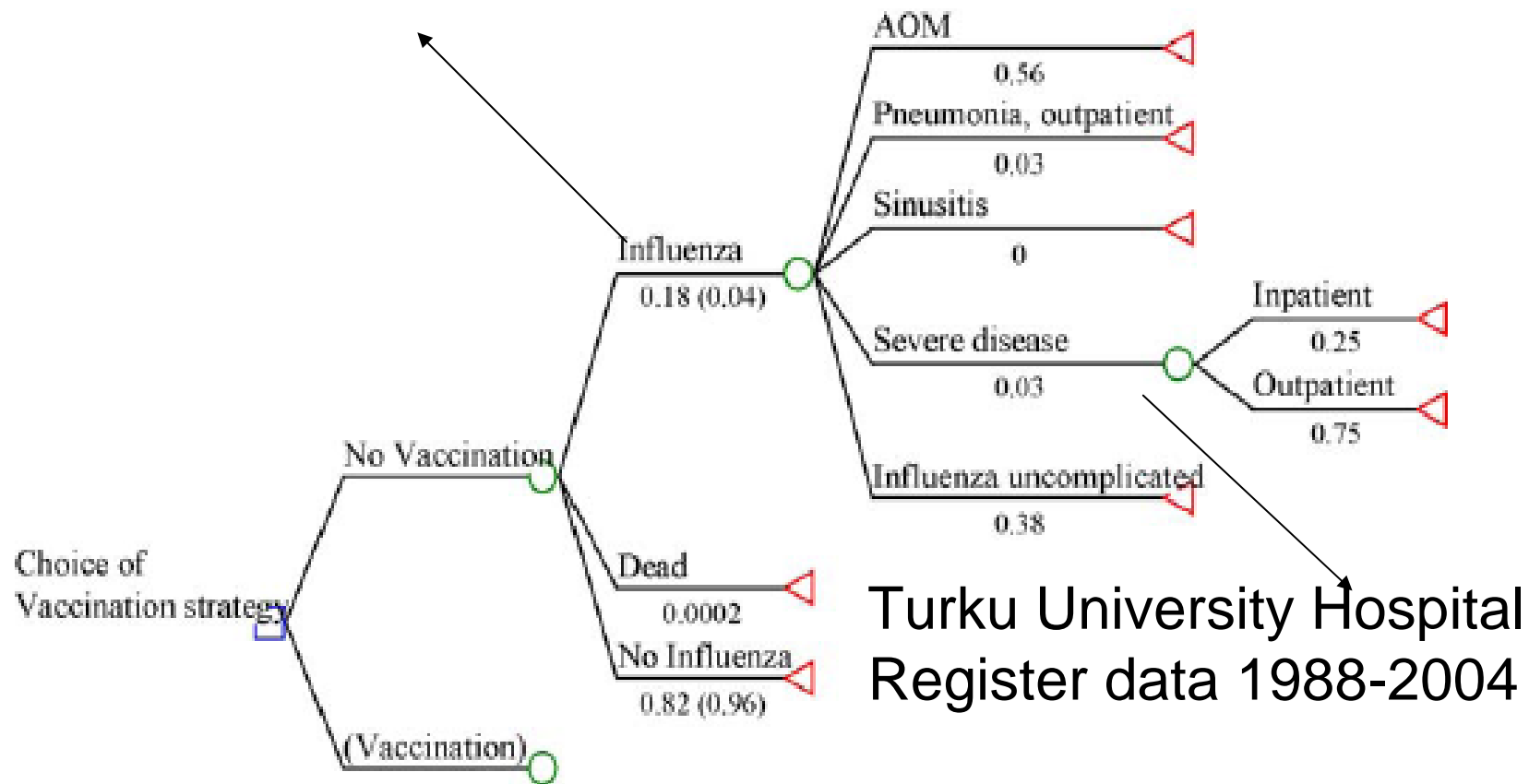
- Public health nurses are in charge of maternity care and well baby clinic vaccinations
- Building trust with dialogue in a well educated population



# Why influenza vaccine to young children ?

# Data elements entered into evaluation

\* 2 cohort studies in Turku (Heikkinen et al 2004)



For costs, national registers, special studies, expert panel

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## Cost-effectiveness of influenza vaccination of healthy children

Heini Salo<sup>a</sup>, Terhi Kilpi<sup>a</sup>, Harri Sintonen<sup>b</sup>, Miika Linna<sup>c</sup>,  
Ville Peltola<sup>d</sup>, Terho Heikkinen<sup>d,\*</sup>

societal perspective. Influenza vaccination resulted in savings in all programs including children  $\leq 13$  years of age from both the health care provider and societal perspective. Investing 1.7 million euros in vaccination of children  $< 5$  years of age yielded savings of 2.7 million euros in health care costs. From the health care provider perspective, the savings per vaccinated child ranged between 5.7 and 12.6 euros in any program including children up to 13 years of age. The vaccination was cost saving in all age groups even with assumed vaccine efficacy of 60%. The results show that influenza vaccination would be cost saving in all children  $\leq 13$  years of age in Finland, which advocates reconsideration of the current influenza vaccine recommendations in all countries.

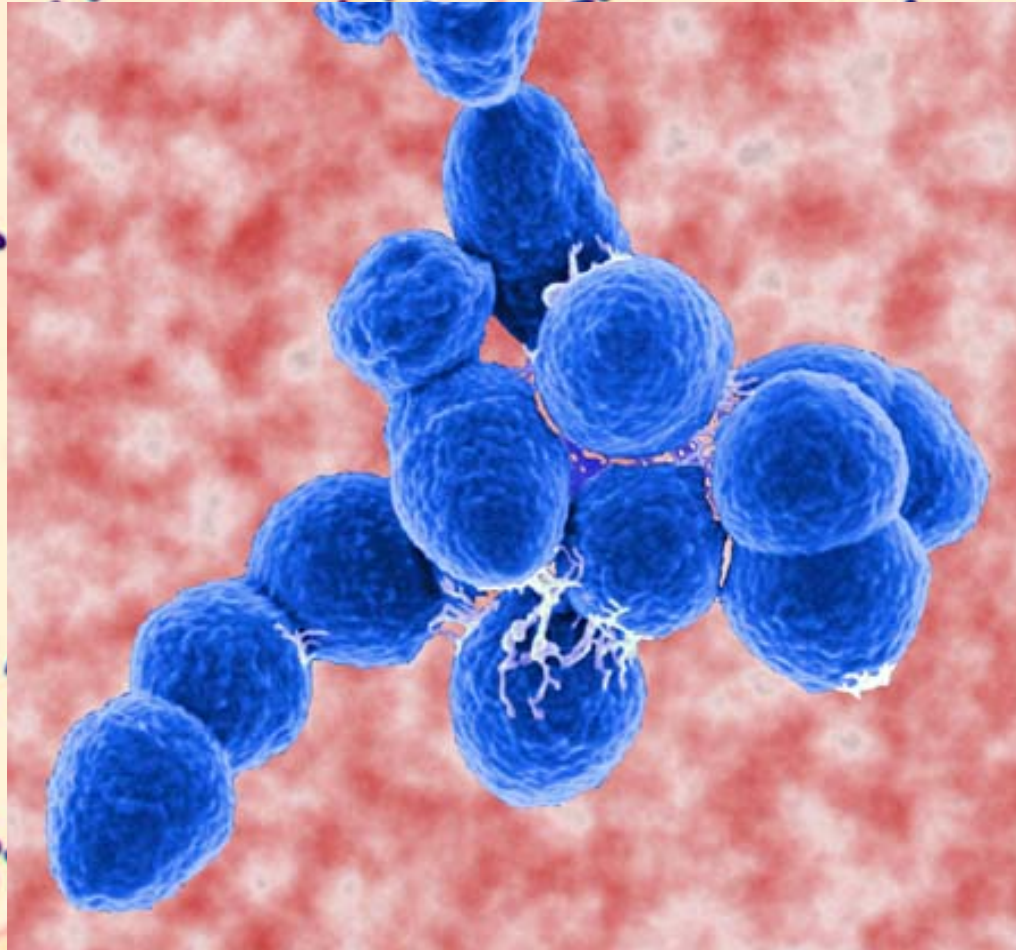


# Criticism from inside and outside

- Why influenza, why not PCV or rota ?
- Main driver of cost was AOM;  
AOM is usually of bacterial origin, could have averted by PCV
- Assumptions on VE too high



# Why pneumococcal vaccine to children ?



# Data elements entered into evaluation

- IPD – National Infectious Disease Register
- Pneumonia – Hospital Discharge Register (ICD10-codes: J13, J15.9, J18.1, J18.8 tai J18.9)
- AOM – national outpatient register (all regardless of etiology); FinOM cohort study (proportion Pnc 0,1-0,3)
- Otologic surgery procedures – National Social Insurance register
- Costs – health care (mean care and complication costs), societal (loss of work days)
- VE – published clinical trials
- Doses needed = 3 +1





# Pnc disease burden in children <5 years

Finland birth cohort 55 000

70	cases of invasive pneumococcal disease
8 000	cases of pneumonia
<b>250 000</b>	<b>episodes of acute otitis media</b>
15 000	otologic surgery procedures
1	death

Cases per year



# PCV efficacy estimates

	%	Source
<b>Invasive disease</b>	89.1	Black et al. 2000
<b>Clinically diagnosed pneumonia</b>	17.7	Black et al. 2002
<b>Clinically diagnosed otitis media</b>	6.0	<b>Eskola et al. 2001</b>
<b>Tympanostomy tube placement and adenotomy</b>	20.3	Black et al. 2000

Duration of vaccine efficacy 5 years



# Pnc disease in children <5 years preventable by universal PCV vaccination

Birth cohort 55 000

Population 5 million

60	cases of invasive pneumococcal disease
1 400	cases of pneumonia
15 000	episodes of acute otitis media
3 000	otologic surgery procedures
0.9	deaths

Cases per year

Salo et al. Scand J Infect Dis 2005;37:821-32

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# In 2000, new pneumococcal conjugate vaccine against pneumococcal diseases

- In 2000, cost effectiveness analysis (CEA) of PCV7 introduction was not favorable
- When only direct vaccine impact was considered with 4 doses of PCV, introduction would have costed 6 mi€.
- PCV was **not introduced** on large scale; a recommendation was made to give it only to medical risk groups

*Scandinavian Journal of Infectious Diseases*, 2005; 37: 821–832



ORIGINAL ARTICLE

## Economic evaluation of pneumococcal conjugate vaccination in Finland

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HEINI SALO<sup>1</sup>, HARRI SINTONEN<sup>2</sup>, J. PEKKA NUORTI<sup>3</sup>, MIIKA LINNA<sup>4</sup>,  
HANNA NOHYNEK<sup>1</sup>, JOUKO VERHO<sup>1</sup> & TERHI KILPI<sup>1</sup>

# What is reasonably cost efficacious ?

# QALY

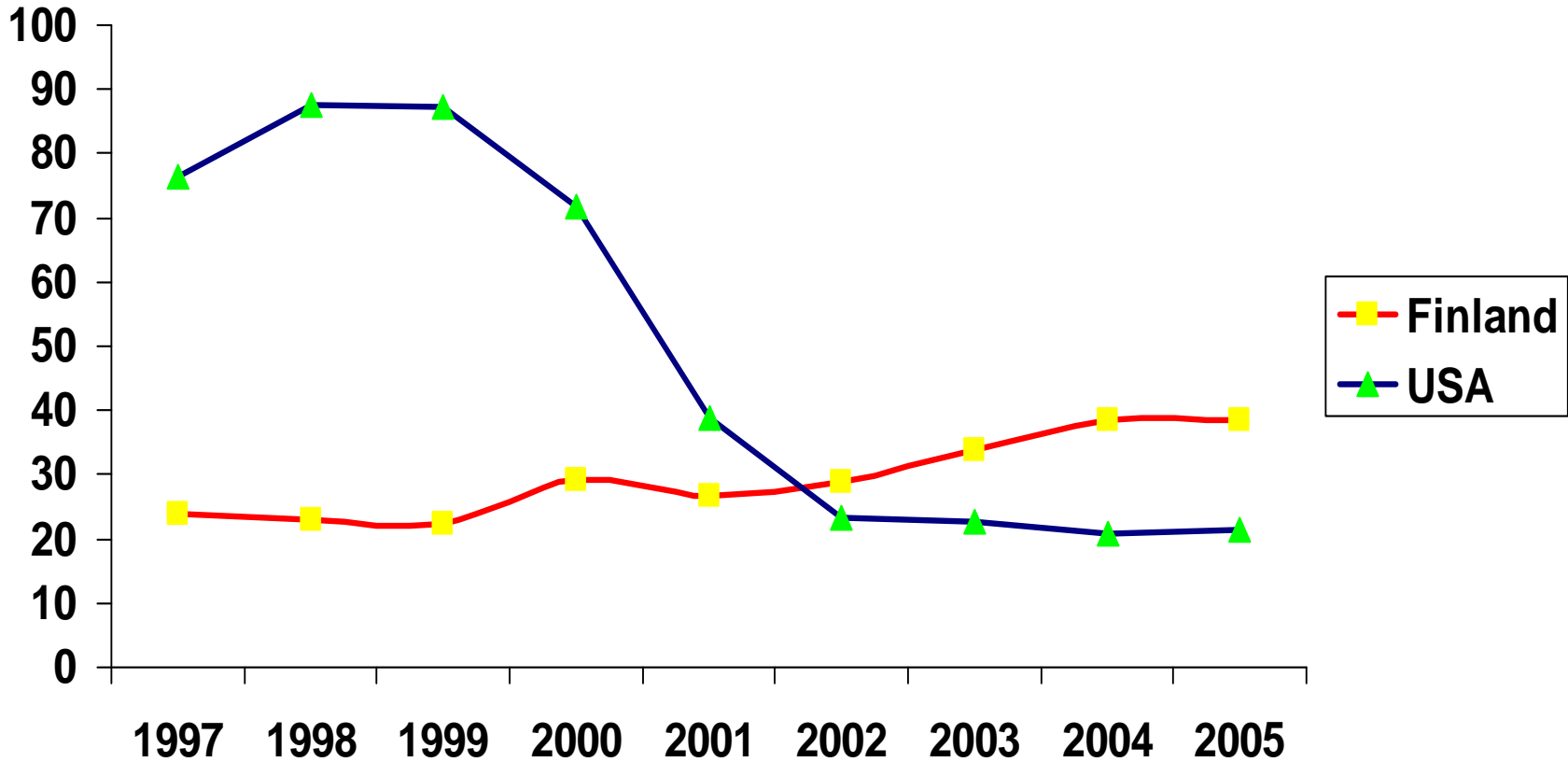


# Criticism from inside and outside

- Finland no longer a model country for NIP development
- Unethical not to introduce PCV
- Too strict in step 4 (CEA) – could have performed sensitivity analysis with preliminary herd impact estimates using carriage reduction as proxy for indirect impact



# Incidence of IPD in <5s



Finland: National Infectious Disease Registry - [www3.ktl.fi/stat/](http://www3.ktl.fi/stat/)

NATIONAL INSTITUTE FOR HEALTH CARE SURVEILLANCE AND CONTROL  
USA: ABC surveillance [www.cdc.gov/ncidod/dbmd/abcs/](http://www.cdc.gov/ncidod/dbmd/abcs/)



# Finland in 2007-8

## Pneumococcal disease burden without PCV

Absolute numbers / year

	AOM *	Pneumonia**		Sepsis	Meningitis	Deaths	
		Primary care	Secondary/ Tertiary care			IPD	Pneumonia** *
<b>&lt; 5 y</b>	<b>251 528</b>	<b>1 268</b>	<b>1 698</b>	<b>97</b>	<b>3.8</b>	<b>1.4</b>	<b>0</b>
<b>5-19 y</b>		<b>2 318</b>	<b>1 326</b>	<b>22</b>	<b>1.4</b>	<b>0.3</b>	<b>0</b>
<b>20-64 y</b>		<b>4 210</b>	<b>5 481</b>	<b>262</b>	<b>13</b>	<b>31</b>	<b>31</b>
<b>65v +</b>		<b>4 860</b>	<b>13 735</b>	<b>283</b>	<b>5</b>	<b>61</b>	<b>94</b>
<b>TOTAL</b>		<b>12 656</b>	<b>22 241</b>	<b>665</b>	<b>23</b>	<b>94</b>	<b>125</b>

\* Includes all AOM regardless of etiology, proportion of Pnc appr 1/10 – 1/3

\*\*ICD10-codes: J13, J15.9, J18.1, J18.8 tai J18.9

\*\*\*ICD10-codes: J13, J18.1

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Salo et al 2008

/www.ktl.fi/attachments/suomi/osastot/  
roko/roto/pneumokokkirokoheen\_  
kustannusvaikuttavuus.pdf





# Recalculation of cost effectiveness of PCV

- In 2008, assumptions made
  - direct impact
  - indirect impact (herd immunity, conservative estimate = half of impact seen in the U.S.)
  - total 3 doses
- Based on the favourable CEA<sup>3</sup>, Finland decided to include PCV into its NIP starting from 9/2010 and using the Nordic 2+1 schedule
- After an open tender, PCV10 was selected



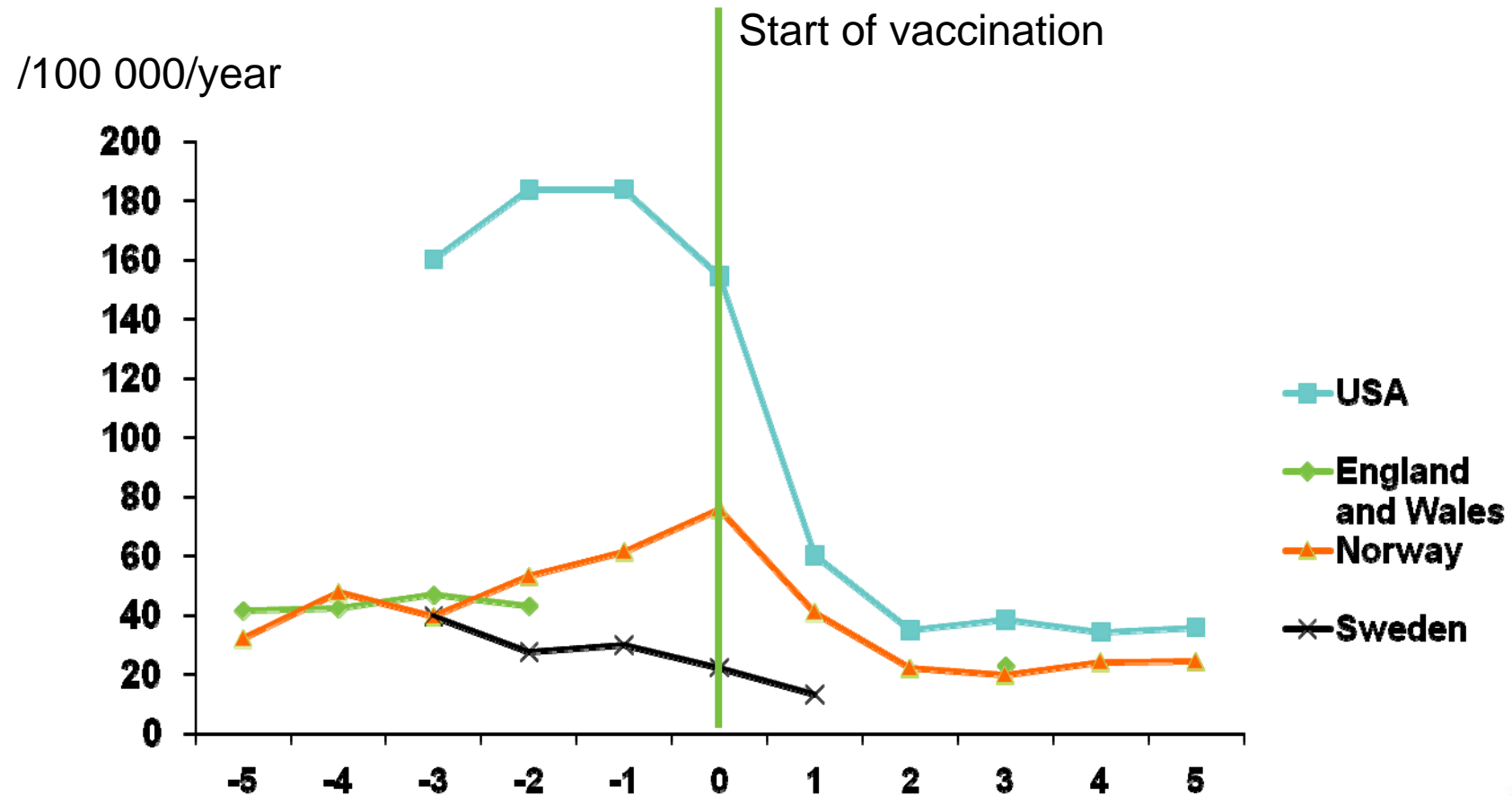


## Kansanterveyslaitoksen asettaman lasten pneumokokkrokotus- työryhmän selvitys

[www.thl.fi](http://www.thl.fi)



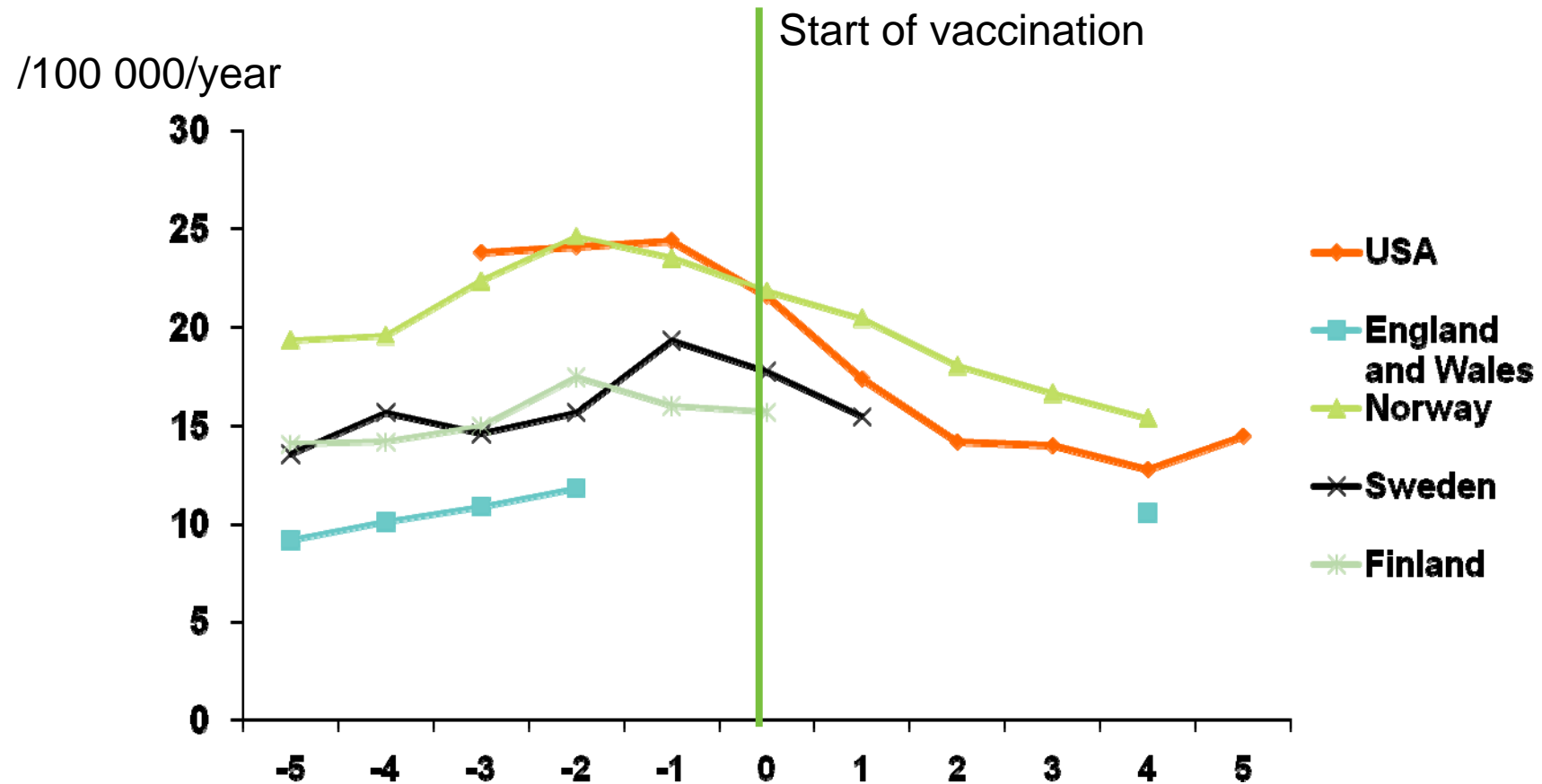
# IPD in infants <2 yrs\* before and after introduction of PCV7



\* <1 year in Norway



# IPD in the whole population before and after introduction of PCV7



<http://www.cdc.gov/abcs/index.htm>  
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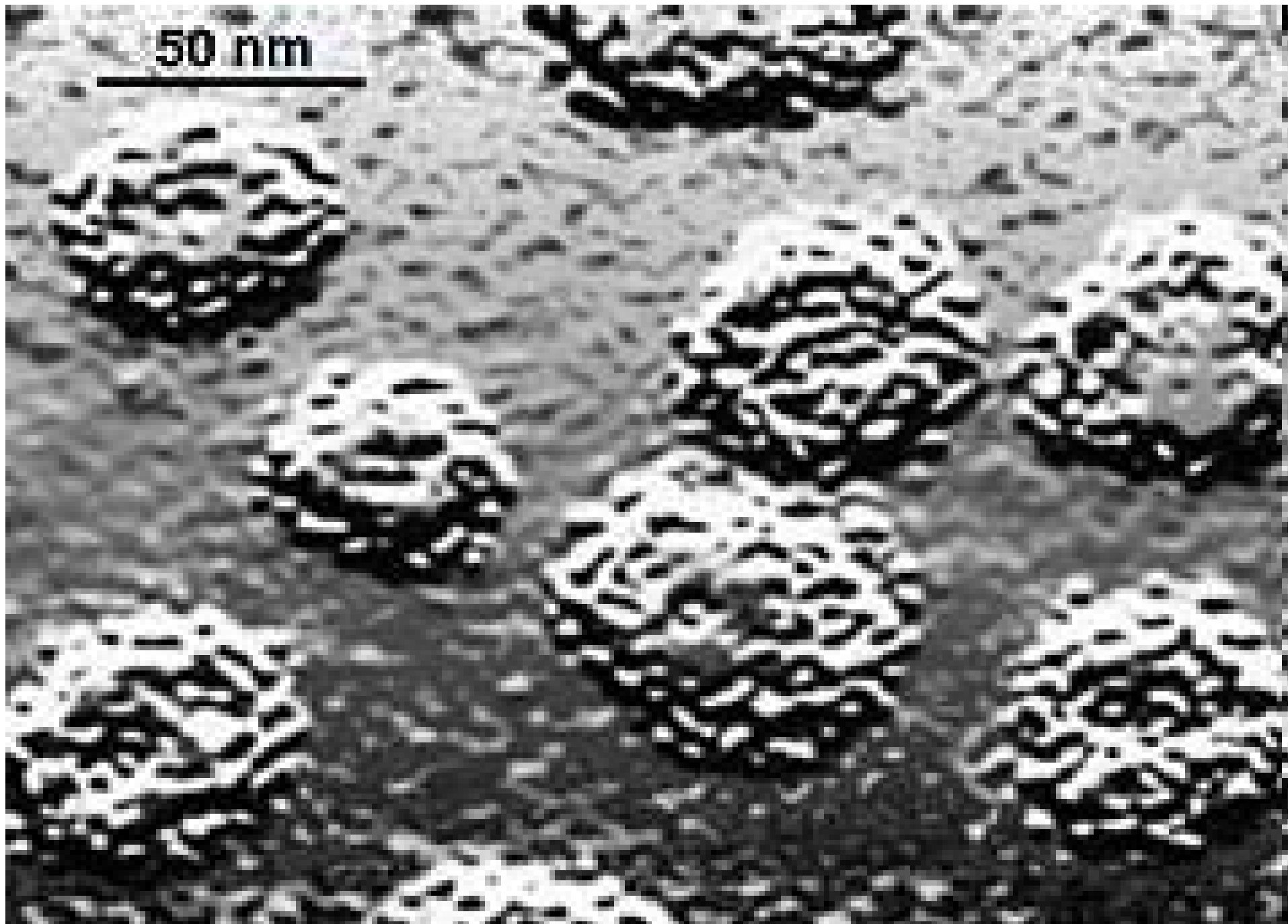


# Vaccine vs. medical costs

In 2005 the State of Finland paid appr

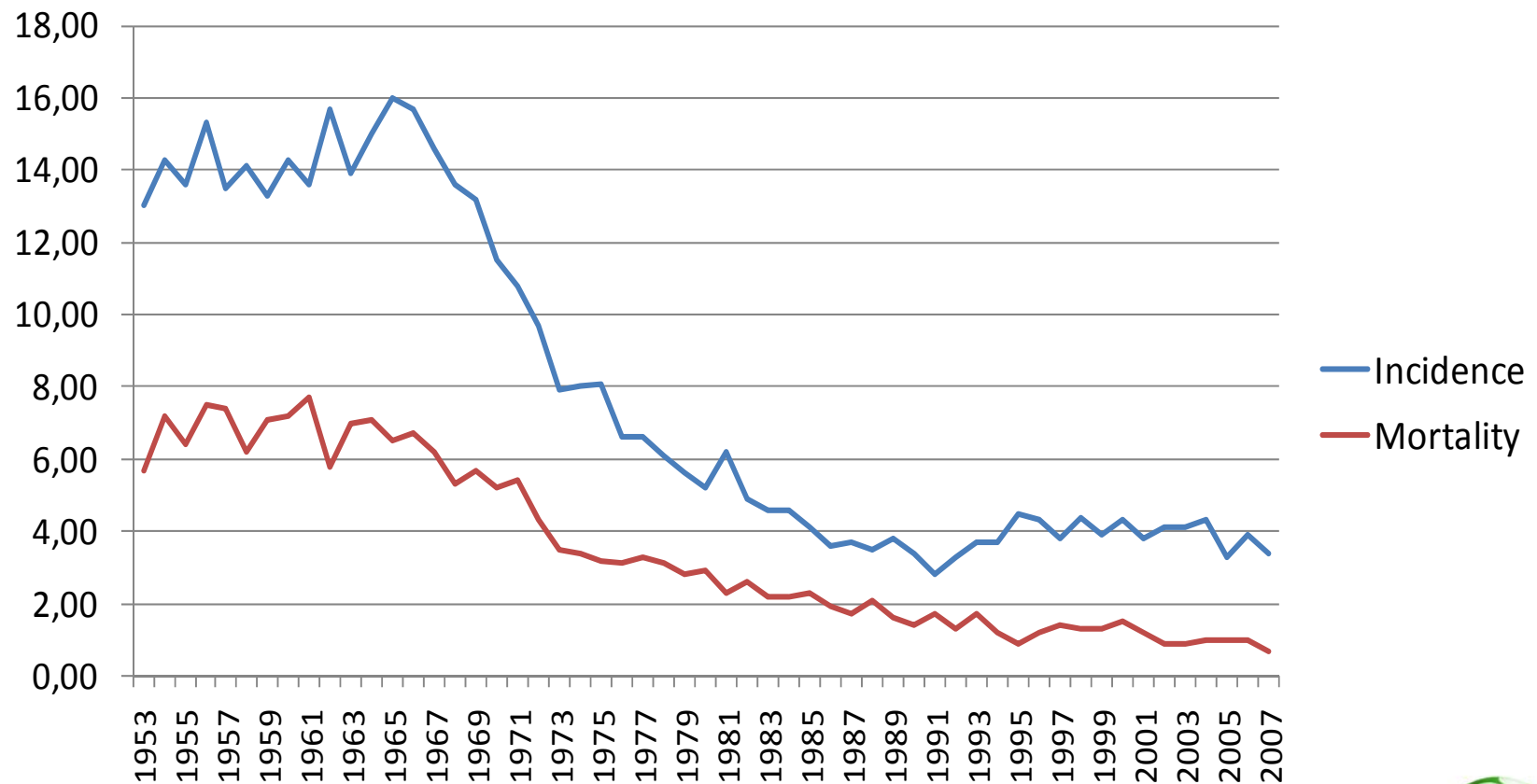
- 200 € for vaccines per each Finnish child up to his/her 18 yrs of age
- 95 - 164 € for hyperlipidemia medications (statins) alone / year to each of the 9% of Finns with the diagnostic criteria set
- **Need to step out of the immunization box; time to change paradigm and have a more holistic, system approach !**





# Should HPV be introduced into NIP? Cervical cancer in Finland 1953-2007

/ 100 000 (world standard population)

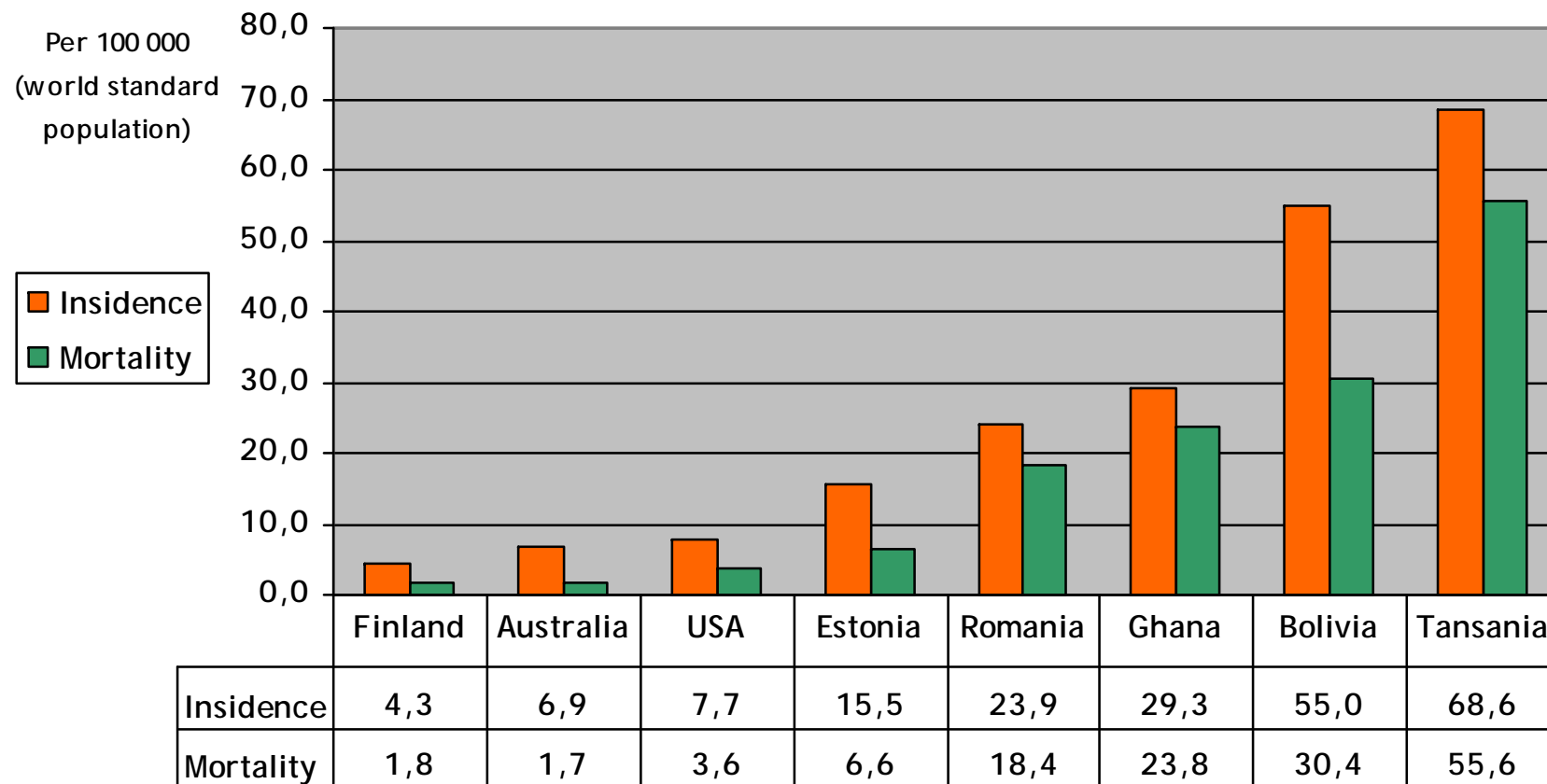


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year

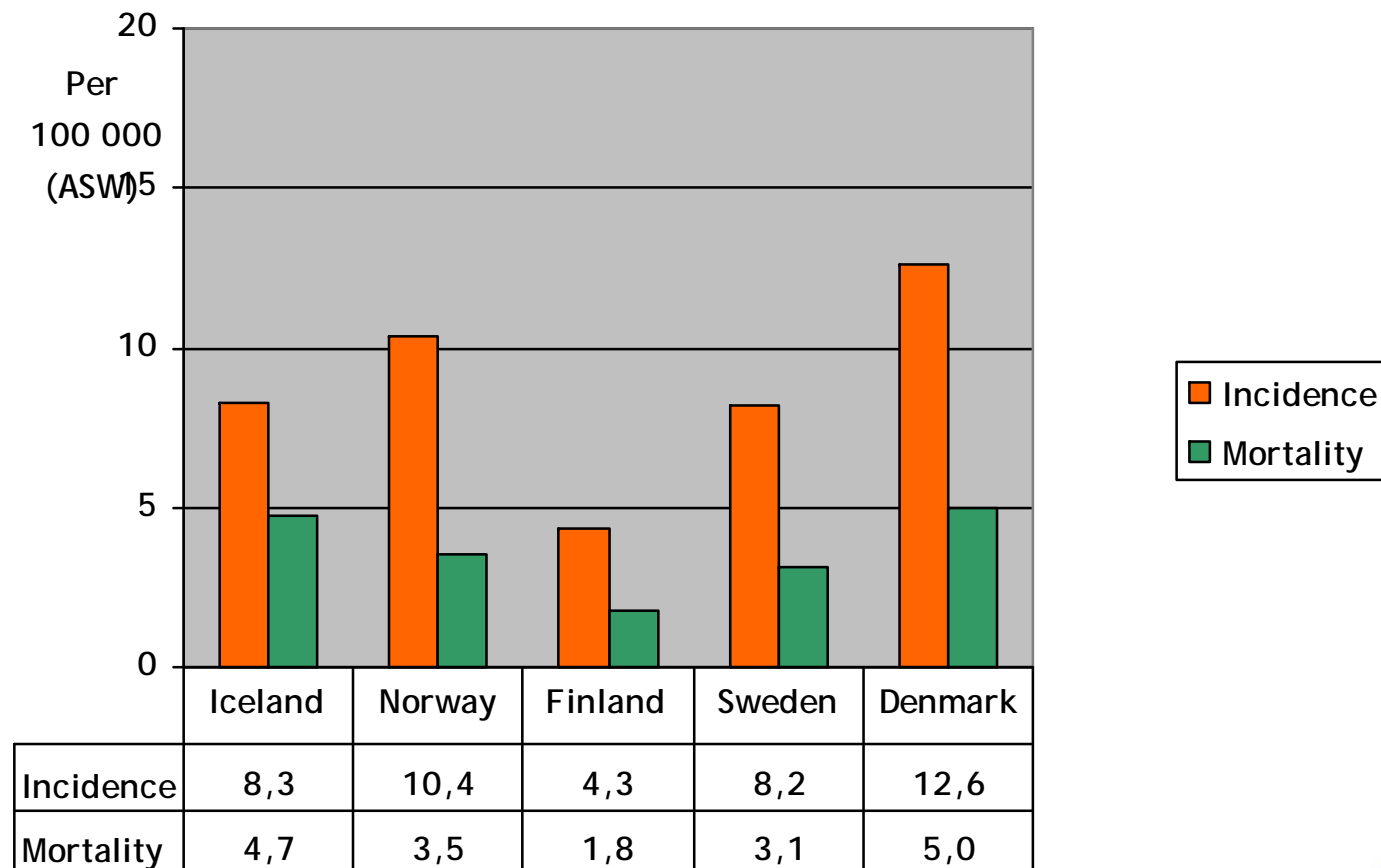


# World statistics

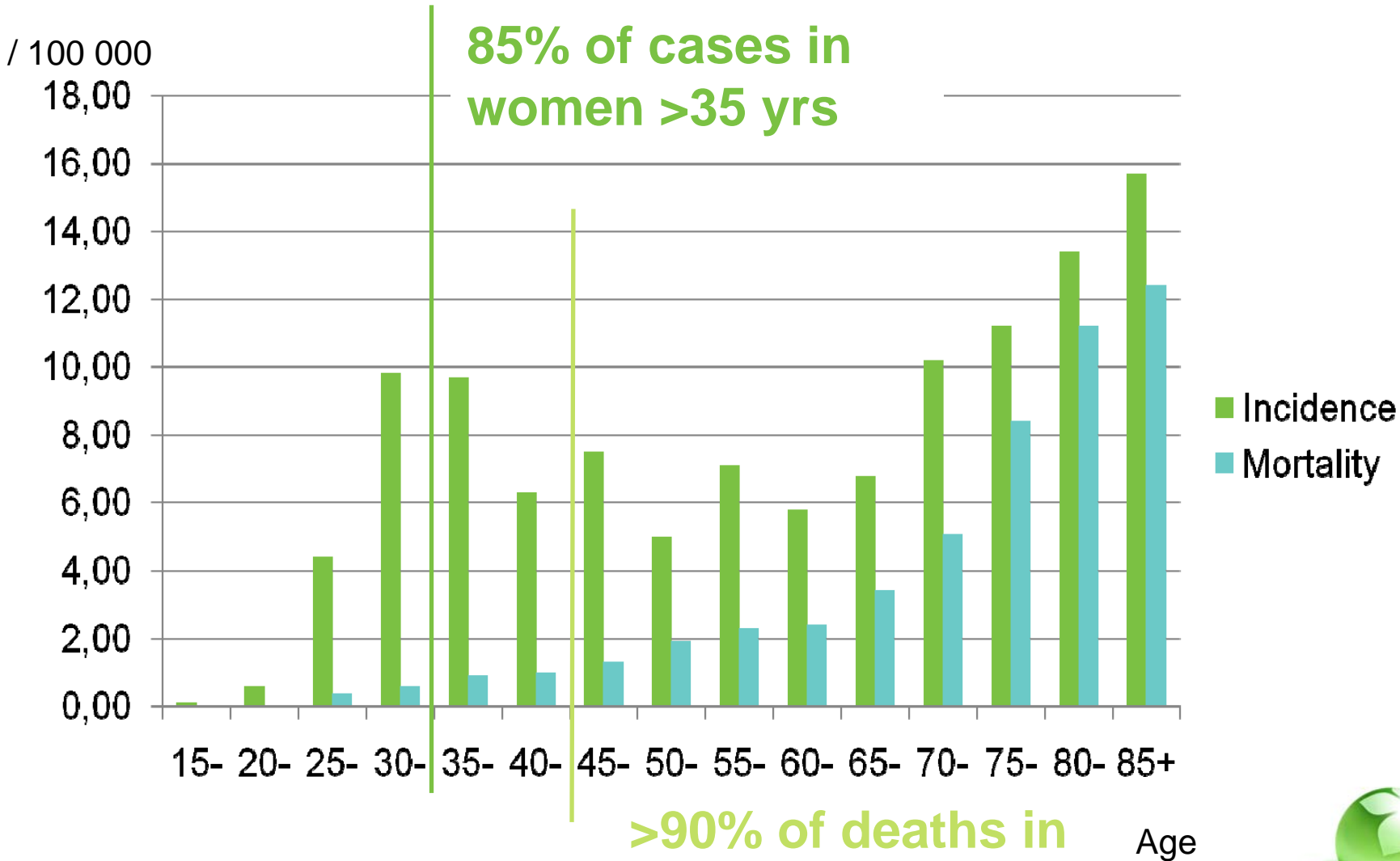




# Cervical Cancer in the Nordic Countries



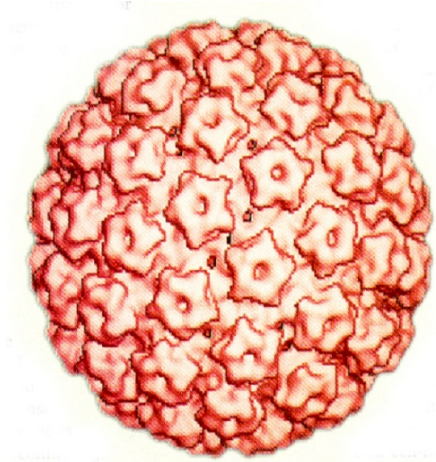
# Cervical cancer by agegroup in Finland 2001-2007



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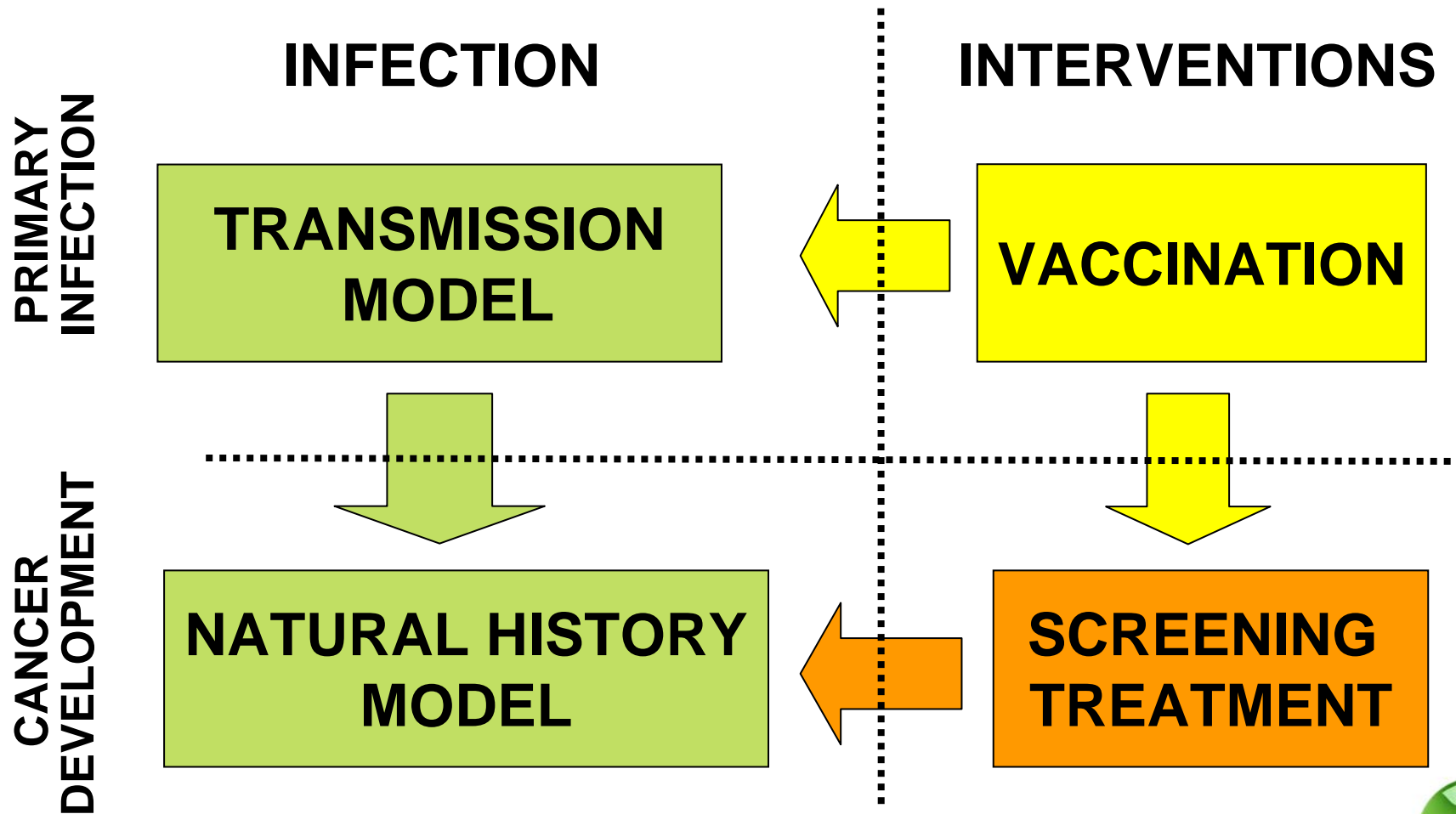
# Finnish approach: Expert group on control of HPV disease



- Assignment
  - To give a recommendation on the best measures needed to further reduce cervical cancer and the overall disease burden caused by HPV
- Started in June 2008
- Final report published 30 April 2011



# Model structure



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## HPV burden of disease register data sets

### Finnish Cancer Registry

(1980 – 2008)

- Cancer cases: cervical (C53), vaginal (C52) and vulval (C51)
- Other HPV related cancer cases

### The Finnish Care Register,

HILMO (1997 – 2008)

- Hospital stays, hospital outpatient visits
- **Finnish Cancer Registry id no (C51-53 cancer cases)**
- ICD10 and Procedure codes

### HUSLAB (1996 – 2008)

- HUS\* laboratories
- Pap tests in HUS area (primary and secondary health care)

\* Hospital District of Helsinki and Uusimaa

### Mass Screening Registry (1990-2008)

- Organised cervical cancer screening tests
- Referrals for further examinations

### Social Insurance Institution, SII (1997-2008)

- **Reimbursement register for medical and pharmaceutical expenses**
  - Opportunistic screening and procedures (private providers)
  - Medicine expenses of GW (podophyllotoxin, imiquimod)

### Finnish Student Health Service Register, FSHS (2000 – 2009)

- Pap tests and procedures

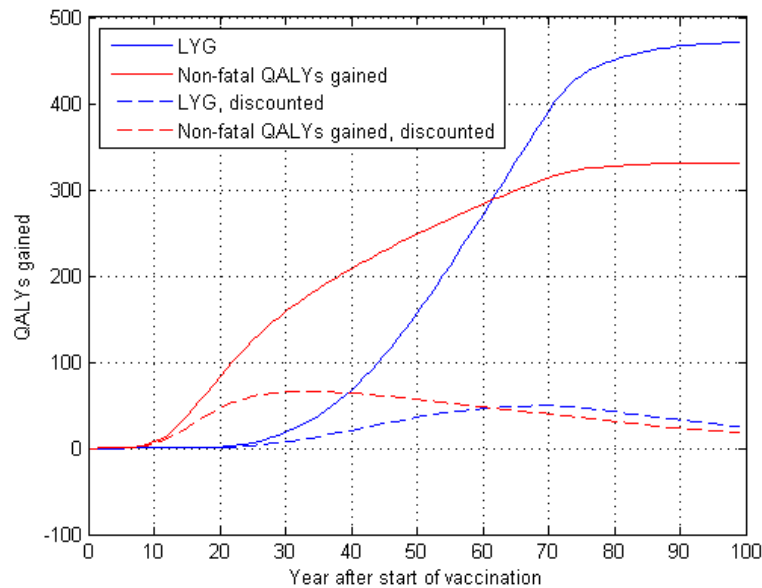
### Turku primary health care (2000 – 2009)

- Pap tests and procedures

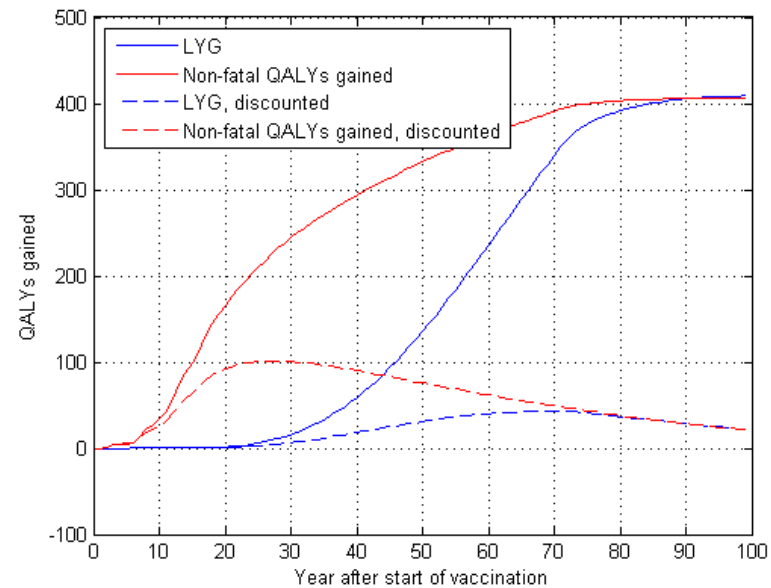
All data is linked by the personal identification number!



# Estimated undiscounted and discounted QALYs and life-years gained (LYG) over time following the introduction of HPV vaccination (at year 0)



Cervarix

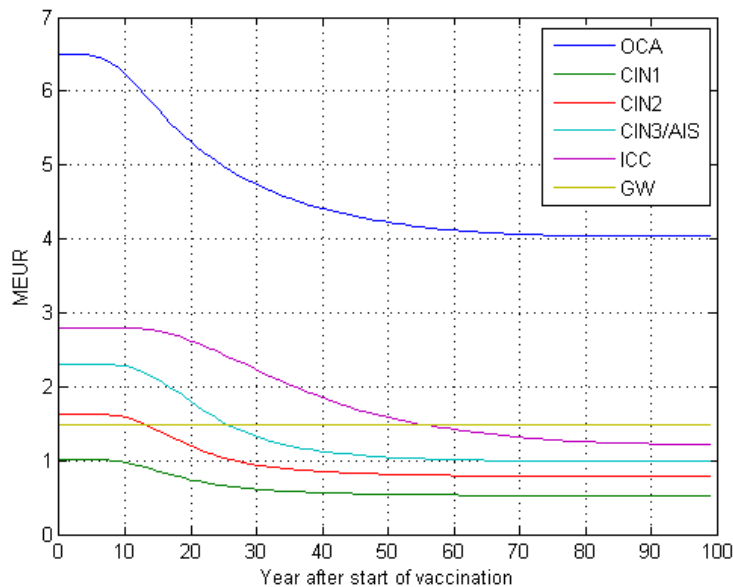


Gardasil

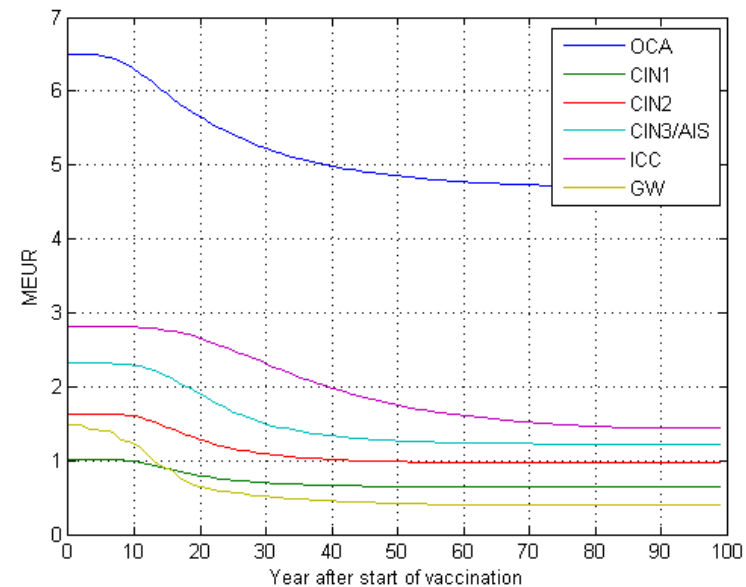


# Undiscounted costs by HPV vaccination in base case programme over time following the introduction of HPV vaccination (at year 0)

Base case programme (girls aged 12 years, no catch-up programme, 80% vaccine coverage, 100 year time horizon, and 3 % discount rate ) assuming vaccine protection lasts an average of 20 years



Cervarix



Gardasil



## NACV recommendation

- HPV to girls is very cost-effective, introduce at 12-13 yr school based
- HPV is even cost saving if total cost/person <125 €
- Screening to start at 25 years
  - 25-34 yrs Papa test
  - ≥ 35 yrs HPV test
- Exit test at 65 yrs
- If found HPV+, exit test at 85 yrs



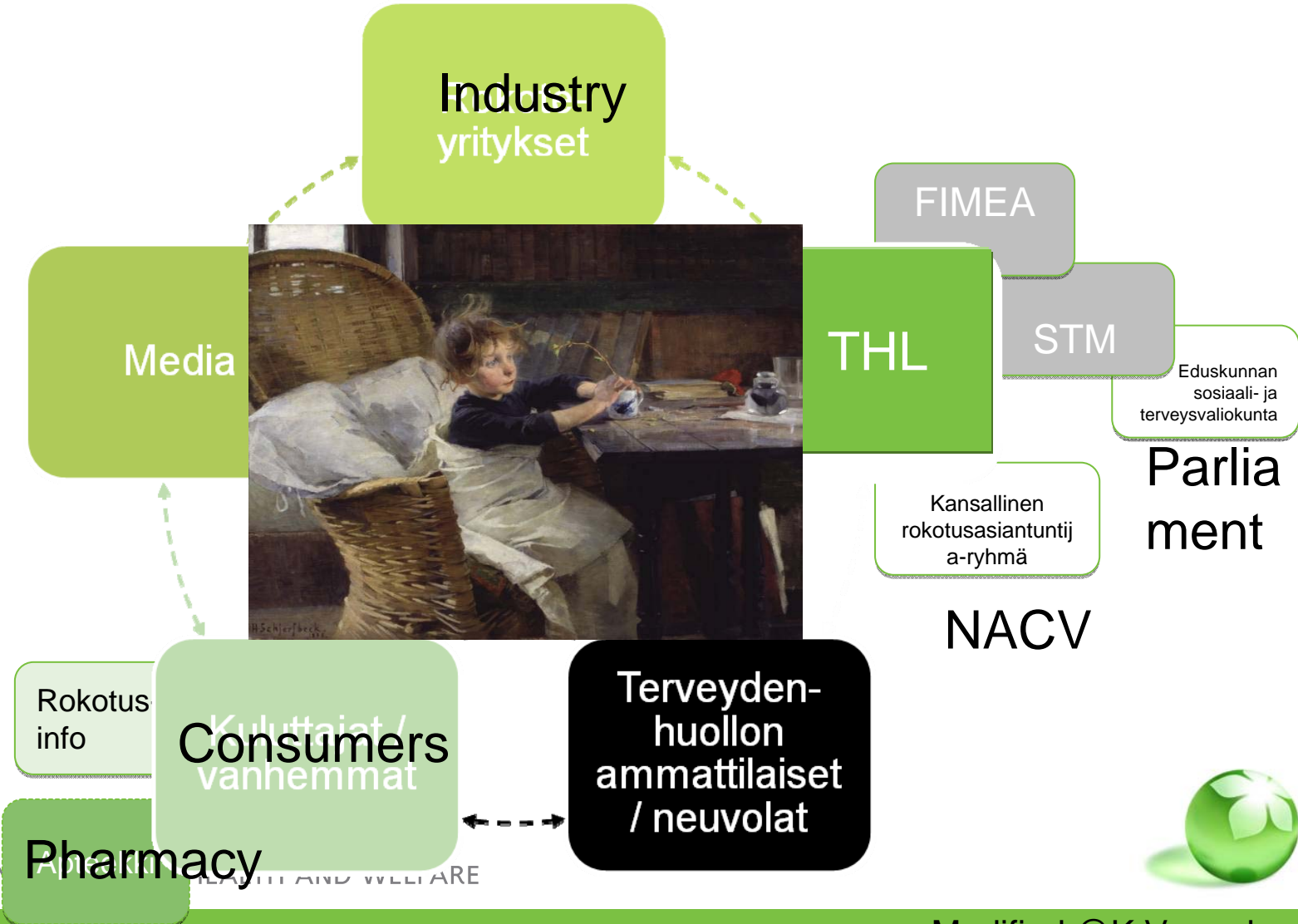


## In summary

- Universal introduction only when sufficient data and/or reliable assumptions available
- Build decision making on long term prevention strategy -> use of register based research for programme design and evaluation
- Challenge: how to keep all stakeholders of NIP informed and part of the process



# Ownership of National Vaccination Programme



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