



**Biomedical and clinical research output:  
comparative analysis  
Europe/Flanders & USA**

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# Health (Care)

= top priority for most people

= expensive ( $\approx 8-18\%$  GDP)

= growth of costs  $\gg$  growth GDP

= research = driving factor for further improvement of care  
for optimal use of health care €/€

# Health care expenditure pp per year (2009)

EMRC memorandum to MEPs nov 2012 – march 2013

	EU25	USA
€ per person / per year for global health care (purchase power equivalent in €)	2.730	6.400
€ spend for alcohol and tobacco	~ 800	n/a

# Health care and public research expenditure pp per year (2009)

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2009 Public research expenditure pp pyr (€) data from EMRC- courtesy of M Stolpe (University of Kiel -Germany)	42	143

# Health care and public research expenditure pp per year

(2009 and 2012)

	EU	USA
€ per person / per year for global health care (purchase power equivalent in €)	2.730	6.400
€ spend for alcohol and tobacco	~ 800	n/a
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Chakma et al NEJM 2014 ( 2012 – in \$)	53 \$	154 \$

# Public input for (bio) medical research

Comparison 2012 (all in US \$\$ per capita) (Chakma et al NEJM 2014 Jan):

Australia	203
<b>US</b>	<b>154</b>
Canada	94
Japan	75
<b>EU</b>	<b>53</b>
China	1.5

# **Biomedical and clinical research output: comparative analysis Europe/Flanders & USA**

## **1. Comparison of all types of biomedical research**

### 2. Comparison of clinical research as published in

- top 5 journals
- top 18 journals

# Medical research: comparative analysis of output Europe/Flanders & USA and the World

Source of data:

Bibliometric data from

Wolfgang Glänzel, Bart Thijs and Koen Debackere

Centre for R&D Monitoring and Dept. MSI, KU Leuven (Belgium)

Data sourced from Thomson Reuters' Web of Science'

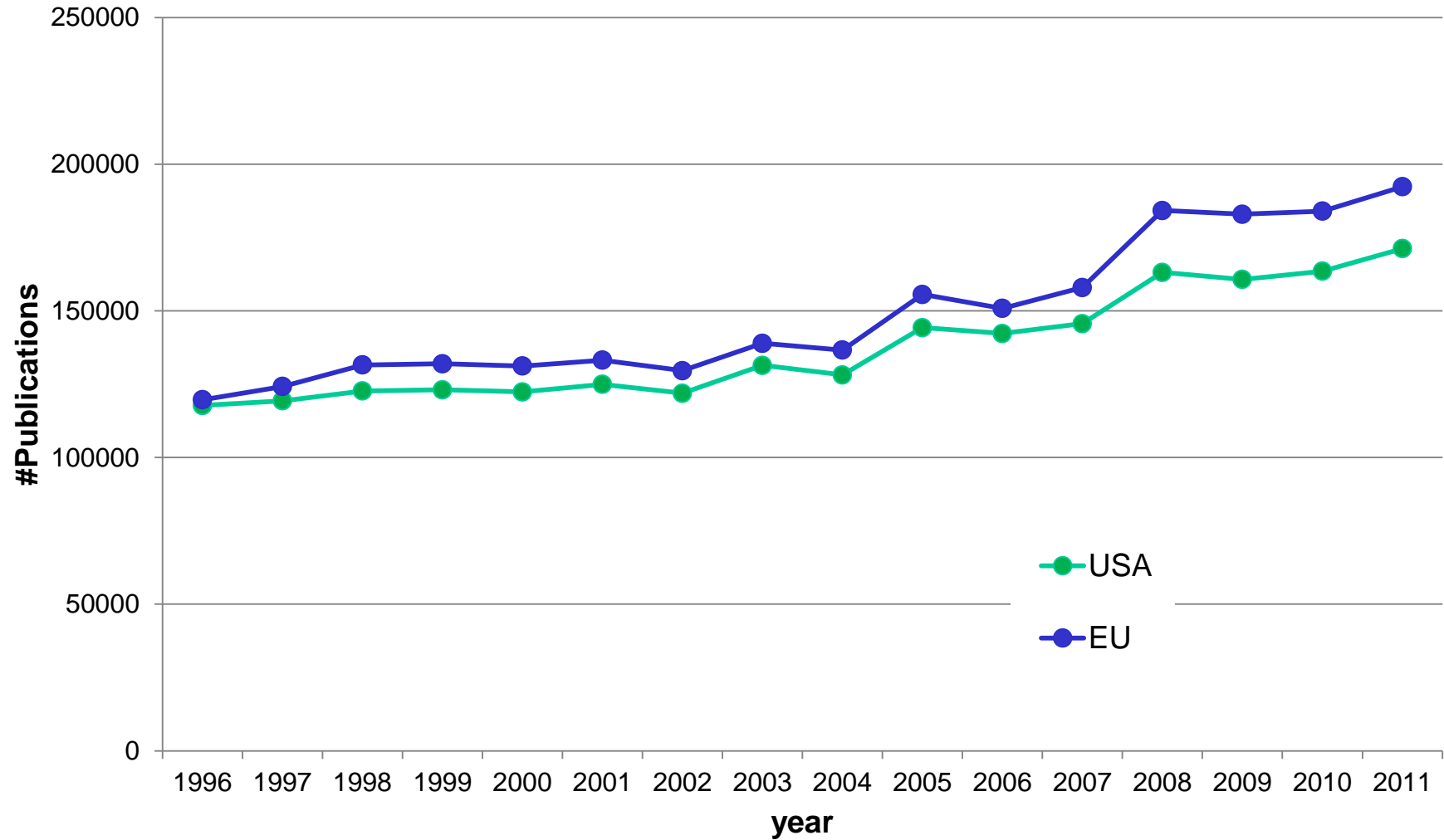
citations refer to 3 yr window after publication

Ms with USA + EU co-authors = counted for both regions

EU = EU 25 data



# Biomedical research outcome US-EU



# Biomedical Publication counts 1996-2011

publications per capita x 10<sup>6</sup>

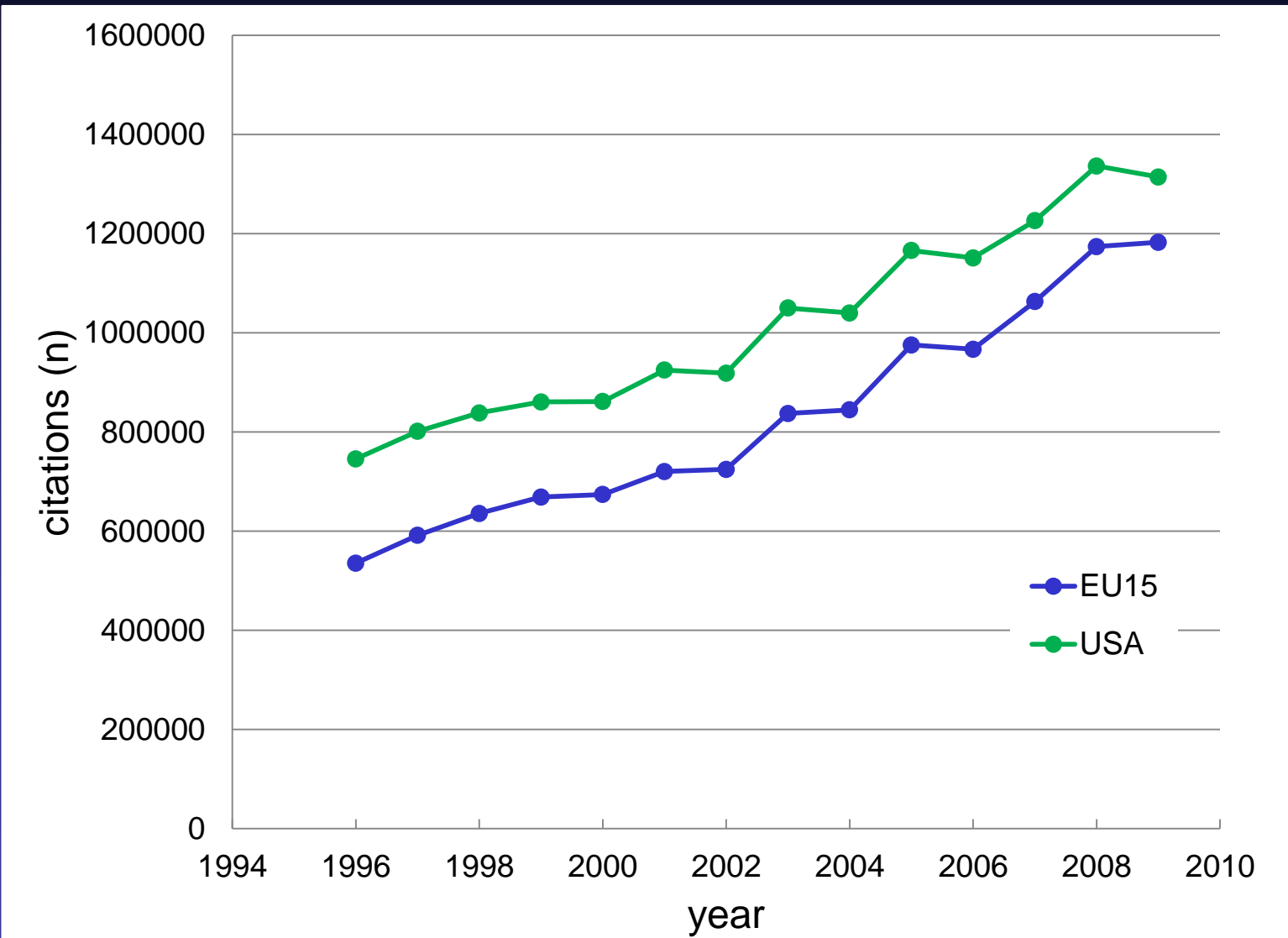
	1996	2005	2011
USA	392	481	570
EU	342	346	384

# Biomedical Publications counts 1996-2011

publications per capita x 10<sup>6</sup>

	1996	2005	2011
USA	392	481	570
EU	342	346	384
Flanders	529	730	1310

# Biomedical research outcome US-EU: citations



# Biomedical research outcome US-EU: citations

citations per capita x 10<sup>6</sup>

	1996	2005	2009
USA	2483	3883	4380
EU	1528	1950	2365

# Biomedical research outcome US-EU: citations

citations per capita x 10<sup>6</sup>

	1996	2005	2009
USA	2483	3883	4380
EU	1528	1950	2365
Flanders	2458	5809	8331

# (Sub) conclusion (1): Biomedical Research Output

## EU versus USA

1. EU output in **publication** number exceeds that of the USA since 1996
2. **Per capita output is higher in USA than in EU**  
( 570 versus 384 publications per  $10^6$  citizens)
3. EU output calculated as **citations** is about 50% of the USA (per capita)
4. USA + EU output in publication and citations = > 70 or 80 % of **world output**  
versus about 11 % world population

# **Biomedical and clinical research output: comparative analysis Europe/Flanders & USA**

1. Comparison of all types of biomedical research

**2. Comparison of clinical research as  
published in**

- **top 5 journals**

- top 18 journals



# **Biomedical and clinical research output: comparative analysis Europe/Flanders & USA**

1. Comparison of all types of biomedical research
2. **Comparison of clinical research as published in**
  - **top 5 journals**
    - NEJM
    - Lancet
    - JAMA
    - Ann Intern Med
    - Nature Medicine

# Clinical Publications counts 2003-2012 in top 5 journals\*

\* NEJM- Lancet-JAMA- Ann Intern Med- Nature Medicine

publications per capita x 10<sup>6</sup>

	2003-06	2007-12
USA	29	25
EU	12	12

# Clinical Publications counts 2003-2012 in top 5 journals\*

\* NEJM- Lancet-JAMA- Ann Intern Med- Nature Medicine

publications per capita x 10<sup>6</sup>

	2003-06	2007-12
USA	29	25
EU 27	12	12
Flanders	35	44

# Clinical Publications counts 2003-2012 in top 5 journals\*

\* NEJM- Lancet-JAMA- Ann Intern Med- Nature Medicine

citations per capita x 10<sup>6</sup>

	2003-06	2007-12
USA	674	728
EU	280	356

# Clinical Publications counts 2003-2012 in top 5 journals\*

\* NEJM- Lancet-JAMA- Ann Intern Med- Nature Medicine

citations per capita x 10<sup>6</sup>

	2003-06	2007-12
USA	674	728
EU	280	356
Flanders	2134	2604

# Lancet-Clinical research output 2003-2012 in top 5 journals

## ature Medicine

Citations per biomedical publication (MOCR) and RCR\*

	2003-06	2007-10	RCR 2003-10
USA	23	29	1.18
EU	24	32	1.27

\*MOCR = mean observed citation rate, uncorrected for journals or subfields

RCR= MOCR/MECR= **ratio of observed versus expected citation rate (corrected for journals).**

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# Lancet-Clinical research output 2003-2012 in top 5 journals in Nature Medicine

Citations per biomedical publication (MOCR) and RCR\*

	2003-06	2007-10	RCR 2003-10
USA	23	29	1.18
EU	24	32	1.27
<b>Flanders</b>	<b>59</b>	<b>59</b>	<b>2.37</b>

\*MOCR = mean observed citation rate, uncorrected for journals or subfields

RCR= MOCR/MECR= **ratio of observed versus expected citation rate (corrected for journals).**

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# **Biomedical and clinical research output: comparative analysis Europe/Flanders & USA**

1. Comparison of all types of biomedical research
2. **Comparison of clinical research as published in**
  - top 5 journals
  - **top 18 journals**



# 18 top clinical journals

1. NEJM
2. Lancet
3. JAMA
4. Ann Intern Med
5. Nature Medicine
6. Circulation
7. European heart journal &
8. J am coll cardiology
9. Gastroenterology
10. Am j resp crit care
11. Archives of internal medicine
12. Leukemia
13. Blood
14. Ann rheum dis
15. Diabetes
16. Journal of clinical endocrinology and metabolism
17. J am soc nephrology
18. Cancer research

# Clinical Publications counts 2003-2012 in 18 top journals

publications per capita x  $10^6$

	2003-06	2007-12
USA	86	78
EU	43	39

# Clinical Publications counts 2003-2012 in 18 top journals

publications per capita x 10<sup>6</sup>

	2003-06	2007-12
USA	86	78
EU	43	39
Flanders	134	142

# Clinical Publications counts 2003-2012 in 18 top journals

citations per capita x  $10^6$

	2003-06	2007-12
USA	1587	1640
EU	733	819

# Clinical Publications counts 2003-2012 in 18 top journals

citations per capita x 10<sup>6</sup>

	2003-06	2007-12
USA	1587	1640
EU	733	819
Flanders	3800	4798

# conclusion (2): clinical Research Output

EU versus USA (per capita)

Top 5

Top 18 Journals

Number of publications:  $US = 2 \times EU$

Number of citations:  $US = 2 \times EU$

Number of citations per publication  
(surrogate for visibility) :  $US = EU$

# conclusion (3): clinical Research Output

EU versus USA (per capita)

Top 5

Top 18 Journals

Number of publications:  $US = 2 \times EU$

Number of citations:  $US = 2 \times EU$

Number of citations per publication:  $US = EU$

**Two to three fold higher public \$\$ investments in biomedical research in US generates two fold higher output in comparison with EU**

# conclusion (4): clinical Research Output

## Flanders versus EU or USA

### Top 5

### Top 18 Journals

A small country (Flanders) generates per capita:

Publication in top 5 or top 18 clinical journals  
x 3-4 versus EU

Citations to top 5 or top 18 clinical journals  
x 3-5 versus EU

**But:**

piggy back phenomenon ?

True comparison: Flanders versus Boston Area, London Area, or California.....



# Biomedical and clinical research output

## EU versus US

### General conclusions:

**1. USA: higher spending (per capita) for research and especially biomedical research than EU**

**2. USA generates a higher output\* per capita than EU:**

**for all types of biomedical research :**

**USA = 1.5- 2 x EU for**

**for clinical research in top 5 or top 28 journals:**

**USA = 2 x EU**

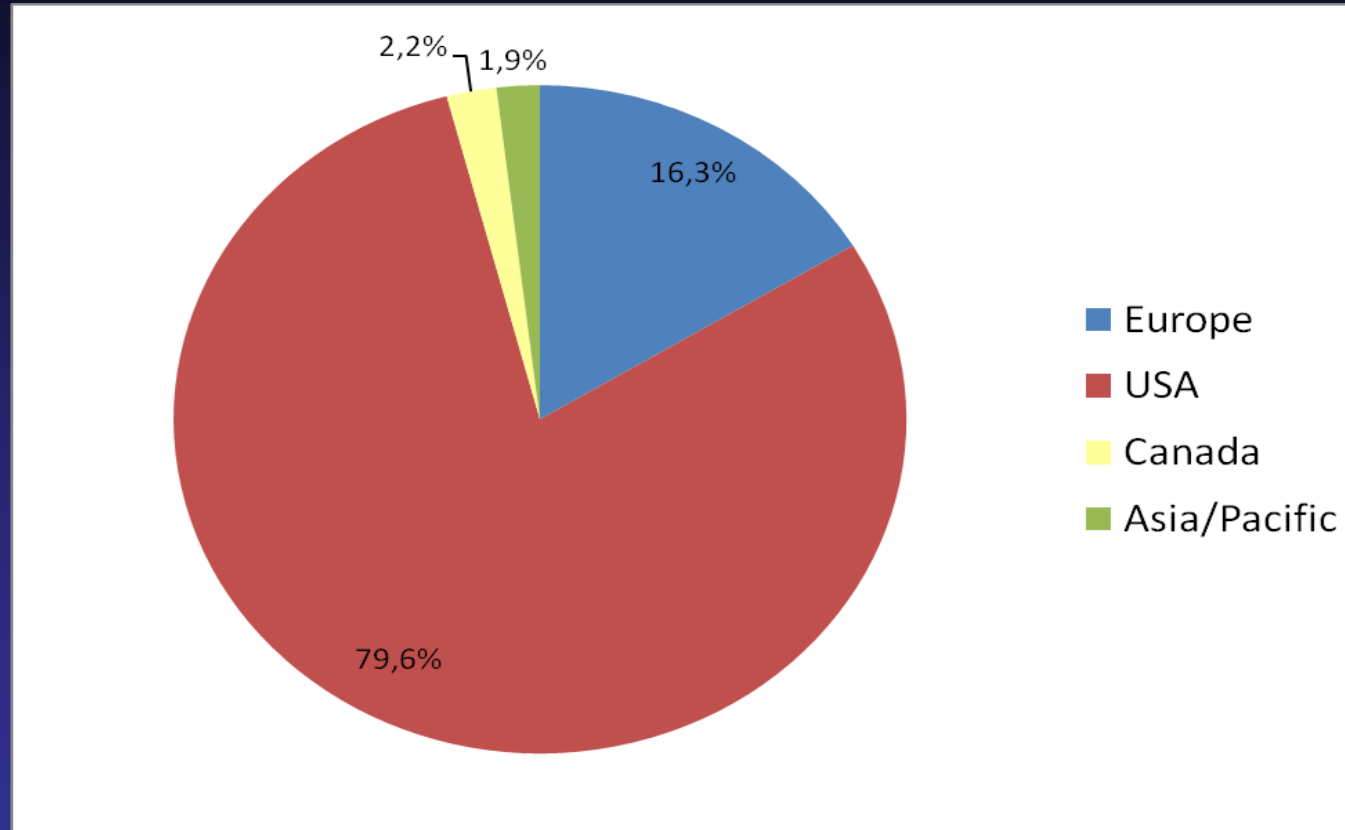
**\*Publication and citation output pp**

# Industrial return

Elpia data 2011 and Chakma et al NEJM 2014

	EU25	USA
R&D Investment by pharma (2011 estimate) (with Switzerland)	22.8 bn € (27.8 )	38.5 bn \$
Chakma et al 2014 (broader definition of fields)	53 bn \$	70 bn \$

# Share of global biotechnology R&D expenses, public companies (2008)



Data source: EFPIA report, 2010 Edition. Source: Ernst & Young, 'Beyond Borders, Global Biotechnology Report 2009'  
(data relate only to publicly traded companies)

# Biomedical and clinical research output

## Questions

### 1. EU investments and output in biomedical and clinical research

Can we match US figures?

If so: what is best strategy:

How to bring this on the policy agenda?

national or EU level?

### 2. Biomedical and clinical research in Flanders

How to explain relative success ratio of the recent past?

How to cope with perceived risks for clinical scientists and clinical research?

# Biomedical and clinical research output

## Questions

1. How to improve clinical research ? ( world - EU – USA – (Flanders) ?

---- more EU or EU national public investments ??

If so: what is best strategy?

---- private investments in health research (first decrease ever in 2012!!)

2. Biomedical and clinical research in Flanders

How to explain relative success ratio of the recent past?

How to cope with perceived (and real!) risks for clinical scientists and clinical research?

# Biomedical and clinical research

1. Public investments in biomedical and clinical research are low in comparison with health care expenditure
2. USA is outperforming EU in global biomedical and clinical research investments and output
3. This has implications
  1. for scientists and clinicians-scientists
  2. for progress in knowledge
  3. For optimal health care
  4. For optimal spending of health care \$/€
  5. For private investments in health (pharma/biotech companies/medical devices)