Precision Medicine.
A Health Economic perspective

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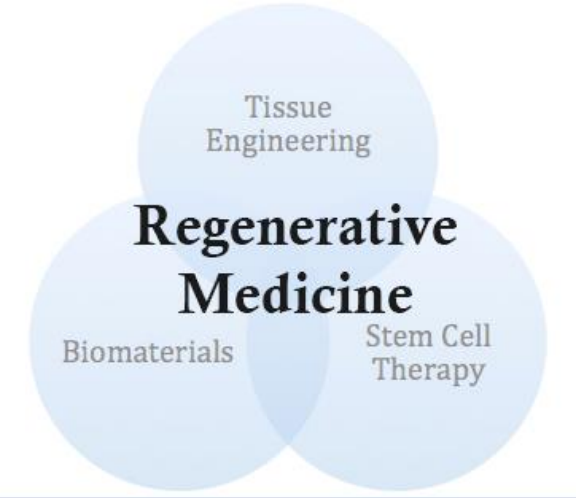
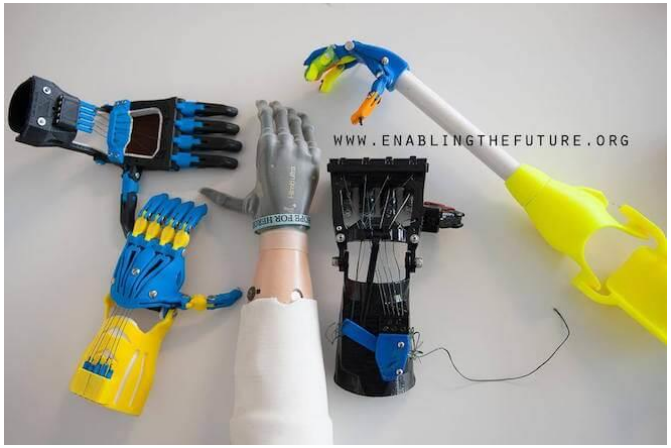
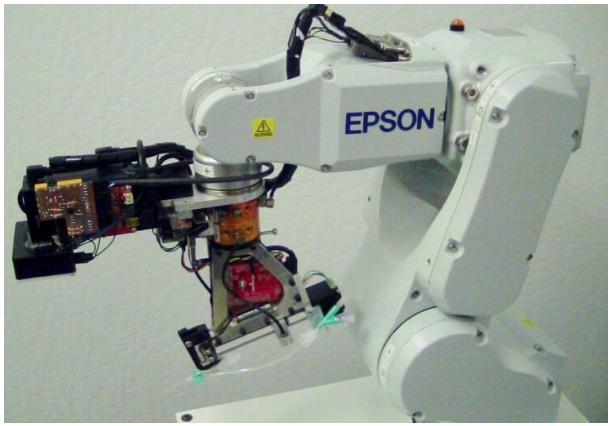
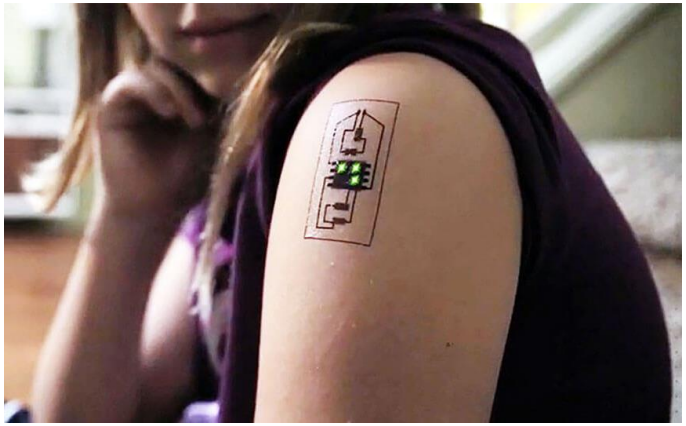
Exponential technology
→ exponential cost?



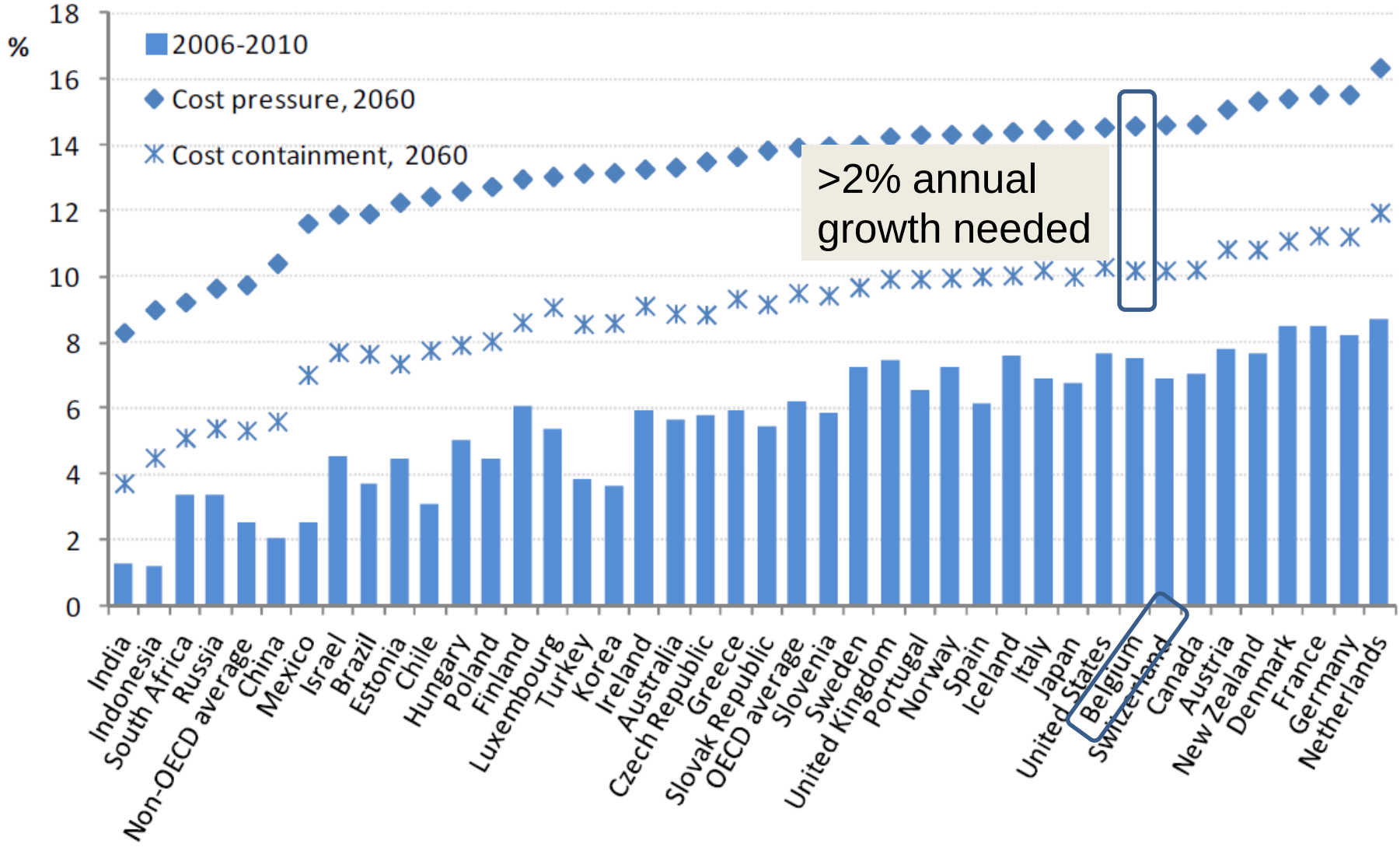






http://medicalfuturist.com

Total <u>public</u> health and long-term care spending ratio to GDP As a % of GDP



OECD (2013), "What Future for Health Spending?", *OECD Economics Department. Policy Notes,* No. 19 June 2013.

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The conflicting goals of healthcare policy

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→ no blind investments

"We need to make available only those innovative technologies that offer an added value to patients and/or society at an acceptable cost (i.e. are cost-effective), and fill unmet medical needs"

NOTE: 'technology' = devices, medicines, diagnostics, prevention programmes,…

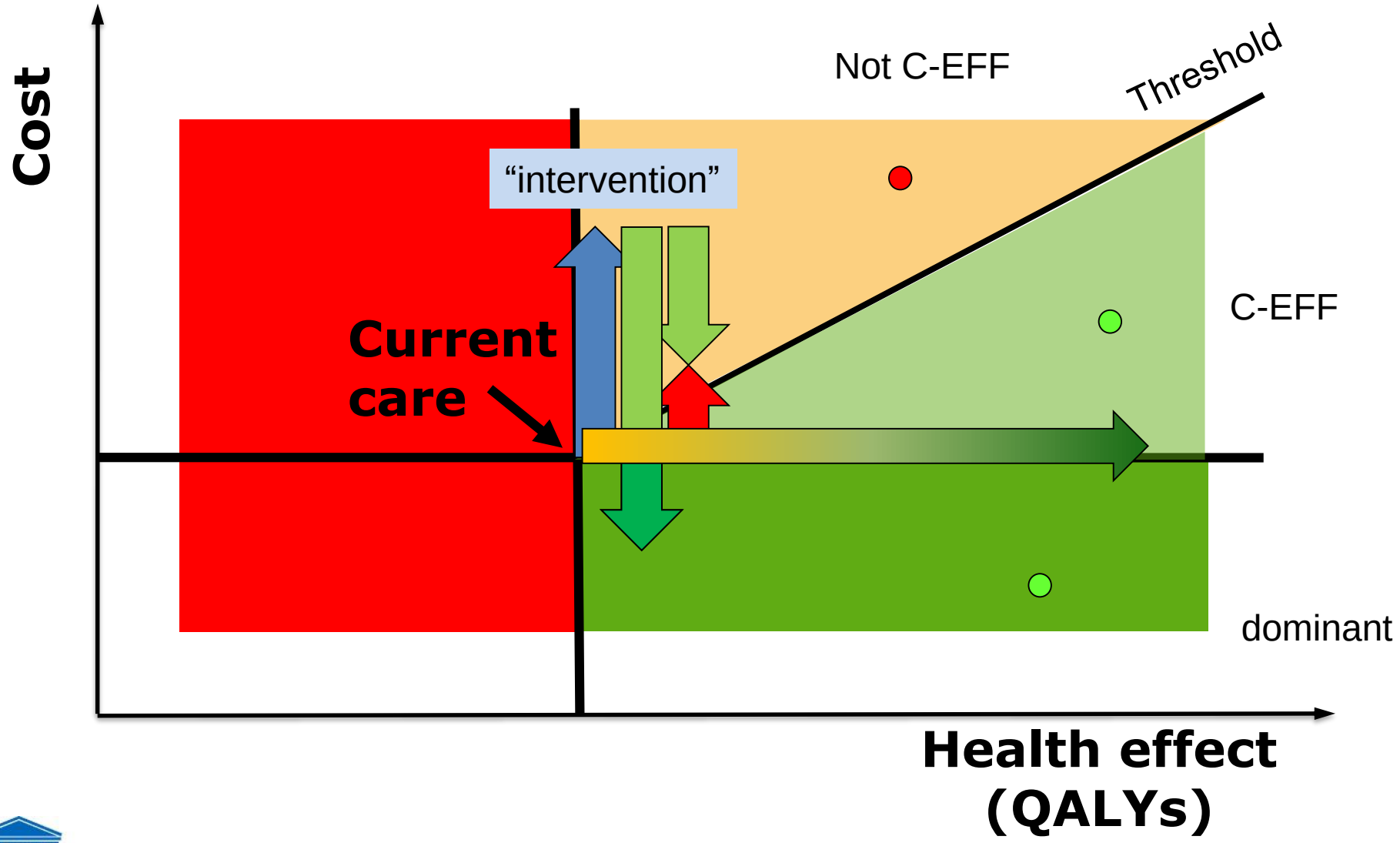
- Report of the Belgian EU Presidency, adopted by the EU Council of Ministers of Health in Dec 2010
- European Commission – Investing in Health February 2013

Public pricing of medicines: two options

- **"cost+"** price → price justified by costing structure.
  - ☺ acceptable mark-up as compensation for costs of R&D
  - ☹ what is the true cost of R&D (what about failures?)
  - ☹ wrong incentives ('spend a lot on R&D')
  - ☹ added value not sufficiently recognized

- **Value based** pricing → more value = higher price
  - ☺ incentives recognizing better added value
  - ☹ profits may not be in reasonable proportion to cost structure
  - ☹ evidence may not be sufficiently convincing

Cost-effectiveness explained



Annemans L. HEALTH ECONOMICS FOR NON-ECONOMISTS. Principles, methods and pitfalls of health economic evaluations. 2nd Edition. Pelckmans. Upcoming May 2018

PROBLEM: where is the threshold?

- HISTORICAL BENCHMARK +/- **50,000€ per QALY**:

  = cost effectiveness of caring for a dialysis patient

  (+/- 4 QALYs gained for an investment of +/- 200,000€)
- WHO: <1 GDP per capita (e.g. Belgium = +/- €37000) (*exceptionally* up to 3x GDP per capita)
- At the discretion of the decision maker (e.g. England 30,000 £ per QALY)

Some examples: “league table”

Treatment	Cost per QALY gained (€)
Cardiac rehabilitation and prevention program	dominant
Helpline for suicide prevention	dominant
New anticoagulants for stroke prevention in atrial fibrillation	5,000
Intensive secondary prevention after a heart attack	12,000
Total Hip Replacement	14,000
New generation drugs in MS	35,000
Low dose Bevacuzumab in 1st line advanced ovarian cancer	70,000
Biannual screening for prostate cancer in all men 40-80 yrs	500,000
Annual CT in former heavy smokers to detect lung cancer	1,000,000

The Belgian solution for medicines

→ Class I: if the company beliefs its medicine offers added therapeutical value, and it claims a price premium, then the medicine will be assessed according to the following criteria:

1. *Added therapeutical value*
2. *Medical therapeutical need*
3. Cost-effectiveness
4. *Impact on the Budget*

PROBLEM: Uncertainty

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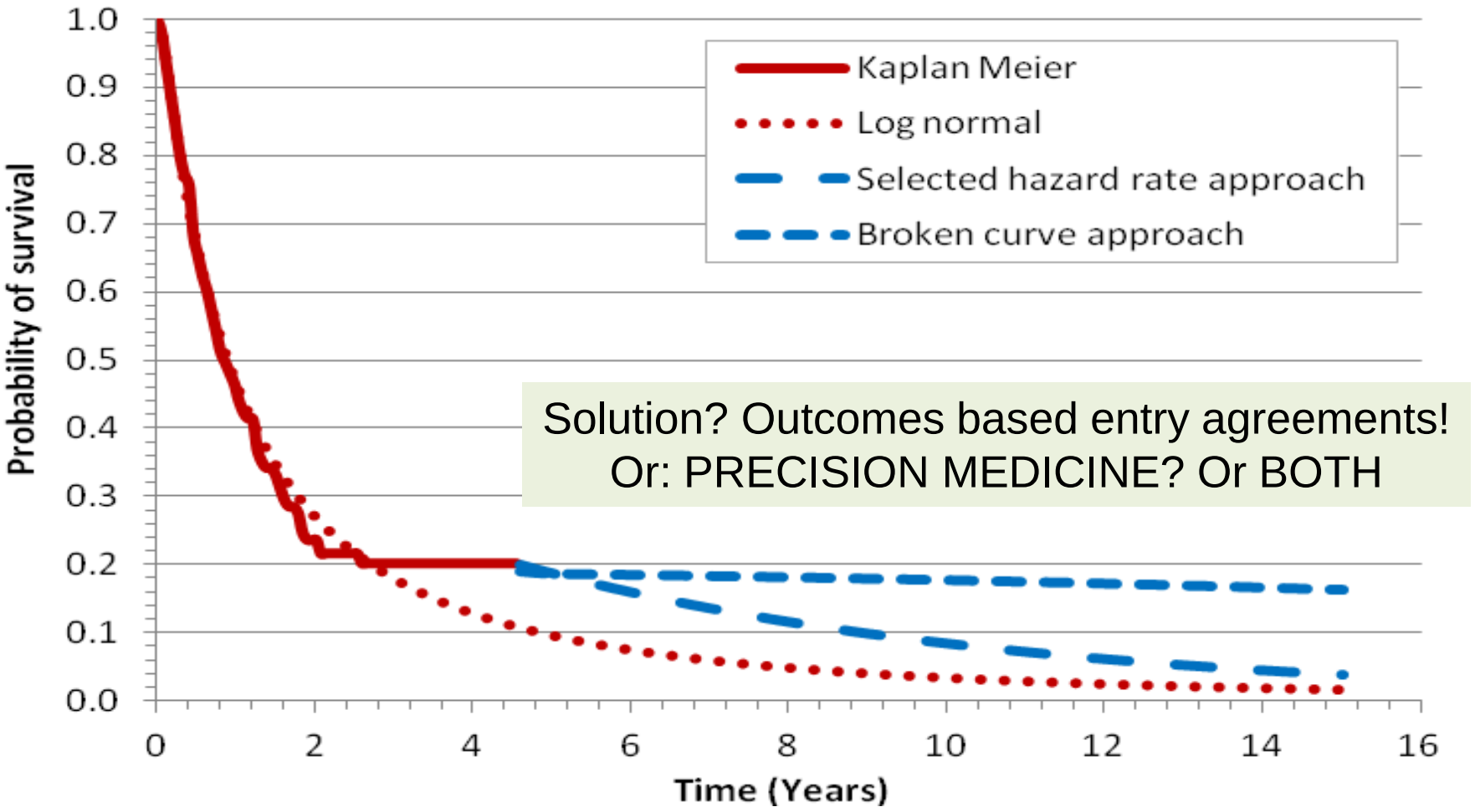
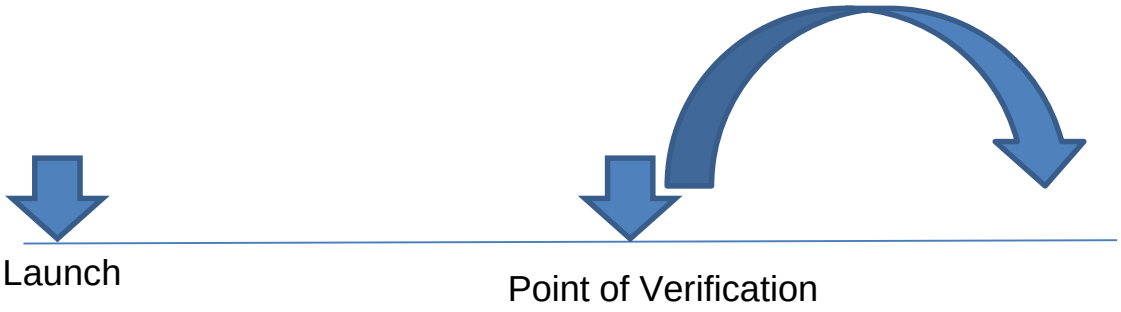
Example ipilimumab



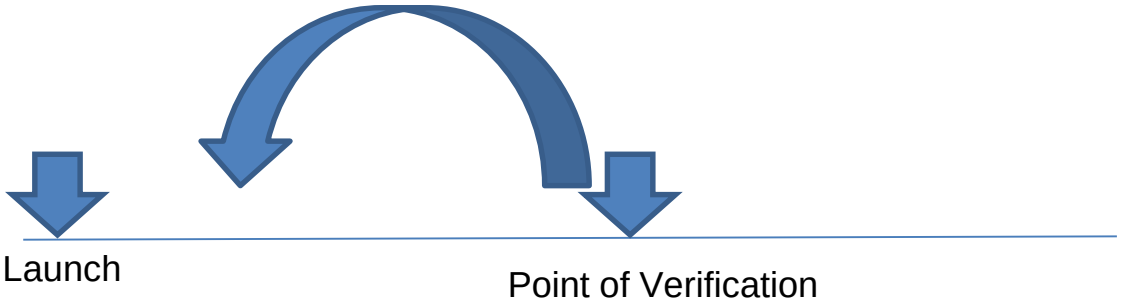
Solution? Outcomes based entry agreements!
Or: PRECISION MEDICINE? Or BOTH

Outcomes based agreements

1. Coverage upon evidence development
    - *Temporary approval, then final decision*



2. Performance Linked Reimbursement (outcomes guarantee)
    - *Not as good as promised → industry pays back*



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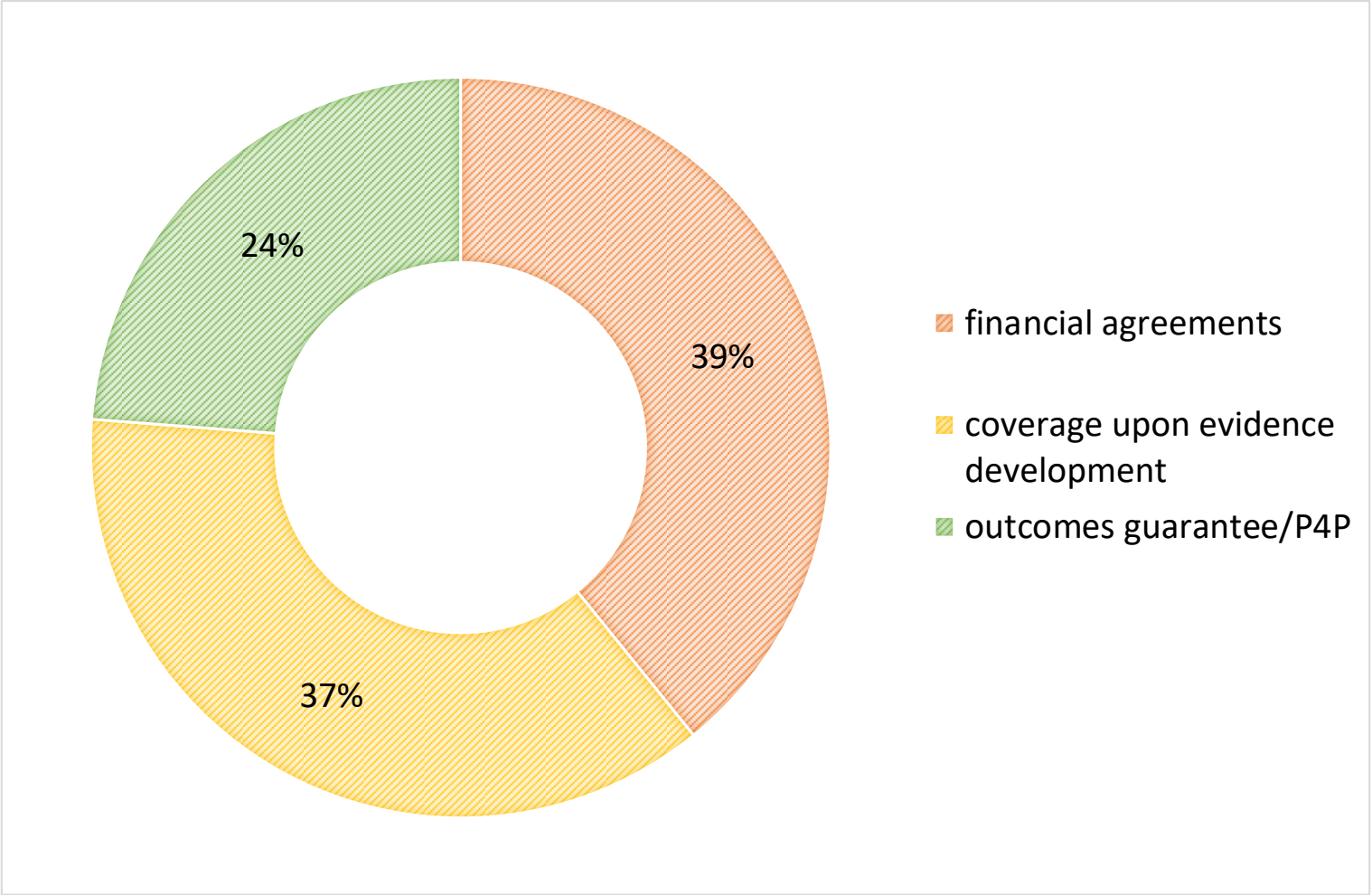
Types of agreements (Toumi et al 2016; n = 143)



Appl Health Econ Health Policy. 2016 Aug 31

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And what about precision medicine?

On first sight, precision medicine is better for all

- Patients
  - Reduced uncertainty, improved care and less exposure to ineffective treatments
- Physicians
  - More effective options and outcomes for their patients
- Industry
  - Innovative products that offer a clear improvement for patients
- **Payers & policy makers**
  - **More cost-effective use of our healthcare Euros**

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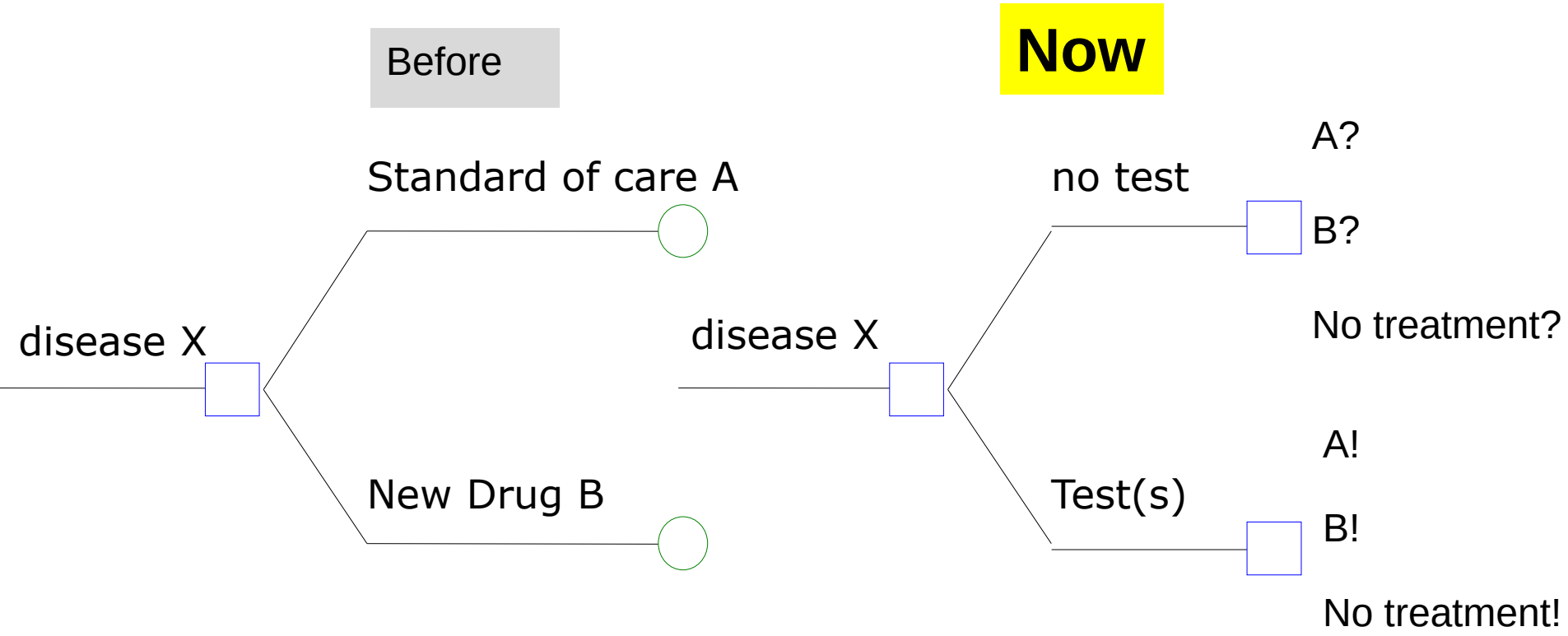
But despite the new paradigm, the same questions need to be adressed



NEW ELEMENTS
- Cost of test
- Performance of test
- False positives and false negatives
- ....

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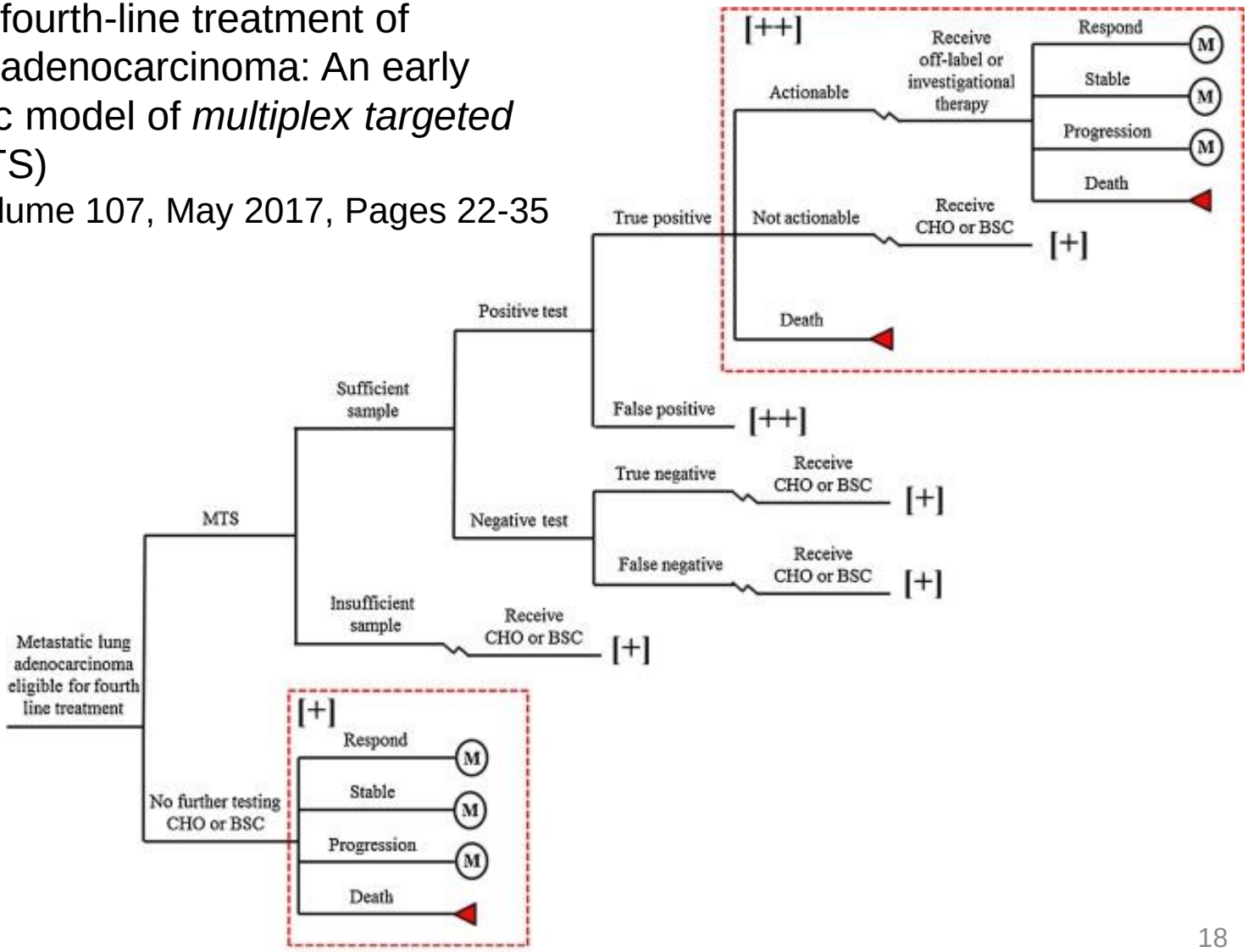
Example lung cancer

Doblea et al. Cost-effectiveness of precision medicine in the fourth-line treatment of metastatic lung adenocarcinoma: An early decision analytic model of *multiplex targeted sequencing* (MTS)
Lung Cancer - Volume 107, May 2017, Pages 22-35



Results Doblea et al 2017

Comparator	Mean LYs/QALYs per patient	Mean costs per patient (AUD)	ICER (excluding dominated strategies)[a]
BSC	1.458	189,529	–
CHO	1.458	190,019	Dominated
MTS	1.466	193,832	485,199
BSC	0.683	189,529	–
CHO	0.684	190,019	361,580
MTS	0.692	193,832	489,338

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Better outcomes not guaranteed!

VALUE IN HEALTH 15 (2012) 1162–1171

Available online at www.sciencedirect.com

SciVerse ScienceDirect

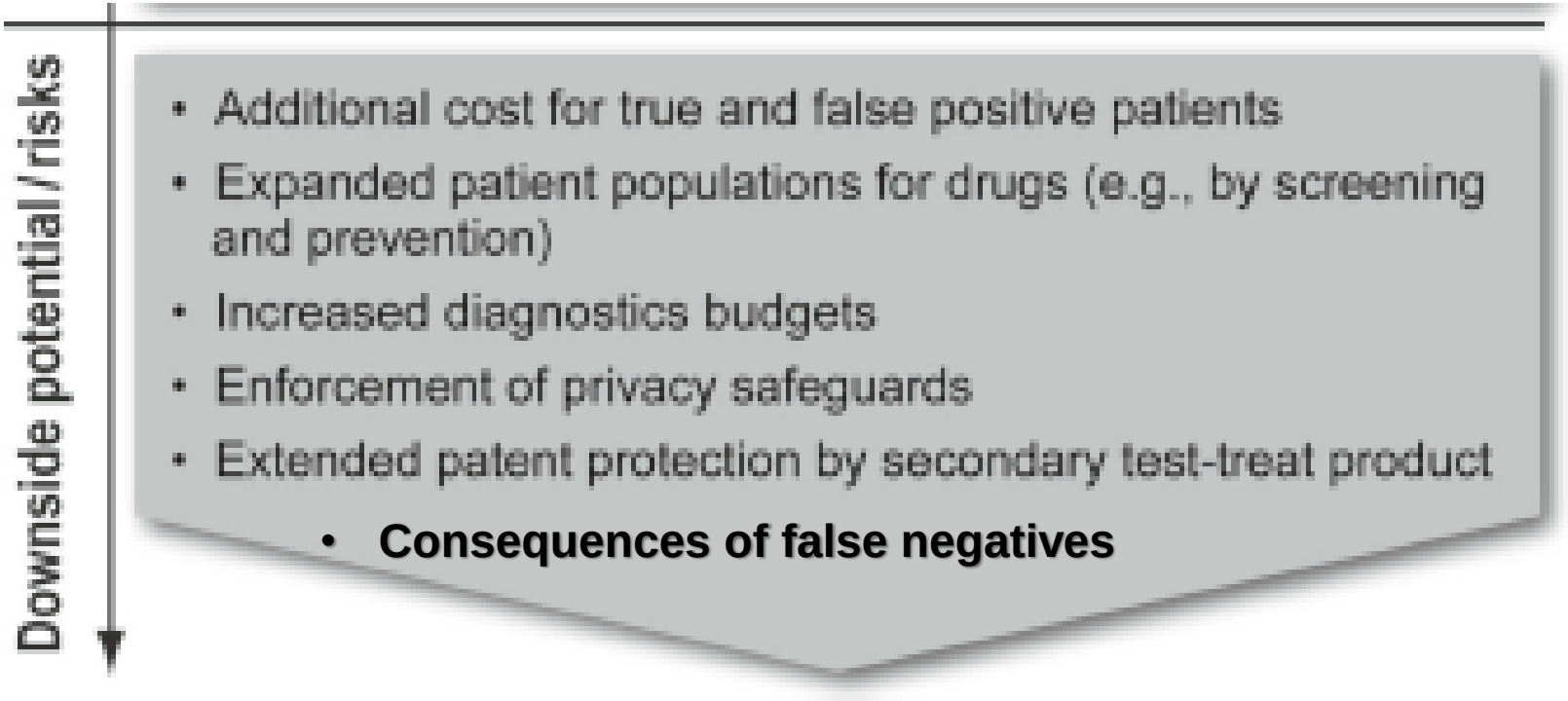
journal homepage: www.elsevier.com/locate/jval

POLICY PERSPECTIVES

Challenges in the Development and Reimbursement of Personalized Medicine—Payer and Manufacturer Perspectives and Implications for Health Economics and Outcomes Research: A Report of the ISPOR Personalized Medicine Special Interest Group

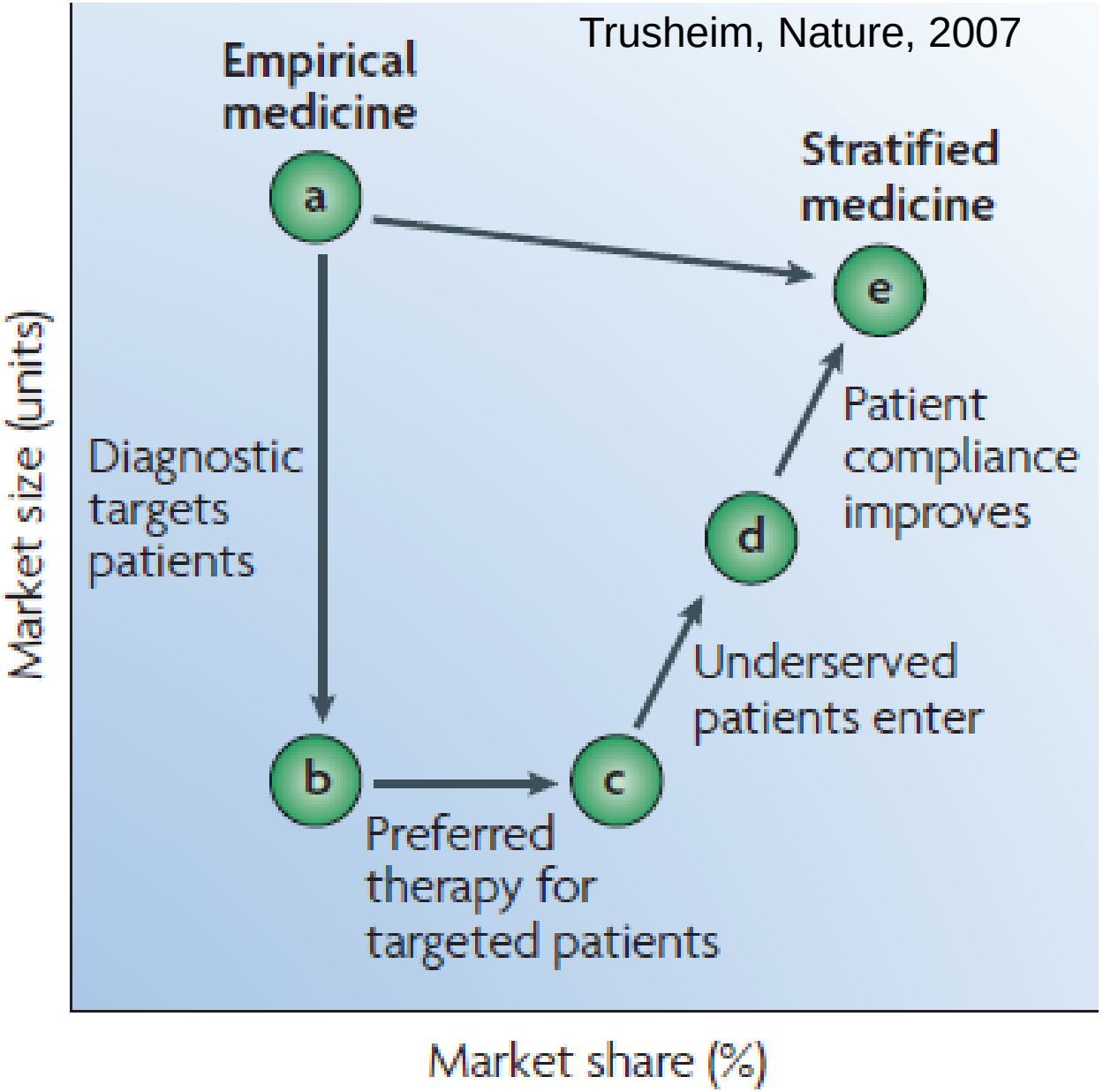
Eric Faulkner, MPH[1,2,3,4,], Lieven Annemans, PhD, MSc[5], Lou Garrison, PhD[6], Mark Helfand, MD, MPH[7], Anke-Peggy Holtorf, PhD, MBA[8], John Hornberger, MD, MS[9,10], Dyfrig Hughes, PhD, MRPharmS[11], Tracy Li, PhD[12], Daniel Malone, PhD[13], Katherine Payne, PhD[14], Uwe Siebert, MD, MPH, MSc, ScD[15,16,17], Adrian Towse, MA[18], David Veenstra, PhD, PharmD[6], John Watkins, PharmD, MPH, BCPS[19], for Personalized Medicine Development and Reimbursement Working Group*

Pitfalls of personalized medicine



Faulkner et al, 2012, adapted

Improved business for companies promised



"If 100,000 cancer patients will all receive a personalized treatment at 50,000€ the budget impact will be 5 Bln €"
(J. De Grève – VUB)

in 2020 oncology PMx will represent 8.9 to 9.5% of the total pharmaceutical specialties budget, a raise from 1.6% in 2005.

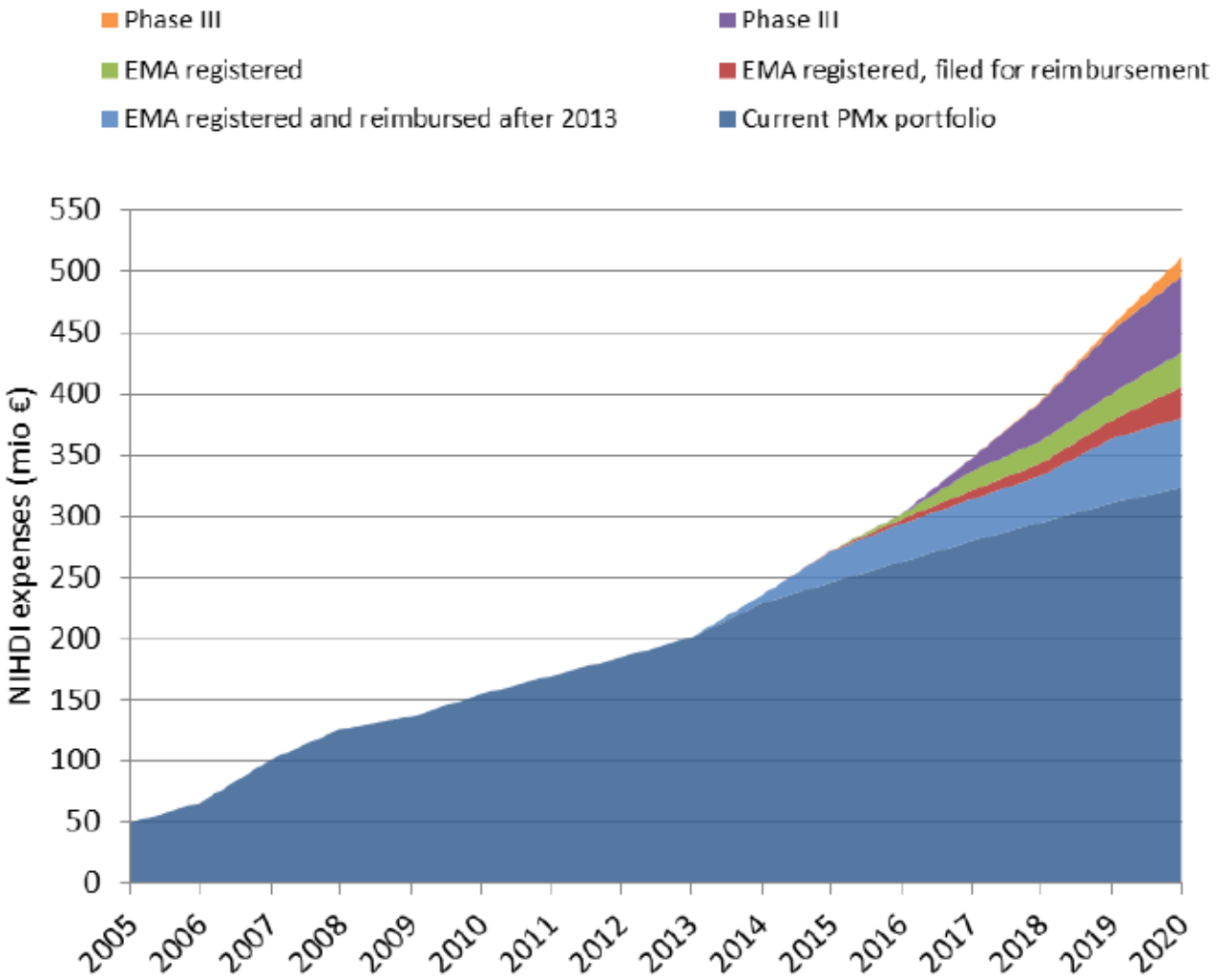


Figure 14: Projection of the budget impact before savings of reimbursed PMx in Belgium from 2005 to 2020.

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HIScreenDiag – Project

Building a Tool to Evaluate and Improve Health Investments in Screening and Diagnosis of Disease

Focus on biomarkers as companion to drugs

Lieven Annemans, Fernando Antoñanzas, Cornelis Boersma, Katharina Fischer, Dolores Ibarreta, Ian Jacob, Reiner Leidl, Daniele Paci, Katherine Payne, Maarten J. Postma, Roberto Rodriguez, Wolf Rogowski, William Sullivan, Dominique Vandijck

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"surprising" finding : the current decision processes in the EU are not transparent, fragmented and highly different

- Enormous differences in
  - who triggers the health economic evaluation of tests
  - who participates in the assessment
  - the criteria for assessment
  - the way they are conducted
- *"coverage decisions about biomarkers frequently appear to be made outside of the scope of national decision making bodies, presumably on a local decision making level"*

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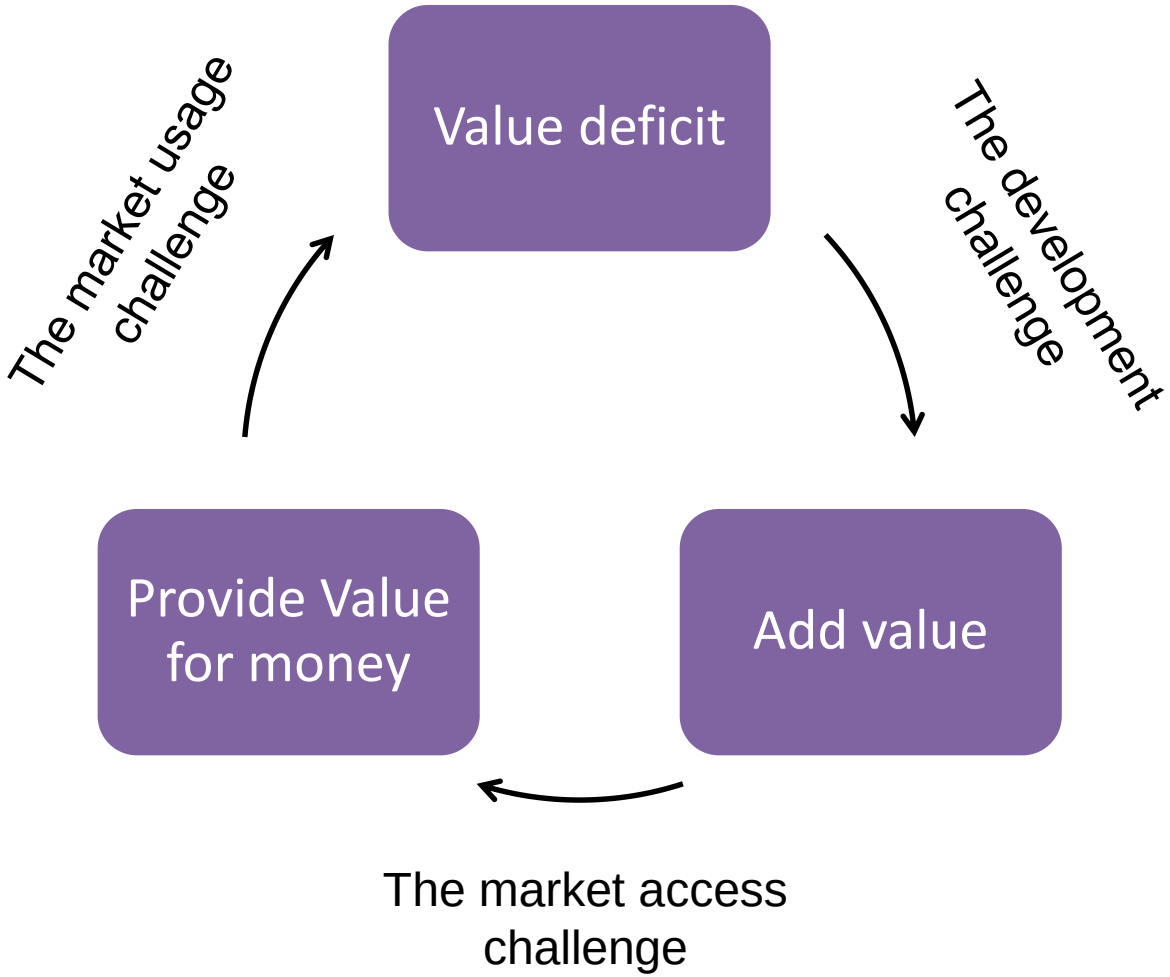
Presenting solutions using the innovation cycle



Ten Actions to Stimulate Patient Access to Personalised Medicine in Europe

1 June 2015

Jo De Cock[1], Lieven Annemans[2]

Introduction

The European Commission published a Report in 2013 on the "Use of '-omics' Technologies in the Development of Personalised Medicine"[3] which highlights the potential of Personalised Medicine. Personalised Medicine (PM) is defined as "a medical model using molecular profiling for tailoring the

I. The Development Challenge

- Early economic evaluations for different diagnosis-treatment combinations in different indications
- Move away from the traditional RCT paradigm
- Early dialogues and joint advice
- Co-ordinate the regulatory processes of diagnostics and therapies

II. The Market Access Challenge

- Integrated health technology assessment processes and criteria for diagnostic tools and medicines/devices
- Risk sharing agreements recognising uncertainties of personalised medicine
- Horizon scanning required for better understanding of future health budget impact

III. The Market Use Challenge

- Organisational measures and financial incentives to allow the market penetration of truly innovative precision medicine, e.g. regional centres of excellence, quality assurance schemes
- Training and education about precision medicine
- Real life data collection

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Some final thoughts

- Also for personalized medicine, cost-effectiveness must be demonstrated – it is not a 'given'
- All personalized treatments together induce a large budget impact → will affect our societal willingness to pay
- Current decision making processes are suboptimal
- Re-investing in health

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