

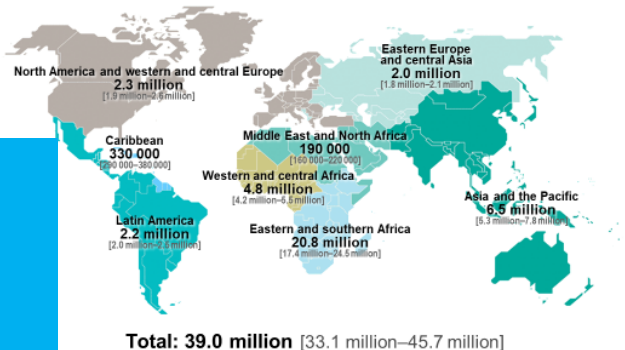
# New Product Pipelines for HIV, Hepatitis and STIs

Meg Doherty, MD, MPH, PHD  
Director Global HIV, Hepatitis and STI Programmes  
WHO, Geneva  
27 Nov 2023

# What are priorities for HIV, Hepatitis and STI health technologies

## Different but intersecting epidemiologies of diseases that affect the poor

Adults and children estimated to be living with HIV | 2022



**HIV -> 39 m**  
 1.5 m new infections/yr  
 630,000 deaths  
 29 m on ART  
 86% /76% /71%

Incident cases of four curable STIs among adults (15–49 years old), by WHO region, 2020



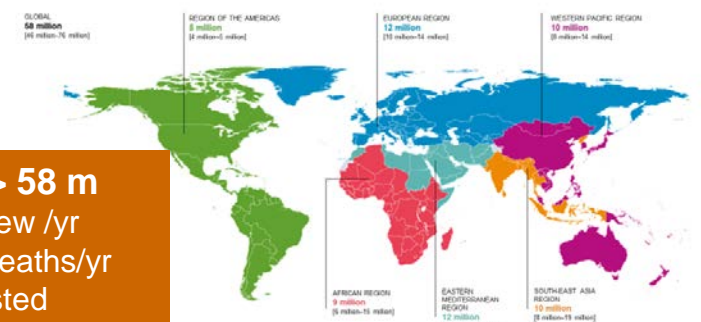
**STI -> 374 m new/yr**  
 1.0 m new infections/Day  
 Testing & Txt coverage unknown

Burden of chronic hepatitis B infection (HBsAg positivity) by WHO Region, 2019



**HBV-> 296 m**  
 1.5 m new/yr  
 800K deaths  
 < 10% tested  
 < 2% on txt

Burden of chronic hepatitis C viraemic infection by WHO Region, 2019



**HCV -> 58 m**  
 1.5 m new /yr  
 300 K deaths/yr  
 21% tested  
 13% txt

# What are priorities for diagnostics health technologies to fight PRDs

**PoC rapid diagnostics** – ideal → low cost, high quality RDTs for diagnosis essential for HIV, STIs and viral hepatitis

## HIV

- **Professional use RDTs** already available, large choice of PQ RDTs from ~US\$0.5 ✓
- **HIVST** - 5 Blood-based and 1 oral fluid-based tests WHO PQ (WHO HIVST) PQ products available for US\$1.00-3.10 through GF ✓
- **Dual HIV/syphilis tests** - 3 dual HIV/syphilis rapid WHO PQ – from \$0.95 per test through GF ✓
- **POC tests for invasive fungal infections seen with advanced HIV disease**, as there are no PQ'd tests for cryptococcus, and no commercial POC tests yet for histoplasmosis, talaromycosis, etc.

➤ *Pipeline for products remains strong & Local/African manufacturing under-development for HIV RDTs*

## STIs

- 2 WHO PQ Syphilis RDT ✓
- WHO recommends RPR or VDRL – **no tests PQed**
- WHO recommends Dual treponemal/non-treponemal RDTs - **no tests**
- WHO recommends Syphilis self-testing - **no tests available**
- RDTs for CT and GC – **no tests available**

## Viral hepatitis

- WHO recommends HCV ST – **no tests available**
- WHO likely to recommend HBV ST – **no tests available**
- Hepatitis D Virus – **RDTs would be an advantage**

### The FUTURE- Multiplex technologies

For triple eliminations (HIV, syphilis and HBV) and products for key populations (LA-OAT & Self-tests for HCV, HBV)

# What are priorities for prevention health technologies to fight PRDs

**Biomedical HIV prevention** – ideal → low cost, simple to administer, no AEs, safe in PBFW, no DR issues

## Oral PrEP

- **TDF based oral PrEP (daily and ED)** recommended by WHO, on PQ list, generics available, low cost✓
- **DVR monthly ring** recommended by WHO, on PQ list, starting to be available✓ significantly more costly than oral PrEP
- **DVR 3 monthly ring** – in trials – will recue costs
- **CAB-LA bi-monthly IM injection** recommended by WHO, on PQ list, generic production planned✓ significantly more costly than oral PrEP
- **LEN – 6 monthly SC injection** – in phase 3 trials
- **Oral monthly pill** – phase 2 trial starting soon

## Multi purpose technologies

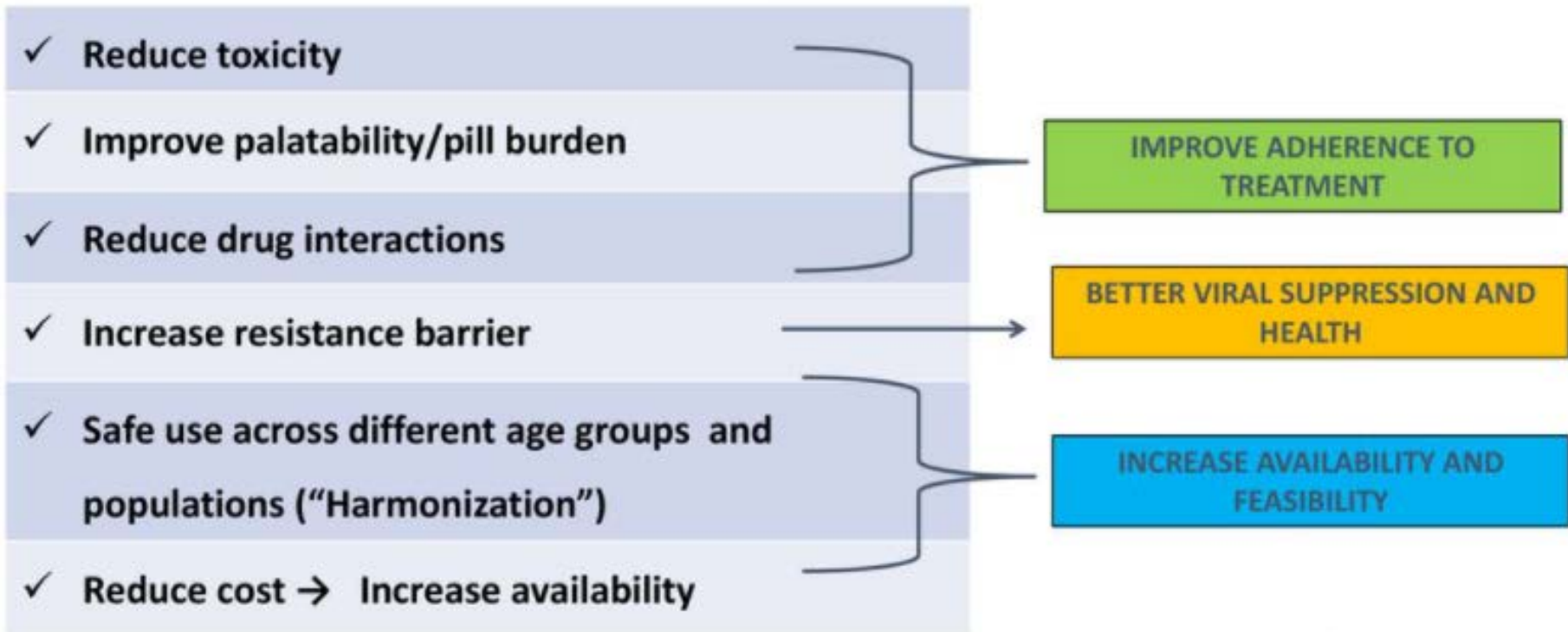
- Dual PrEP and contraceptive ring – in safety trials and bioequivalence etc studies
- Dual PrEP and OCP – in safety trials and bioequivalence studies

## The future

- BNABs – for prevention of paediatric HIV as part of Post-natal prophylaxis & part of Ultra-long acting ART & HIV Vaccines
- Rectal products for MSM
- Topical products – patches and films & Implants

# What are priorities for **treatment** technologies to fight PRDs

## Principles of Treatment Optimization





# What are priorities for treatment technologies to fight PRDs

## Adult HIV treatment priorities

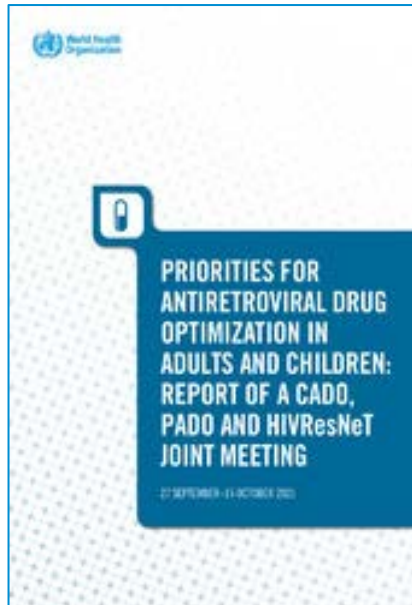
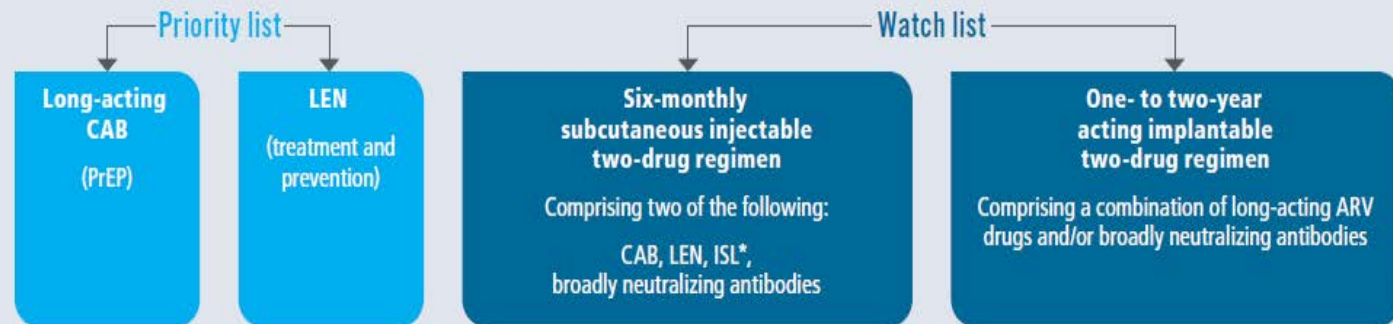


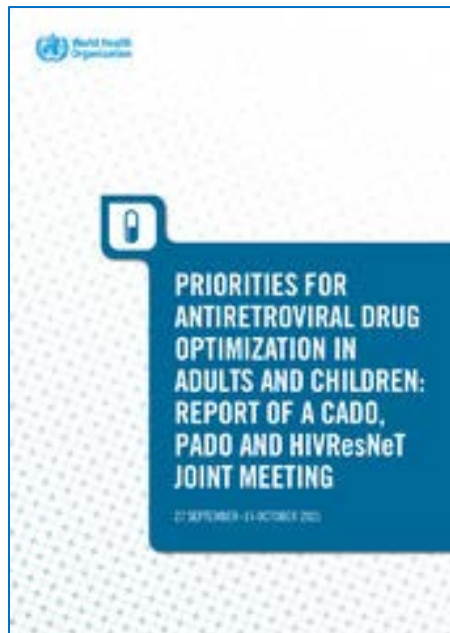
FIGURE 1. CADO-4 LIST



\*The role of ISL is uncertain because of a significant decrease in total lymphocyte and CD4+ T-cell counts observed across several trials that are investigating the efficacy and safety of this drug for HIV treatment and prevention. In December 2021, the studies were put on hold until more information on causality becomes available. (10).

# What are priorities for treatment technologies to fight PRDs

## Paediatric HIV treatment priorities



### PADO5 list

DRVr 120/20 mg

XTC/TAF

XTC/TAF/DTG

CAB LA

### PADO5 watch list

Islatravir

Lenacapavir

Neutralizing antibodies

Micro Array patches

# What are priorities for long-acting health technologies to fight PRDs

## Long-acting therapies and technologies: A game changer?

### OPPORTUNITIES

- ✓ Less frequent dosing
- ✓ Avoidance of "pill fatigue"
- ✓ Oral dosing by-passed; bioavailability ~100%
- ✓ Less adverse events
- ✓ Less drug-drug interactions
- ✓ Protection of health privacy
- ✓ Avoidance of HIV-related stigma
- ✓ Improved adherence?

### CHALLENGES

- \* Large injection volumes
- \* Need for oral lead in
- \* Management of missed doses
- \* Coverage of the "tail"
- \* Development of drug resistance
- \* Management of drug-drug interactions
- \* Management of serious adverse events
- \* Unknown dosing for children & pregnant women

Table 1: Select agents in development for HIV-1 Therapy (non-comprehensive)

DRUG	MANUFACTURER	DRUG CLASS	INDICATION	REGIMEN	ADMINISTRATION	DEVELOPMENT PHASE
ISL/DOR	Merck	NRTTI/NNRTI	VS	STR	QD, Oral	Phase III
ISL/LEN	Merck/Gilead	NRTTI/CA	VS	STR	QW, LA Oral	Phase II
LEN/BIC	Gilead	CA/InSTI	VS	STR	QD, Oral	Phase II
VH3810109	ViiV/GSK	bNAb	TBD	TBD	TBD, LA Injectable	Phase II
GS-6212	Gilead	InSTI	TBD	TBD	Q3M, LA Injectable	Phase I
GS-5894	Gilead	NNRTI	TBD	TBD	QW, LA Oral	Phase I
GS-1720	Gilead	InSTI	TBD	TBD	QW, LA Oral	Phase I
VH3739937	ViiV/GSK	MI	TBD	TBD	TBD, LA Injectable	Phase I
VH4524184	ViiV/GSK	InSTI	TBD	TBD	Q3M+, LA Injectable	Phase I

ARV, antiretroviral drug; BIC, bictegravir; bNAb, broadly-neutralizing antibody; CA, capsid inhibitor; DOR, doravirine; InSTI, integrase strand transfer inhibitor; LA, long acting; LEN, lenacapavir; MI, maturation inhibitor; NNRTI, non-nucleoside reverse transcriptase inhibitor; NRTI, nucleoside reverse transcriptase inhibitor; NRTTI, nucleoside reverse transcriptase translocation inhibitor; PrEP, pre-exposure prophylaxis; QD, once daily; QW, once weekly; Q3M, once every 3 months; Q3M+, once every 3 months or more; STR, single-tablet regimen; TBD, to be determined; VS, virologically suppressed.

Long-Acting Antiretroviral Therapy: Potential Opportunities and Challenges



### What can we expect?

- More new drugs available in the near future
- New routes of administration: IM/SC/IV injectables, depot, transdermal
- New mechanism of action: capsid inhibitors, maturation inhibitors, monoclonal antibodies
- Hopefully, wide distribution and access for all who can benefit from it

Cortes., IAS 2023. PL02



What are priorities for digital & AI health technologies to fight PRDs

What mobile health tools can we use in support of HIV, Hepatitis and STI care and Prevention initiatives?

**Text Messaging**  
(SMS / MMS)

**Web-based tools**, online  
order Rx & test  
kits

**Smartphone**  
apps, smart  
devices

**Social  
networking/**  
media-based

**Telehealth**  
Video counseling  
& directly  
observed therapy

**Virtual reality**  
Artificial  
Intelligence (AI)

**Wearable  
devices**, Sensors  
Digi-pills

**Electronic  
health and**  
medical records

# Acknowledgements

- Rachel Baggaley
- Robert Luo
- Nathan Ford
- Marco Vitoria



**Thank you!**