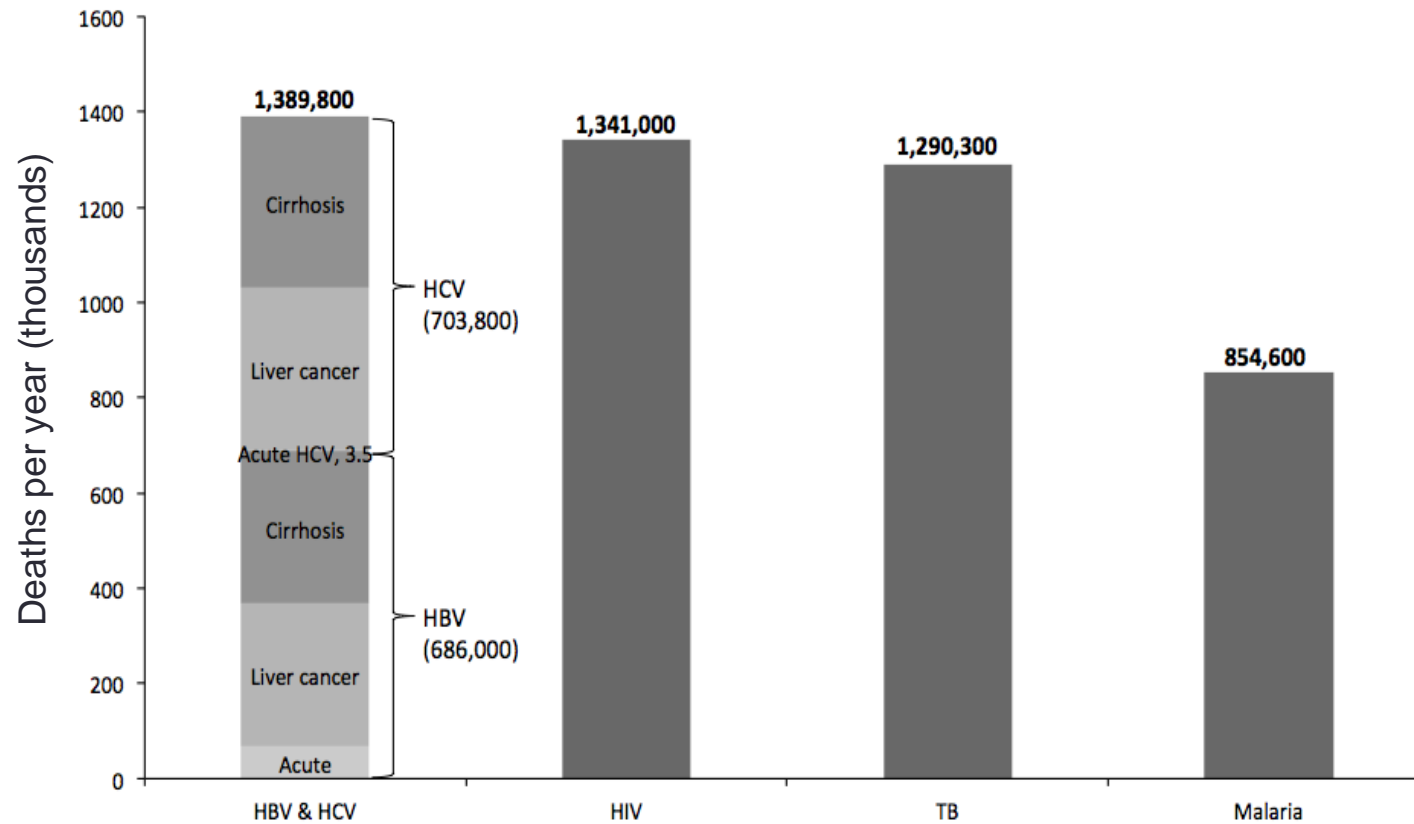


Treating epidemics with low-cost generics

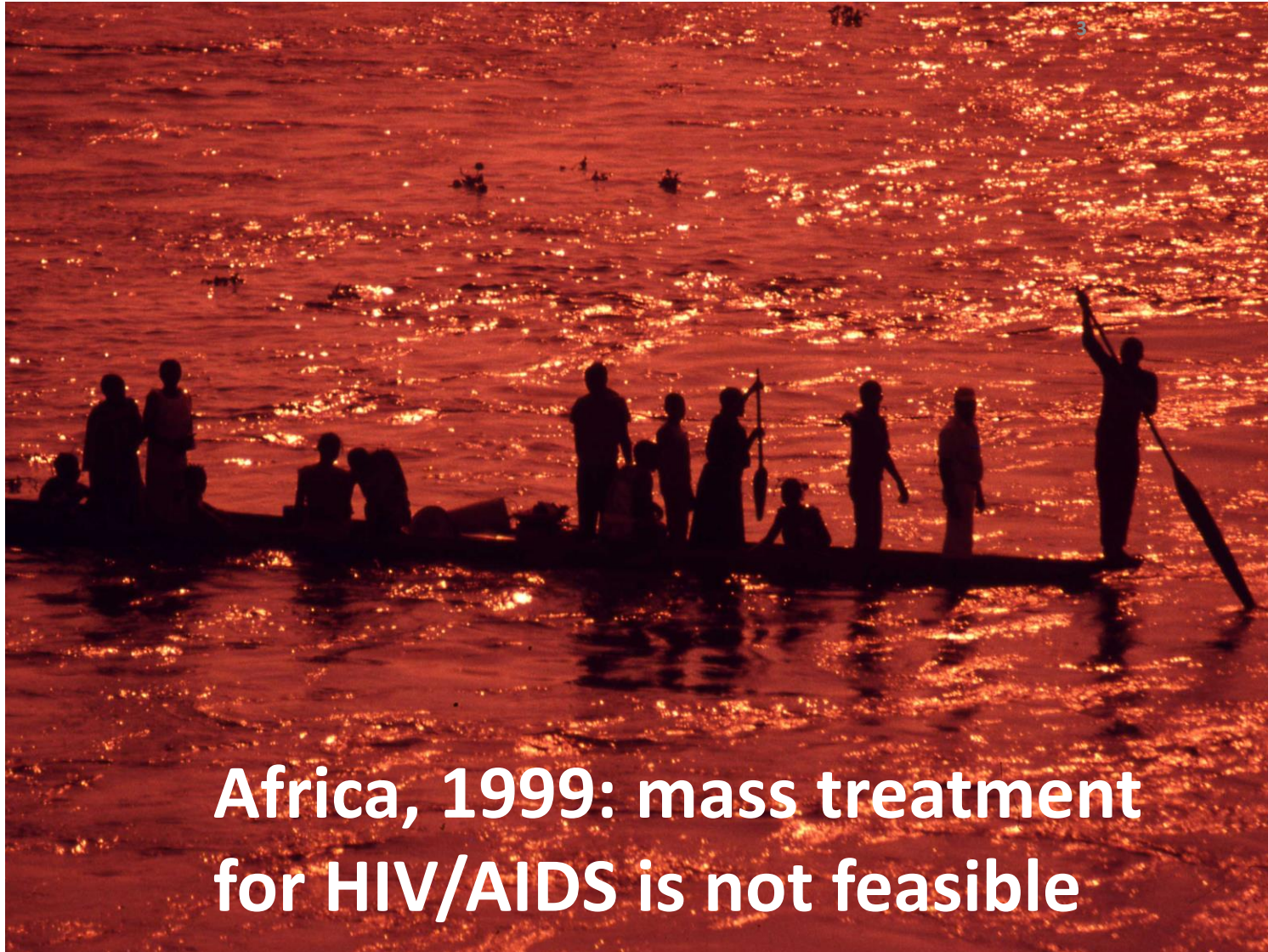
Dr Andrew Hill

**Senior Visiting Research Fellow
Pharmacology and Therapeutics,
University of Liverpool, UK**

Worldwide deaths from HCV, HBV, HIV, tuberculosis, and malaria in 2013



Global Burden of Disease report, Lancet 2014, 385: 117-171



**Africa, 1999: mass treatment
for HIV/AIDS is not feasible**

A key moment in the history of HIV

“My generics company
can manufacture
HIV antiretrovirals for
a dollar per day”

Dr Yussef Hamied
Cipla,
G8 summit,
2000



**Could we eliminate
Hepatitis B and C
worldwide by
producing treatments
cheaply?**

Active Pharmaceutical Ingredient

Raw drug substance

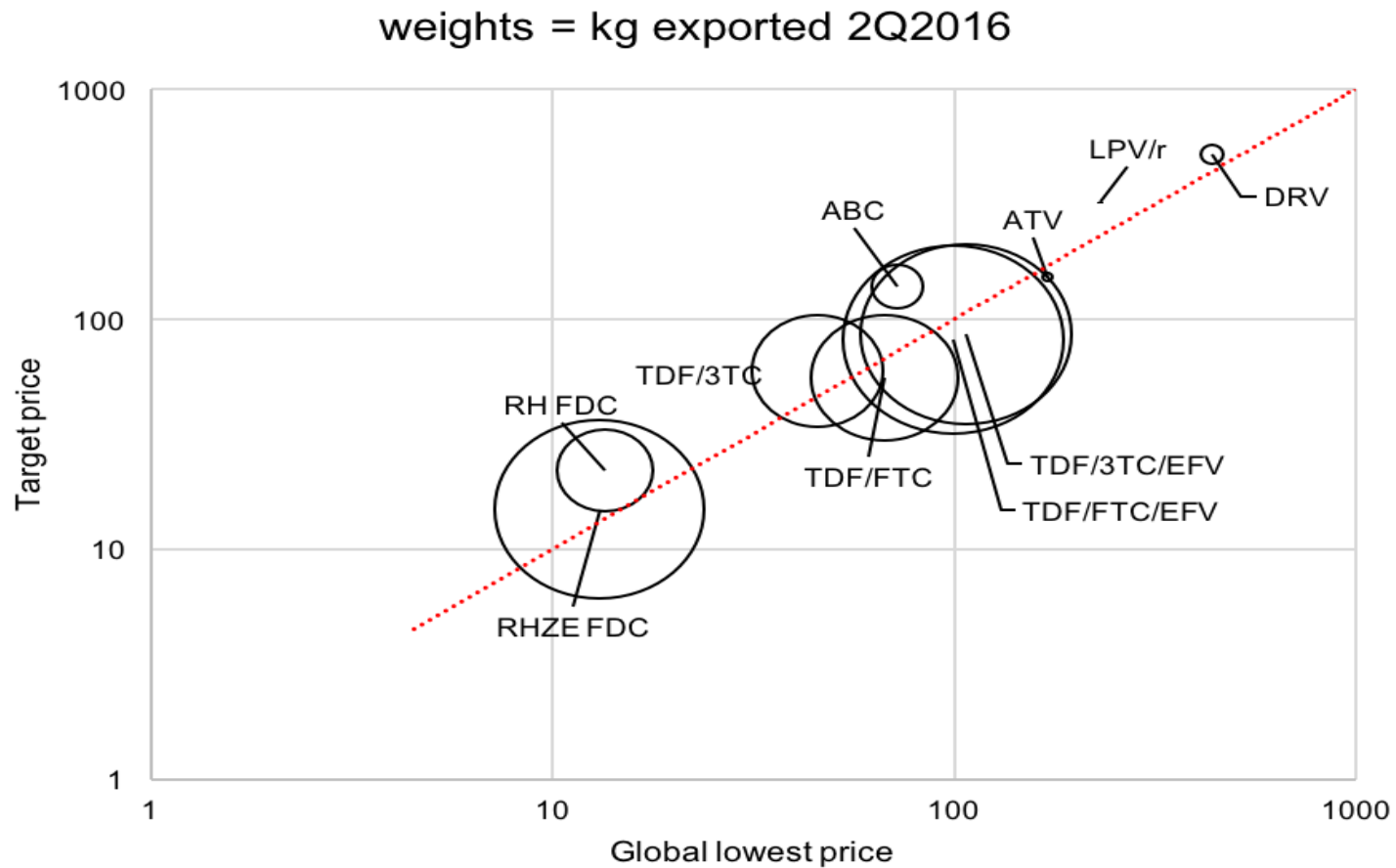
Database www.indiainfodrive.com shows exports of API from India to other countries, with costs per kilogram of API, for many drugs

From API cost/kg to target price

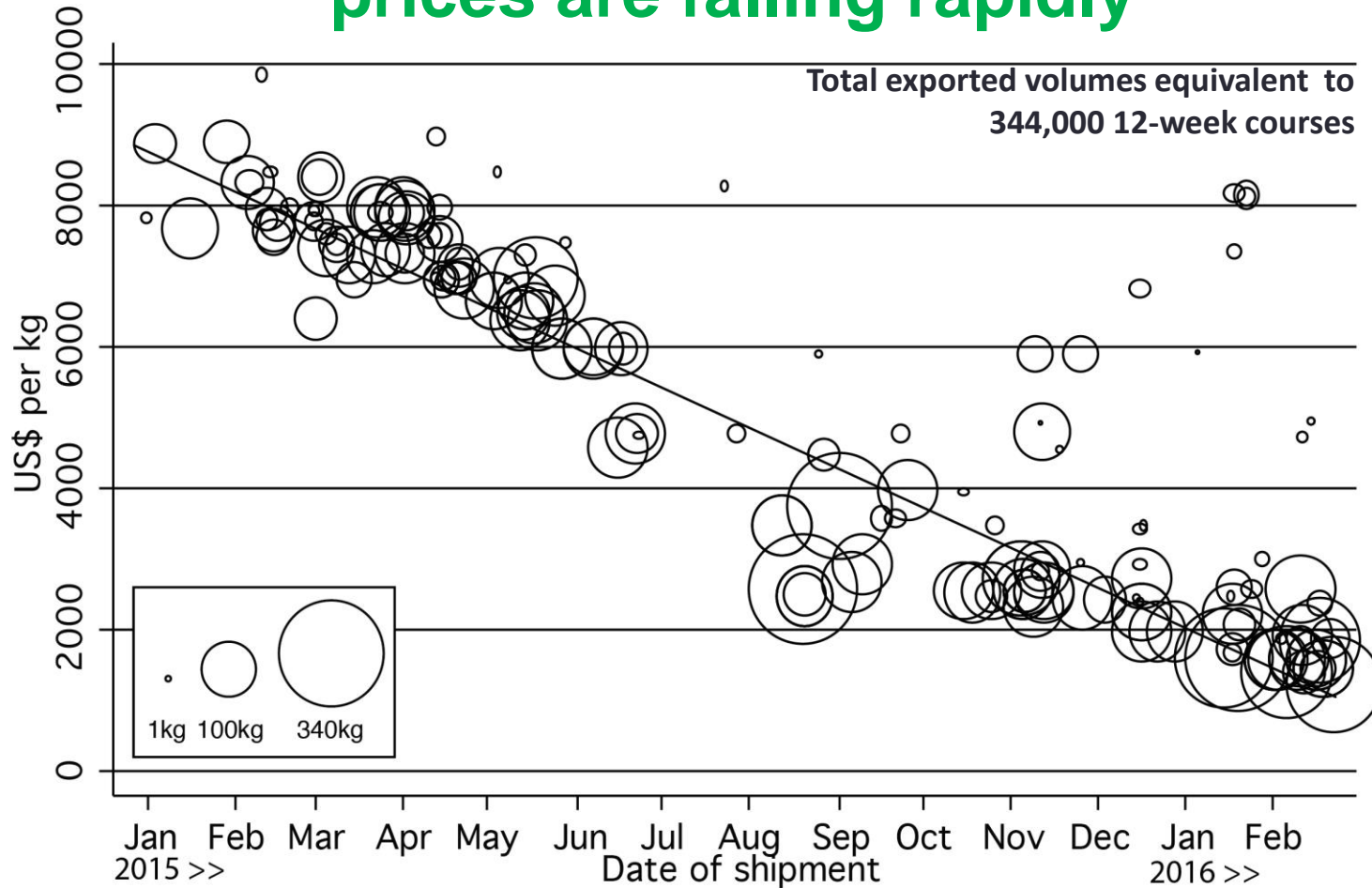
**API price/kg x grams per treatment course
+ \$0.01 / tablet,
+ \$0.35/month formulation
x 10-50% profit margin**

10% for mass-produced drugs – e.g. HIV, TB

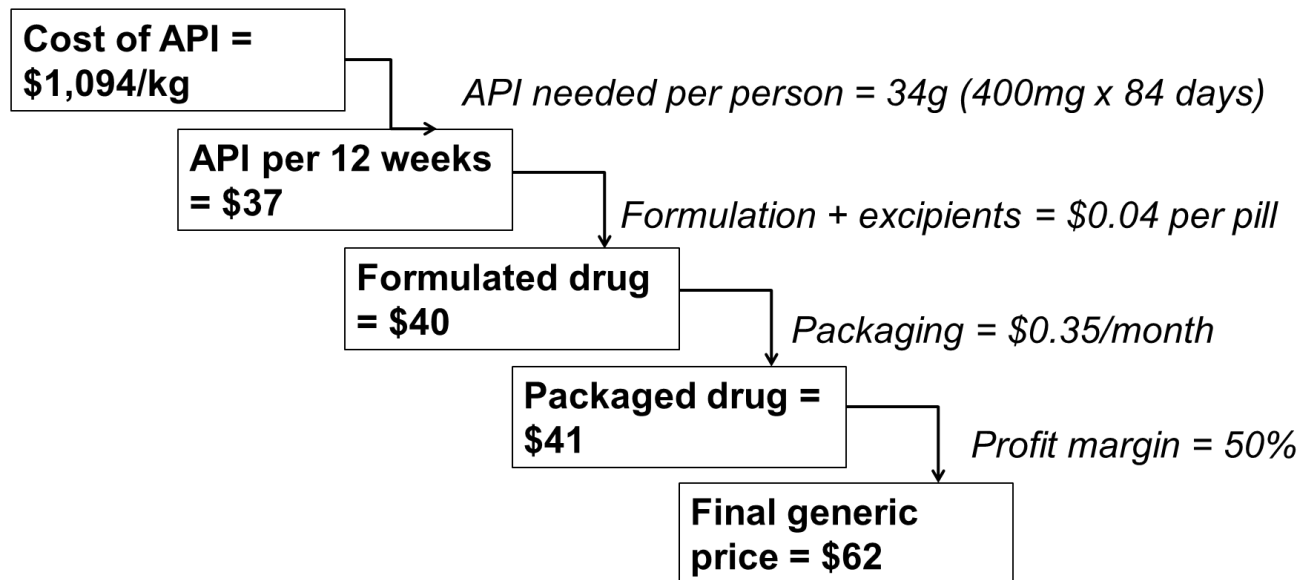
Target versus Global lowest prices: HIV and TB



Exports of sofosbuvir API from India prices are falling rapidly

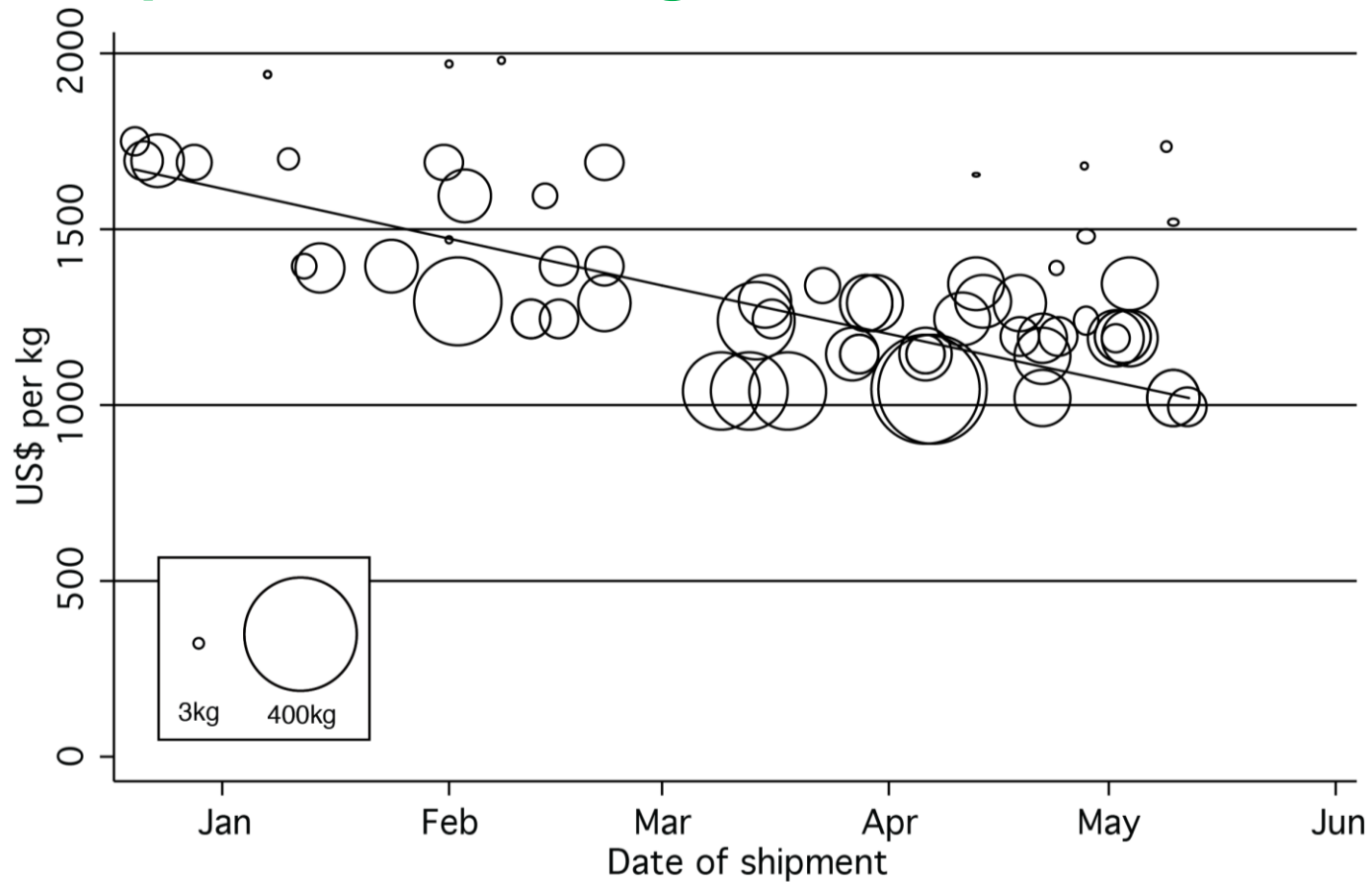


Target generic price of sofosbuvir (12 weeks)



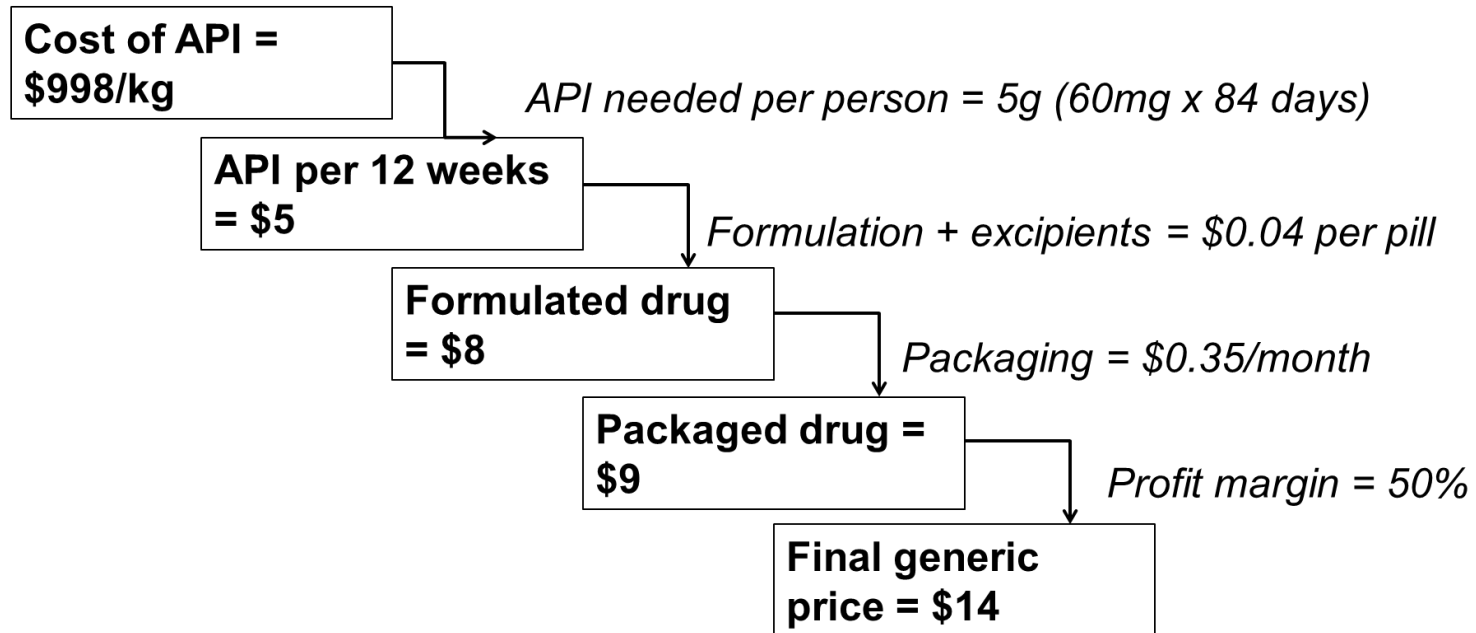
Gotham D, Barber M, Fortunak J, Pozniak A, Hill A.
Abstract number A-792-0516-01639, presented at AIDS2016, Durban.

Exports of daclatasvir API from India - prices also falling

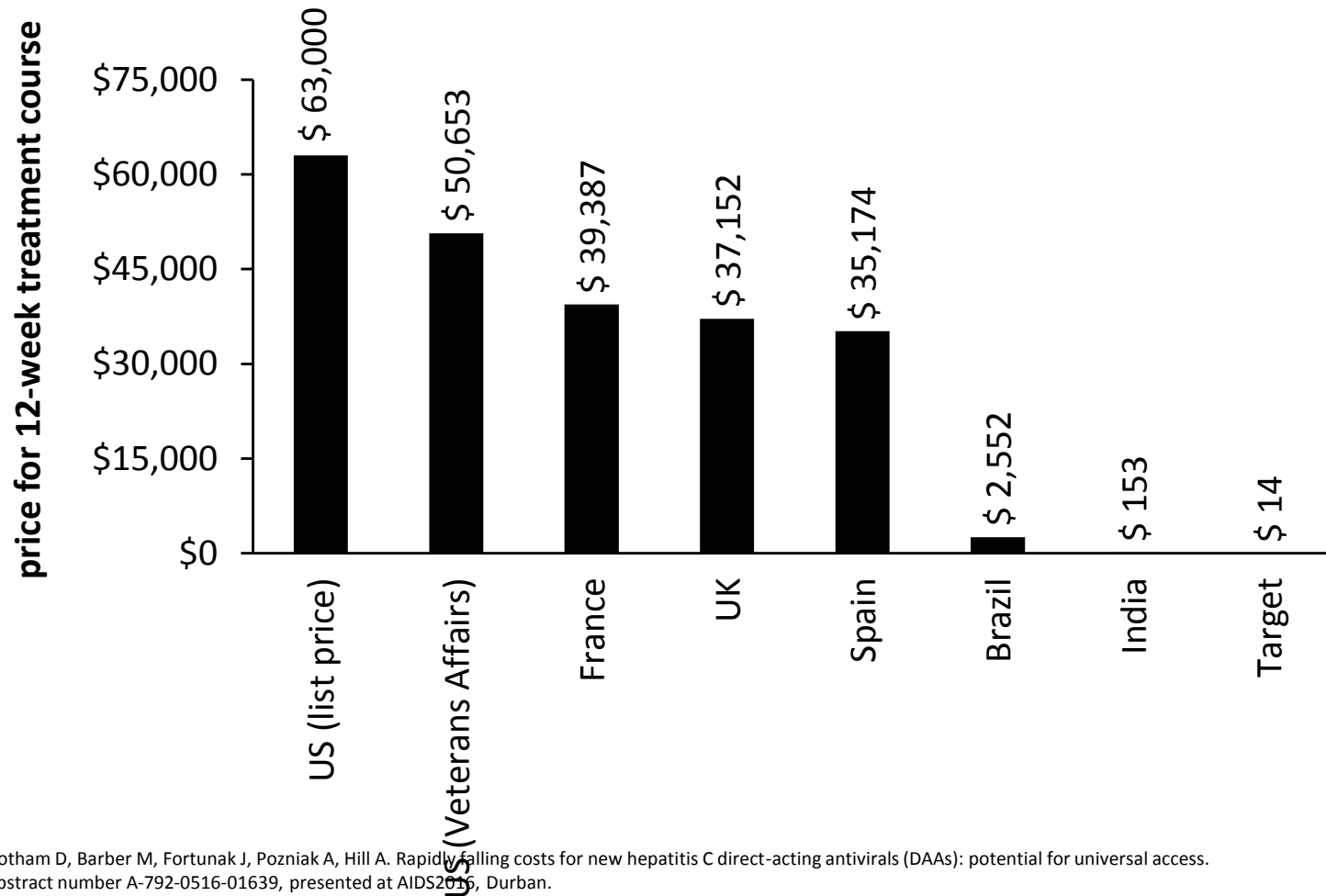


Gotham D, Barber M, Fortunak J, Pozniak A, Hill A. Rapidly falling costs for new hepatitis C direct-acting antivirals (DAAs): potential for universal access. Abstract number A-792-0516-01639, presented at AIDS2016, Durban.

Target generic price of daclatasvir (12 weeks)



Lowest prices of daclatasvir in selected countries



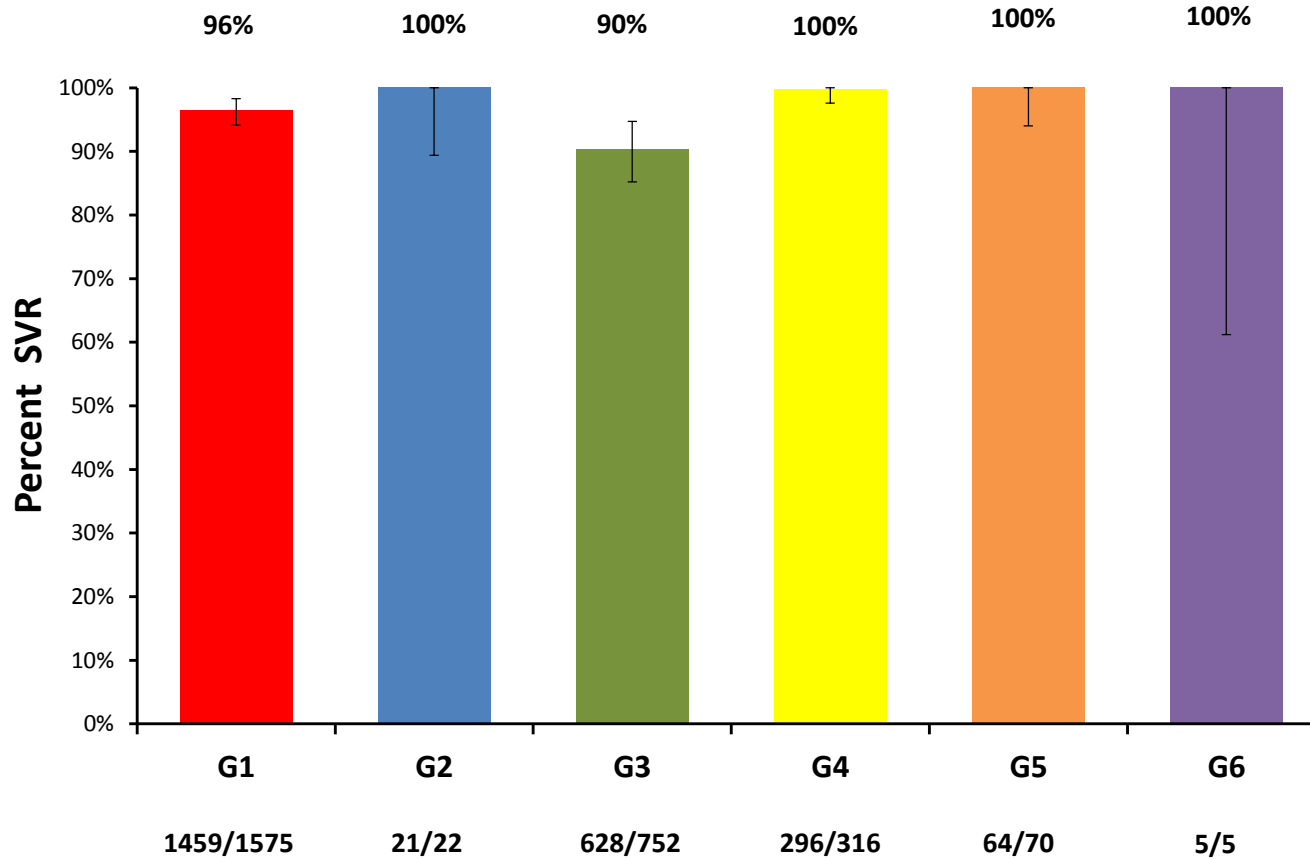
Gotham D, Barber M, Fortunak J, Pozniak A, Hill A. Rapidly falling costs for new hepatitis C direct-acting antivirals (DAAs): potential for universal access. Abstract number A-792-0516-01639, presented at AIDS2016, Durban.

HCV DAAs: costs of API, targets and current prices

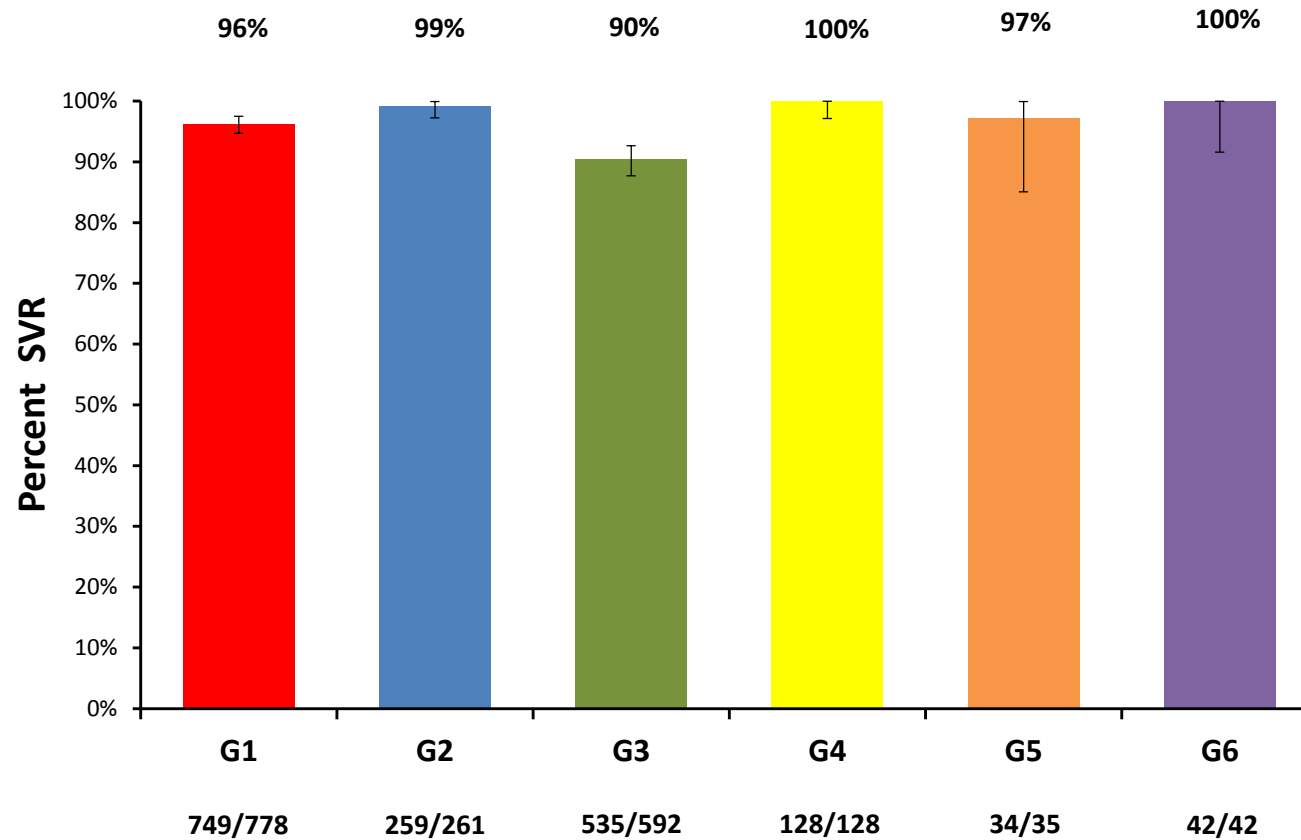
Drug	API cost/kg	Target price for finished product per treatment	Current lowest Indian market price	Current US price
Sofosbuvir (SOF)	\$1,094	\$62	\$324	\$49,860-84,000
Daclatasvir	\$998	\$14	\$153	\$50,653-63,000
Ledipasvir (LDV)	\$2,441	\$34	-	-
SOF+LDV	N/A	\$96	\$507	\$56,700-94,500
Velpatasvir (VEL)	\$8,900-11,700	\$119-154	-	-
SOF+VEL	N/A	\$181-216	-	\$74,760

Gotham D, Barber M, Fortunak J, Pozniak A, Hill A. Rapidly falling costs for new hepatitis C direct-acting antivirals (DAAs): potential for universal access. Abstract number A-792-0516-01639, presented at AIDS2016, Durban.

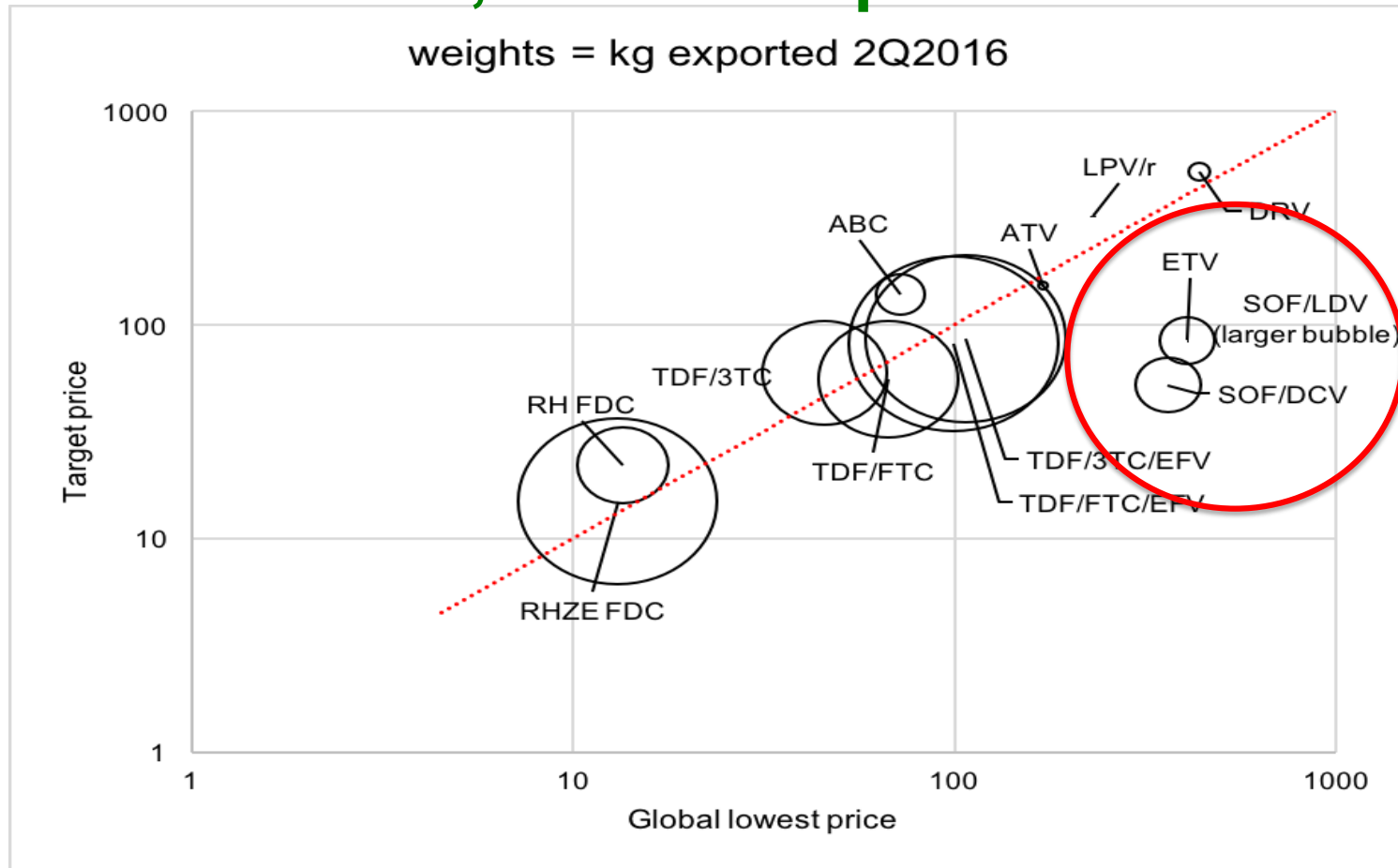
Sofosbuvir + Daclatasvir \pm RBV (12-24 wks) Percentage of people cured, by Genotype



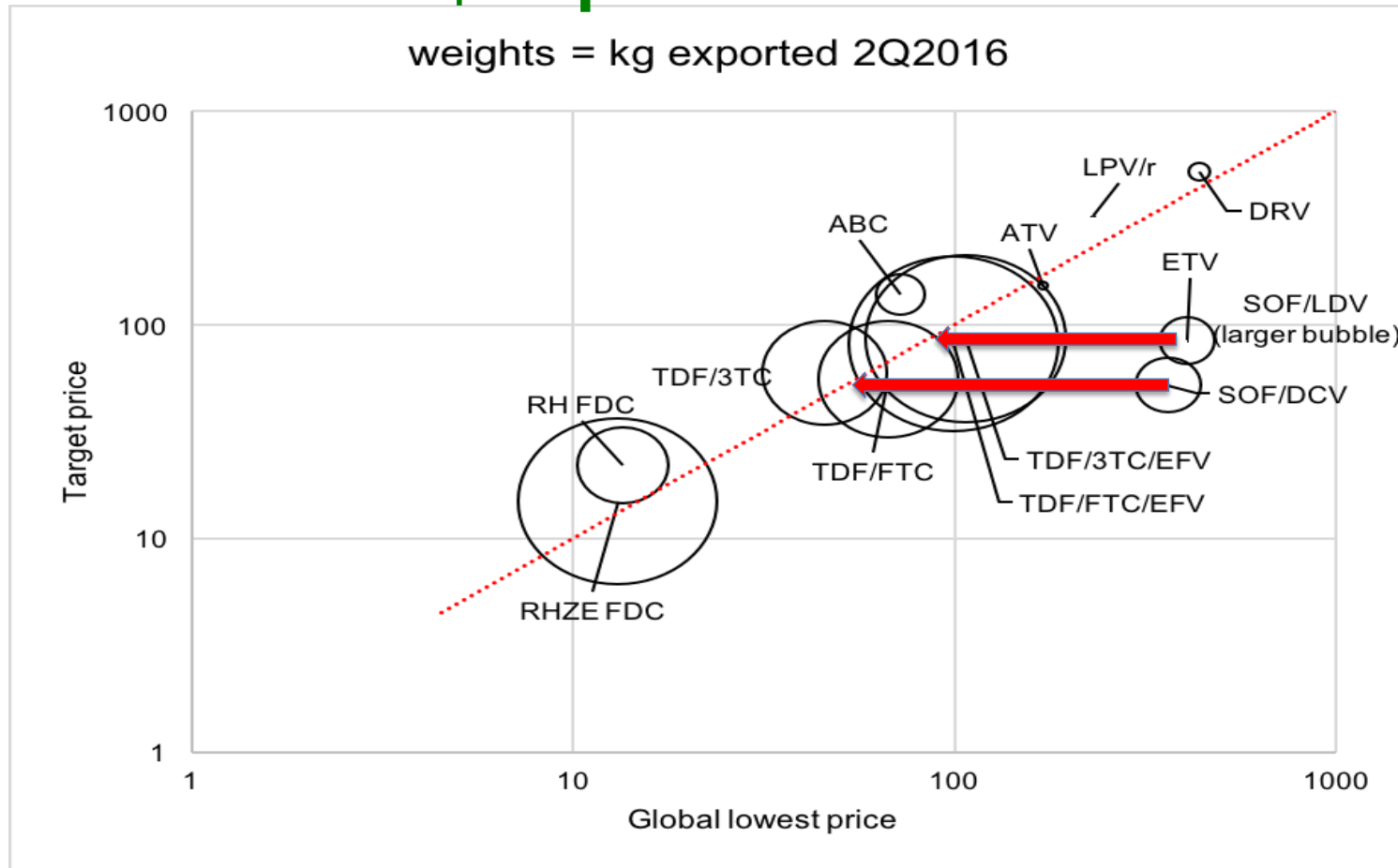
Sofosbuvir + Velpatasvir ± RBV (12-24 wks) Percentage of people cured, by Genotype



Target versus Global lowest prices: HIV, TB and Hepatitis



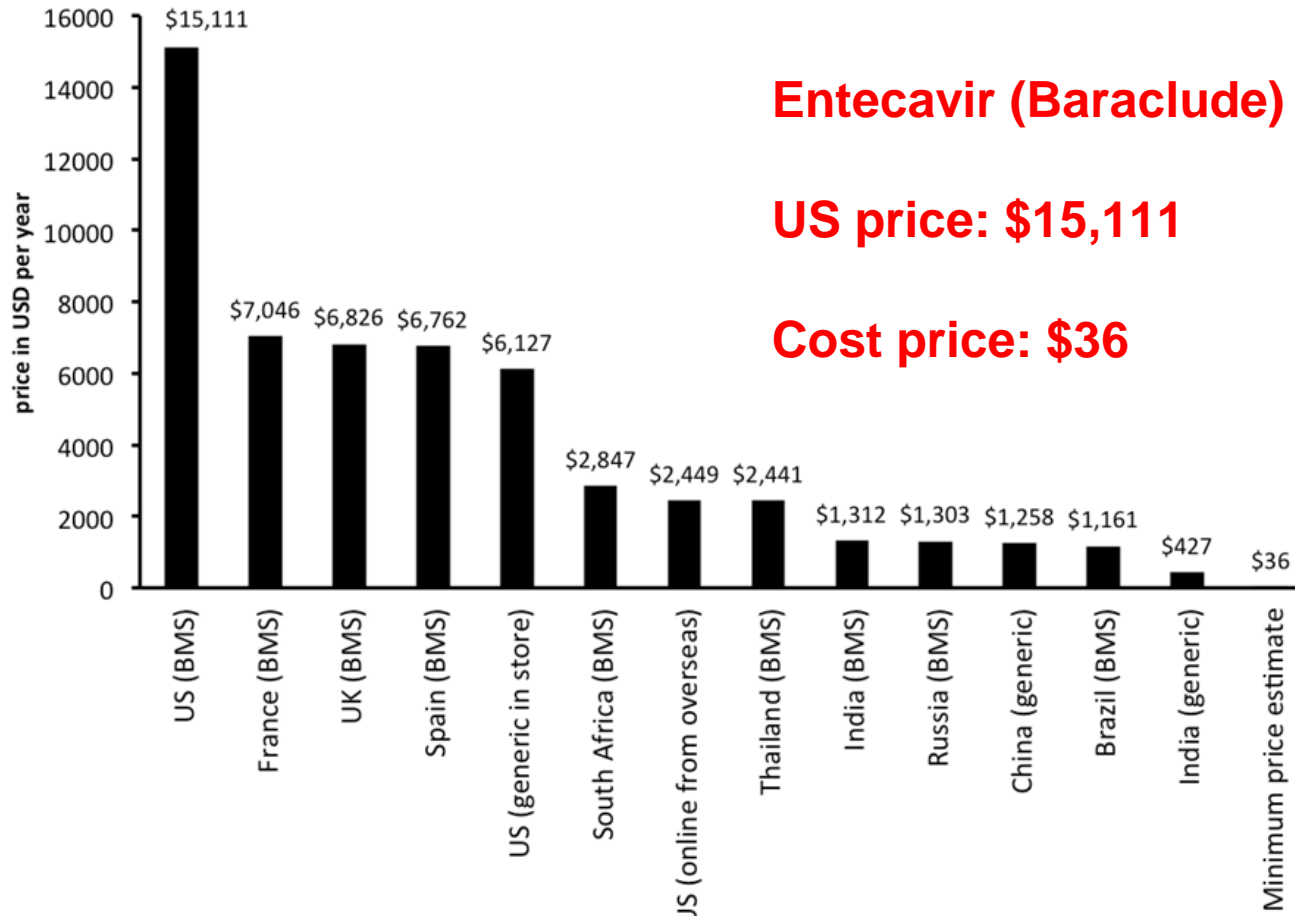
Mass produced HCV DAAs should fall to <\$90 per 12-week course



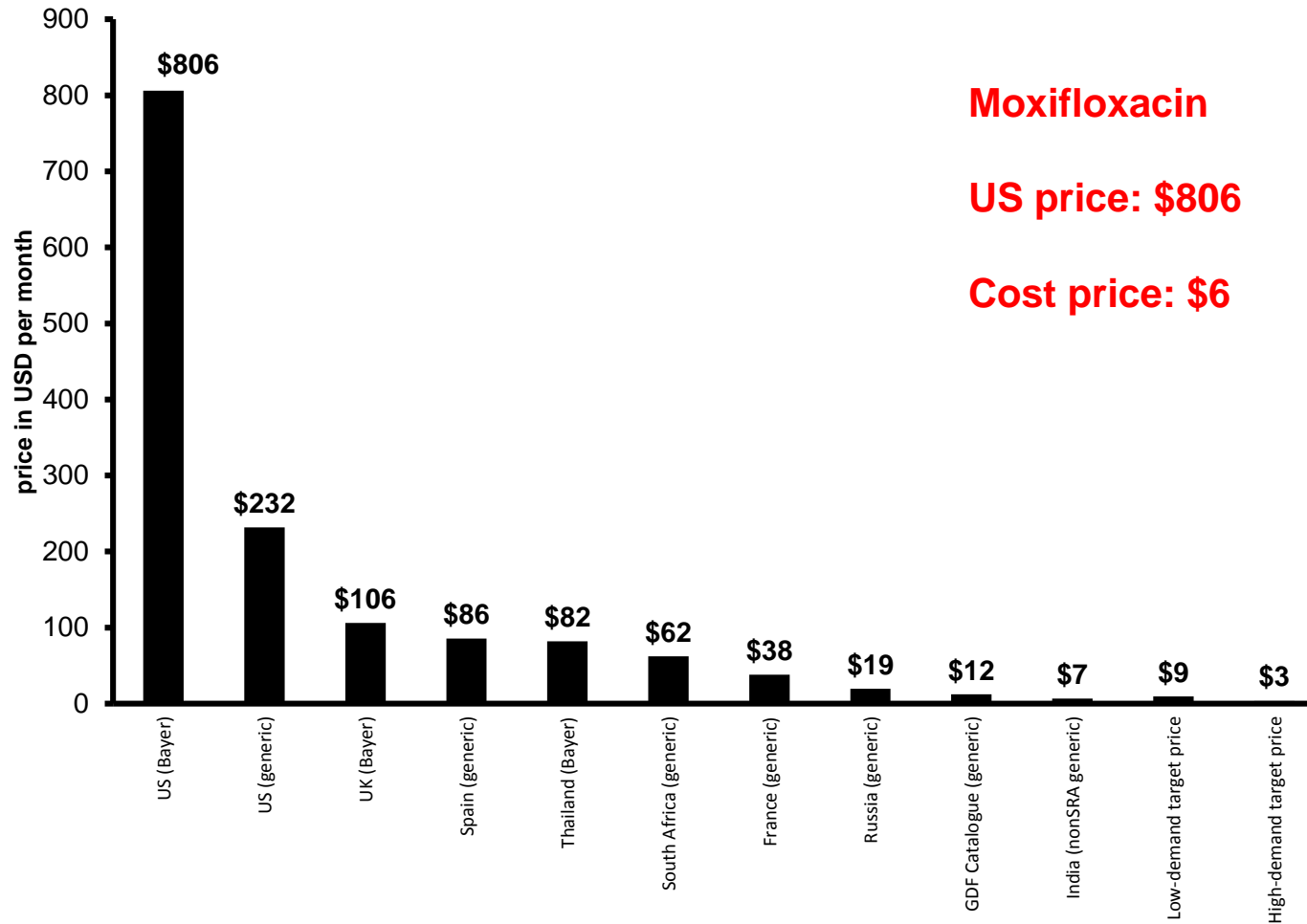
**Entecavir for Hepatitis B
one year's supply (0.2g)**



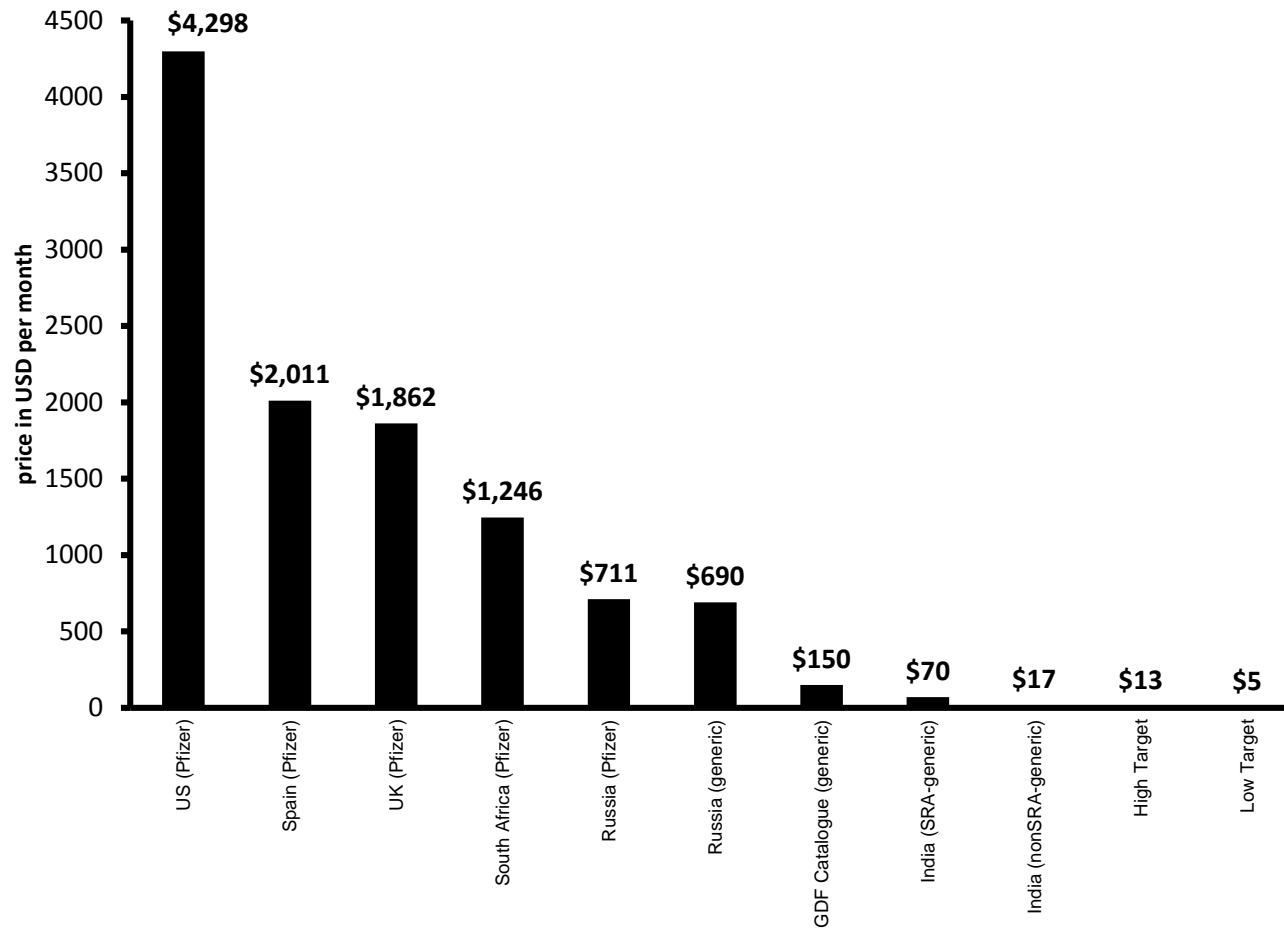
Entecavir for Hepatitis B cost per person/year by country



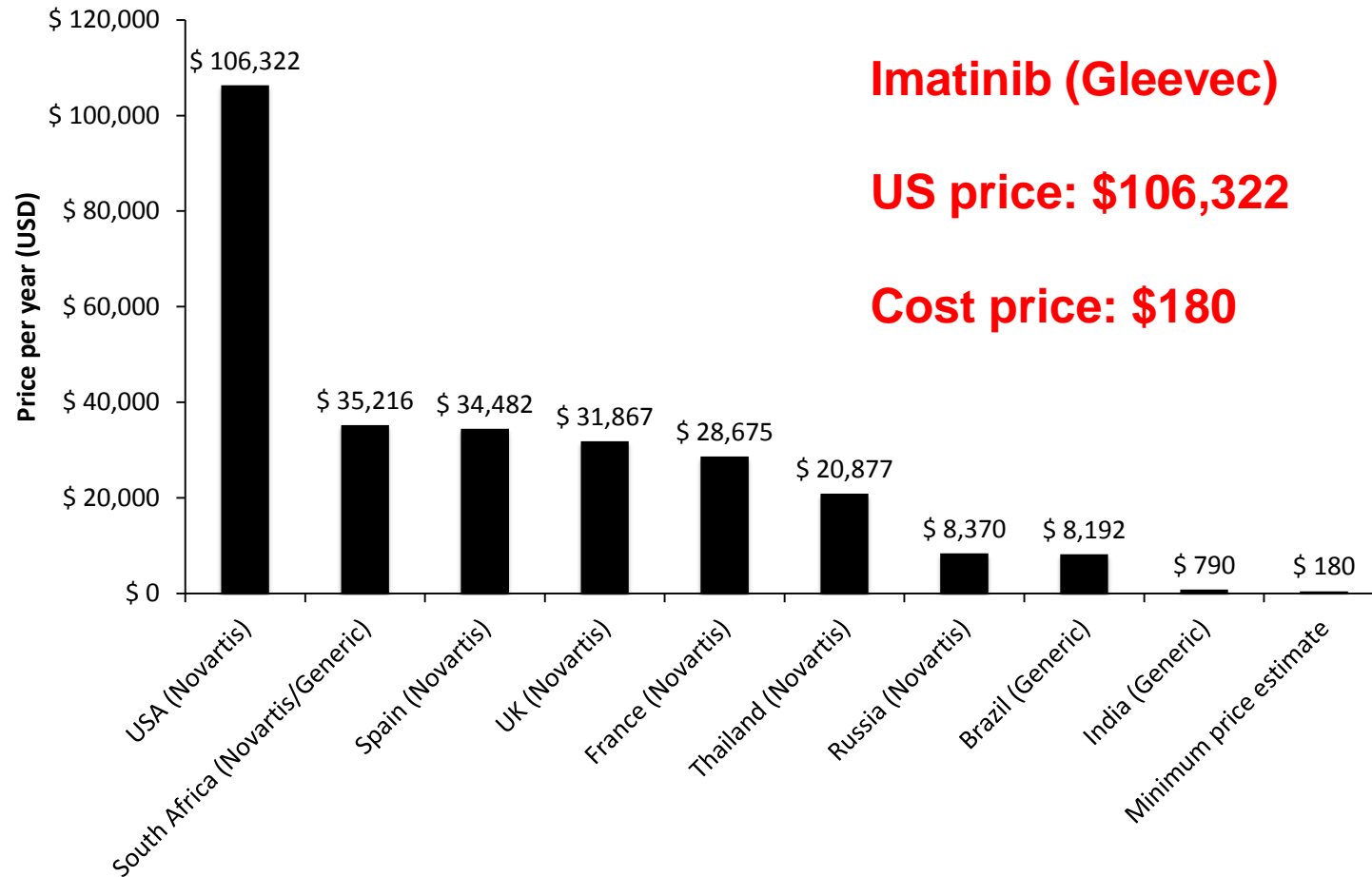
Price of Moxifloxacin by country



Price of Linezolid by country



Lowest available price for Imatinib (400mg) in selected countries



Drug	Major indication	Target price	Indian price (or other lowest	US price
Imatinib	Chronic Myeloid Leukaemia	\$172	\$803	\$107,799
Erlotinib	Non-Small Cell Lung Cancer	\$240	\$1932	\$79,891
Sorafenib	Renal Cell Carcinoma	\$1450	\$1332	\$139,138
Lapatinib	Breast Cancer	\$4020	\$18,603 (Thailand)	\$75,161
Cabazitaxel	Metastatic prostate cancer	\$666	\$30,810 (South Africa)	\$120,613
Dasatinib	Chronic Myeloid Leukaemia	\$15	\$1183 (Brazil)	\$10,408
Pazopanib	Renal Cell Carcinoma	\$116	\$1463 (Brazil)	\$8412
Abiraterone	Metastatic prostate cancer	\$3589	\$27,570 (Thailand)	\$85,877
Gefitinib	Non-Small Cell Lung Cancer	\$16	\$139	\$6728
Capecitabine	Metastatic Colorectal Cancer	\$73	\$126 (Latvia)	\$1941

The new \$90 \$90 \$90

There could be standard prices for HIV, Hepatitis B and Hepatitis C in low/middle income countries.

- < \$90 for 12-weeks course of HCV DAAs – SOF/DCV
- < \$90 per year to treat HIV – TDF/3TC/EFV
- < \$90 per year to treat Hepatitis B – TDF/3TC

Widespread access to generics

When patents have expired, drugs should be available worldwide, at close to the cost of production

However, few national health services know these costs

Widespread over-charging

Pricing transparency is needed (WHO panel)

Lower costs for generics could drive down patented drug prices in the same therapeutic area

Paracetamol – UK NHS

**NHS spends £87m on paracetamol...
at 20 TIMES the high street cost:**

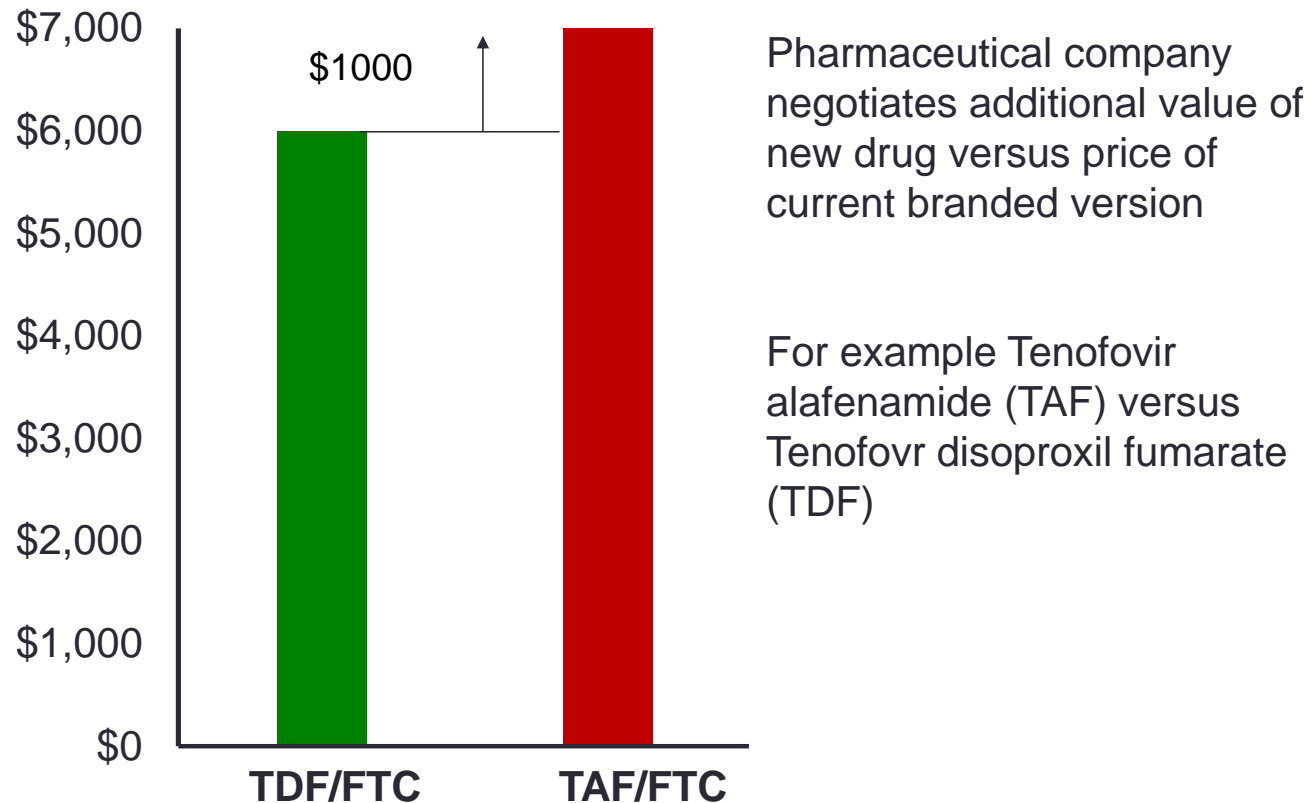
**Doctors wrote 22.9m prescriptions
last year at an average cost of £3.83
each**

**Average prescription cost 20 times
price of 25p box from supermarket**

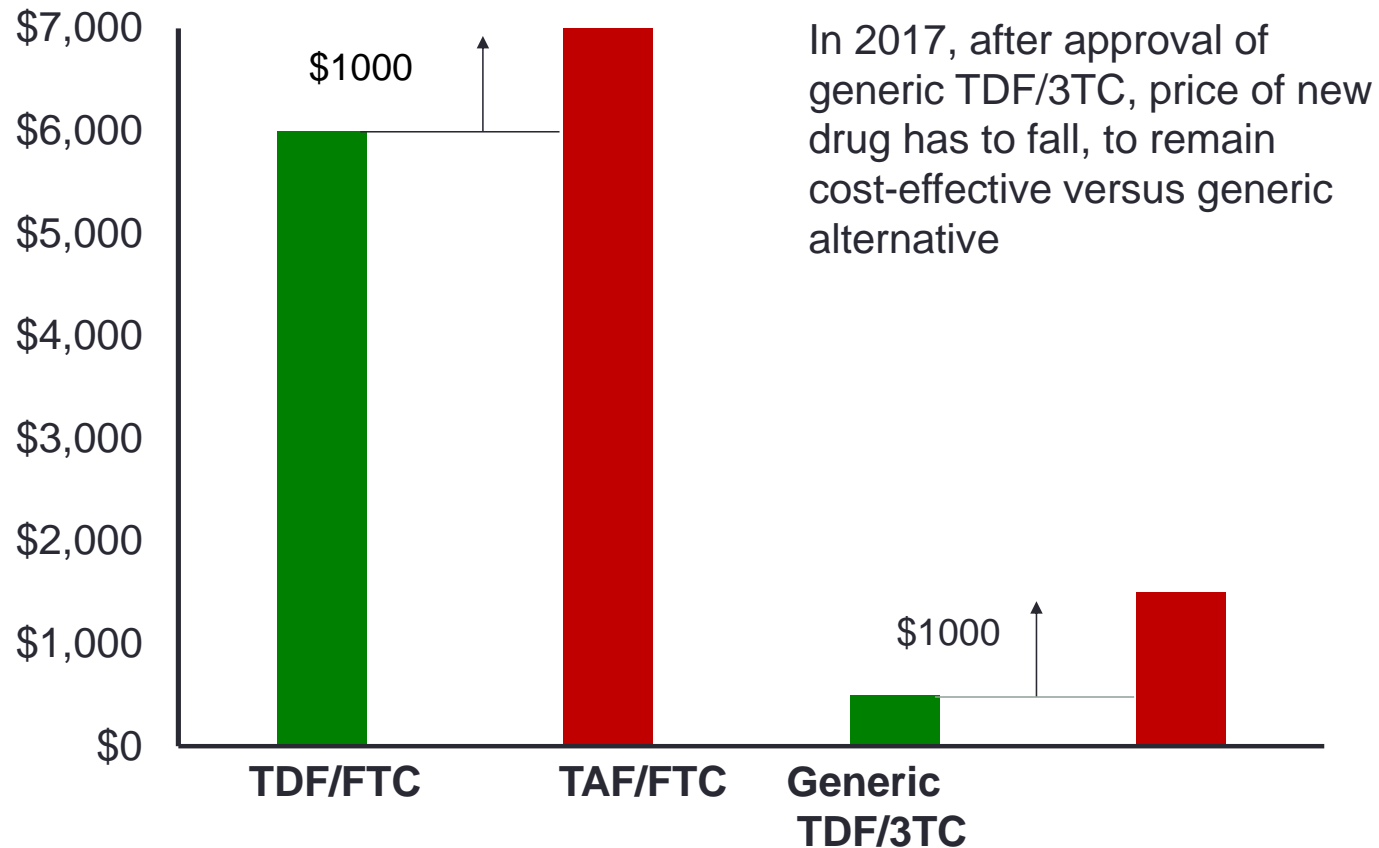


Source: The Daily Mail, 28th July 2016

Value of patented drugs before generics have been approved



Value of patented drugs after generics have been approved



Options if drugs still patented - Voluntary licenses

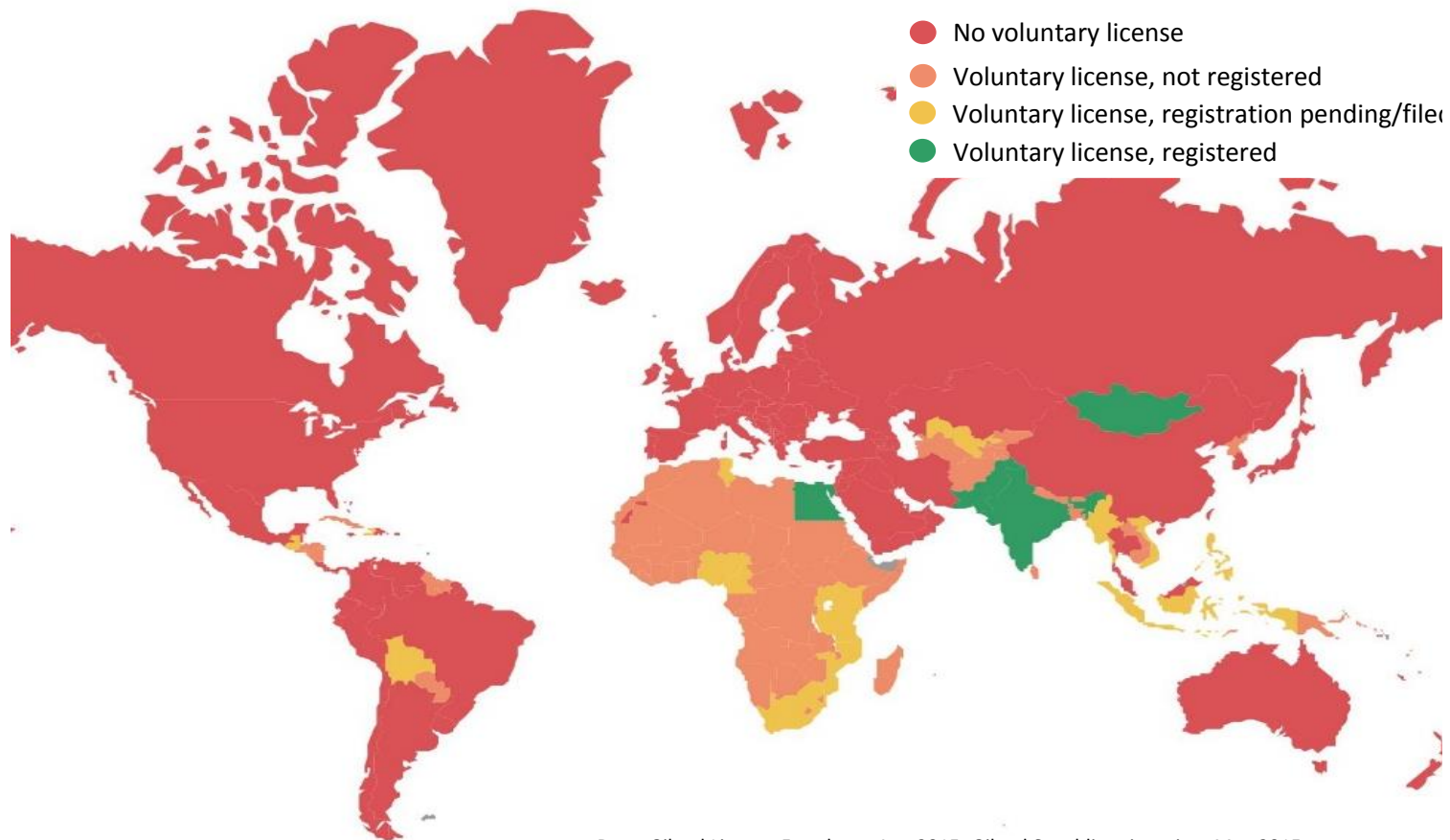
Some pharmaceutical companies allow cheap generics to be sold in certain low and middle income countries, with voluntary licenses

China, South America, Russia and Eastern European countries are not included in most of these agreements. As a result, prices in these countries can be unaffordable

Other countries may have voluntary licenses but no registration of the drug – so it is not available

Not all companies set up these licenses

SOFOSBUVIR VOLUNTARY LICENSE & REGISTRATION



Data: Gilead License Factsheet, Aug 2015. Gilead Sovaldi registration, May 2015.

Other options if drugs still patented

“Flat rate pricing”- single large payment for unlimited use
Can only be organised in countries with highly centralised procurement – e.g. Australia, HCV DAAs

Compulsory licensing – a country declares a national health emergency and buys drug from generic supplier
(e.g. ciprofloxacin in USA after Anthrax scare in 2001)

**If drug prices were
lower, could
pharmaceutical
companies still afford
to do R&D?**

Gilead sales and profits

Cumulative sales of
sofosbuvir and
Harvoni to end
2015:

\$31.5 billion

Profits in 2015:

\$18 billion



Pharma profits and tax avoidance

Company	Profits held offshore	US Tax avoided
Pfizer	\$69 billion	\$20 billion
Merck	\$57 billion	\$16 billion
Johnson & Johnson	\$51 billion	\$14 billion
Amgen	\$26 billion	\$9 billion
Abbott	\$24 billion	\$7 billion
BMS	\$24 billion	\$7 billion

Source: US Citizens for Tax Justice, 2016

Gilead: \$10 billion in tax avoidance

Washington Post, July 13 2016:

“The drug company that shocked the world with its prices dodged \$10 billion in taxes”

\$10 billion is enough money to treat 100 million people with HCV, at the cost price of \$100 each



Hepatitis C buyers clubs

There are many companies willing to export generic DAAs into Europe / North America

Generic sofosbuvir can be bought online in 15 minutes, for approx. \$1200 per course. Prices falling rapidly.

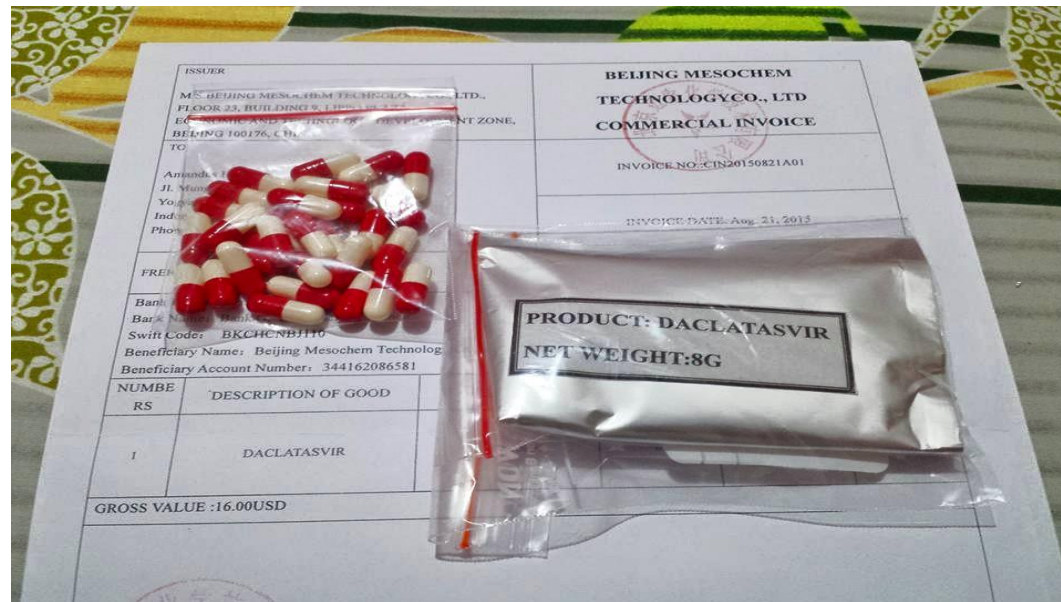
But what about quality?

We need systems in place to ensure that supplies are from accredited generic manufacturers

The legal basis of personal importation

- Article 60 of TRIPS - De Minimis Imports – states:
 - *Members may exclude from the application of the above provisions small quantities of goods of a non-commercial nature contained in travellers' personal luggage or sent in small consignments*
- In line with Article 60 most countries allow some form of personal medication importation
- Medicines are being sent from India and Bangladesh to countries all over the world

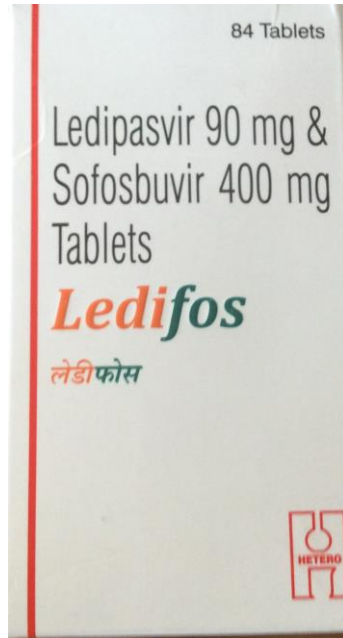
2015: daclatasvir imported into Australia from Mescochem, China



2016: Generics from India and Bangladesh



**Incepta
(Bangladesh)
Twinvir
SOF/LDV**

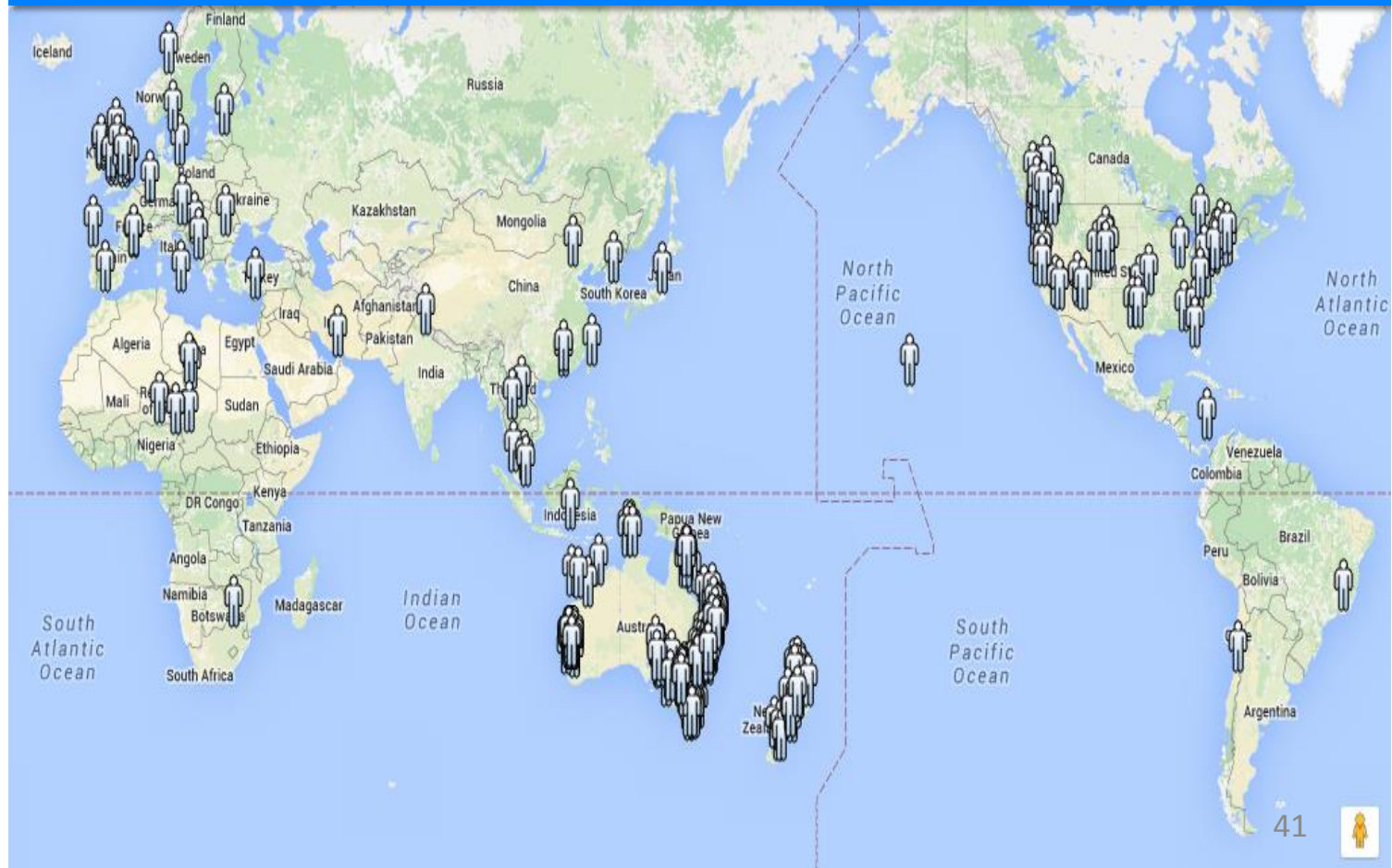


**Hetero
(India)
Ledifos
SOF/LDV**

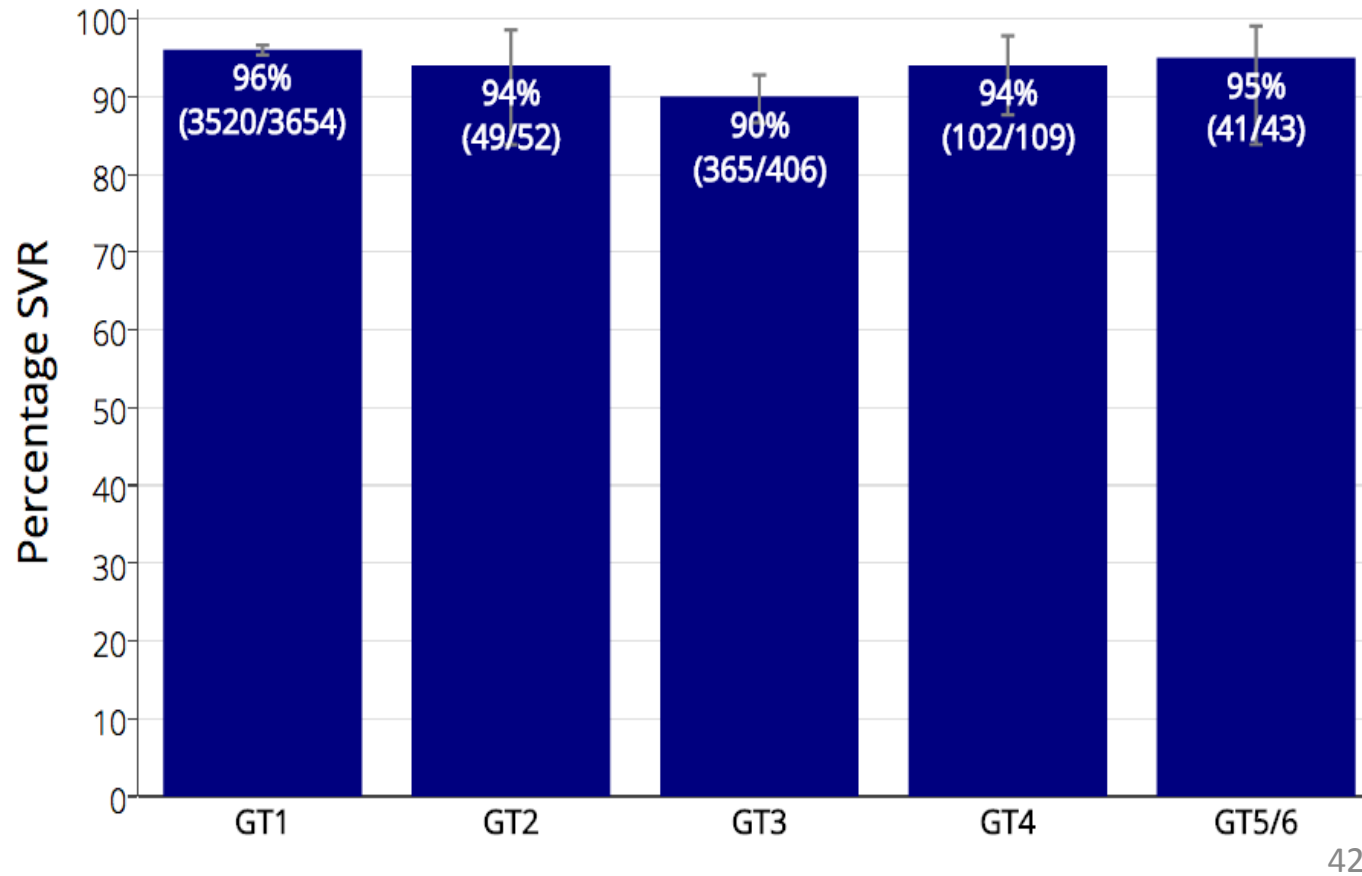


**Cipla
(India)
HepcvirL
SOF/LDV**

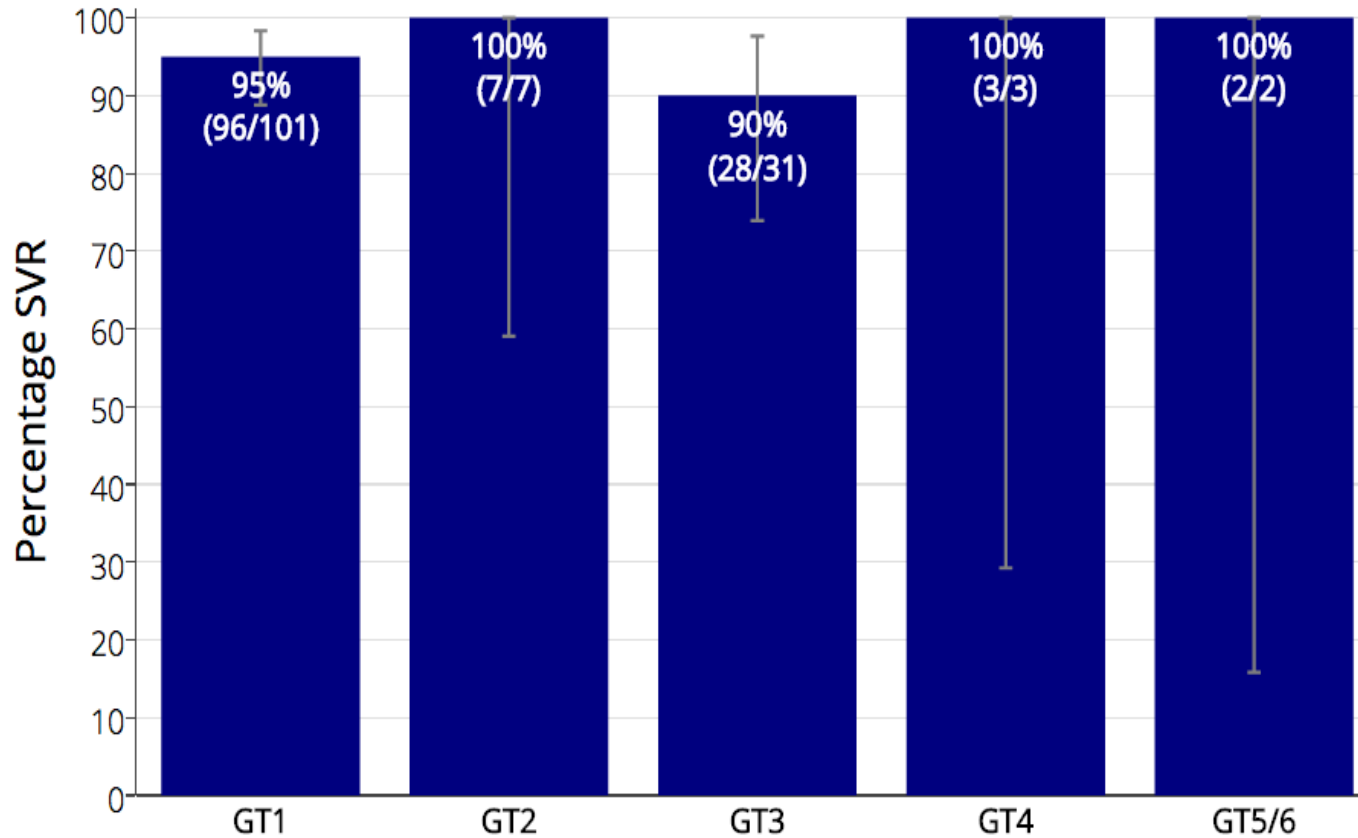
The FixHepC Buyers Club (www.fixhepc.com)



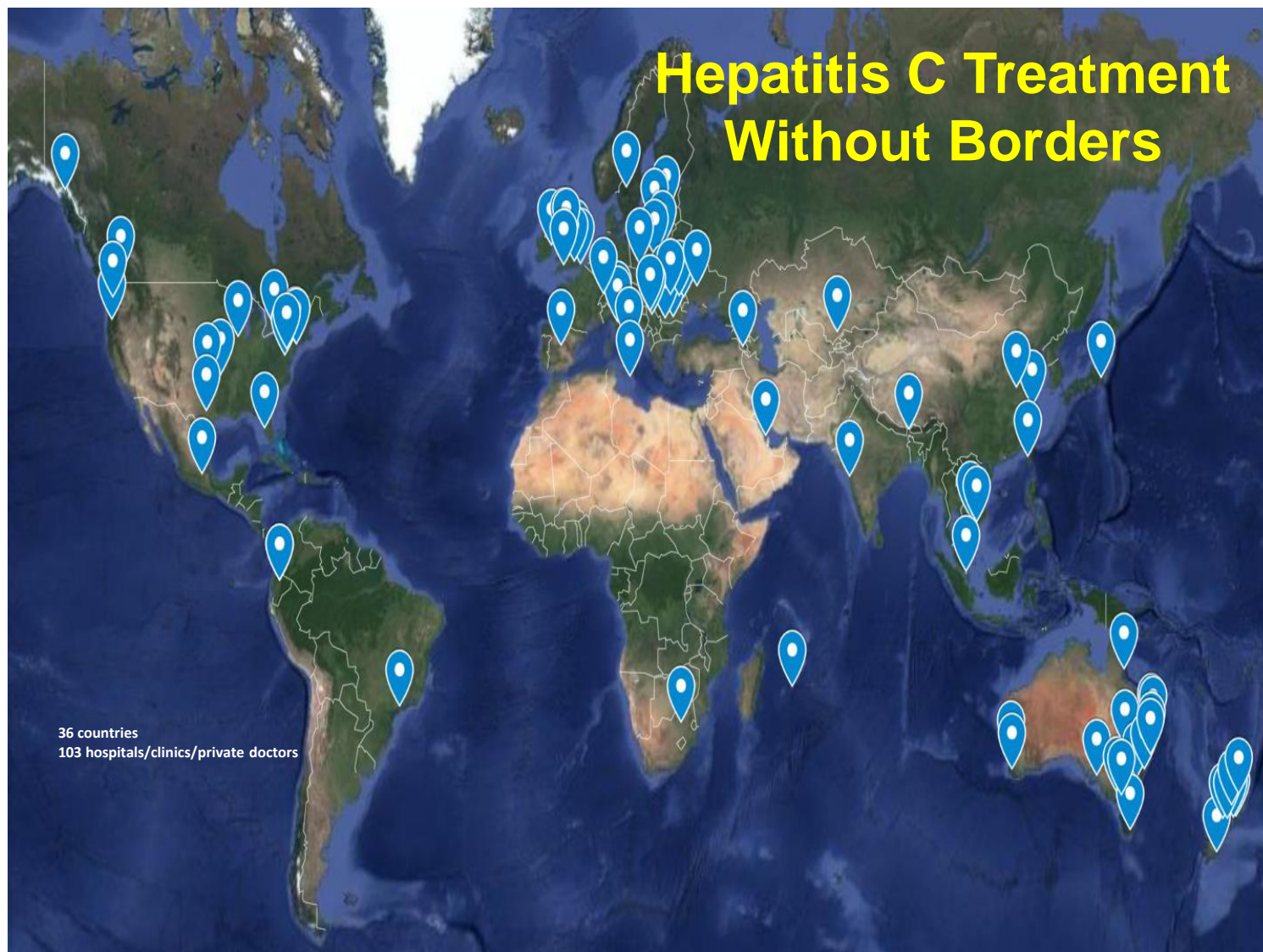
Published SVR12 Results SOF+LDV and SOF+DCV



REDEMPTION-1 Overall SVR4 Results For Generics



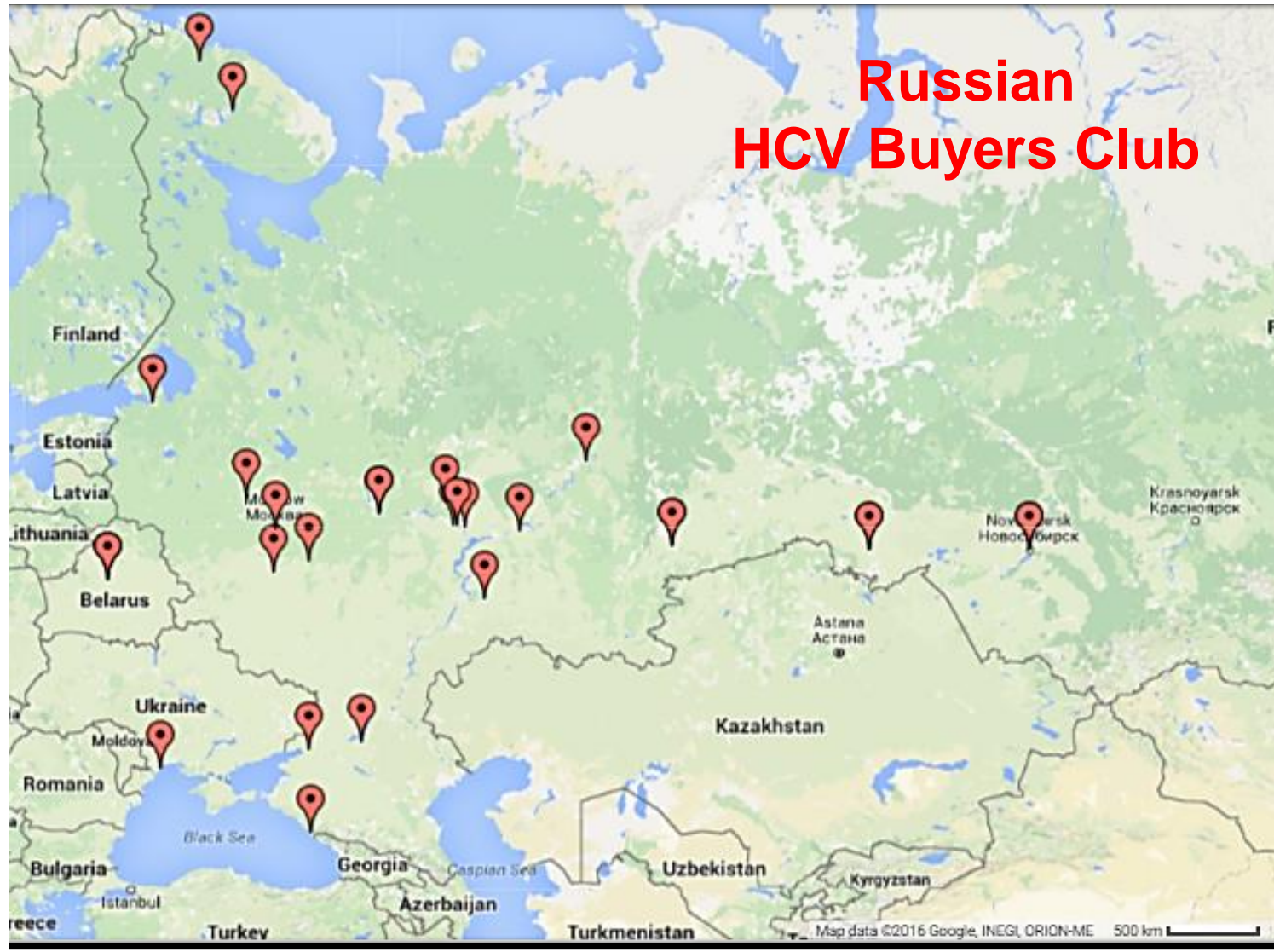
Note: Some small percentage loss of SVR is expected during the SVR4 to SVR12 period



South East Asian HCV Buyers Club



Russian HCV Buyers Club



Conclusions - 1

There is now the potential to eliminate Hepatitis B and Hepatitis C using drugs which are cheap to manufacture.

US \$10 billion would be enough money to treat everyone with chronic HCV worldwide.

Hepatitis B can be treated with generics costing less than \$90 per person-year – patent expiry 2017/8.

By 2017/8, HIV could be treated with generics costing <\$90 worldwide (TDF/3TC/EFV).

Conclusions - 2

Elimination of disease is only affordable if drugs can be accessed at low prices, within national health budgets

We need new approaches to funding mass treatment programmes:

Flat pricing – unlimited treatment for a fixed price

Voluntary licenses – from all pharma companies

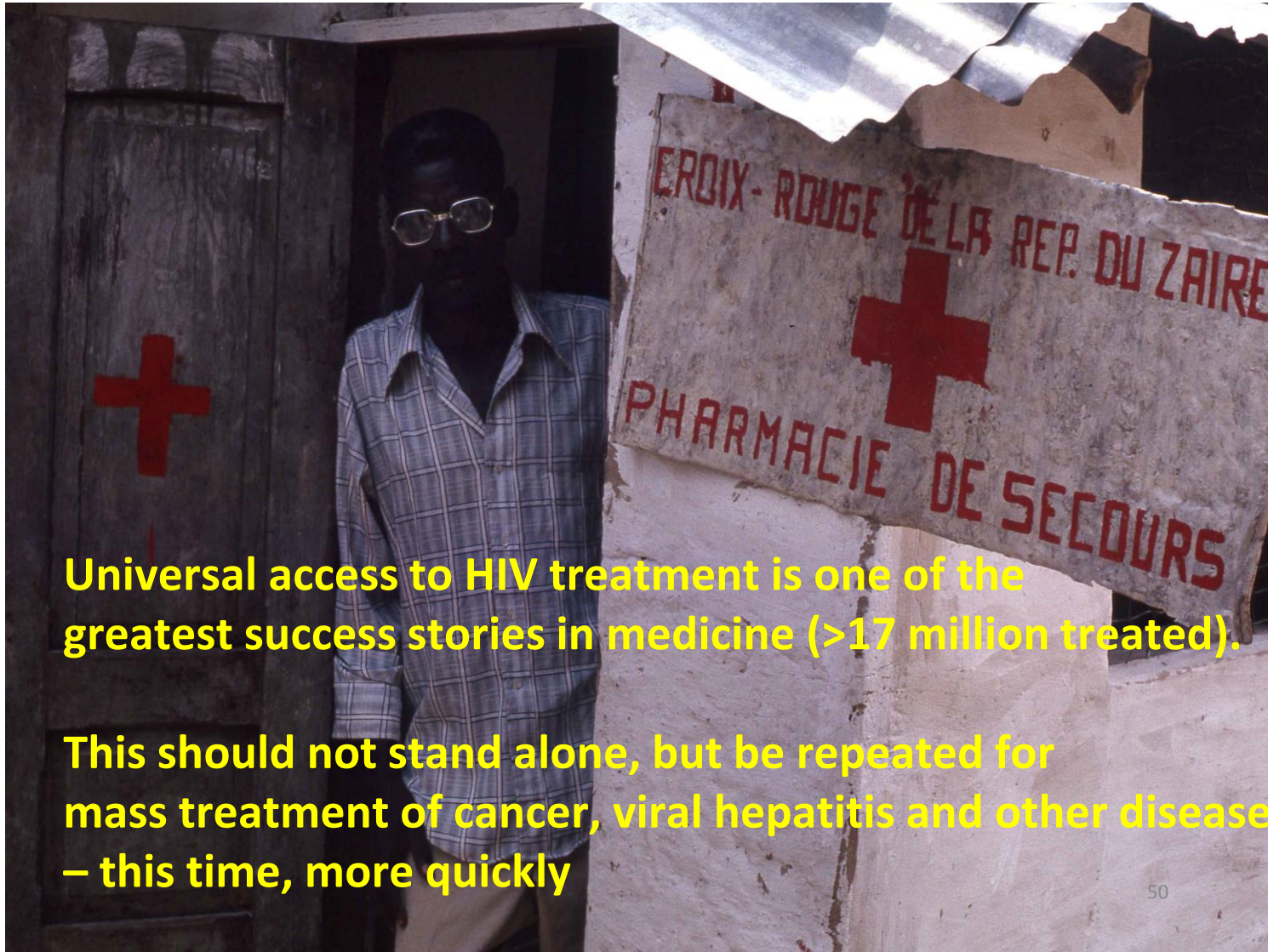
Most drugs are fundamentally cheap to produce, so pharmaceutical companies can still make large profits from selling to large numbers of people at low unit prices.

Conclusions - 3

If pharmaceutical companies refuse to lower prices, we need back-up mechanisms to ensure access:

- Compulsory licenses
- Buyers Clubs
- Windfall taxes on tax avoidance

Recovery of Gilead's avoided tax alone would provide sufficient funds to treat everyone with Hepatitis C worldwide.



Universal access to HIV treatment is one of the greatest success stories in medicine (>17 million treated).

This should not stand alone, but be repeated for mass treatment of cancer, viral hepatitis and other diseases – this time, more quickly

Thanks to:

St Stephens AIDS Trust

Anton Pozniak
Marta Boffito

Global Health

Dzintars Gotham
Vicky Houghton-Price
Jake Levi
Roxanna Korologou-Linden
Bryony Simmons
Rachel Smith

Howard University, USA

Joe Fortunak

Hepatitis C Buyers Clubs:

Greg Jeffreys
– HCV Treatment without borders

James Freeman – FixHepC

Sergey Golovin and Julia Dragunova –
- ITPC Russia

Giten Khwairakpan
- SE Asian Buyers Club

- And all the patients who took these
generic DAAs especially in the early
days