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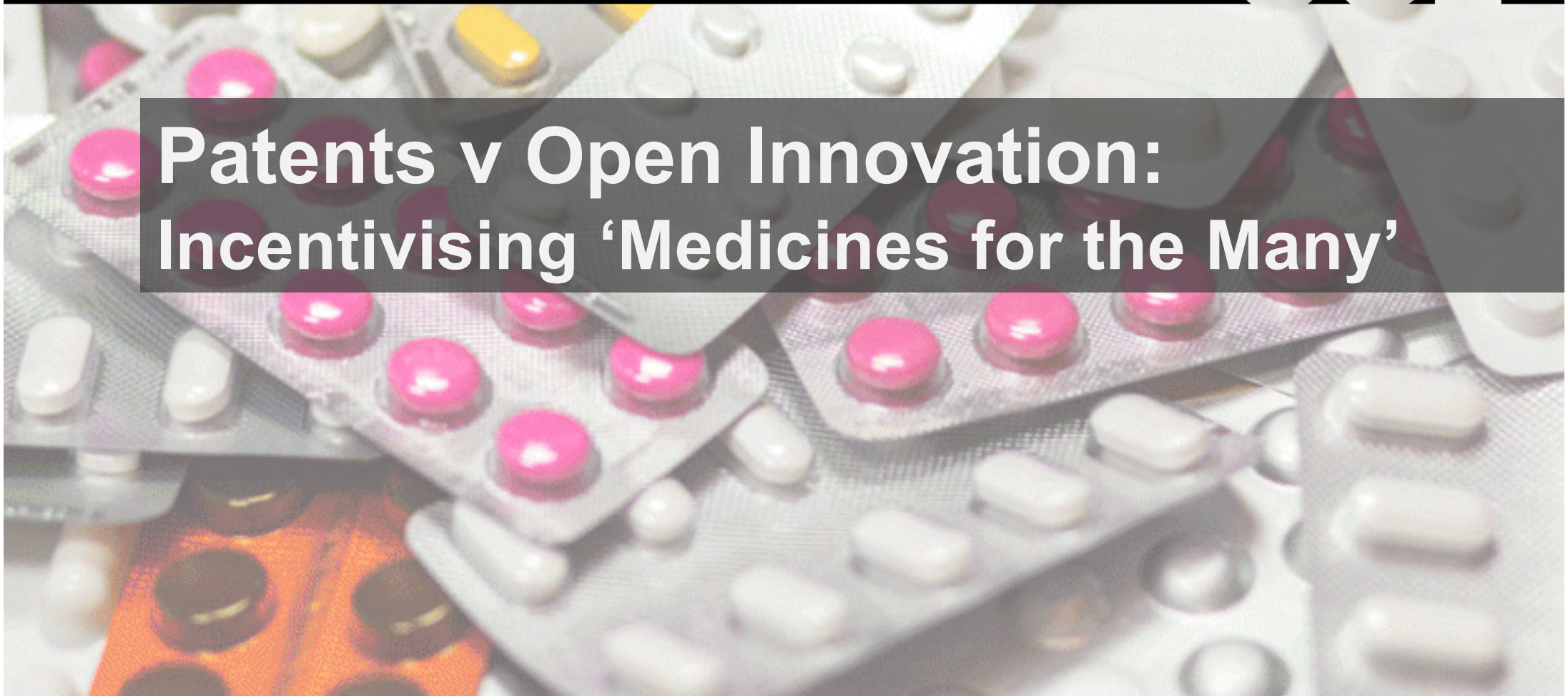

Patents v Open Innovation:
Incentivising ‘Medicines for the Many’

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Dr Galit Gonen-Cohen

Head of Intellectual Property Law at Novartis, former VP and General Counsel, Europe, Teva

Novartis Pharma
Intellectual Property

Pharma Patents and Open Innovation

Dr. Galit Gonen-Cohen, Head of Intellectual Property, Novartis Pharma
UCL, Institute of Brand and Innovation Law
27 November 2019

NOVARTIS | Reimagining Medicine

"The biopharma sector interacts within a wider ecosystem which also includes academic institutions and publicly funded research laboratories and institutes. This ecosystem is highly fragmented, however, with each actor working in isolation on a specific part of the process, with strong upstream intellectual property rights, leading to insufficient collaboration."

"However, aggressive patenting strategies by companies have created closed rather than open innovation, blocking learning, diffusion and dynamic collaborations."

Medicines for the Many: Public Health before Private Profit, Labour, 2019

The Journal Cell noted that:

"Among the most persuasive evidence for the value to humanity of the synergy between academic biomedical research and industrial product development has been a 50% decrease in deaths from heart attacks and strokes over the past 30 years in the developed world."

8 of the top 10 best selling medicines in 2017 originated outside of the companies who sell them today

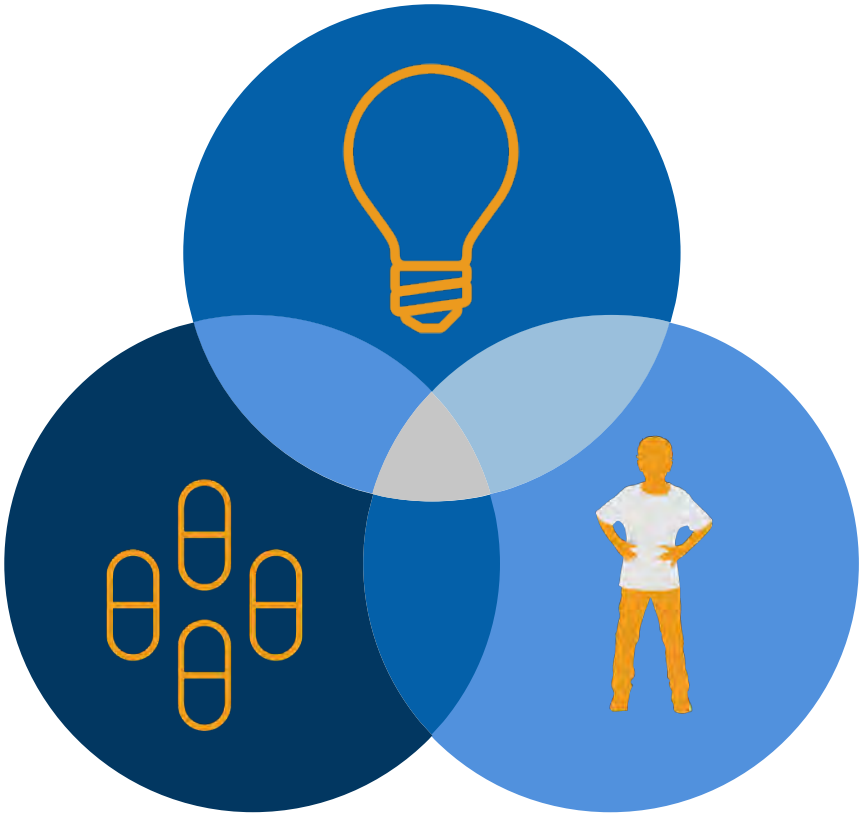
Source: MTS Health Partners

- Why does drug development require open innovation / collaboration?
- Partnerships & external innovation
- Managing IP in collaborations

Why does drug development require open innovation / collaboration?

"Diseases like Alzheimer's and diabetes are looming tsunamis. Deciphering them could not be done by any single organization … no one company can do it."

Elias Zerhouni, MD, Sanofi former president of global R&D



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Partnerships & external innovation

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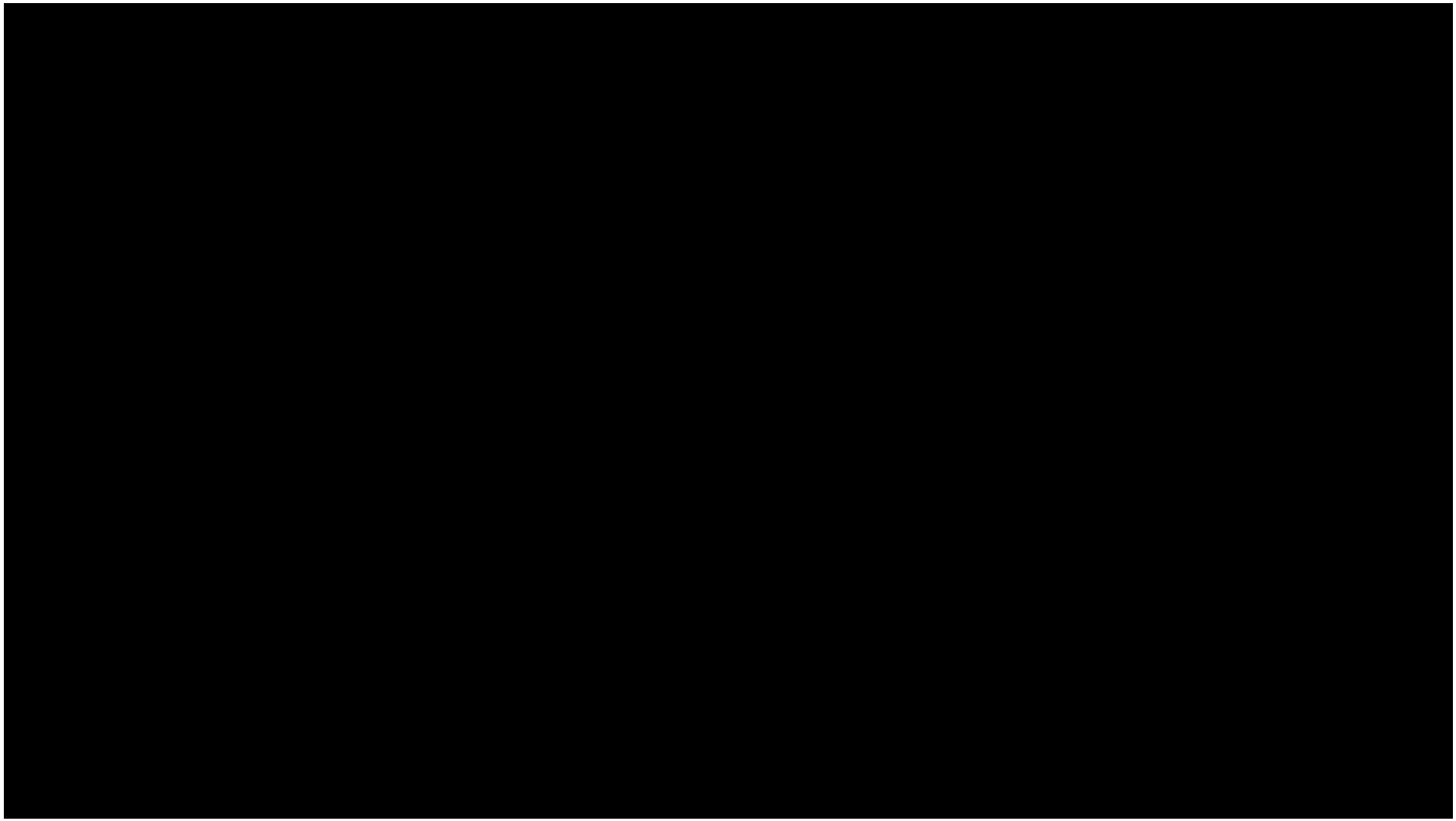
Gene Therapy for SMA Type 1: Evelyn's Story -
click to view the video below or go to https://youtu.be/yRrqbvUv6gQ

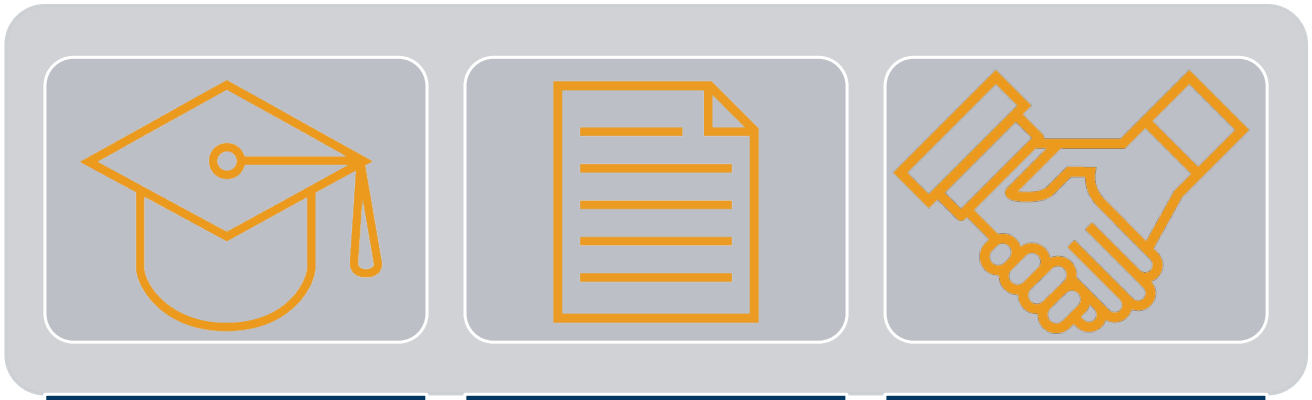


Managing IP in collaborations

"IP is fundamental, as it provides the legal framework that allows valuable knowledge to be safely shared."

The Wall Street Journal

Managing IP in collaborations



Publish vs IP

Novartis #1 for university collaborations

nature INDEX 2017 SCIENCE INC.

Control of IP can be shared

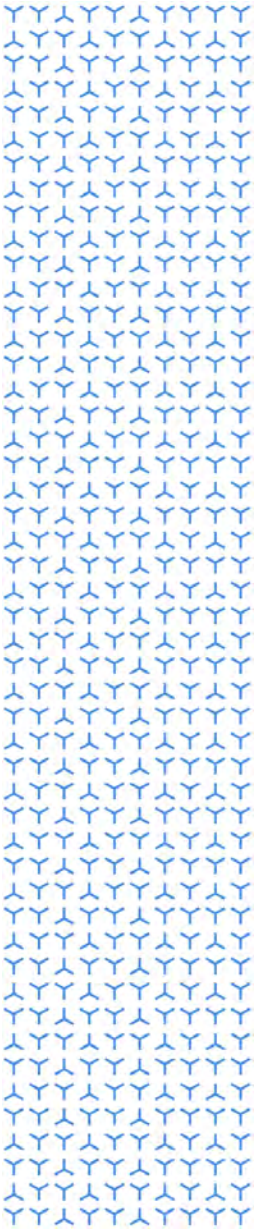
Clear value enables collaborations

NOVARTIS | Reimagining Medicine

Patents facilitate market-based transactions for converting useful ideas into products and help markets **to assign and value the entitlements in a transparent way**;

What would the alternative be: imposing forced coordination and non-market-based valuation of inventions? How can this be economically efficient and sustainable?

The Patent System is not perfect but is the best we have.



Thank you

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UCL

Professor Matthew Todd

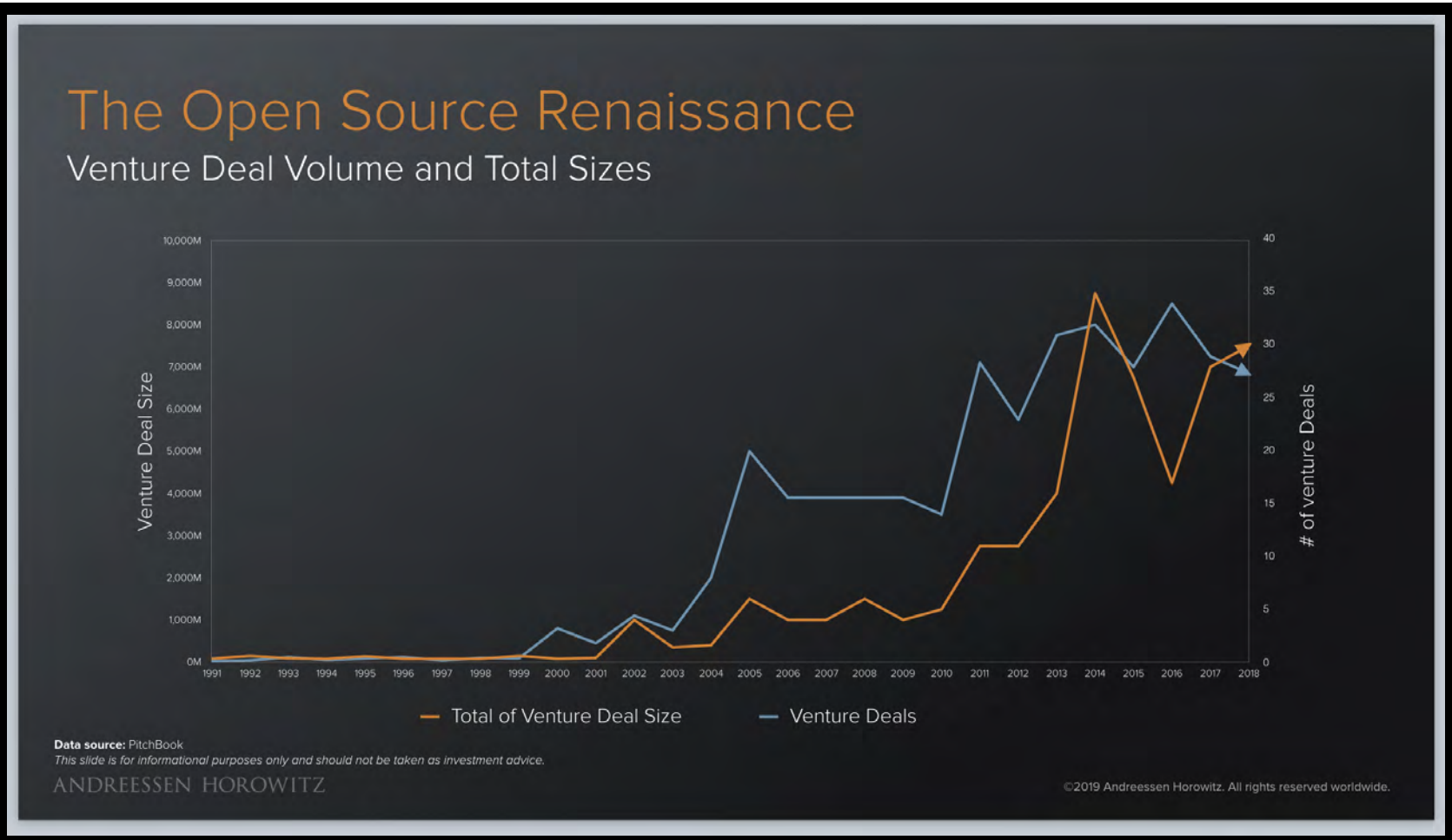
Professor of Drug Discovery at UCL School of Pharmacy

The Cathedral and the Bazaar

CC, Wikipedia

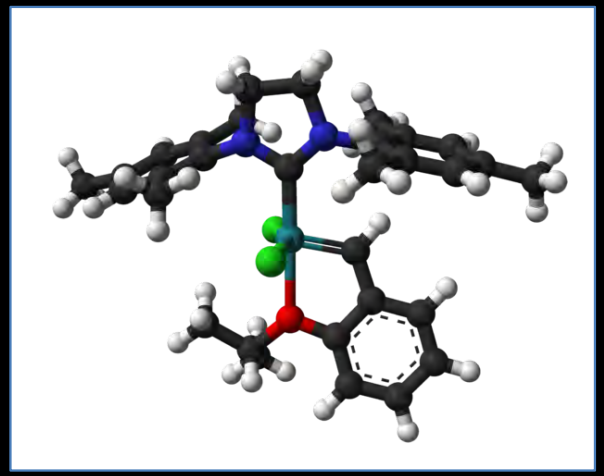
Investment in Open Source Software

>$10Bn
VC funds
In last
30 yrs



https://a16z.com/wp-content/uploads/2019/10/image.png

Things We Might Want to Develop



Can Open Source Research Lead to Investment by People Towards Things Like This?

Publicdomainfiles,com; wikipedia

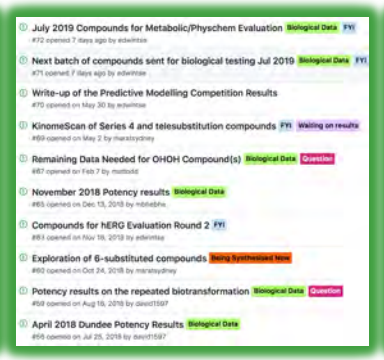
What I Talk About When I Talk About Open

1st Law: All data are open and all ideas are shared
2nd Law: Anyone can take part at any level
3rd Law: There will be no patents
4th Law: Suggestions are the best form of criticism
5th Law: Public discussion is much more valuable than private email
6th Law: An open project is bigger than, and is not owned by, any given lab

Open Source Malaria: *ACS Cent. Sci.* 2016, *2*, 687–701.
TB: *J. Med. Chem.* 2018, *61*, 11327–11340. ***Antifungals***: *PLoS NTD* 2018, *12(4)*: e0006437. ***Platform***: *Chem. Sci.* 2015, *6*, 1614–1629; *Parasitology* 2014, *141*, 148–157. ***These Laws:*** ChemMedChem 2019, 14, 1804–1809

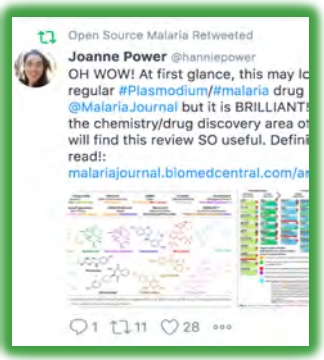
Components

Laboratory Notebooks



Public To Do Lists/Discussion

Open Data



Community

Contributions

Students → *Pharma*

Go Big or Go Home!

As Novartis Exits, Who Will Make New Antibiotics?

By **Julianna LeMieux** - July 25, 2018 0

Opinion | 23 April 2019

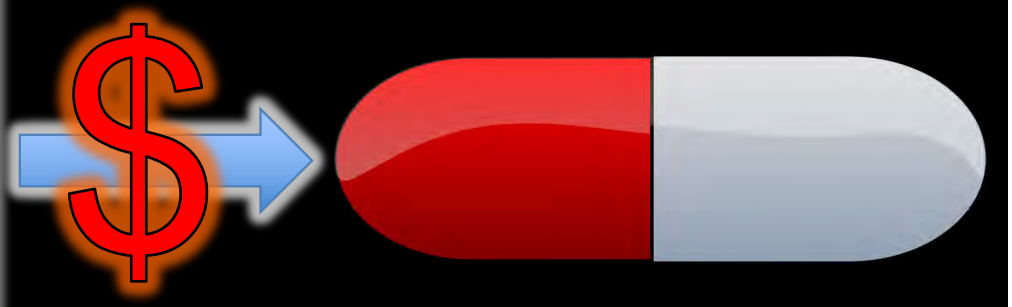
We ignore the disaster in the antibiotics market at our peril

Jeremy Farrar
Director
Wellcome

There is no viable path for new drugs, however valuable they are to society.

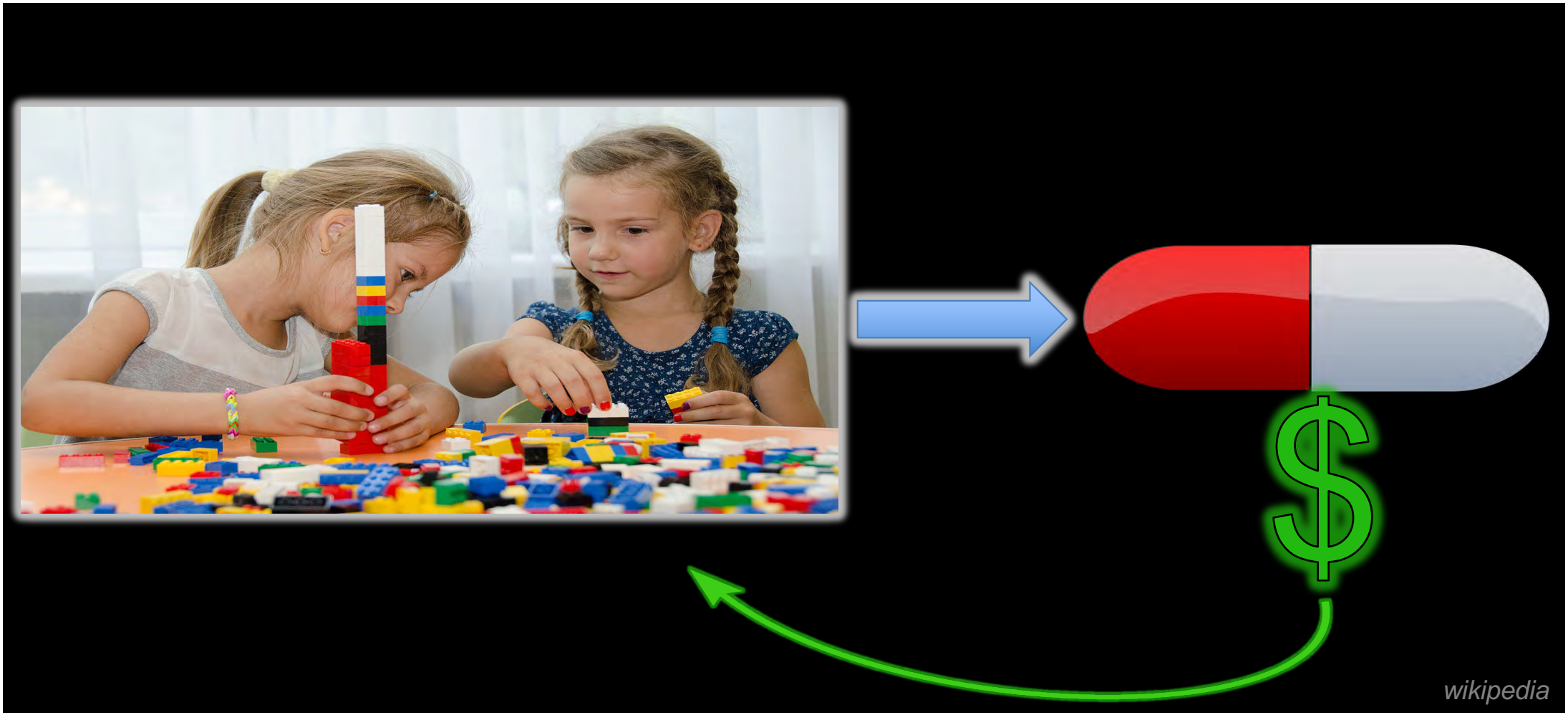
Genengnews.cpm; wikipedia

We Know There's Another Way, but



wikipedia

Patents *vs*. Exclusivities



One Possible Open Source Business Model

Diverse Funding of Open Source Drug Discovery

Make Money Back

Drug Goes Generic

For example, one could introduce a new form of data exclusivity, administered by a regulator, that rewards drug development of an open source licensed molecule, pathway or process.[165] In the short term, the data exclusivity would allow the drug developer a certain fixed term of market monopoly, by blocking others from relying on the approval data to file a generic application. This would allow the drug developer a fixed term to recoup some of its investment. The benefit of using data

*Emily Marden, Minn. J. L. Sci. Tech, **2010**, 11, 217 (https://scholarship.law.umn.edu/mjlst/vol11/iss1/10/)*

mattoddchem 3:20 am on February 23, 2015

Tags: data exclusivity, economics (2), Open Source Drug Discovery (5), Open Source Pharma (2), patents (2), TRIPS

The Economics of Open Source Pharma – What about data exclusivity?

*Me, Intermolecular Blog **2015***

Ideation and implementation of an open science drug discovery business model – M4K Pharma [version 1; referees: awaiting peer review]

Maxwell Robert Morgan [1-3], Owen Gwilym Roberts[2], Aled Morgan Edwards [1-3]

*Al Edwards and team, Wellcome Open Res. **2018**, 3:154*

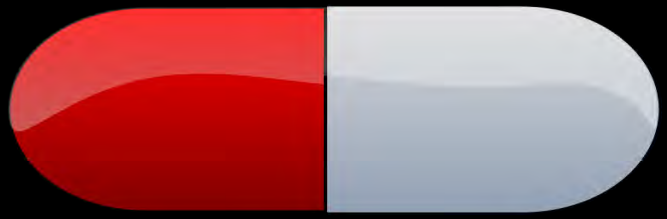
Unpatented but Protected

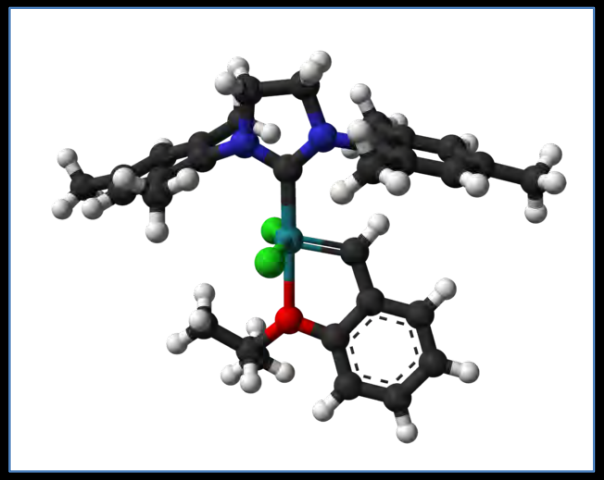
Table 1. Examples of FDA new drug approvals from 1986 to 2014 brought to market with new chemical entity exclusivity but either (i) no patents listed in the FDA Orange Book, or (ii) listed patents expiring prior to new chemical entity exclusivity. The priority review eligibility and orphan drug status of each drug are also indicated. Source: Lietzan, E. The Myths of Data Exclusivity. Lewis Clark Law Rev. 20, 91–164 (2016).

Year of Approval	Drug	Indication	Priority Review Granted ('Significant Improvement' Over Standard of Care)	Concurrent Orphan Drug Exclusivity	Orange Book Listed Patent (Expiry)
1986	Provocholine (methacholine chloride)	Diagnosis of bronchial airway hyper-reactivity in patients who do not have clinically apparent asthma	+		
1987	Levatol (penbutolol sulfate)	Mild to moderate arterial hypertension			
1989	Anafranil (clomipramine hydrochloride)	Obsessive-compulsive disorder	+		
1989	Optipranolol (metipranolol hydrochloride)	Open-angle glaucoma and other causes of ocular high pressure			
1989	Lariam (mefloquine hydrochloride)	Mild to moderate acute malaria	+		
1989	Clorazil (clozapine)	Severely ill schizophrenic patients	+		
1990	Hexalen (altretamine)	Refractory ovarian cancer	+	+	
1993	Leustatin (cladribine)	Active hairy cell leukemia	+	+	
1993	Trasylol (aprotinin bovine)	Reduction of bleeding during complex surgery	+	+	
1993	Flumadine (rimantadine hydrochloride)	Influenza type-A infections	+		
1995	Revex (nalmefene hydrochloride)	Partial reversal of effects of narcotics			
1996	Proamatine (midodrine hydrochloride)	Orthostatic hypotension		+	
1997	Normiflo (ardeparin sodium)	Prevention of blood clot formation following certain types of surgery			
1997	Corlopam (fenoldopam mesylate)	Short-term management of hypertension			
1998	Infasurf (calfactant)	Respiratory distress syndrome in premature infants			
1999	Nilandron (nilutamide)	Treatment of prostate cancer in men who have undergone surgical			

Morgan MR, Roberts OG and Edwards AM, Wellcome Open Res 2018, 3:154 (DOI: 10.12688/wellcomeopenres.14947.1)

Some Ownership .. Works for Open Drugs!





Publicdomainfiles,com; wikipedia

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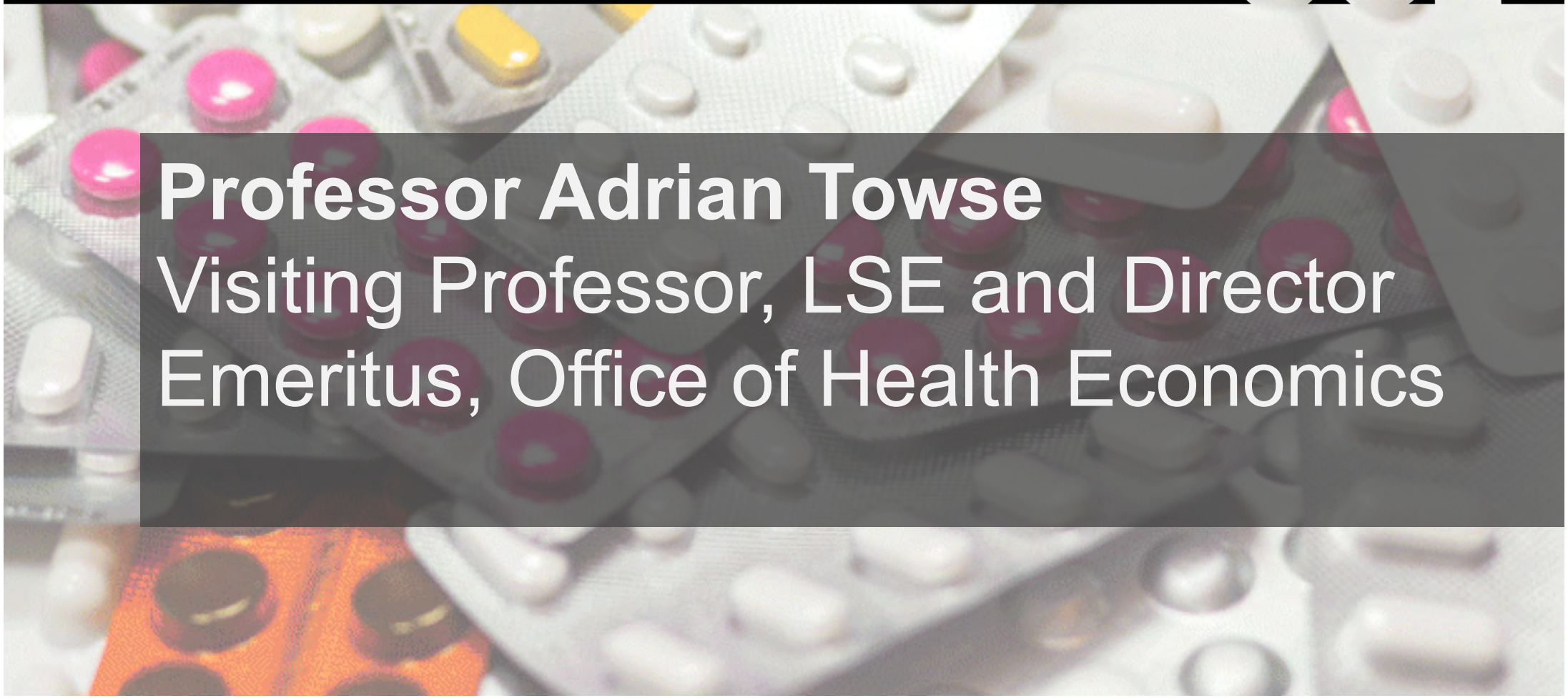


Professor Adrian Towse

Visiting Professor, LSE and Director Emeritus, Office of Health Economics

Pharmaceutical patents and open innovation

Adrian Towse, Emeritus Director and Senior Research Fellow, Visting Professor, London School of Economics

ohe.org

INSTITUTE OF BRAND AND INNOVATION LAW (IBIL)
EVENING DEBATE 27TH NOVEMBER 2019

My Agenda

OIE

- The R&D “machine” of the industry. Is it broken?
- “Open Science” and redefining the role of IP
- Value-Based Differential Pricing: Setting Optimal Prices for Drugs Cross-Nationally
- Sorting out the demand side
  - Health Impact Fund
  - Incentives to tackle AMR
  - New drugs for TB
- Concluding thoughts

The R&D "machine" of the industry. Is it broken?

- The science isn't broken. We are getting innovation – but rather is the cost of delivering it to health systems too high?
- Estimates of $2.6bn - $3bn for the cost of an NCE / NBE / NME (DiMasi et al. 2016) . Much disputed (e.g. Prasad and Mailankody, 2017) but …
  - A forthcoming paper by DiMasi and Grabowski on R&D cost argues that oncology R&D costs are high, because of (i) low success rates and (ii) the number of indications – lots of trials, and, cumulatively, lots of patients.
  - But R&D cost per patient treated is almost certainly rising,
- Will fast-track access reduce R&D cost? Or shift to the post launch setting? Earlier access means higher expenditure for payers. And payers are asking for more evidence not less.
- Can we revolutionise R&D costs? One way is through IT. If we are able to track patients through EHRs and these capture health status and interactions with the health system, then we can change the costs of pre-launch RCTs and of post-launch RCT /observational studies.
  - What about patent pools, open innovation, and open source innovation?

“Open Science” and redefining the role of IP

- Falling drug productivity and lack of understanding of key diseases
  - e.g. high Phase 1 failure rates @90%
- Sharing data and know how at early risky stages reduces duplication and increases knowledge
- IP leads to secrecy
- Recommends “the state ..push the threshold of pre-competitive and open source DD down the development pathway.”

Available at https://www.oxfordmartin.ox.ac.uk/downloads/academic/Transforming_Drug_Discovery.pdf

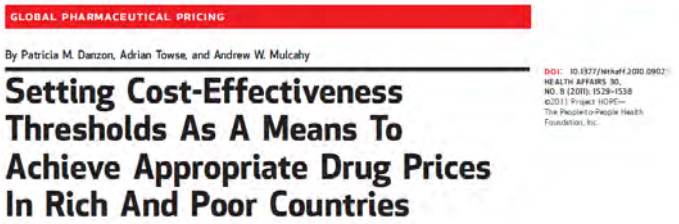
"Open Science" and redefining the role of IP – my thoughts

- Evidence is that successful companies patent and publish / share
  - Patents involve the disclose of information
- There are key gains to be had from pre-competitive collaborations
  - We may need Competition Authorities to look at the boundaries
- We can form innovation clubs in a disease area where the members share their knowledge of trials / studies but retain their IP
  - This can lead to less duplication (fewer dry holes) and increased knowledge
- Pushing to registration requires a market / uptake. Makes more sense to have effective "pull" incentives
  - I do not think governments / health systems should pay for effort. They should pay for success, i.e. what they want. Need to separate the demand side failure from R&D efficiency issues.
- There is an argument that much R&D is publicly funded and is not recognised
  - This should be addressed in tech transfer deals and in e.g. Bayh-Dole type legislation

Value-Based Differential Pricing: Setting Optimal Prices for Drugs Cross-Nationally

OHE

- Optimal price levels and differences across markets can be achieved if each payer unilaterally sets an incremental cost effectiveness threshold based on its citizens' willingness to pay for health and health related gain
- Manufacturers will price to that threshold
- Payers should limit reimbursement to patients for whom a drug is cost-effective at that price
- If there are price differentials between patient subgroups matching value differences, prices will achieve first best static & dynamic efficiency.
- The resulting price levels and use within each country and price differentials across countries should be appropriate for second best static and dynamic efficiency.



GLOBAL PHARMACEUTICAL PRICING

By Patricia M. Danzon, Adrian Towse, and Andrew W. Mulcahy

Setting Cost-Effectiveness Thresholds As A Means To Achieve Appropriate Drug Prices In Rich And Poor Countries

HEALTH ECONOMICS
Health Econ. **24**: 294–301 (2015)
Published online 11 December 2013 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/hec.3021

VALUE-BASED DIFFERENTIAL PRICING: EFFICIENT PRICES FOR DRUGS IN A GLOBAL CONTEXT

PATRICIA DANZON[a,*], ADRIAN TOWSE[b] and JORGE MESTRE-FERRANDIZ[b]

[a]*The Wharton School, University of Pennsylvania, Philadelphia, PA, USA*
[b]*Office of Health Economics, London, UK*

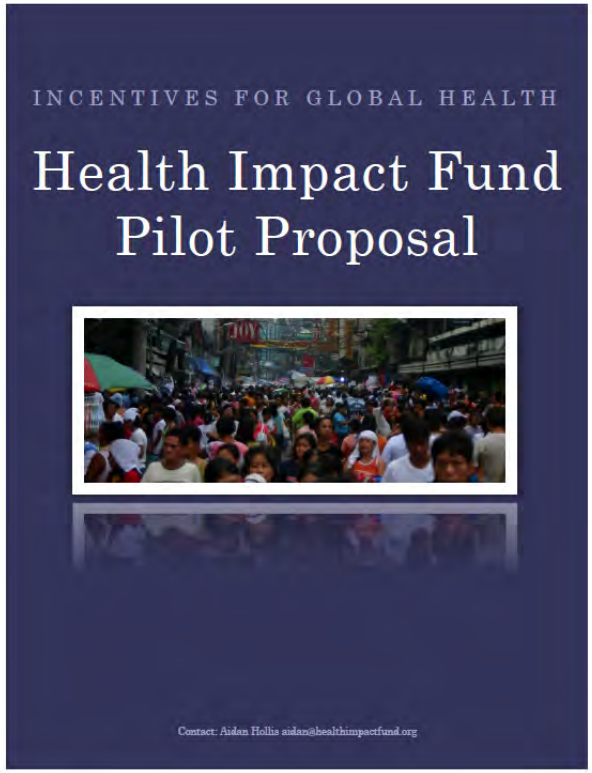
ABSTRACT

This paper analyzes pharmaceutical pricing between and within countries to achieve second-best static and dynamic efficiency. We distinguish countries with and without universal insurance, because insurance undermines patients' price sensitivity, potentially leading to prices above second-best efficient levels. In countries with universal insurance, if each payer unilaterally sets an incremental cost-effectiveness ratio (ICER) threshold based on its citizens' willingness-to-pay for health; manufacturers price to that ICER threshold; and payers limit reimbursement to patients for whom a drug is cost-effective at that price and ICER, then the resulting price levels and use within each country and price differentials across countries are roughly consistent with second-best static and dynamic efficiency. These value-based prices are expected to differ cross-nationally with per capita income and be broadly consistent with Ramsey optimal prices. Countries without comprehensive insurance avoid its distorting effects on prices but also lack financial protection and affordability for the poor. Improving pricing efficiency in these self-pay countries includes improving regulation and consumer information about product quality and enabling firms to price discriminate within and between countries. © 2013 The Authors. *Health Economics* published by John Wiley & Sons Ltd.

Danzon, P., Towse, A. and Mulcahy, A. (2011) Health Affairs. 30(8), 1529-1538.
Danzon, P.; Towse, A.; Mestre-Ferrandiz, J. (2015). Health Economics: 24 (3) 294-301

Sorting out the demand side – Health Impact Fund

- IGH would have a donor funded pot
- Companies would compete for prizes (health impact awards)
- Each would receive a share of the total reward proportional to the health impact of the project
  - Expert committee assesses impact using IHME analyses
  - Maximum value cap per DALY delivered
- Companies then sell at cost of production
- No IP implications



Available at https://healthimpactfund.org/en/

Sorting out the demand side – Incentives to tackle AMR

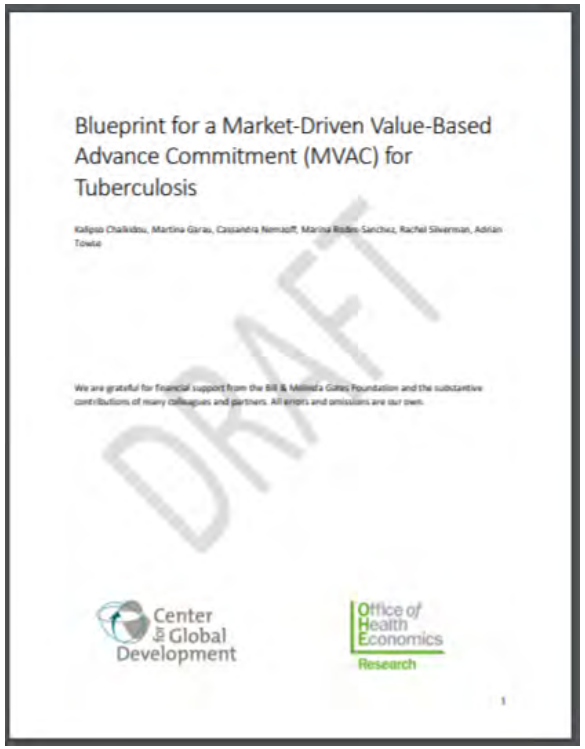
- More antibiotics needed due to build-up of resistance
  - But existing treatments are off-patent and we want to restrict use of new treatments. Low revenue.
- Problem 1: an externality that we need to internalise
  - Reform HTA methods to reflect full value
- Problem 2: we need to delink payment from volume
- New payment mechanisms can include:
  - market entry rewards
  - transferable exclusivity vouchers
  - an “availability” contract

Available at https://www.oie.org/publications/hta-and-payment-mechanisms-new-drugs-tackle-amr

Funded by the Wellcome Trust

Sorting out the demand side – New drugs for TB

- The Center for Global Development and OHE (with a BMGF research grant) have developed a Market-driven Value-based Advance Commitment (MVAC) for TB.
- Builds on success of the Advance Market Commitment (AMC) for pneumococcal vaccine.
- MVAC differs in three respects:
  - the price is based on expected value (DALYs delivered and offsetting health system costs)
  - it is funded by the BRICS countries
  - Payments guaranteed by an MDB e.g. the World Bank or Asian Development Bank.



Available at https://www.cgdev.org/sites/default/files/MVAC-Blueprint-for-Consultation-2019-02-28.pdf

Concluding thoughts

OHE

- Need to separate the demand side failure from R&D efficiency issues
- Not clear to me that IP is a barrier to tackling either
- We can "push" all of the way, but governments / health systems should not pay for *effort*. They should pay for *success*.
  - Solving demand side problems with push is not likely to be efficient.
- Danger of mixing the positive and the normative here
  - Of course, I may well be guilty of this ….

To enquire about additional information and analyses, please contact:

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atowse@ohe.org

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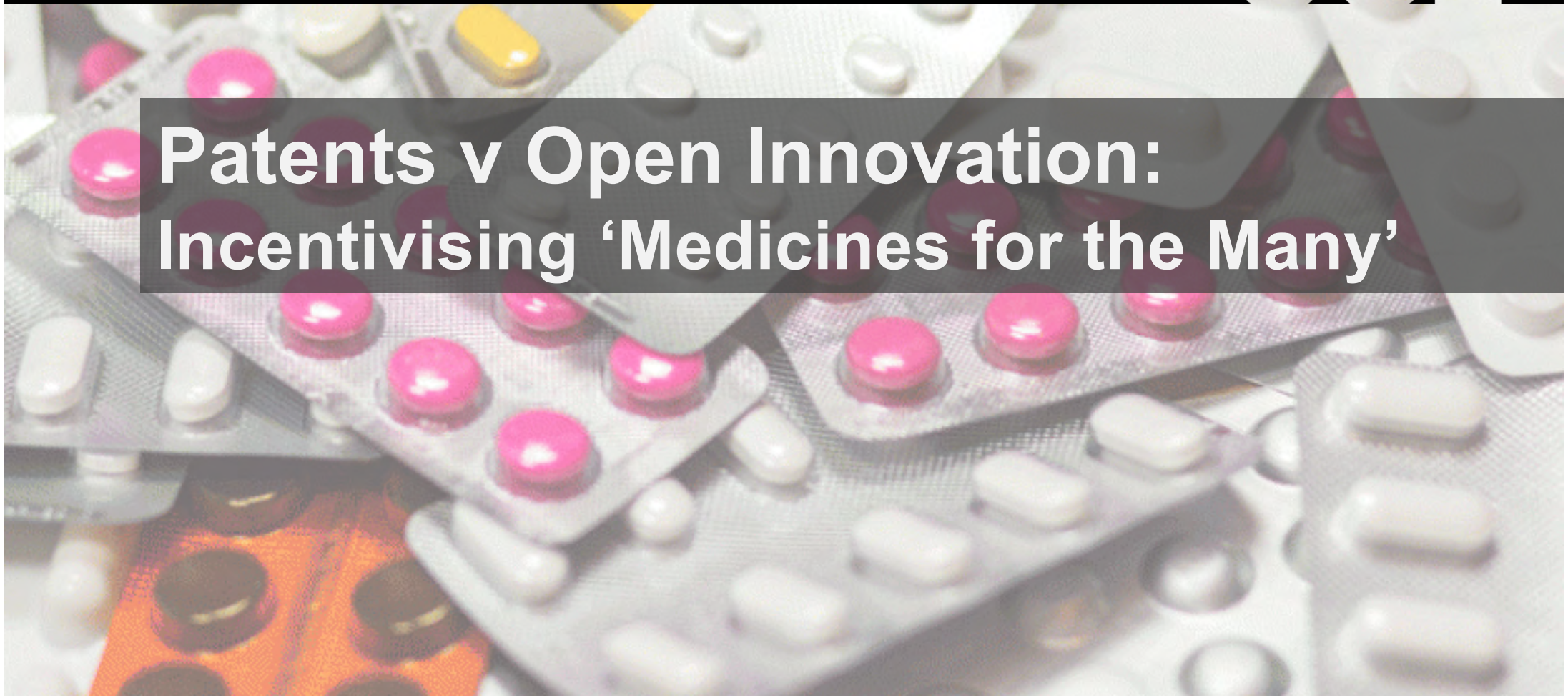

Patents v Open Innovation:
Incentivising ‘Medicines for the Many’